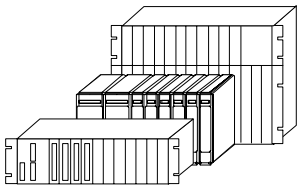
Ax 1703



Firmware Description

SA8S00

SIEMENS SINAUT8 Substation

HW-Type: 2541 / FW-Type: 2532

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

SA8S00 Rev. 01 and higher

Version	Revision	Date	Change
A, 1	01	08.03.02	first issue in English
A, 1	02	02.09.03	SDA-Inquiry, Telegram format "Counter BCD coded with time", System technical parameterization
A, 1	03	03.09.03	Chap. 1.3. Restrictions, 2.1.9. General Interrogation, 2.1.10. System Number
A, 1	04	24.09.03	Measured value formats
A, 1	05	09.04.04	Chap. 2.4.2.2. Measured Values
A, 1	06	10.05.04	Chap. 2.1.12. Check Message "new"
A, 1	07	27.01.06	Diagnostic and Parameter Documentation revised Chap. 3 "System-technical Parameter-setting" removed, div. chap. completed Startup interrogation + Acknowledgement, Information on time

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1. System Overview

1.1. Brief Description

SA8S00 firmware is used for coupling Ax 1703 system components to external systems with the SIEMENS SINAUT8 protocol.

The firmware can be operated in both point-to-point traffic, and as a multipoint traffic slave (transmission on demand).

1.2. Specifications

- Modulation: PCM byte-synchronous or PDM transmission (adjustable)
- Baud rate: 50 - 19200 baud for PCM
  50 - 2400 baud for PDM
- Message protection: HA = 4 for PCM
  HA = 2, 4, 6 for PDM (adjustable)
- Traffic handling: - Point-to-point traffic
  - Multipoint traffic slave
    (not for PDM transmission)
- Ax 1703 redundancy
- Keeping of transients of single-point information in multipoint traffic
- "Transparent data channel " in the transmit and receive direction (except messages in traffic handling)
- Message formats Ax 1703 → SINAUT8
  - Single- or double-point information 4 bytes (ÜB4)
  - Measured values 8 bits – 4 MW (ÜB8)
  - Measured values 11 Bits – 2 MW (ÜB10)
  - Measured values 11 Bits – 4 MW (ÜB11)
  - Transformer taps with moving contact (ÜB14)
  - Count values, BCD-coded (ÜB15)
  - Count values, dual-coded (ÜB16)
  - System error message (ÜO16)
  - Check message (ÜO1)
  - Error bit message (ÜO13), only for point-to-point traffic
  - Last STOP cause (ÜO14), only for point-to-point traffic
  - Response message for transmission on demand (ÜO20)

- Confirmation record on startup interrogation (ÜO8); from firmware revision 13
- Single- or douple-point information – 1 byte with time tag (ÜB6a, time resolution = 10 ms); from firmware revision 13

- Message formats SINAUT8 → Ax 1703

  - Switching commands (SB1)
  - Analog setpoints, 1 MW (SB2)
  - Digital setpoints, 8 Bit (SB5)
  - Digital setpoints, 16 Bit (SB6)
  - Check command (SO1)
  - Repeat message request /TFK acknowledgment (SO2)
  - Acknowledge startup command (SO3)
  - Reset command (SO4)
  - Group interrogation command (SO6)
  - Request for information command (SO32); only in multipoint traffic
  - Startup interrogation (SO20); from firmware revision 13

This protocol element adapts external systems by implementing only a portion of the functionality and data formats of the external interface. Therefore, specific applications require that the extent to which the actual requirements reflect the implemented functionality be determined, along with the scope of required additional expansions or adjustments.

1.3. Restrictions

- No clock synchronization via SINAUT8 message format
- No support of DCD signal (receive channel must be fixed-gated)
- Single- or douple-point information – 1 byte with time tag:

  - time resolution: only 10 ms
  - only single-point information TI = 30
  - only douple-point information TI = 31

- System number is not supported for organizational messages, except system error message
- System number can not be used as "address extension" (= same message number but different system number) for permanent measured values.

2. Protocol Description

2.1. Traffic Handling

2.1.1. Point-to-Point Traffic

The respective SINAUTS remote terminal units are coupled in the transmit direction via a point-to-point connection. The command direction can be designed as a multipoint traffic line, i.e., several remote terminal units are connected to a fixed-gated command channel. The messages in the command direction always contain a station number, while messages in the transmit direction can optionally contain a station number (to increase transmission security). A sum acknowledging procedure with specific repeat message requests is used for traffic handling.

The remote terminal unit sends messages to the central station spontaneously and cyclically (if parameterized), labels each message with a message sequence identifier TFK (1-31), and stores them in a transmitter memory. Acknowledge messages are sent to the central station section-by-section after message sequence identifiers 10, 20 and 30.

Traffic handling in the command direction takes place without acknowledgment.

One precondition for the function of issuing specific repeat command for invalid messages involves the check message transmitted cyclically by the central station (or telecontrol interface or submaster station, only the function of “central station” is here intended), because the check message increases the message sequence identifier number (TFK), so that a missing message is hereby detected.

2.1.2. Multipoint Traffic

Several remote terminal units are now connected to a communication line. The remote terminal units can no longer transmit telegrams “spontaneously”, but now only if requested by the central station. If a remote terminal unit is addressed, it activates the transmitter of the routing equipment (WT), and transmits the response messages (1-n) to the central station according to the function in the request for information message. After transmission is complete, the remote terminal unit deactivates the transmitter of the routing equipment again. The message last sent is labeled with the TGE bit.

The central station uses two messages (message with fixed block length) as requests for information:

— QUICK CHECK

This message is always sent “to all” (broadcast). If a transmit event is present in the remote terminal unit (=data change), the remote terminal unit sends out a “quick-check acknowledgement”; in the absence of a transmit event, the remote terminal unit remains silent. If transmit events are present in several remote terminal units, several remote terminal units send out an “acknowledgment” simultaneously. The central station will now not recognize a formally correct response. It now infers from this that data changes are present in several remote terminal units, and initiates a “QUICK SCAN” cycle.

— QUICK SCAN

This message is always transmitted only to a station. If the remote terminal unit has no data changes to transmit, it sends out a “negative QUICK SCAN acknowledgment”. If changes are present, all modified data are transmitted. The last telegram is labeled with the TGE bit, and is intended to signal the end of transmission to the central station.
”QUICK SCAN” is also used for the early detection of the failed remote terminal unit, since the central station automatically initiates a “QUICK SCAN” cycle after n “QUICK CHECK” telegrams without any response by the remote terminal units.

Commands are also transmitted without acknowledgment.

2.1.3. Startup Characteristics

After a startup (power failure, reset), the remote terminal unit transmits messages with the message sequence identifier = 31. The messages are not stored at the remote terminal unit.

The central station must specifically confirm remote terminal unit startup with a startup acknowledge command (address 514).

After acknowledgment, the remote terminal unit transmits the error bit message (address 781) with message sequence identifier = 1 and the “last STOP event” (address 782) with the message sequence identifier = 2 in point-to-point traffic, and switches to normal operation. Only the message sequence identifier is initialized in multipoint traffic.

2.1.4. Acknowledgement Behavior

Operation Under Normal Conditions

The remote terminal unit increases the message sequence identifier by 1 for each record with the data construct “spontaneous” or “organizational” or “interrogated” (parameterizable).

The central station uses a TFK acknowledge command (address 513) to acknowledge the TFK memory given TFK number 10, 20 or 30. If messages are lost, the central station issues a repeat command for the spontaneous records that have been lost. The central station outputs all information in the correct sequence.

Operation Under Fault Conditions

In the absence of the TFK acknowledgment, and if the TFK memory in the remote terminal unit overflows, the latter sets the overflow bit.

If the central station detects the overflow of the message memory at the remote terminal unit, it must send a priority acknowledgement to the remote terminal unit.

If a message passing through the TFK memory is lost while the overflow bit is set, the central station has lost information.

2.1.5. Retry Behavior

SA8S00 detects the repeat request.

In response to this repeat command record, the message labeled with TFK number is read out of the TFK memory, and earmarked for transmission with this TFK number and a high priority during transmission mode control, and the TFK memory is acknowledged up to the specified number. A subsequent message is not recorded in the TFK memory during transmission.

2.1.6. Interface Monitoring

2.1.6.1. Point-to-Point Traffic

The central station transmits a check command (address 512) to all remote terminal units every 10 seconds. The remote terminal unit must reflect the received check command back to the central station as a check message.

The central station expects at least one check message (address 513) from each remote terminal unit within 30 seconds. If the central station detects a missing check message, the corresponding remote terminal unit is labeled as failed.

2.1.6.2. Multipoint Traffic

The central station automatically monitors communication with the remote terminal unit via the "QUICK CHECK" and "QUICK SCAN" requests for information.

2.1.7. Persistent Commands

Persistent commands denoted by command code = 1 are converted into regulating commands.

In the SAT system, a regulating command consists of:

- Regulating command - start message (t=x, OW = 0)
- Regulating command - retrigger message (t=x, OW = 1)
- Regulating command - stop message (t=x, OW = 1)

The SINAUTS central station cyclically sends out the persistent command message. The firmware uses the first persistent command message to generate the regulating command start message, and activates a monostable circuit with the time specified in the persistent command message (time code 0-15). Further, the SINAUT8 address of the persistent command is filed in a flag. The monostable circuit is retriggered with each additionally received persistent command message. The regulating command retrigger messages are only generated after half of the command output time has expired, in order to reduce the internal system load. The operational sequence of the monostable circuit causes the firmware-internal termination of the regulating command; a new persistent command of the SINAUT8 central station is accepted.

The regulating command stop message is not generated, since the command output unit terminates the current regulating command after the command output time has expired.

2.1.8. Error Concept

Errors that arise at the remote terminal unit are transmitted by means of so-called bit messages (32 bit).

A distinction is made between two bit messages:

- System error message (message number 1016)
- Error bit message (message number 781)

- The system error message displays the current error condition of the remote terminal unit, and is transmitted spontaneously during a general interrogation.

  The system error message contains single-point and group information, which are basically transmitted with "coming“ and "going".

  The system error message is formed out of single-point information messages with message numbers 1016-1019. In addition, a parameterizable bit mask can be used to mask out individual bits for spontaneous transmission (=record some error bits only in the error bit message, but no transmission of system error message).

- The error bit message stores all arising errors in the system error message. In terms of the control center, the error bit message is purely “archival” in nature.

  During a system startup, it is transmitted once on receipt of the startup acknowledgment (from the control center), and usually deleted thereafter. The error bit message is only transmitted if interrogated by the control center in normal operation (never spontaneously).

  If information allocated to the error bit message arises, it is recorded in the error bit message. Spontaneous transmission based on the entry does not take place.

  If the error is eliminated, the information remains set until an “error bit message interrogation” with deletion takes place from the SINAUT8 central station.

  Since the error bit message is only transmitted once after a startup, it cannot be subjected to an old/new comparison at the control center.

  The error bit message can be evaluated only for maintenance purposes at the control center. It is not included in system management.

2.1.9. Processing of Invalid Data

In the Ax 1703 system, invalid or failed data points are specially marked with the data point quality code (IV, NT).
Since blocked formats (e.g.: 32 single-point information items, 16 double-point information items, 2 or 4 measured values) are always used in the SINAUT8 system, parameters must be used to determine the behavior given a failure of individual or all data points of a SINAUT8 message.

Possibilities:
- Do not send message if at least one data point of a SINAUT8 message is invalid/has failed.
- Do not send message if all used data points of a SINAUT8 message are invalid/have failed.
- Do not evaluate NT or IV bit.

Note: To transmit the SINAUT8 message, it is necessary, to send all SAT messages, which are logged in the address conversion, to SA8S00 for once.

- In addition, all invalid or failed measured values and transformer taps are recorded with a parameterizable substitute value in the process image.

- In addition, the failure of specific system parts must be displayed in the system error message as needed (project-specific)

- Measured value with "OV bit"
  From firmware revision 13 measured values with "OV = 1" can be sent with a predefined substitute value (parameter = valuate "OV bit"):

  Substitute value = +/- 254 for measured values – 8 bit (SINAUT8 data format)
  Substitute value = +/- 2046 for measured values – 11 bit (SINAUT8 data format)

  (Positive or negative substitute value, because positive or negative overflow is possible.)

2.1.10. Permanent Measured Values (Point-to-Point Traffic Only)

Measured values can be transmitted as permanent measured values via parameterization. In other words, if there are no events to transmit, the firmware sends out the defined permanent measured values by ascending address (data construct = cyclic).

Characteristic Features:

- Invalid or failed permanent measured values continue to be cyclically transmitted; the measured value is transmitted with the parameterizable substitute value (see Chapter 2.4.2.2. Measured Values).
- Permanent measured values are not transmitted in a general interrogation.
- For permanent measured values the system number can not be used as address extension (e.g. message number = 512 / system number = 0 and message number = 512 / system number = 1).
- It is possible to disable spontaneous transmission of permanent measured values via parameter "Send permanent measured values spontaneous" (from firmware revision 13).

2.1.11. Data Management in Multipoint Traffic

If the firmware is operated in multipoint traffic (transmission on demand), every spontaneous information item cannot be immediately transmitted as in point-to-point traffic, but is rather stored in a process image.

Measured values, transformer taps, count values and double-point information items are recorded directly in the process image, and the corresponding transmit event (per message number) is set given a change.

For single-point information, a so-called retention buffer is present in addition to the process image, so that short-term information changes that are shorter than the polling cycle can also be transmitted.

- After runup, the process image is updated by the delay in runup. At the same time, the retention buffer is updated with the process image state.
- If a change arises after the runup delay has expired (new state unlike the state in the process image), the new state is recorded in the retention buffer, the retention buffer is marked “active” (per single-point information item), and the entire message record is prompted for transmission.
- As long as the retention buffer is “active”, no new changes are recorded in the retention buffer. The process image is always updated.
- If a message with the set transmit event can be sent out, the transmit event is reset, the retention buffer is set to “inactive”, and a comparison between the process image and retention buffer is performed.
- If the comparison is negative, i.e., no match between transmitted state and process image (interim change), the process image state is stored in the retention buffer, and the transmit event is again set.

2.1.12. General Interrogation

The message numbers are transmitted in increasing order from the firmware internal process image to the master station (from rev. 09).

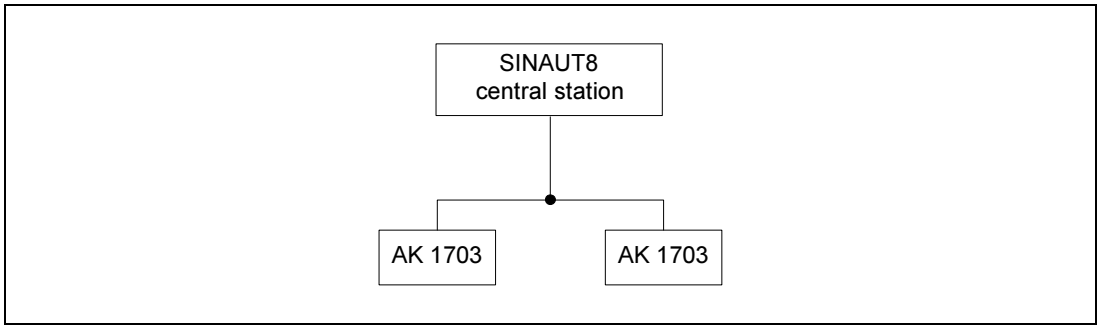
2.1.13. System Number

There is the possibility, to assign several system numbers to a message number in transmit and receive direction. Among other things this is necessary for master stations of the type 8FW-64, which uses the system number as extension of the address.

Note: In case of permanent measured values only one system number per message number is transmitted.

2.1.14. Redundancy

Configuration:



The "Ax redundancy" system function makes it possible to connect redundant “SINAUT8 remote terminal units” to a SINAUT8 central station. When using the SA8S00 firmware on the SM2541-B, the interface signals TXD and TRS do not have to be separated by a reversing logic; the interface signals (=outputs) are switched to “TRISTATE” in standby operation.

If the redundancy function switches the firmware to "passive",

- a running message transmission is terminated
- a running interrogation procedure is prematurely terminated in multipoint traffic
- the interface signals (outputs) are switched to "TRISTATE"
- stored "transmit events" are deleted (only in multipoint traffic)
- stored "transients“ in the transient retention buffer are deleted (only in multipoint traffic)
- all messages received by the central station are discarded.

If the redundancy function switches the firmware to active,

- time-delayed "active“ operation is initiated
- traffic handling is initialized, i.e., backup buffers are deleted, and transmission begins with TFK=31 (denotes component restart)
- runup delay is initiated to update the process image

  Comment: - There is no response to the check command during runup delay in point-to-point traffic.
  - The firmware acts as though no spontaneous data were present during runup delay in multipoint traffic.

- after runup delay has expired in point-to-point traffic, the check command is answered, and the permanent measured values (if parameterized) are transmitted (TFK=31, …); the system error message (1016) is prompted for transmission in multipoint traffic.

2.1.15. Check Message

With a PST-Telegram it is possible to activate and deactivate the reflection of the check messages.

You must parametrize a PST-Telegram in the detailt routing.

Important is the parameter "function"

function = 0 ... reflection of check messages
function = 1 ... no reflection of check messages

2.1.16. Binary Information With Time Tag (Single or Double Point Information)

Binary information with time tag are only supported in the operating mode = "Point-to-point traffic RTU" (from firmware revision 13).

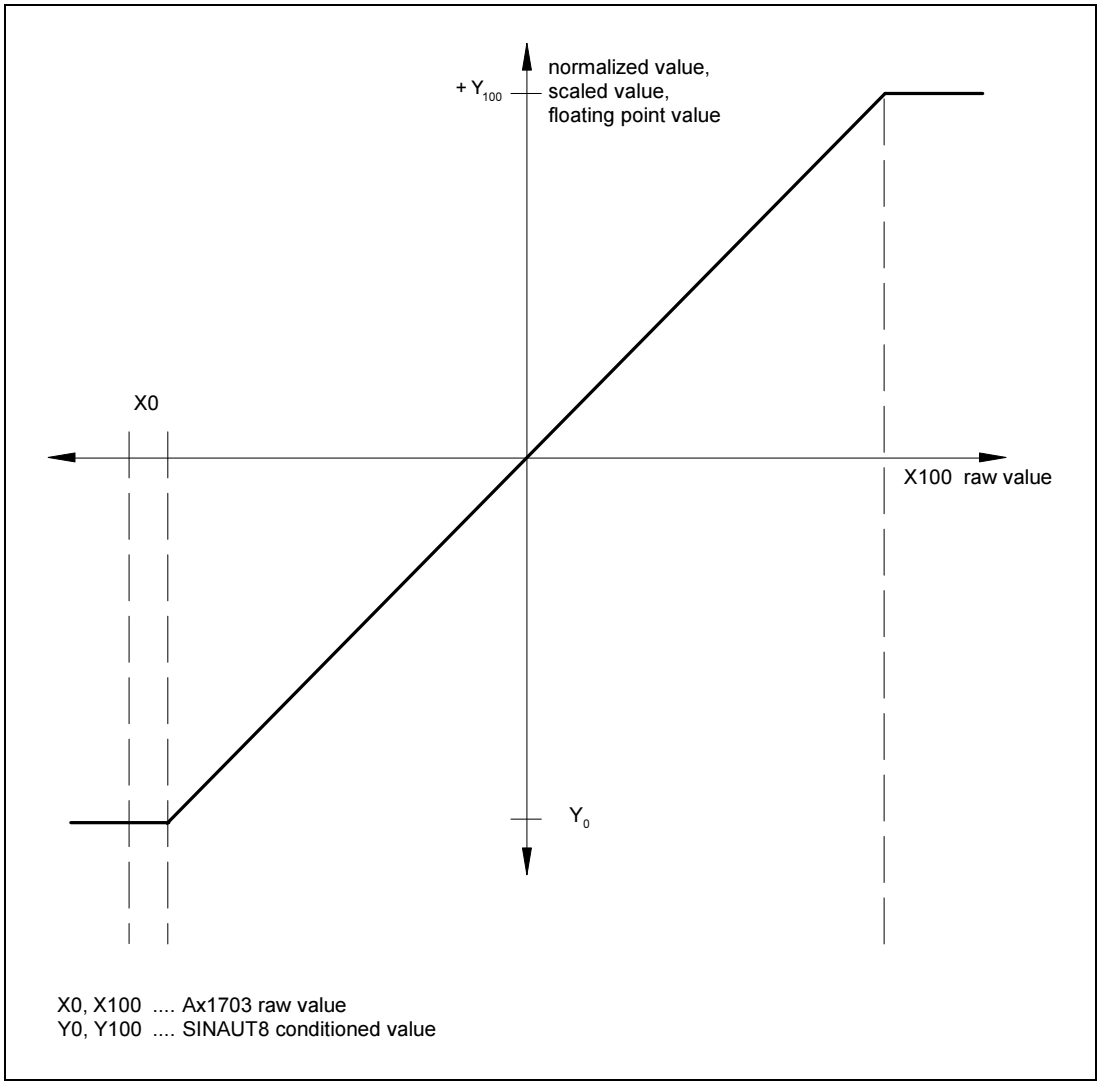
- Transmission:
  - spontaneous at change: "Binary information – 1 byte with time tag" with the corresponding message number (4, 5, 6, usw.) and a time resolution of 10 ms.
    The time, transmitted in the message format is defined with max. 9 min. 59,99 sec.
  - at general interrogation: "Binary information 4 byte" (without time) with message number 4, 8, 12, … etc.
- The handling of "invalid data" (NT/IV bit handling, see chap. 2.1.9.) happens like for binary informations without time in groups of 4 message numbers. (Reasen: Transmission at general interrogation). An information block always starts with a message number divisible by "4" (4, 8, 12, etc.).
- A binary information change with cause of transmission = "interrogated" respectively "background interrogation" is always sent like at general interrogation to the master station with format "binary information – 4 byte (= without time and data type = spontaneous).
- Changes a binary information block (4 message numbers) from "invalid" to "ok" because of a going "NT/IV bit", so this is also sent to the master station with format "binary information – 4 byte" (= without time und data type = spontaneous) independent from a change, because the binary information block is not transmitted in the process of a general interrogation.

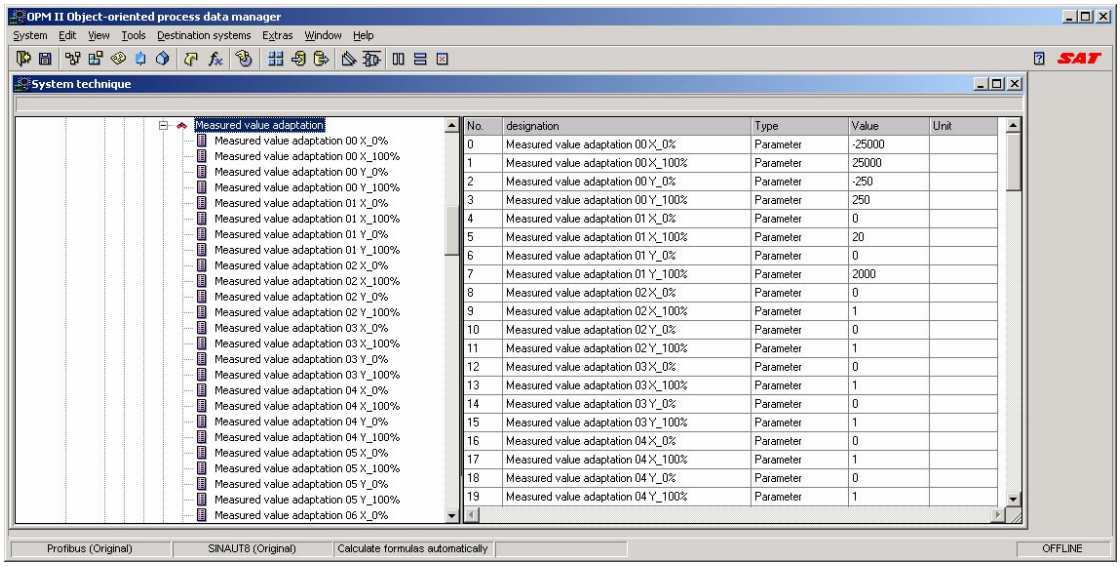
2.1.17. Measured Value Adaptation

Max. 31 adaptation lines can be parameterized in the system-technical parameter-setting. The assignment to the single measured values is made in the OPM detailed routing (adaptation index).

Comment:

The measured value adaptation must be released in the system-technical parameter-setting (Parameter: "Use measured value adaptation").





Y_0%: Value adaptation
Lower limit of the used measuring range in the external (protocol specific) format. The corresponding internal value is defined X_0%.

Y_100%: Value adaptation
Upper limit of the used measuring range in the external (protocol specific) format. The corresponding internal value is defined X_100%.

X_0%: Value adaptation
Lower limit of the used measuring range in the selected internal format. The internal format is defined at TI (type identification). The corresponding internal value is defined at Y_0%.

X_100%: Value adaptation
Upper limit of the used measuring range in the selected internal format.\nThe internal format is defined at TI (type identification).\nThe corresponding internal value is defined at Y_100%.

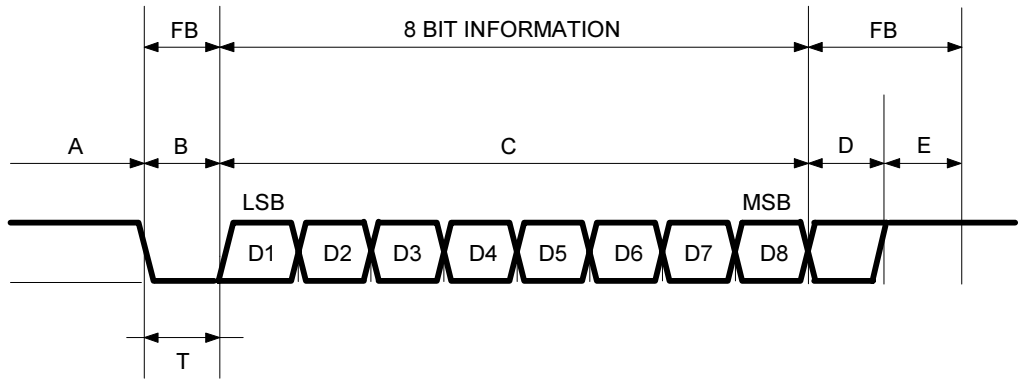
2.2. Message Description

2.2.1. PCMBA Modulation Process

The data are transmitted in groups of 8 bits each, pulse-code modulated and asynchronously. A USART module in the asynchronous mode here provides each byte with a byte frame (BR).

This byte frame contains:
1 start bit
8 data bits
1 parity bit (odd or even parity)
1 stop bit

The receiver is resynchronized with each byte via the start and stop bits of the byte frame.



A: Empty state of the line (binary information "1"), at least 33 bits between two messages (in event of error)
B: Start bit ("0")
C: 8 bit data (possibly frame data or message data), LSB (least significant bit) is transmitted first
D: Parity bit (ODD PARITY)
E: 1 stop bit ("1")
T: Time for the transmission of a bit (1/transmission speed)
FB: Framing bits of the USART module

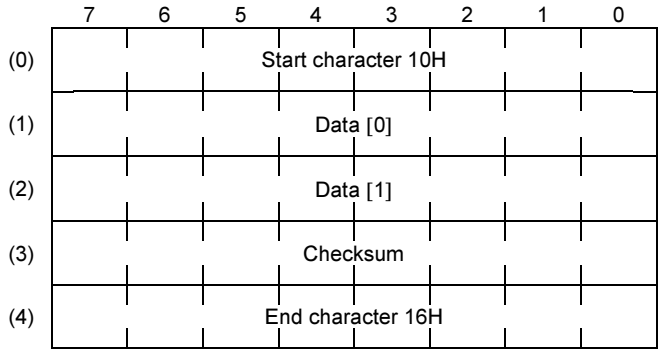
2.2.2. Message Formats

The message formats and rules relate to the IEC 60870-5-1 standard. Formats are defined for fixed and variable message length and single characters.

2.2.2.1. Messages with Fixed Block Length

a) Block Length <> 0

The message has a fixed length of 5 bytes, and consists of a start character, 2 bytes of user data, a checksum and an end character.



This message format is only used in multipoint traffic

- QUICK CHECK (central station)
- QUICK SCAN (central station)
- QUICK CHECK/SCAN acknowledgment (remote terminal unit)

b) Individual characters (block length = 0) are not used.

c) Transmission rules for messages with a fixed block length

R1 Idle state on the line corresponds to 1-signal.

R2 Each character has a start bit (0-signal), 8 data bits, an even parity bit and a stop bit (1-signal).

R3 No idle states are permitted between the characters of a message.

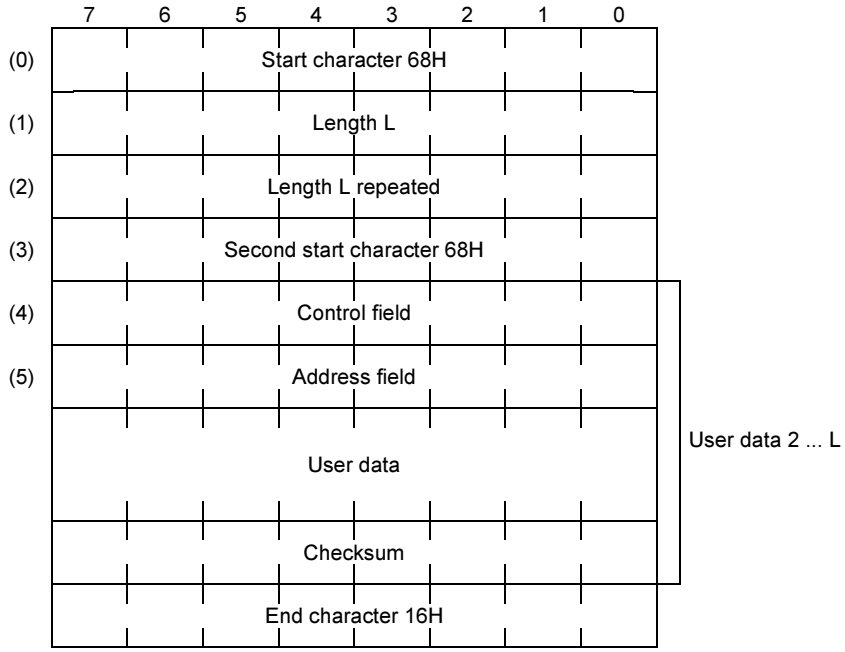
R4 If an error is detected per rule R6, a minimum distance of 33 bits is required in an idle state.

R5 The sequence of user data characters is concluded by an 8-bit checksum (CS). The checksum is the arithmetic total for all user data, without consideration of the transmissions.

R6 The receiver checks:
per character: Start bit, stop bit and an even parity bit
per message: Start character, message checksum and end character, as well as the duration of the idle state after an error has been detected, as indicated in R4. If one of these checks yields a negative result, the message must be discarded, otherwise it must be released for the user.

2.2.2.2. Messages with Variable Block Length

The format consists of a first start character, two identical characters in which the number L of user data is transmitted, a second start character, the checksum and the stop character. The number of user data bytes ranges from 0 … 255.



Transmission rules:

R1 Idle state on the line corresponds to 1-signal.

R2 Each character has a start bit (0-signal), 8 data bits, an even parity bit and a stop bit (1-signal).

R3 No idle states are permitted between the characters of a message.

R4 If an error is detected per rule R6, a minimum distance of 33 bits is required in an idle state.

R5 The sequence of user data characters is concluded by an 8-bit checksum (CS). The checksum is the arithmetic total for all user data, without consideration of the transmissions.

R6 The receiver checks:
per character: Start bit, stop bit and an even parity bit
per message:
- the set start character at the beginning and end of the message header
- the equality of the two indicated lengths L
- whether the number of received characters is equal to L + 6
- the message checksum
- the end character
- the duration of the idle state after an error has been detected, as indicated in R4.

If one of these checks yields a negative result, the message must be discarded, otherwise it must be released for the user.

2.2.3. PDM Modulation Process

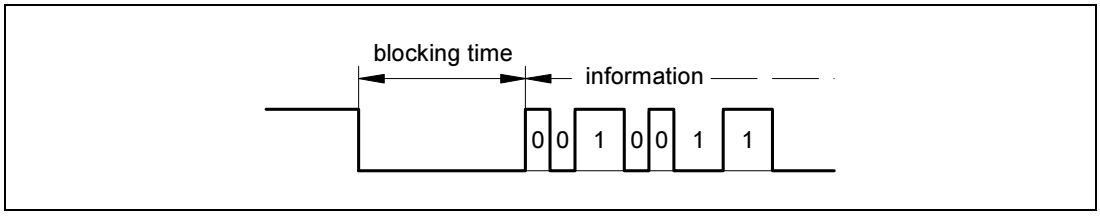
The data are transmitted pulse-duration modulated (DPDM) as a bit stream, wherein synchronization is ensured by the change in signal level after each character.

The signal states “0” and “1” are marked with normal and expanded characters (a short increment corresponds to the binary “0”, a long increment to the binary “1”).

A parameterizable modulation ratio of 1 : 2.0 – 1 : 3.0 is used.

The messages are separated from each other by a blocking interval. Therefore, this protocol element belongs in the class of “message synchronous” protocols.

Digital pulse duration modulation (DPDM):



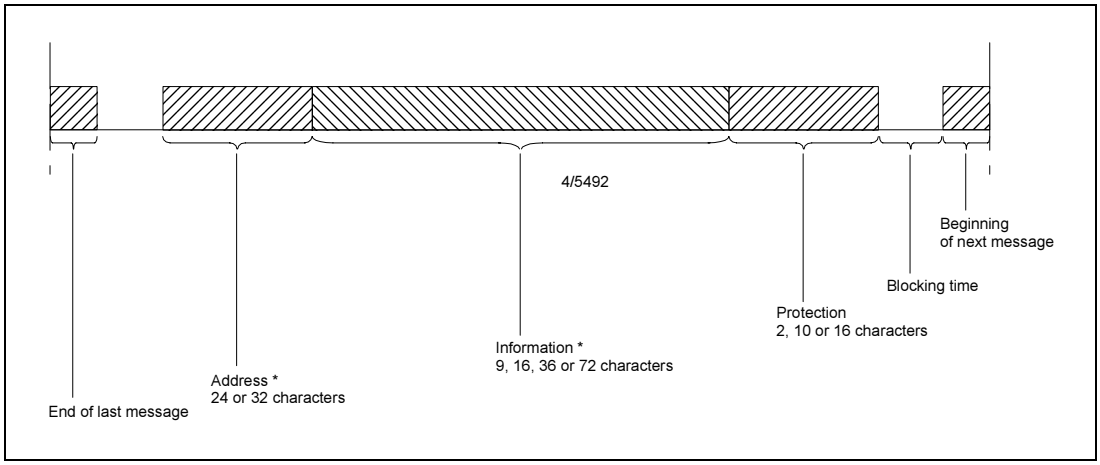
in general, the LSB of associated data is transmitted first.
The time interval between two messages can be parameterized on the firmware (standard 3 long characters).

Message synchronization takes place via the 1st message edge.

2.2.4. PDM Transmission

No additional message header is used in PDM transmission, the address section is sent out right away.

2.2.4.1. General Message Structure



* These message sections will be described in Chapter 3.3.5 (Archives) or as a function of message (information section)..

2.2.4.2. Protective Section

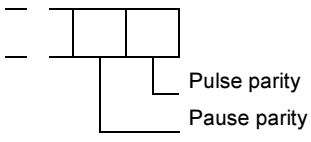
The protective section secures the entire message with an optional d = 2, 4 or 6. The protective characters are appended to the end of the message as a block. In PCM messages, distributed in the message.

Protection takes place with 2 parity characters for d = 2, and with a linear, systematic code according to Bose and Ray-Chaudhuri (BHC). for d = 4 or d = 6.

The message protection block can be set in the firmware separately for the transmit and receive direction.

d = 2

The protection block consists of 2 characters, a pause parity and a pulse parity.



Pause parity supplements the long pause characters (even increments) to odd parity.

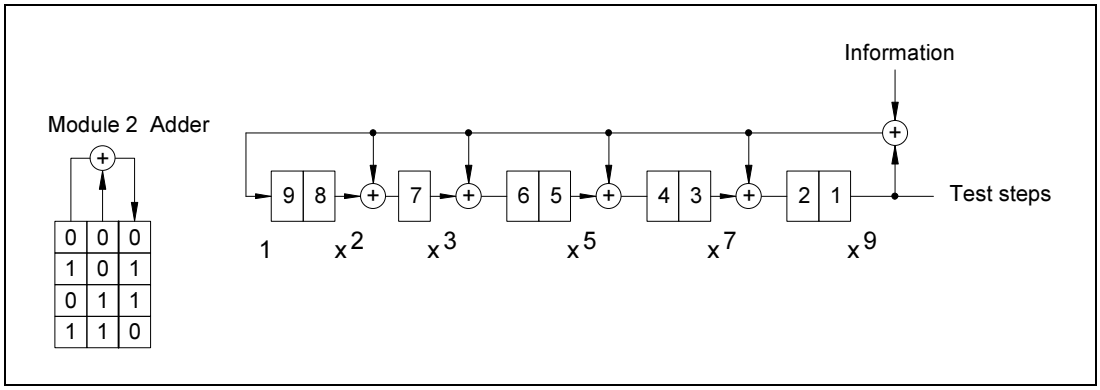
Pulse parity supplements the long pulse characters to odd parity.

d = 4

The protection block consists of 10 characters, which are determined according to a cyclic code (CRC), added during transmission and checked when received. HA = 4 is achieved with this protection block.

Block:	Test Character									
Designation:	1	2	3	4	5	6	7	8	9	10

The cyclic protection block is generated based on the model of a " feedback shift register". Protection extends over all organizational, address and information characters (always over all 105 bits).



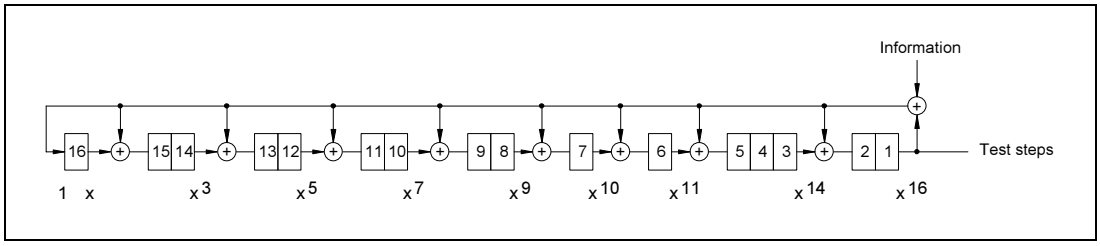
Polynomial: $g(x) = x^9 + x^7 + x^5 + x^3 + x^2 + 1$

d = 6

The protection block consists of 16 characters, which are determined according to a cyclic code (CRC), added during transmission and checked when received. HA = 6 is achieved with this protection block.

Block:	Test Character															
Designation:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

The cyclic protection block is generated based on the model of a " feedback shift register". Protection extends over all organizational, address and information characters (always over all 105 bits).



Polynomial: $g(x) = x^{16} + x^{14} + x^{11} + x^{10} + x^9 + x^7 + x^5 + x^3 + x^2 + x + 1$

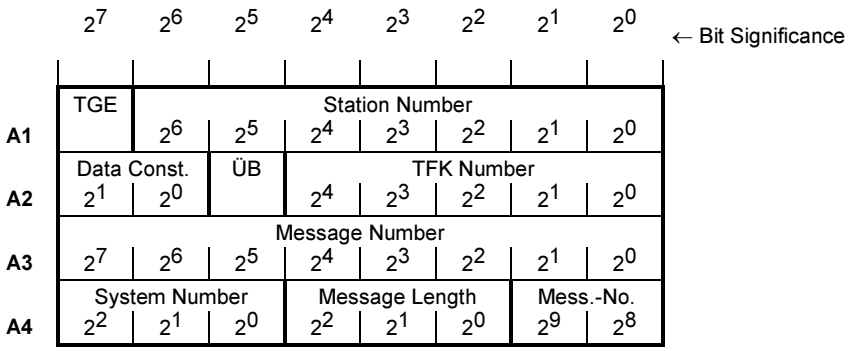
Message Structure

The data content is identical for all messages regardless of the transmission process (PCM/PDM). Each message consists of:

- Address section
- Information section
- Protective section (depending on transmission process)

2.2.5. Address Section

The address section is comprised of 4 bytes



2.2.5.1. Station Number 7 Bit

7 characters dual-coded for the designation of 127 remote terminal units (station numbers 1 – 127). The station number can be set differently for transmitting and receiving. It is used for protection on the transmission route, and is evaluated by the receiver. The central station branches into station-specific processing with the station number.

2.2.5.2. TGE = Message Group End 1 Bit

Message group end (only in monitoring direction for multipoint traffic), for displaying the last message of a station during transmission on demand in multipoint traffic (always “0” in point-to-point traffic).

2.2.5.3. TFK = Message sequence identifier 5 Bit

The message sequence identifier enables the specific repetition of messages that were destroyed on the transmission route. The last 30 repeatable records are buffered at the remote terminal unit.

During startup, the remote terminal unit sends out all messages with the TFK No. 31. During normal operation, it transmits the TFK numbers 1 – 30 after startup acknowledgement by the control center.

Spontaneous and organizational messages always increase the TFK number, interrogated messages can increase the TFK (parameterizable), and cyclic messages do not increase them.

Each message increases the TFK number in multipoint traffic.

2.2.5.4. ÜB = Overflow Bit 1 Bit and Direction Identification

The overflow bit is set at the remote terminal unit if the TFK memory was not acknowledged and overflows.

The distinction between messages and control direction and monitoring direction is made as follows:

- Control direction: TFK = 0, ÜB = 0
- Monitoring direction: TFK <> 0, ÜB = 0 or 1

2.2.5.5. DA = Data Construct 2 Bit

The data bits denote the data origin in the monitoring direction, and the data destination in the control direction. They bring about a simple switch setting for the software at the received station.

The data construct expands the range of message numbers. Identical message numbers can be transmitted with different data constructs.

The different data constructs are:

Control Direction:

Code	Data Construct	Transmission	Example
0 0 = 0	Organizational	Spontaneous	Interrogation commands Measured value selection commands
0 1 = 1	Spontaneous	Spontaneous	Switching commands, Setpoints

Monitoring Direction:

Code	Data Construct	Transmission	Example
0 0 = 0	Organizational	Spontaneous	Error bit message, Real-time message
0 1 = 1	Spontaneous	Spontaneous	Information, measured values, count values
1 0 = 2	Cyclic	Cyclic, time-controlled	Measured values
1 1 = 3	Interrogated	Interrogated	Information (GA)

2.2.5.6. Record Number 10 Bit (Message Address)

Each information byte within a system is marked with a number (relative address within the 1024 byte-long input section).

When transmitting a message in which the information section consists of only one byte, this byte number is identical to the message number. However, if the information section comprises several bytes, the number of the first byte to be transmitted is identical to the message number. The following bytes are sequentially numbered. The array of 10 bits makes it possible to mark 1024 bytes in the monitoring and control direction (1 K-byte input section or output section).

2.2.5.7. SL = Record Length 3 Bit (Message Length)

The record length denotes the number of bytes in the information section.

The actual record length is represented by two bits. The 3rd bit is a compression bit K (= bit 2^0).

If the compression bit (bit 2^0) is contained in the message, this indicates that the useable information section is 9 bits, 36 bits or 72 bits long. For example, this applies to measured values acquired at the remote terminal unit with a 2 byte length, and were compressed to 1 byte plus sign.

Several organizational messages use the K bit to transmit identifications.

In real-time messages transmitted with a 36-bit length, 4 bit identifications are present.

The following record lengths are possible:

2^2 2^1 2^0	Record numbers Jumps	User data (Bit)	Transmitted bit number	Example
0 1 0	1	8	9	Spontaneous information, organizational records
0 1 1	2	9	9	Spontaneous measured value
0 0 0	2	16	16	Check message, commands
1 0 0	4	32	36	Spontaneous information, count values, organizational records
1 0 1	8	36	36	Spontaneous or cyclic measured values
1 1 0	8	64	72	Interrogated information
1 1 1	16	72	72	Cyclic measured values

System Number (Processor Number) = 3 Bit

Denotes the data origin in the monitoring direction, and the data destination in the control direction. The system number is parameterized in the message conversions (OPM II) per data point.

Restrictions:

- System number in organizational messages in receive direction is not valuated.
- System number in organizational messages in transmit direction is always set to "0". Exception: System error message.
- Permanent measured values with equal message number (= record number) but different system number not possible.

Information Section

The information section differs in the various message formats, and is described during the respective message conversion.

2.3. Message Conversion

Message conversion is used to denote the conversion of message formats Ax 1703 ↔ IEC 60870-5-103 and the conversion of address information.
The address information is converted via the OPM (object-oriented process data manager) protocol precision allocation system.

2.3.1. Message Conversion in Transmit Direction: SAT Ax 1703 → SINAUT8

SAT Ax 1703		SINAUT8
TI	**Designation**	**Designation**
30 31 136 137 138 139	1 single-point information item 1 double-point information item 1 double-point information item + BRM 16 single-point information items 8 double-point information items 4 double-point information items + BRM	Informationitems 4 byte
30 137	1 single-point information item 16 single-point information items	System response message
34 35 36 140	Measured value 15 bit + VZ normalized Measured value 15 bit + VZ scaled Measured short floating point Measured value 31 bit + VZ	Measured value 8 bit – 4 MW Measured value 8 bit – 8 MW Measured value 11 bit – 4 MW Measured value 11 bit – 2 MW
32	Number of transformer taps	Transformer taps with moving contact
140 37	Measured value 31 bit + VZ Count value 31 bit + VZ with sequence number	Count value BCD-coded Count value dual-coded
		Check message
		Error bit message
		Last stop event
		Confirmation record on startup interrogation

2.3.1.1. Single-Point Information, Double-Point Information – 4 Byte

SINAUT8-FW1024 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	TGE	Station Number						
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	Data Const.		ÜB	TFK Number				
A2	2^1	2^0		2^4	2^3	2^2	2^1	2^0
	Message Number							
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	System Number			Record Length			Mess.-Nr.	
A4	2^2	2^1	2^0	1	0	0	2^9	2^8

← Bit Significance

TGE:	Always "0"
Station Number:	1)
Data Construct:	2)
Overflow Bit (ÜB):	0 or 1
Message Sequence-Identifier (TFK):	1 - 31
Message Number:	Parameterizable 0-508
System Number:	0 - 7
Record Length:	100

1) Parameterizable 0 - 127
2) Spontaneous "01" or interrogated "11"

I1	E8	E7	E6	E5	E4	E3	E2	E1
I2	E16	E15	E14	E13	E12	E11	E10	E9
I3	E24	E23	E22	E21	E20	E19	E18	E17
I4	E32	E31	E30	E29	E28	E27	E26	E25
I5					0	0	0	0

Inputs for digital input

Double-Point Information:

All odd inputs (E1, E3,...) correspond to "OFF".
All even inputs (E2, E4,...) correspond to "ON".

Supported SAT 1703 Message Formats

- 1 single-point information item (TI = 30)
- 1 double-point information item (TI = 31)
- 1 double-point information item + BRM (TI = 136)
- 16 single-point information items (TI = 137)
- 8 double-point information items (TI = 138)
- 4 double-point information items + BRM (TI = 139)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_Information” with the following entries:

SAT 1703 Address:

CASDU1
CASDU2
IOA1
IOA2
IOA3

5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 255, supported formats
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

SINAUT8 Address:

System Number: Possible 0 – 7

Signaling Bit: 1 single-point information item: 0 – 7
1 double-point information item: 0, 2, 4, 6
Blocked formats: always "0"

Message Address: 0 – 511;
The messages are always sent in increments of 4 (4, 8, 12,...)

SINAUT8 Format: Information items 4 byte

Additional Information: Always "0"

2.3.1.2. System Error Message

SINAUT8-FW1024 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	TGE	Station Number						
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	Data Constr.		ÜB	TFK Number				
A2	2^1	2^0		2^4	2^3	2^2	2^1	2^0
	Message Number							
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	System Number			Record Length			Mess. No.	
A4	2^2	2^1	2^0	1	0	0	2^9	2^8

← Bit Significance

TGE:	Always "0"
Station Number:	1)
Data Construct:	2)
Overflow Bit (ÜB):	0 or 1
Message Sequence Identifier (TFK):	1 - 31
Message Number:	1016
System Number:	0 - 7
Record Length:	100

1) Parameterizable 0 - 127
2) Organizational "00" or interrogated "11"

I1	E7	E7	E6	E5	E4	E3	E1	E0
I2	E15	E15	E14	E13	E12	E11	E10	E8
I3	E23	E22	E21	E20	E19	E18	E17	E16
I4	E31	E30	E29	E28	E27	E26	E25	E24
I5					0	0	0	0

Marking error numbers currently present

From the standpoint of the firmware, the system error message is treated like a "normal" telegram. Only the error bit message is additionally updated.

Supported SAT 1703 Message Formats

- 1 single-point information item (TI = 30)
- 16 single-point information items (TI = 137)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_Information” with the following entries:

SAT 1703 Addresse:

CASDU1
CASDU2
IOA1
IOA2
IOA3

5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 255, supported formats
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

SINAUT8 Address:

System Number:	Possible 0 – 7	
Signaling Bit:	1 single-point information item:	0 – 7
	16 single-point information items:	always "0"
Message Address:	1 single-point information item:	1016 – 1019
	16 single-point information items:	1016, 1018
SINAUT8 Format:	Information items 4 byte	
Additional information:	Always "0"	

2.3.1.3. 4 Measured Values 8 Bit

SINAUT8-FW1024 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: Always "0"
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1) Data Construct: 2)
	Data Constr.		ÜB	TFK Number					Overflow Bit (ÜB): 0 or 1
A2	1	0		2^4	2^3	2^2	2^1	2^0	Message Sequence Identifier (TFK): 1 - 31
	Message Number								
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Message Number: Parameterizable 512-984
	System Number			Record Length			Mess.-No.		System Number: 0 - 7
A4	2^2	2^1	2^0	1	0	1	2^9	2^8	Record Length: 011

1) Parameterizable 0 - 127
2) Cyclic "10" or spontaneous "01" or interrogated "11"

I1	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	1st measured value
I2	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	2nd measured value
I3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	3rd measured value
I4	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	4th measured value
I5					VZ4	VZ3	VZ2	VZ1	Sign

- Each measured value occupies 2 message numbers; therefore, each message is sent in increments of 8.
- Negative values (VZx = 1) are always displayed in two's complements.

Supported SAT 1703 Message Formats

- Measured value 15 bit + VZ normalized (TI = 34)
- Measured value 15 bit + VZ scaled (TI = 35)
- Measured value short floating point
- Measured value 31 bit + VZ (TI = 140)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_Information” with the following entries:

SAT 1703 Address:

CASDU1 CASDU2 IOA1 IOA2 IOA3	5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 255, supported formats
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Measured value format: Full range
8 Bit + VZ
11 Bit + VZ
12 Bit + VZ

The measured value format determines the transmitted resolution in the Ax 1703 data format. The adjustment is made to the SINAUT8 format (= 8 bits) based on the set measured value format. If the measured value format is parameterized for a “full range”, the resolution is related to the SINAUT8 format (= 8 bits). If the measured value transmitted in the Ax 1703 format does not correspond to the indicated resolution, the message is discarded with “error, format conversion in transmit direction”.

Note: In case of TI = 34, "full range" has to be parameterized.

SINAUT8 Address:

System Number: Possible 0 – 7

Message Address: 0 - 984

SINAUT8 Format: Measured values 4 MW – 8 bit

Additional Information: Always "0"

2.3.1.4. 8 Measured Values 8 Bit

SINAUT8-FW1024 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: Always "0"
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1)
	Data Constr.		ÜB	TFK Number					Data Construct: 2)
A2	1	0		2^4	2^3	2^2	2^1	2^0	Overflow Bit (ÜB): 0 or 1
	Message Number								Message Sequence Identifier (TFK): 1 - 31
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Message Number: Parameterizable 512-984
	System Number			Record Length			Mess.-No.		System Number: 0 - 7
A4	2^2	2^1	2^0	1	1	1	2^9	2^8	Record Length: 111

1) Parameterizable 0 - 127
2) Cyclic "10" or spontaneous "01" or interrogated "11"

I1	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	1st measured value
I2	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	2nd measured value
I3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	3rd measured value
I4	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	4th measured value
I5	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	5th measured value
I6	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	6th measured value
I7	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	7th measured value
I8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	8th measured value
I9	VZ8	VZ7	VZ6	VZ5	VZ4	VZ3	VZ2	VZ1	Sign

- Each measured value occupies 2 message numbers; therefore, each message is sent in increments of 16.
- Negative values (VZx = 1) are always displayed in two's complements.

Supported SAT 1703 Message Formats

- Measured value 15 bit + VZ normalized (TI = 34)
- Measured value 15 bit + VZ scaled (TI = 35)
- Measured value short floating point
- Measured value 31 bit + VZ (TI = 140)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_Information” with the following entries:

SAT 1703 Address:

CASDU1
CASDU2
IOA1
IOA2
IOA3

5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 255, supported formats
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Measured value format: Full range
8 Bit + VZ
11 Bit + VZ
12 Bit + VZ

The measured value format determines the transmitted resolution in the Ax 1703 data format. The adjustment is made to the SINAUT8 format (= 8 bits) based on the set measured value format. If the measured value format is parameterized for a “full range”, the resolution is related to the SINAUT8 format (= 8 bits). If the measured value transmitted in the Ax 1703 format does not correspond to the indicated resolution, the message is discarded with “error, format conversion in transmit direction”.

Note: In case of TI = 34, "full range" has to be parameterized.

SINAUT8 Address:

System Number: Possible 0 – 7

Message Address: 0 - 984

SINAUT8 Format: Measured values 8 MW – 8 bit

Additional Information: Always "0"

2.3.1.5. 4 Measured Values 11 Bit

SINAUT8-FW1024 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	TGE	Station Number						
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	Data Constr.		ÜB	TFK Number				
A2	0	1		2^4	2^3	2^2	2^1	2^0
	Message Number							
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	System Number			Record Length			Mess.-No.	
A4	2^2	2^1	2^0	1	1	0	2^9	2^8

← Bit Significance

TGE:	Always "0"
Station Number:	1)
Data Construct:	2)
Overflow Bit (ÜB):	0 or 1
Message Sequence Identifier (TFK):	1 - 31
Message Number:	Parameterizable 512-984
System Number:	0 - 7
Record Length:	110

1) Parameterizable 0 - 127
2) Cyclic "10", spontaneously "01" or interrogated "11"

I1	2^3	2^2	2^1	2^0	0	0	0	0	1st measured value
I2	VZ	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	
I3	2^3	2^2	2^1	2^0	0	0	0	0	2nd measured value
I4	VZ	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	
I5	2^3	2^2	2^1	2^0	0	0	0	0	3rd measured value
I6	VZ	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	
I7	2^3	2^2	2^1	2^0	0	0	0	0	4th measured value
I8	VZ	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	
I9	0	0	0	0	0	0	0	0	

- Each 11-bit measured value occupies 2 message numbers; therefore, each message is sent in increments of 8.
- Negative values (VZx = 1) are always displayed in two's complements.

Supported SAT 1703 Message Formats

- Measured value 15 bit + VZ normalized (TI = 34)
- Measured value 15 bit + VZ scaled (TI = 35)
- Measured value short floating point
- Measured value 31 bit + VZ (TI = 140)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_value” with the following entries:

SAT 1703 Address:

CASDU1 CASDU2 IOA1 IOA2 IOA3	5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 255, supported formats
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Measured value format: Full range
8 Bit + VZ
11 Bit + VZ
12 Bit + VZ

The measured value format determines the transmitted resolution in the Ax 1703 data format. The adjustment is made to the SINAUT8 format (= 11 bits) based on the set measured value format. If the measured value format is parameterized for a “full range”, the resolution is related to the SINAUT8 format (= 11 bits). If the measured value transmitted in the Ax 1703 format does not correspond to the indicated resolution, the message is discarded with “error, format conversion in transmit direction”.

Note: In case of TI = 34, "full range" has to be parameterized.

SINAUT8 Address:

System Number: Possible 0 – 7

Message Address: 0 - 984

SINAUT8 Format: Measured values 4 MW – 11 bit

Additional Information: Always "0"

2.3.1.6. 2 Measured Values 11 Bit

SINAUT8-FW1024 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	← Bit Significance							
	TGE	Station Number						
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	Data Constr.		ÜB	TFK Code				
A2	0	1		2^4	2^3	2^2	2^1	2^0
	Message Number							
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	System Number			Record Length			Mess.-No.	
A4	2^2	2^1	2^0	1	0	0	2^9	2^8

TGE:	Always "0"
Station Number:	1)
Data Construct:	2)
Overflow Bit (ÜB):	0 or 1
Message Sequence Identifier (TFK):	1 - 31
Message Number:	Parameterizable 512-984
System Number:	0 - 7
Record Length:	100

1) Parameterizable 0 - 127
2) Cyclic "10", spontaneous "01" or interrogated "11"

I1	2^3	2^2	2^1	2^0	0	0	0	0	1st measured value
I2	VZ	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	
I3	2^3	2^2	2^1	2^0	0	0	0	0	2nd measured value
I4	VZ	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	
I5					0	0	0	0	

- Each 11-bit measured value occupies 2 message numbers; therefore, each message is sent in increments of 4.
- Negative values (VZx = 1) are always displayed in two's complements.

Supported SAT 1703 Message Formats

- Measured value 15 bit + VZ normalized (TI = 34)
- Measured value 15 bit + VZ scaled (TI = 35)
- Measured value short floating point
- Measured value 31 bit + VZ (TI = 140)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_value” with the following entries:

SAT 1703 Address:

CASDU1 CASDU2 IOA1 IOA2 IOA3	5-level, freely parameterizable SAT 1703 source address possible: 0 – 255

TI: Type Identification: possible: 255, supported formats
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Measured value format: Full range
8 Bit + VZ
11 Bit + VZ
12 Bit + VZ

The measured value format determines the transmitted resolution in the Ax 1703 data format. The adjustment is made to the SINAUT8 format (= 11 bits) based on the set measured value format. If the measured value format is parameterized for a “full range”, the resolution is related to the SINAUT8 format (= 11 bits). If the measured value transmitted in the Ax 1703 format does not correspond to the indicated resolution, the message is discarded with “error, format conversion in transmit direction”.

Note: In case of TI = 34, "full range" has to be parameterized.

SINAUT8 Address:

System Number: Possible 0 – 7

Message Address: 0 - 984

SINAUT8 Format: Measured values 2 MW – 11 bit

Additional Information: Always "0"

2.3.1.7. Transformer Taps with Moving Contact

SINAUT8-FW1024 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: Always "0"
A1		2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1)
	Data Constr.		ÜB	TFK Number					Data Construct: 2)
A2	2^1	2^0		2^4	2^3	2^2	2^1	2^0	Overflow Bit (ÜB): 0 or 1
	Message Number								Message Sequence Identifier (TFK): 1 - 31
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Message Number: Parameterizable 0 – 511
	System Number			Record Length			Mess.-No.		System Number: 0 - 7
A4	2^2	2^1	2^0	1	0	0	2^9	2^8	Record Length: 100

1) Parameterizable 1 - 127
2) Spontaneous "01" or interrogated "11"

I1	L	F	2^5	2^4	2^3	2^2	2^1	2^0	1st transformer tap, 6 bit BCD-coded
I2	L	F	2^5	2^4	2^3	2^2	2^1	2^0	2nd transformer tap, 6 bit BCD-coded
I3	L	F	2^5	2^4	2^3	2^2	2^1	2^0	3rd transformer tap, 6 bit BCD-coded
I4	L	F	2^5	2^4	2^3	2^2	2^1	2^0	4th transformer tap, 6 bit BCD-coded
I5					0	0	0	0	

L = Moving contact
F = Error bit

Supported SAT 1703 Message Formats

- Number of transformer taps (TI = 32)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_value” with the following entries:

SAT 1703 Address:

CASDU1 CASDU2 IOA1 IOA2 IOA3	5-level, freely parameterizable SAT 1703 source address possible: 0 – 255

TI: Type Identification: possible: 32, 255, supported formats
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Measured value format: Irrelevant

SINAUT8 Address:

System Number: Possible 0 – 7

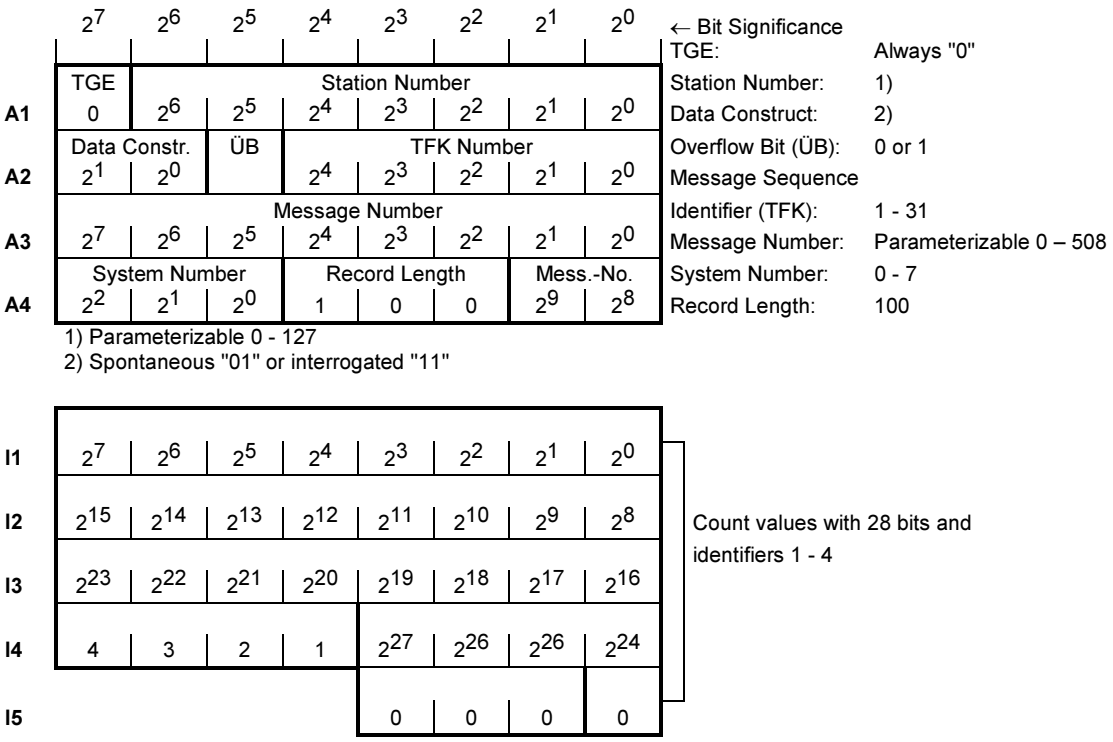
Message Address: 0 - 511

SINAUT8 Format: Transformer taps 6 bit with moving contact, 4 byte

Additional Information: Always "0"

2.3.1.8. Count Value, Dual-Coded

SINAUT8-FW1024 Format:



Identifiers:

1 =	Irrelevant, reserved for signs,	always "0"
2 = UB =	Re-storing bit (1 bit counter) Bit is inverted after each transmission	
3 = FBI =	Internal error bit,	always "0"
4 = FBE =	External error bit,	always"0"

Supported formats:

- Measured value 31 bit + VZ (TI = 140)
- Count value 31 bit + VZ with sequence number (TI = 33)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_value” with the following entries:

SAT 1703 Address:

CASDU1 CASDU2 IOA1 IOA2 IOA3	5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 33, 140,
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Measured value format: Irrelevant

SINAUT8 Address:

System Number: Possible 0 – 7

Message Address: 0 - 508

SINAUT8 Format: Count value dual-coded

2.3.1.9. Count Value, BCD-Coded

SINAUT8-FW1024 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: Always "0"
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1)
	Data Constr.		ÜB	TFK Number					Data Construct: 2)
A2	2^1	2^0		2^4	2^3	2^2	2^1	2^0	Overflow Bit (ÜB): 0 or 1
	Message Number								Message Sequence Identifier (TFK): 1 - 31
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Message Number: Parameterizable 0 – 508
	System Number			Record Length			Mess.-No.		System Number: 0 - 7
A4	2^2	2^1	2^0	1	0	0	2^9	2^8	Record Length: 100

1) Parameterizable 0 - 127
2) Spontaneous "01" or interrogated "11"

I1	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	1st and 2nd decade
I2	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	3rd and 4th decade
I3	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	5th and 6th decade
I4	4	3	2	1	2^3	2^2	2^1	2^0	7th decade and identifier
I5	0	0	0	0	0	0	0	0	

Identifiers:

1 =	Irrelevant, reserved for signs,	always "0"
2 = UB =	Re-storing bit (1 bit counter) Bit is inverted after each transmission	
3 = FBI =	Internal error bit,	always "0"
4 = FBE =	External error bit,	always"0"

Supported formats:

- Measured value 31 bit + VZ (TI = 140)
- Count value 31 bit + VZ with sequence number (TI = 33)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_value” with the following entries:

SAT 1703 Address:

CASDU1 CASDU2 IOA1 IOA2 IOA3	5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 33, 140, 255
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Measured value format: Irrelevant

SINAUT8 Address:

System Number: Possible 0 – 7

Message Address: 0 - 508

SINAUT8 Format: Count value BCD-coded

Additional Information: Always "0"

2.3.1.10. Count Value, BCD-Coded with Time

SINAUT8-FW1024 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: Always "0"
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1)
	Data Constr.		ÜB	TFK Number					Data Construct: 2)
A2	2^1	2^0		2^4	2^3	2^2	2^1	2^0	Overflow Bit (ÜB): 0 or 1
	Message Number								Message Sequence Identifier (TFK): 1 - 31
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Message Number: Parameterizable 0 – 508
	System Number			Record Length			Mess.-No.		System Number: 0 - 7
A4	2^2	2^1	2^0	1	0	0	2^9	2^8	Record Length: 100

1) Parameterizable 0 - 127
2) Spontaneous "01" or interrogated "11"

I1	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	1st and 2nd decade
I2	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	3rd and 4th decade
I3	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	5th and 6th decade
I4	4	3	2	1	2^3	2^2	2^1	2^0	7th decade and identifier
	day								
I5	0	0	0	2^4	2^3	2^2	2^1	2^0	
	hour								
I6	0	0	0	2^4	2^3	2^2	2^1	2^0	
	minute								
I7			2^5	2^4	2^3	2^2	2^1	2^0	
I8	0	0	0	0	0	0	0	0	
I9	0	0	0	0	0	0	0	0	

Identifiers:

1 =	Irrelevant, reserved for signs,	always "0"
2 = UB =	Re-storing bit (1 bit counter) Bit is inverted after each transmission	
3 = FBI =	Internal error bit,	always "0"
4 = FBE =	External error bit,	always"0"

Supported formats:

- Measured value 31 bit + VZ (TI = 140)
- Count value 31 bit + VZ with sequence number (TI = 33)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_value” with the following entries:

SAT 1703 Address:

CASDU1 CASDU2 IOA1 IOA2 IOA3	5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 33, 140, 255
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Measured value format: Irrelevant

SINAUT8 Address:

System Number: Possible 0 – 7

Message Address: 0 - 508

SINAUT8 Format: Count value BCD-coded RT/NRT

Additional Information: Always "0"

The messages are converted as follows:

- All 15 minutes values are transmitted with time;
  Format: Count value BCD-coded with time

- All other values are transmitted without time;
  Format: Count value BCD-coded (chapter 2.2.5.13.)

2.3.1.11. Check message

The check message is always sent only during point-to-point traffic as a response of the received check command to the central station.

SINAUT8 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: Always "0"
A1		2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1) Data Construct: Organizational "00"
	Data Constr.		ÜB	TFK Number					Overflow Bit (ÜB): 0 or 1
A2	0	0		2^4	2^3	2^2	2^1	2^0	Message Sequence Identifier (TFK): 1 - 31
	Message Number								
A3	0	0	0	0	0	0	0	0	Message Number: 512 (200 H)
	System Number			Record Length			Mess.-No.		System Number: 000
A4	0	0	0	0	0	0	1	0	Record Length: 000

1) Parameterizable 1 - 127

I1	1	0	1	0	1	0	1	0	Check bit pattern
I2	0	1	0	1	0	1	0	1	

2.3.1.12. Error Bit Message "ZFBIT"

SINAUT8 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: Always "0"
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1) Data Construct: Organizational "00"
	Data Constr.		ÜB	TFK Number					Overflow Bit (ÜB): 0 or 1
A2	0	0		2^4	2^3	2^2	2^1	2^0	Message Sequence Identifier (TFK): 1 - 31
	Message Number								
A3	0	0	0	0	1	1	0	1	Message Number: 781 (30D H)
	System Number			Record Length			Mess.-No.		System Number: 000
A4	0	0	0	1	0	0	1	1	Record Length: 100

1) Parameterizable 1 - 127

I1	7	6	5	4	3	2	1	0	Error flags
I2	15	14	13	12	11	10	9	8	
I3	23	22	21	20	19	18	17	16	
I4	31	30	29	28	27	26	25	24	
I5					0	0	0	0	

The error bit message is the system error message stored since the last error bit message interrogation of the SINAUT8 control center. In terms of the central station, the error bit message is purely “archival” in nature.

The error bit message is transmitted once after a restart, and on request of the SINAUT8 central station.

Attention: The error bit message is only sent out during point-to-point traffic.

2.3.1.13. Last STOP Cause

The "Last Stop Cause " is always transmitted during an error bit message interrogation of the SINAUT8 central station only in point-to-point traffic. The transmission can be blocked via parameterization.

SINAUT8 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: Always "0"
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1)
	Data Constr.		ÜB	TFK Number					Data Construct: Organizational "00"
A2	0	0		2^4	2^3	2^2	2^1	2^0	Overflow Bit (ÜB): 0 or 1
	Message Number								Message Sequence Identifier (TFK): 1 - 31
A3	0	0	0	0	1	1	0	0	Message Number: 782 (30E H)
	System Number			Record Length			Mess.-No.		System Number: 000
A4	0	0	0	1	1	0	1	1	Record Length: 110

1) Parameterizable 1 - 127

I1	a	0	2^5	2^4	2^3	2^2	2^1	2^0	Error Source (Program No.)
I2	b								Mode
I3									Error Number
I4									Additional Information to 1
I5									Additional Information to 2
I6	0	0	0	0	0	0	0	0	
I7	0	0	0	0	0	0	0	0	
I8	0	0	0	0	0	0	0	0	
I9	0	0	0	0	0	0	0	0	

a = 1: Error information from equipment module
a = 0: Error information from program
b = 1: No new entry, has already been transmitted once
b = 0: New entry

2.3.1.14. Confirmation Record on Startup Interrogation

SINAUT8 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: Always "0"
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1) Data Construct: Organizational "00"
	Data Constr.		ÜB	TFK Number					Overflow Bit (ÜB): 0 or 1
A2	0	0		2^4	2^3	2^2	2^1	2^0	Message Sequence Identifier (TFK): 1 - 31
	Message Number								
A3	0	0	0	0	0	1	0	0	Message Number: 772 (304 H)
	System Number			Record Length			Mess.-No.		System Number: 000
A4	0	0	0	0	1	0	1	1	Record Length: 010

1) Parameterizable 1 - 127

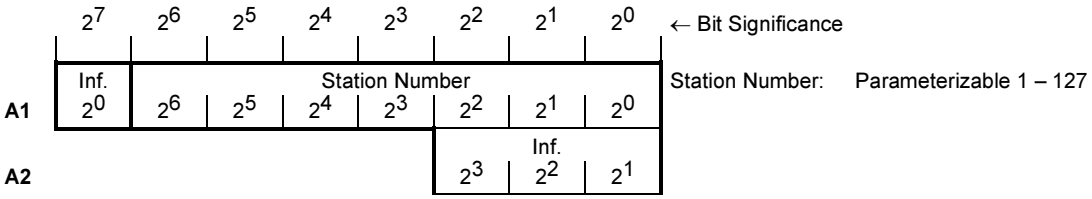
I1	2^5	2^5	2^5	2^4	2^3	2^2	2^1	2^0	Marking = always "FFH"
I2	b							0	

Comments:

Marking = 00H = Startup: Parameter in the RAM, smoothing factor and threshold value are deleted.

Marking = FFH = Startup: Parameter in the RAM are kept.

2.3.1.15. Response Message during Request for Information



Meaning of Information:

2^3	2^2	2^1	2^0	
0	0	0	0	Quick Check Acknowledgment
0	0	0	1	Negative Quick Scan Acknowledgment

Comments:

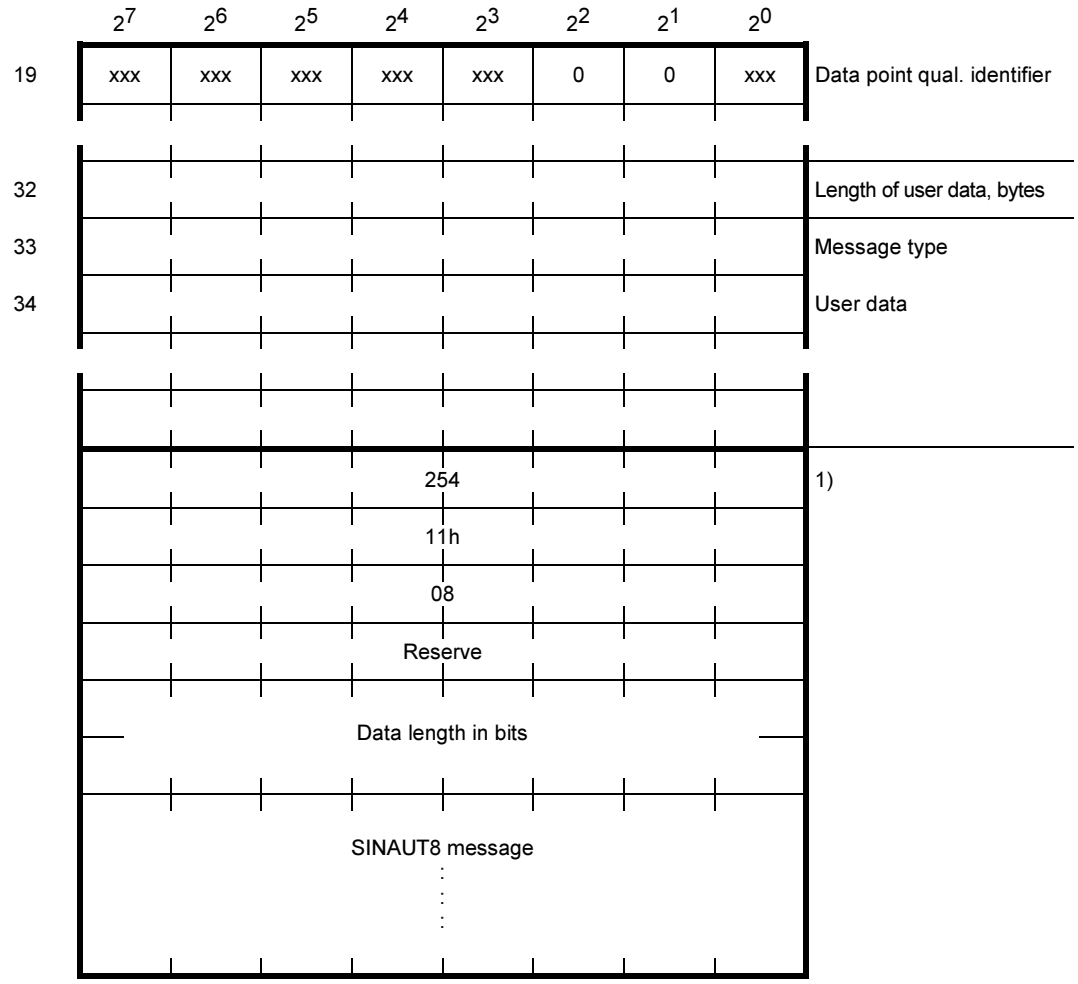
Internal, short message format used in requests for information during multipoint traffic. Only realized as PCM message! (Message with fixed block length).

Quick Check: Interrogation of all stations simultaneously after spontaneous data
Quick Scan: Interrogation of one station after spontaneous data

2.3.1.16. User data Container in Transmit Direction

The user data container in the transmit direction enables a transparent transmission of SINAUT8 messages.

Message Format (User Data):



1) Interface number 254 = unused
Sequencing/current sequence: 11h
Protocol type: SINAUT8

Address Information:

R#/01	Parameterizable in the OPM
K#/02	Parameterizable in the OPM
BG#/IOA1	255 parameterizable in the OPM
W#/IOA2	255 parameterizable in the OPM
SA/IOA3	Parameterizable in the OPM

In the container mode permanent measured values are only transmitted if:

- the message number is in the parameterized message number range (start and last message number for permanent measured values parameterizable) and
- the permanent measured value was sent as container.

It is possible to block the transmission of specific measured values. Therefor a special message is defined.

Data starting from SINAUT8 Message:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance	
	TGE	Station Number							TGE:	Always "0"
A1		2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number:	1)
	Data Const.		ÜB	TFK Number					Data Construct:	Organizational "00"
A2	0	0		2^4	2^3	2^2	2^1	2^0	Overflow Bit (ÜB):	0
	Message Number								Message Sequence	
A3	0	0	0	0	0	0	0	0	Identifier (TFK):	0
	System Number			Record Length			Mess.-No.		Message Number:	0
A4	0	0	0	0	0	0	0	0	System Number:	0
									Record Length:	0

1) Parameterizable 1 – 127

Message Number								
						Mess.-No.		
0	0	0	0	0	0			
1	1	1	1	1	1	1	1	= Identification failed

To reincorporate the value into the cycle again, the value must be transmitted to the protocol once more.
For test responses, monitoring can be parameterized. If the timeout expires, no test response is transmitted on the line.

2.3.1.17. Binary Information - 1 Byte With Time Tag, 10 ms (Single/Double Point Information)

SINAUT8-FW1024-Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
									TGE: Always "0"
	TGE	Station Number							Station Number: 1)
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Data Construct: Organizational "00"
	Data Constr.		ÜB	TFK Number					Overflow Bit (ÜB): 0 or 1
A2	0	1	0	0	0	0	0	0	Message Sequence
	Message Number								Identifier (TFK): 1 - 31
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Message Number: 2)
	System Number			Record Length			Mess.-No.		System Number: 0 - 7
A4	2^2	2^1	2^0	1	0	1	2^9	2^8	Record Length: 101

1) Parameterizable 1 – 127
2) Parameterizable 0 - 511

I1	E8	E7	E6	E5	E4	E3	E2	E1	Inputs on the digital input
I2	Ā8	Ā7	Ā6	Ā5	Ā4	Ā3	Ā2	Ā1	Change indication
I3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Time x 10 ms (less significant)
I4	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	Time x 10 ms (more significant)
I5					A	B	C	D	Identifier

A..... 1 minute overflow (not used, always "0")
B..... Startup (not used, always "0")
C..... Not synchronized (not used, always "0")
D..... Not real-time (invalid identifier "IV" of the time information)

E1 – E8 Inputs (1 byte of a digital input)
Ā1 – Ā8 Changes to the "old" state

Double-point information:

All odd inputs (E1, E3,…) correspond to "OFF".
All even inputs (E2, E4,…) correspond to "ON".

Supported SAT 1703 Message Formats

- 1 single-point information item (TI = 30)
- 1 double-point information item (TI = 31)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_Information” with the following entries:

SAT 1703 Address:

CASDU1
CASDU2
IOA1
IOA2
IOA3

5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 255, supported formats
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

SINAUT8 Address:

System Number: Possible 0 – 7

Signaling Bit: 1 single-point information item: 0 – 7
1 double-point information item: 0, 2, 4, 6

Message Address: 0 – 511;
In case of general interrogation "Information with time" are sent in the SINAUT8 format "Information – 4 byte" (ÜB4) in increments of 4 (4, 8, 12,...).

SINAUT8 Format: Information 1 byte real-time

Additional Information: Always "0"

2.3.2. Message Conversion in Receive Direction SINAUT8 → Ax 1703

SINAUT8	Ax 1703	
Designation	**Designation**	**TI**
Switching commands	Single command	45
	Double command	46
	Command with output time	160
Setpoint, analog Setpoint, digital 8 bit Setpoint, digital 16 bit	Measured value 15 bit + VZ scaled	35
	Measured value short floating point	36
	Setpoint setpoint command scaled	49
	Setpoint setpoint command short floating	50
Reset command	Remote reset (FC = 151)	—
Group interrogation command	Image GA request	—
Interrogation list 1 – 4 1)	Image GA request	—
Check command	—	
Startup acknowledge command	—	
Quick Check / Scan 1)	—	
Repeat message request/ TFK acknowledgment	—	
Error bit message interrogation	—	
Startup interrogation	—	

1) Only in multipoint traffic (request for information)

2.3.2.1. Switching Command

SINAUT8 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
									TGE: 0
	TGE	Station Number							Station Number: 1)
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Data Construct: Spontaneous "01"
	Data Constr.		ÜB	TFK Number					Overflow Bit (ÜB): 0
A2	0	1	0	0	0	0	0	0	Message Sequence
	Message Number								Identifier (TFK): 0
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Message Number: 0 - 255
	System Number			Record Length			Mess.-No.		System Number: 0 - 7
A4	2^2	2^1	2^0	0	0	0	2^9	2^8	Record Length: 000

1) Parameterizable 0 - 127

	E	A	E	A	E	A	E	A	
I1	8	7	6	5	4	3	2	1	Command byte
	P	BK			ZK				
I2		2^2	2^1	2^0	2^3	2^2	2^1	2^0	Codes

E, A: Denotes the IN/OFF command of the Siemens command.

Comments:

P = Parity bit, supplemented to odd "1" every 6 bytes
ZK = Time code, 15 different command execution times can be transmitted, f (parameter), default fixed 0, otherwise f (command output time)
BK = Command code f (parameter), default fixed switching command, otherwise f (command output time)

2^2	2^1	2^0	Meaning	
0	0	0	Switching command	
0	0	1	Persistent command	
1	0	0	Broadcast command	1)
1	1	0	Short interruption	
1	1	0	Command interruption	1)

1) Not supported

Supported Ax 1703 Message Formats

- Single command (TI = 45)
- Double command (TI = 46)
- Single command with output time (TI = 160)

Address Conversion SINAUT8 → Ax 1703

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Receive_command” with the following entries:

SINAUT8 Address:

Command bit: Possible: 0 – 7 for single commands
0, 2, 4, 6 for double commands

Message address: "0" to message address for digital setpoints (system-oriented parameter)
Default: 0 - 255

Command code: Possible: - Switching command
- Persistent command
- Short interruption

"Persistent command" (= regulating command) is only possible in conjunction with the Ax 1703 data format "single command with output time ".

System number: Possible 0 - 7

SAT 1703 Address:

CASDU1
CASDU2
IOA1
IOA2
IOA3

5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 33, 140, 255,
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Ax 1703 Command Code (only for TI = 45 and TI = 46):

Possible: - no additional definition
- short command output time
- long command output time

Ax 1703 Command Number (only for TI = 160):

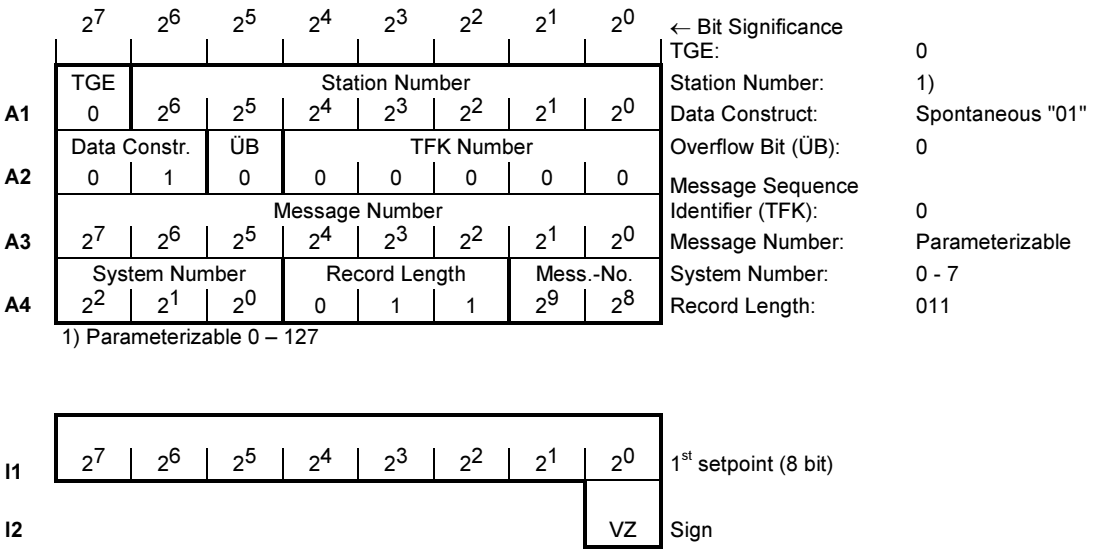
Possible: 0 – 15

Comment: The command output time is added based on the received time code (ZK) (system-oriented parameter).

Additional Information: Always "0"

2.3.2.2. 1 Setpoint, Analog

SINAUT8 Format:



Negative setpoints (VZ = 1) are displayed in two's complements.

Supported Ax 1703 Message Formats

- Measured value 15 bit + VZ scaled (TI = 35)
- Measured value short floating point (TI = 36)
- Setpoint setpoint command scaled (TI = 49)
- Setpoint setpoint command short floating point (TI = 50)

Address Conversion SINAUT8 → Ax 1703

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Receive_setpoint” with the following entries:

SINAUT8 Address:

Message Address: Parameterizable in systems engineering
(message address – analog setpoints)
Default: 512 – 767

System number: Possible 0 - 7

SAT 1703 Address:

CASDU1
CASDU2
IOA1
IOA2
IOA3

5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type Identification: possible: 35, 36, 49, 50, 255,
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Additional Information: Always "0"

2.3.2.3. Setpoints, Digital 8 Bit

SINAUT8-FW1024 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance	
									TGE:	0
	TGE	Station Number							Station Number:	1)
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Data Construct:	Spontaneous "01"
	Data Constr.		ÜB	TFK Number					Overflow Bit (ÜB):	0
A2	0	1	0	0	0	0	0	0	Message Sequence	
	Message Number								Identifier (TFK):	0
A3	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Message Number:	Parameterizable
	System Number			Record Length			Mess.-No.		System Number:	0 - 7
A4	2^2	2^1	2^0	0	1	0	2^9	2^8	Record Length:	010

1) Parameterizable 0 - 127

I1	E^8	E^7	E^6	E^5	E^4	E^3	E^2	E^1	Setpoint bit pattern
I2								0	2nd setpoint (8 bit)

Supported Ax 1703 Message Formats

- Measured value 15 bit + VZ scaled (TI = 35)
- Measured value short floating point (TI = 36)
- Setpoint setpoint command scaled (TI = 49)
- Setpoint setpoint command short floating point (TI = 50)

Address Conversion SINAUT8 → Ax 1703

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Receive_setpoint” with the following entries:

SINAUT8 Address:

Message Address: Parameterizable in systems engineering
Message address – digital setpoints to
message address – analog setpoints
Default: 256-511

System number: Possible 0 - 7

SAT 1703 Address:

CASDU1
CASDU2
IOA1
IOA2
IOA3

5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

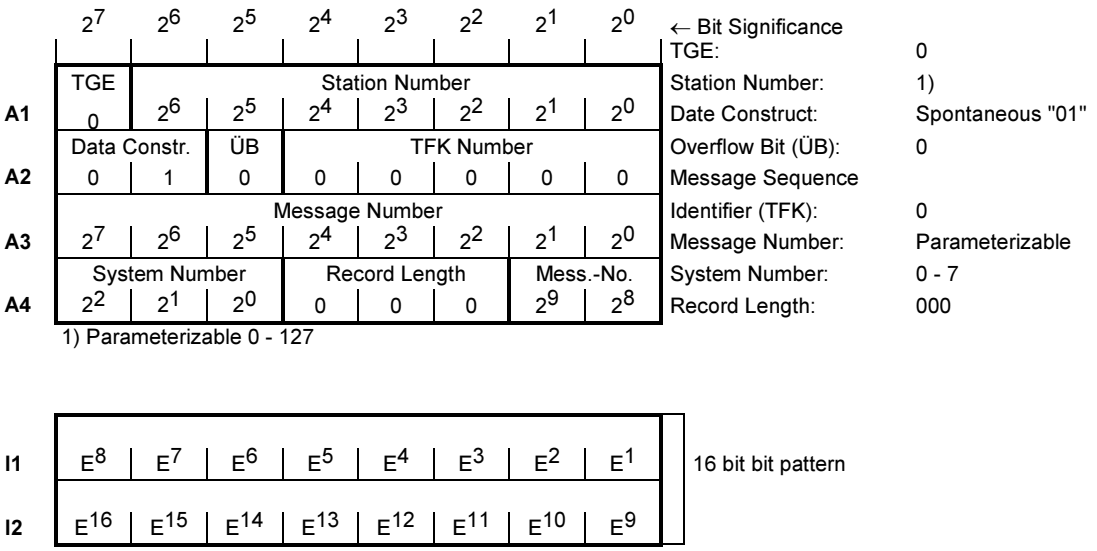
TI: Type Identification: possible: 35, 36, 49, 50, 255,
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

Additional Information: Possible: 0..... Setpoint display in SINAUT8 message dual-coded
1..... Setpoint display in SINAUT8 message BCD-coded

Comment: If setpoint display is "BCD-coded", the received setpoint is discarded with error message “error, format conversion in receive direction” given an implausible BCD code.

2.3.2.4. Setpoints, Digital 16 Bit

SINAUT8 Format:



If the received setpoint is relayed in scaled form (measured value or setpoint setpoint command), and the received value is greater than 32767, the IV bit is set.

2.3.2.5. Check Command

SINAUT8 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance	
	TGE	Station Number							TGE:	0
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number:	1)
	Data Constr.		ÜB	TFK Number					Data Construct:	Organizational "00"
A2	0	0	0	0	0	0	0	0	Overflow Bit (ÜB):	0
	Message Number								Message Sequence	
A3	0	0	0	0	0	0	0	0	Identifier (TFK):	0
	System Number			Record Length			Mess.-No.		Message Number:	512 (200 H)
A4	0	0	0	0	0	0	1	0	System Number:	000
									Record Length:	000

1) Parameterizable 0 - 127
2) Message group end during request for information

I1	1	0	1	0	1	0	1	0	Test Bit Pattern
I2	0	1	0	1	0	1	0	1	

2.3.2.6. Startup Acknowledge Command

SINAUT8 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: 0
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1)
	Data Constr.		ÜB	TFK Number					Data Construct: Organizational "00"
A2	0	0	0	0	0	0	0	0	Overflow Bit (ÜB): 0
	Message Number								Message Sequence Identifier (TFK): 0
A3	0	0	0	0	0	0	1	0	Message Number: 514 (202 H)
	System Number			Record Length			Mess.-No.		System Number: 000
A4	0	0	0	0	1	0	1	0	Record Length: 010

1) Parameterizable 0 - 127

I1	0	0	0	0	0	0	0	0	
I2								0	

2.3.2.7. Repeat Message Request / TFK Positive Acknowledgment

SINAUT8 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
									TGE: 0
	TGE	Station Number							Station Number: 1)
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Data Construct: Organizational "00"
	Data Constr.		ÜB	TFK Number					Overflow Bit (ÜB): 0
A2	0	0	0	0	0	0	0	0	Message Sequence
	Message Number								Identifier (TFK): 0
A3	0	0	0	0	0	0	0	1	Message Number: 513 (201 H)
	System Number			Record Length			Mess.-No.		System Number: 000
A4	0	0	0	0	1	0	1	0	Record Length: 010

1) Parameterizable 0 - 127

I1	c	b	a	2^4	2^3	2^2	2^1	2^0
I2								0

2^0 - 2^4 Message sequence identifier number of the record to retransmitted

c = 1
b = 0 Repeat command without acknowledgment

c = 1
b = 1 Repeat command with acknowledgment

c = 0
b = 1 Only acknowledgment

c = 0
b = 0 Not used

a = 1 Overflow bit is acknowledged

Address Conversion:

This message is generated on the SIP.

2.3.2.8. Group Interrogation Command

SINAUT8 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance	
									TGE:	0
	TGE	Station Number							Station Number:	1)
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Data Construct:	Organizational "00"
	Data Constr.		ÜB	TFK Number					Overflow Bit (ÜB):	0
A2	0	0	0	0	0	0	0	0	Message Sequence	
	Message Number								Identifier (TFK):	0
A3	0	0	0	0	1	0	0	1	Message Number:	521 (209 H)
	System Number			Record Length			Mess.-No.		System Number:	000
A4	0	0	0	0	1	0	1	0	Record Length:	010

1) Parameterizable 0 - 127

	8	7	6	5	4	3	2	1	
I1									Interrogation group
I2								0	

Interrogation Group:

1 =	General interrogation	To a remote terminal unit Bit 5 - 8 = 0
2 =	Count value interrogation	
3 =	Partial interrogation 3	
4 =	Partial interrogation 4	

5 = Overall image interrogation

6 = Partial image interrogation (e.g., ZW)

7 = Partial image interrogation (e.g., MW)

8 = Partial image interrogation (e.g., ML)

Comment:

- The firmware only evaluates the code 1 (general interrogation).
- The received message is converted in the Ax 1703 system message “Image GI request” (FC = 155)
  - with the parameterized CASDU for general interrogation (parameter: "Send GI with parameterized CASDU") or
  - with the CASDUs parameterized in the send detailed routing (several "Image GI requests" can be generated).

2.3.2.9. Reset Command

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	TGE	Station Number						
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	Data Constr.	ÜB	TFK Number					
A2	0	0	0	0	0	0	0	0
	Message Number							
A3	0	0	0	0	0	1	1	1
	System Number			Record Length			Mess.-No.	
A4	0	0	0	0	1/0	0	1	0

1) Parameterizable 0 - 127

	TGE:	0
	Station Number:	1)
A1	Data Construct:	Organizational
	Overflow Bit (ÜB):	0
A2	Message Sequence	
	Identifier (TFK):	0
A3	Message Number:	519 (207 H)
	System Number:	000
A4	Record Length:	010/000

I1	0	0	0	0	0	0	0	0	
I2									0

The reset command is converted to the parameterized destination address (destination region, destination component) in the Ax 1703 system message “Reset for Internal Module” (FC=131).

2.3.2.10. Error Bit Message Interrogation

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	TGE	Station Number						
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	Data Constr.	ÜB	TFK Number					
A2	0	0	0	0	0	0	0	0
	Message Number							
A3	0	0	0	0	0	0	0	1
	System Number			Record Length			Mess.-No.	
A4	0	0	0	0	1	0	1	0

← Bit Significance

1) Parameterizable 0 - 127

	TGE:	0
	Station Number:	1)
A1	Data Construct:	Organizational
	Overflow Bit (ÜB):	0
A2	Message Sequence	
	Identifier (TFK):	0
A3	Message Number:	781 (30 D H)
	System Number:	a
A4	Record Length:	010

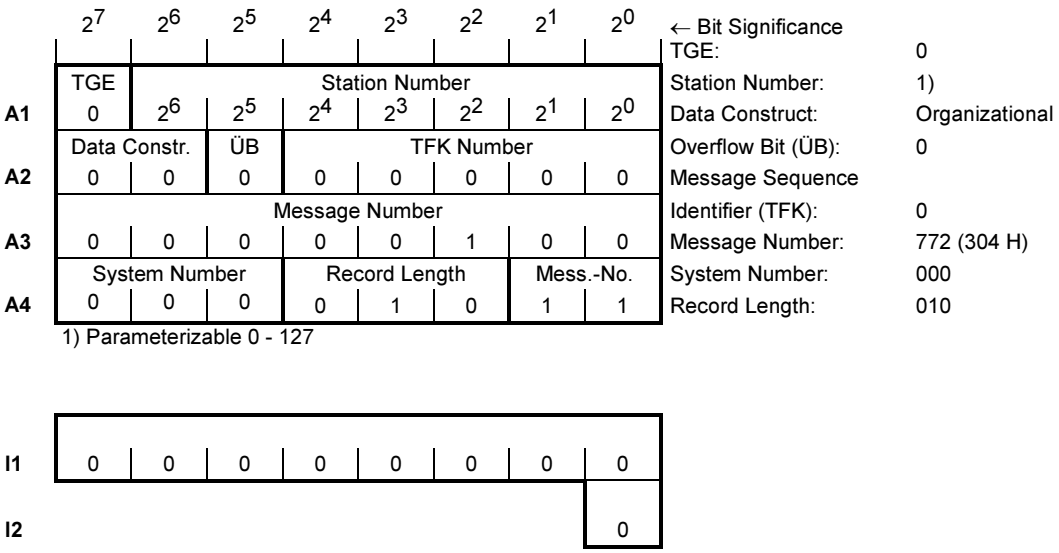
I1	0	0	0	0	0	0	0	b	
I2									0

Comment:

a = No. of system from which the error bit message is being requested; is not evaluated.
b = 1 with deletion of error bit message after transmission
b = 0 without deletion of error bit message after transmission

2.3.2.11. Startup Interrogation

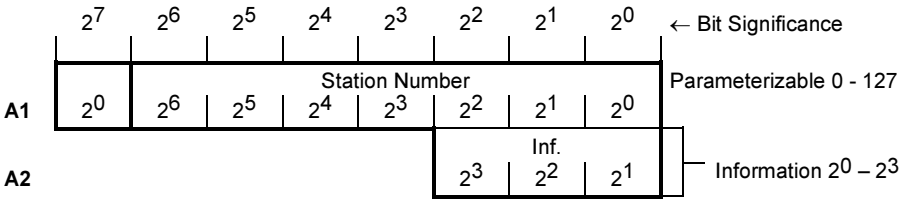
SINAUT8 Format:



Comment:

The master station interrogates the SINAUT8 substation, if parameters, threshold values, smoothing factors are still available after a startup.

2.3.2.12. Request for Information Command during Multipoint Traffic



Meaning of Information Block

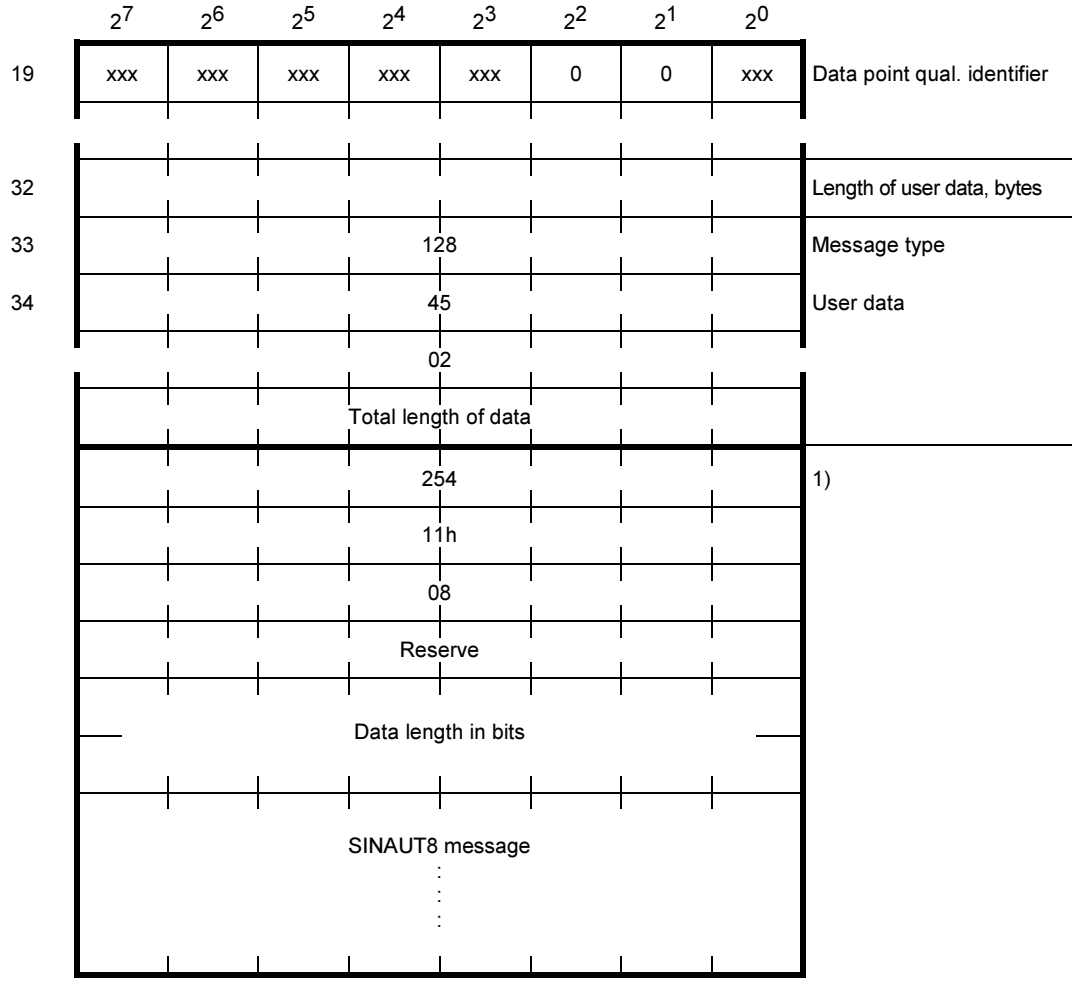
	2^3	2^2	2^1	2^0	
Quick-Check	0	0	0	0	
Quick-Scan	0	0	0	1	
Interrogation List 1	0	0	1	0	
Interrogation List 2	0	0	1	1	
Interrogation List 3	0	1	0	0	
Interrogation List 4	0	1	0	1	
Single interrogation 1	0	1	1	0	currently not used
Single interrogation 2	0	1	1	1	
Single interrogation 3	1	0	0	0	
Single interrogation 4	1	0	0	1	

The firmware does not support single interrogation!
If the firmware receives an interrogation list 1 – 4, an internal image GA request is always initiated.

2.3.2.13. User data Container in Receive Direction

The user data container in the receive direction enables a transparent transmission of the SINAUT8 message for spontaneous data. Organizational messages, such as check command, GA request, are not sent out, since these are only responsible for protocol processing.

Message Format (User data):



1) Interface number 254 = unused
Sequencing/current sequence: 11h
Protocol type: SINAUT8

Address Information:

R#/01	Parameterizable in the OPM
K#/02	Parameterizable in the OPM
BG#/IOA1	255 parameterizable in the OPM
W#/IOA2	255 parameterizable in the OPM
SA/IOA3	Parameterizable in the OPM

2.4. Short-Data-Archive (SDA)-Inquiry

A "Single counter inquiry" or a "Group counter inquiry" is converted into 1-n SDA inquries.

2.4.1. Single Counter Inquiry

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
									TGE: 0
	TGE	Station Number							Station Number: 1)
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Data Construct: 00 Organizational
	Data Constr.		ÜB	TFK Number					Overflow Bit (ÜB): 0
A2	0	0	0	0	0	0	0	0	Message Sequence
	Message Number								Identifier (TFK): 0
A3	0	0	0	0	0	0	0	0	Message Number: 621
	System Number			Record Length			Mess.-No.		System Number: 0 - 7
A4	2^2	2^1	2^0	1	0	0	0	0	Record Length: 100

1) Parameterizable 0 - 127

	b								
I1									
I2	0	0	0	0	0	0	0	0	
	Day								
I3	0	0	0	2^4	2^3	2^2	2^1	2^0	
	Hour								
I4	0	0	0	2^4	2^3	2^2	2^1	2^0	

b ... not assessed
Day: 1 – 31
Hour: 0 - 23

2.4.2. Group Counter Inquiry

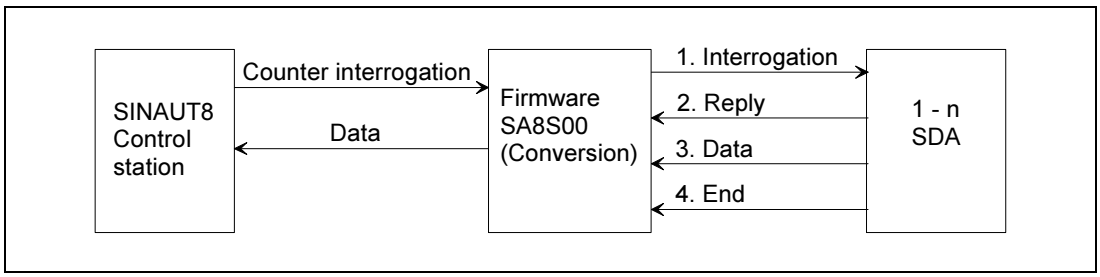
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	← Bit Significance
	TGE	Station Number							TGE: 0
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Station Number: 1)
	Data Constr.		ÜB	TFK Number					Data Construct: 00 Organizational
A2	0	0	0	0	0	0	0	0	Overflow Bit (ÜB): 0
	Message Number								Message Sequence Identifier (TFK): 0
A3	0	0	0	0	0	0	0	0	Message Number: 620
	System Number			Record Length			Mess.-No.		System Number: 0 - 7
A4	2^2	2^1	2^0	1	0	0	0	0	Record Length: 100

1) Parameterizable 0 - 127

	b							
I1								
I2	0	0	0	0	0	0	0	0
	Day							
I3	0	0	0	2^4	2^3	2^2	2^1	2^0
	Hour							
I4	0	0	0	2^4	2^3	2^2	2^1	2^0

b ... not assessed
Day: 1 – 31
Hour: 0 - 23

2.4.3. Transmission Mechanism



A counter interrogation (single/group) forces the transmission of all 15-minutes counters within one hour.
So 4 SDA interrogations will be forced (0, 15, 30, 45 minutes).

2.4.4. Interrogation of the Archive Data

Message structure of the interrogation of an archive timepoint

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
33 / 51								Type identifier
SQ = 0	Number							Variable structure identifier
								Transmission cause (spontaneous)
								Origin address (optional)
Region number / Octet 1								Common address of the ASDU
Component number / Octet 2								
Value number / Octet 3								Information object address
Module number / Octet 4								
Subaddress / Octet 5								
RQK	0	Minute						User data
0	0	0	Hour					
D	0	0	Day					
0	0	0	0	Month				
IV=0	NT=0	SB=0	BL=0	0	0	0	OV=0	DP quality identifier
								Time - 7-octet

RQK Computer source identifier

D Double time identifier 0 = Interrogation of archive data without double-time identifier
1 = Interrogation of archive data with double-time identifier (i.e. double hour after summer/wintertime switchover)

If the type identifier 51 is used for the archive interrogation, then the DP Quality Identifier field is not present.

The SAT-address is parameterized in OPM with typ "Empf KDA".

SAT 1703 Address:

CASDU1
CASDU2
IOA1
IOA2
IOA3

5-level, freely parameterizable SAT 1703 address

TI: Type identification: possible: 255
33 32 bit bit pattern
51 32 bit bit pattern

Archive number: possible: 0 – 255 (assignment archive number ↔ reply telegrams)

Message number: 620, 621

2.4.5. Reply Message, End of the Archive Transmission

The archive transmission is started and ended with these messages.

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
33								Type identifier
SQ = 0	Number							Variable structure identifier
								Transmission cause (= spontaneous)
								Origin address (optional)
Region number								Common address of the ASDU
Component number								
Value number								Information object address
Module number								
Subaddress 5								
RQK	0	Minute						User data
0	0	0	Hour					
D	0	0	Day					
Status			Month					
IV	NT	SB	BL	0	0	0	OV	DP quality identifier
								Time - 7-octet

The address is assigned by the SDA function (exclusively system engineering) in the following way:

- Region number = Own
- Component number = Own
- Value number = Archive number (0 – 15)
- Module number = Own
- Subaddress= 132

If archive data are present for the interrogated timepoint, then two reply messages are sent before transmission of the data.

- 1st reply message with Status = 5
- 2nd reply message with Status = 0

All remaining reply statuses end the archive interrogation (without ending the archive transmission) because no archive data could be found.
"Spontaneous" is flagged in the transmission cause.

Status:

5 .... Archive interrogation is allowed and data for the interrogated timepoint are present.
Time and date = Time and date of the interrogation message and RQK

0 .... Archive interrogation is allowed and data for the interrogated timepoint are present.
For Status = 0, the user data are assigned as follows:

Number of archive data to be sent								User data
0	0	0	0	0	0	0	RQK	
Status = 0				0	0	0	0	

1 .... No entry present in the archive or archive not present.
Time and date = Time and date of the interrogation message and RQK

2 .... No further interrogation possible while archive interrogation is running.
Time and date = Time and date of the interrogation message and RQK

3 .... No data stored in the archive for the interrogated timepoint.
Time and date = Next (newer) timepoint and RQK which are stored in the archive

4 .... Interrogated timepoint is outside the time range stored in the archive
Time and date = The oldest timepoint and RQK which are in the archive

15 .. End of the archive data transmission
Time and date = Time and date of the interrogation message

The address conversion is parameterized with OPM (type "Send KDA").

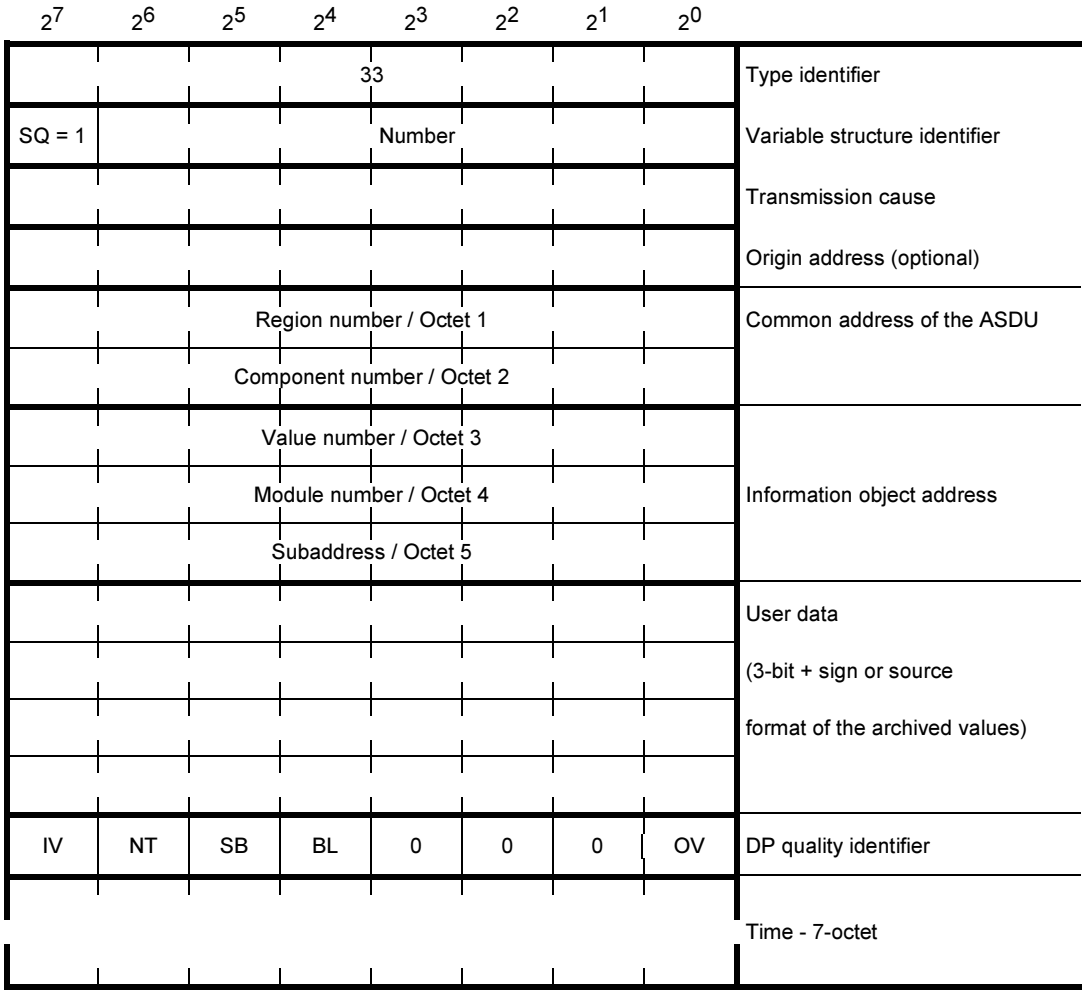
SAT 1703 Address:

CASDU1 CASDU2 IOA1 IOA2 IOA3	5-level, freely parameterizable SAT 1703 source address possible: 0 - 255

TI: Type identification: possible: 255
33 32 bit bit pattern
51 32 bit bit pattern

Archive number: possible: 0 – 255 (assignment for interrogation)

2.4.6. Archive Data (Values)



The archive data are transmitted with the five-stage source address of the archived data point as a process engineering address.

The data point quality identifier applies to the archive data.

The archive data are forwarded with the transmission cause "Retrieved" (= 5).

Supported SAT 1703 Message Formats

- 32 bit bit pattern (TI = 33)

Address Conversion SAT 1703 → SINAUT8

Address conversion is parameterized using an OPM (object-oriented process data manager). To this end, the protocol precision allocation system provides the precision allocation type “Send_value” with the following entries:

SAT 1703 Address:

CASDU1 CASDU2 IOA1 IOA2 IOA3	5-level, freely parameterizable SAT 1703 source address possible: 0 – 255

TI: Type Identification: possible: 255, supported formats
When using system-oriented addressing (= topology parameters), TI = 255 must be parameterized, and the appropriate subaddress must be entered in field IOA3; during process-oriented addressing, the appropriate TI must be parameterized.

SINAUT8 Address:

System Number: Possible 0 – 7

Message Address: 0 - 984

SINAUT8 Format: Counter value RT from SDA BCD-coded

Additional Information: Archive number 0 - 255

SINAUT8 Format:

	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	← Bit Significance							
	TGE	Station Number						
A1	0	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	Data Constr.		ÜB	TFK Number				
A2	1	1	0	0	0	0	0	0
	Message Number							
A3	0	0	0	0	1	0	0	0
	System Number			Record Length			Mess.-No.	
A4	2^2	2^1	2^0	1	1	0	0	0

TGE:	0
Station Number:	1)
Data Construct:	interrogated "11"
Overflow Bit (ÜB):	0 or 1
Message Sequence Identifier (TFK):	1 - 31
Message Number:	0 - 508
System Number:	0 - 7
Record Length:	110

1) parameterizable 0 - 127

I1	2^{nd} Decade				1^{st} Decade			
I2	4^{th} Decade				3^{rd} Decade			
I3	6^{th} Dekade				5^{th} Dekade			
I4	0	0	0	0	7^{th} Dekade			
I5	Day							
	0	0	0	2^4	2^3	2^2	2^1	2^0
I6	Hour							
	0	0	0	2^4	2^3	2^2	2^1	2^0
I7	Minute							
	0	0	2^5	2^4	2^3	2^2	2^1	2^0
I8	0	0	0	0	0	0	0	0
I9	0	0	0	0	0	0	0	0

A. Appendix: Diagnostic

A.1. Class Internal

A.1.1. Class Internal - Record 0 : Internal error in the operating system

Bit	Description
00	RAM error
01	STACK error The defined stack range was exceeded; Replace system element or notify SAT.
02	Firmware shutdown Diagnostic: - Read out system diagnostics ring (Command ID R) in ST emulation (possibly store to file)
03	Too little free space There is not enough free RAM memory for the dynamic memory management; Diagnostic: - Change parameterization of size definitions (e.g. realtime rings, pool size) - Notify SAT.
08	CPU 80186 error Occurs on internal software error.

A.1.2. Class Internal - Record 2 : Parameter error SSE

Bit	Description
00	Parameter error detected by SIP
01	Parameter error - Migration (Parameter block L06) Possible causes: - TI 38-40 and 136-143 must not be parameterized without time - TI 160 must not be parameterized with time - Transmission of objects for GI with/without time; Value > 3 - Number of octets - Transmission cause (COT) <> 2 - Number of octets - Common address of the ASDU (CAASDU) <> 2 - Number of octets - Information object address (IOA) <> 3 - Number of octets - Time mark <> 7
02	Parameter error - SSE general
03	Incorrect station number parameterized. Reason: Station number is greater than 100 and is also not a Broadcast Station No.
04	Incorrect station number parameterized. Reason: Station number is already used.
05	Parameter error for IEC870 connection layer
06	Parameter error for IEC870 application layer
07	Parameter error - Redundancy
10	Parameter error Adaption for measured values
15	Parameter error - Time zones

A.1.3. Class Internal - Record 3 : Error - Format conversion SSE

Bit	Description
00	Error - Format conversion in the transmission direction
02	Error - Format conversion in the receive direction
15	Error detected when converting a PST control message Diagnosis: - Read out system diagnostics ring (Command ID R) in ST emulation (possibly save to file)

A.1.4. Class Internal - Record 10 : Parameter error detected by SSE

Bit	Description
00	Parameter error - System-technical parameterization
03	Address type incorrectly parameterized
05	More than 1000 routings used in the transmit direction
06	More than 400 routings used in the receive direction
10	Parameter error - Receive fine routing
11	Parameter error - Transmission fine routing

A.2. Class Communication

A.2.1. Class Communication - Record 2 : Communications error

Bit	Description
00	Communications failure to the remote station

A.3. Class Test

A.3.1. Class Test - Record 0 : Test mode of the operating and basic systems

Bit	Description
00	Memory test disabled
01	Online debugger running (breakpoints possibly set)

B. Appendix: Parameter Documentation

B.1. Common settings

Parameter	Description	Values/Ranges
Protocol type	Selection of the communication mode betwenn "balanced point-point" and "multipoint slave"	[0] point-to-point traffic RTU [1] multi-point traffic slave
baud rate receiver	baud rate in receive direction	[50] 50 [Bd] [75] 75 [Bd] [100] 100 [Bd] [110] 110 [Bd] [150] 150 [Bd] [200] 200 [Bd] [300] 300 [Bd] [600] 600 [Bd] [1050] 1050 [Bd] [1200] 1200 [Bd] [1800] 1800 [Bd] [2000] 2000 [Bd] [2400] 2400 [Bd] [4800] 4800 [Bd] [9600] 9600 [Bd] [134,5] 134,5 [Bd]
baud rate transmitter	baud rate in transmit direction	[50] 50 [Bd] [75] 75 [Bd] [100] 100 [Bd] [110] 110 [Bd] [150] 150 [Bd] [200] 200 [Bd] [300] 300 [Bd] [600] 600 [Bd] [1050] 1050 [Bd] [1200] 1200 [Bd] [1800] 1800 [Bd] [2000] 2000 [Bd] [2400] 2400 [Bd] [4800] 4800 [Bd] [9600] 9600 [Bd] [134,5] 134,5 [Bd]
electrical interface	electrical interface	[0] PDM - modulation [1] PCM - modulation with IEC-Header
own station number	own station number must be parametrized always	Integer [###] 0 to 127

B.2. Common settings | Settings for PDM modulation

Settings for PDM modulation

Parameter	Description	Values/Ranges
Distortion	Maximal distortion in receive direction	Integer [##] 0 to 99 [Percent]

Message end in transmit direction	Minimal gap between two messages in transmit direction	Integer [###] 3 to 255 [Long Bits]
Message protection receive direction	Setting of the used message protection The message protection protects each message optional with d=2,4 or 6	[0] 2 (parity check) [1] 4 (10 bit CRC) [2] 6 (16 bit CRC)
Message protection transmit direction	Setting of the used message protection The message protection protects each message optional with d=2,4 or 6	[0] 2 (parity check) [1] 4 (10 bit CRC) [2] 6 (16 bit CRC)
Modulation ratio receive direction	The modulation ratio defines the ration between "short" character und "long" character	[0] 1 : 2,0 [1] 1 : 2,2 [2] 1 : 2,4 [3] 1 : 2,6 [4] 1 : 2,8 [5] 1 : 3,0
Modulation ratio transmit direction	The modulation ratio defines the ration between "short" character und "long" character	[0] 1 : 2,0 [1] 1 : 2,2 [2] 1 : 2,4 [3] 1 : 2,6 [4] 1 : 2,8 [5] 1 : 3,0
Monitoring message end	Gap-monitoring between two messages in receive direction	[0] NO [1] YES
Station number is being received	Setting, if the station number is included in the SINAUT8-message	[0] YES [1] NO
Station number is being transmitted	Setting, if the station number is included in the SINAUT8-message	[0] YES [1] NO
Synchronization receiver		[0] negative edge [1] positive edge
invert transmitter		[0] NO [1] YES

B.3. Common settings | protocoll enabling

protocoll enabling

Parameter	Description	Values/Ranges
Block counter values at GI.	Possibility to block transmission of integrated totals at general interrogation	[0] NO [1] YES
Increase message sequence ID at GI	Definition if messages with "data type = interrogated" increase the message sequence identifier.	[0] YES [1] NO
Send last stop cause (TGN=782)	Send "cause of last stop" (=organizational message) after "startup acknowlege command"	[0] YES [1] NO
Topple single-/double pt. information	single-/double point ifnormation turn byte wise	[0] NO [1] YES

B.4. Redundancy

Parameter	Description	Values/Ranges
Delay time passive=>active	delay time in case of switch over from PASSIVE=>ACTIVE (0 = without delay)	Integer [####] 0 to 2000 [s]
operation if passive	operation if passive	[0] interface "TRISTATE" [3] interface "ACTIVE",

		calling mode (=OPERATION)

B.5. advanced parameters

Parameter	Description	Values/Ranges
IV and NT-bit assessment	Setting for transmission for information with "NT/IV=1" Example: SINAUT8-indication consists up to 32 single point information Block transmission, if - at least one "NT/IV=1" or - all "NT/IV=1"	[0] block emission when all IV/NT - Bit are set [1] block emission when min 1IV/NT - Bit is set [2] no IV and NT-bit assessment
Send GI with parametrized CASDU	ja: GA mit param. CASDU nein: GA mit gelernter CASDU aus Sendefeinrangierung	[0] YES [1] NO
Startup delay	This delay is used to update the process image table after restart and before the communication is getting started.	Integer [###] 0 to 255 [s]
Subst. value transformer tap	Substitute value for step position information Substitute value is used, if "NT-Bit" and/or "IV-Bit" is set.	Integer [###] 0 to 255

B.6. advanced parameters | CAASDU for general interrog.

CAASDU for general interrog.

Parameter	Description	Values/Ranges
CASDU1	1st byte of common address of ASDU (LSB)	Integer [###] 0 to 255
CASDU2	2nd byte of common address of ASDU (MSB)	Integer [###] 0 to 255

B.7. advanced parameters | CAASDU for reset command

CAASDU for reset command

Parameter	Description	Values/Ranges
CASDU1	1st byte of common address of ASDU (LSB)	Integer [###] 0 to 255
CASDU2	2nd byte of common address of ASDU (MSB)	Integer [###] 0 to 255

B.8. advanced parameters | Measured values

Measured values

Parameter	Description	Values/Ranges
Block measured values at GI	Possibility to block transmission of measured values at general interrogation	[0] NO [1] YES

Subst. value 11 bit meas. value	Substitute value "measured values - 11 Bit" (SINAUT8-format) Substitute value is used, if "NT-Bit" and/or "IV-Bit" is set.	Integer [#####] -2048 to 2047
Subst. value 8 bit meas. value	Substitute value "measured values - 8 Bit" (SINAUT8-format) Substitute value is used, if "NT-Bit" and/or "IV-Bit" is set.	Integer [####] -256 to 255
Use measured value adaptation	Activation of the measured value adaption	[0] NO [1] YES
disable time for cycl. measured values at running GI	Nach Ablauf der Zeit werden die zykl. Messwerte wieder gesendet Sperrzeit wird mit jedem GA-Telegramm retriggert	Float [####.#] 0.1 to 6553.5 0
evalute OV-bit	If the "OV-Bit" is set and should be evaluated the measured value is set to a predefined substitute value 8 Bit measured value: 254 11 Bit measured value:2046 (positive and negative overrange possible)	[0] NO [1] YES
send measured value/tap position with NT/IV = 1	Measured values and tap positions with "NT/IV=1" can be transmitted independently of the parameter "IV and NT-bit-assesment". These values are also transmitted at general interrogation (if enabled).	[0] NO [1] YES
send permantent measurands spontaneous	Transmission of "continous measured values" Is no spontanous information to send, "continous measured values" are transmitted permanently in increasing adress-order. These measured values can be transmitted also on change additionally.	[0] YES [1] NO

B.9. advanced parameters | Measured values | Measured value adaptation

Measured value adaptation

Parameter	Description	Values/Ranges
Measured value adaptation 00 X_0%		Float [#########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 00 X_100%		Float [#########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 00 Y_0%		Float [#########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

Measured value adaptation 00 Y_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 01 X_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 01 X_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 01 Y_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 01 Y_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 02 X_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 02 X_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 02 Y_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000

Measured value adaptation 02 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 03 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 03 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 03 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 03 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 04 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 04 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 04 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

Measured value adaptation 04 Y_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 05 X_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 05 X_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 05 Y_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 05 Y_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 06 X_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 06 X_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 06 Y_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000

Measured value adaptation 06 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 07 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 07 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 07 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 07 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 08 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 08 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 08 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

Measured value adaptation 08 Y_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 09 X_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 09 X_100&		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 09 Y_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 09 Y_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 10 X_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 10 X_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 10 Y_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000

Measured value adaptation 10 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 11 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 11 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 11 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 11 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 12 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 12 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 12 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

Measured value adaptation 12 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 13 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 13 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 13 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 13 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 14 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 14 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 14 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

Measured value adaptation 14 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 15 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 15 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 15 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 15 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 16 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 16 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 16 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

Measured value adaptation 16 Y_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 17 X_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 17 X_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 17 Y_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 17 Y_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 18 X_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 18 X_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 18 Y_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000

Measured value adaptation 18 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 19 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 19 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 19 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 19 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 20 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 20 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 20 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

Measured value adaptation 20 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 21 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 21 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 21 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 21 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 22 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 22 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 22 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

Measured value adaptation 22 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 23 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 23 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 23 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 23 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 24 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 24 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 24 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

Measured value adaptation 24 Y_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 25 X_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 25 X_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 25 Y_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 25 Y_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 26 X_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 26 X_100%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 26 Y_0%		Float [##########.######] -340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000

Measured value adaptation 26 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 27 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 27 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 27 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 27 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 28 X_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 28 X_100%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000
Measured value adaptation 28 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

Measured value adaptation 28 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 29 X_0%		Float [##########################.######] - 340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 29 X_100%		Float [##########################.######] - 340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 29 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 29 Y_100%		Float [##########################.######] - 340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 30 X_0%		Float [##########################.######] - 340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 30 X_100%		Float [##########################.######] - 340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000
Measured value adaptation 30 Y_0%		Float [##########################.######] - 340282300000000000000000000000000000.000000 to 340282300000000000000000000000000000.000000

Measured value adaptation 30 Y_100%		Float [##########################.######] -340282300000000000000000000000000000000.000000 to 340282300000000000000000000000000000000.000000

B.10. advanced parameters | Measured values | Message number permanent measured values

Message number permanent measured values

Parameter	Description	Values/Ranges
Number of last message	Continuous measured value are indentificated by the start message number and end message number	Integer [####] 0 to 767
Start message number	Continuous measured value are indentificated by the start message number and end message number	Integer [####] 0 to 767

B.11. advanced parameters | Message number bounds receive direction

Message number bounds receive direction

Parameter	Description	Values/Ranges
1. message no. of analog setpoint values	Telegrammnumbers below corresponds to digital setpoints	Integer [#####] 0 to 1023
1. message no. of digital setpt. values	Telegrammnumbers below corresponds to commands	Integer [#####] 0 to 1023

B.12. advanced parameters | Operation and error bit field

Operation and error bit field

Parameter	Description	Values/Ranges
error bit border 15-8	Bytemask to mask out bits	Integer [########] 0 to 255
error bit border 23-16	Bytemask to mask out bits	Integer [########] 0 to 255
error bit border 31-24	Bytemask to mask out bits	Integer [########] 0 to 255
error bit border 7-0	Bytemask to mask out bits	Integer [########] 0 to 255
operation bit border 15-8	Bytemask to mask out bits	Integer [########] 0 to 255
operation bit border 23-16	Bytemask to mask out bits	Integer [########] 0 to 255
operation bit border 31-24	Bytemask to mask out bits	Integer [########] 0 to 255

operation bit border 7-0	Bytemask to mask out bits	Integer [########] 0 to 255

B.13. advanced parameters | Software test points

Software test points

Parameter	Description	Values/Ranges
Handshake RTS,GPB (ASCII-Mode)	The change of this parameter required profoundness communication knowledge. A specialist should be contacted before.	[0] NO [1] YES
Handshake RTS,GPB (HEX-Mode)	The change of this parameter required profoundness communication knowledge. A specialist should be contacted before.	[0] NO [1] YES
Init-end processing	The change of this parameter required profoundness communication knowledge. A specialist should be contacted before.	[0] NO [1] YES
ZDT-filter	The change of this parameter required profoundness communication knowledge. A specialist should be contacted before.	[0] NO [1] YES
correction time of the time synchr.	The change of this parameter required profoundness communication knowledge. A specialist should be contacted before.	[0] NO [1] YES
data and acknowledgement between BSE	The change of this parameter required profoundness communication knowledge. A specialist should be contacted before.	[0] NO [1] YES
level locking station locking	The change of this parameter required profoundness communication knowledge. A specialist should be contacted before.	[0] NO [1] YES
mask for blocking data pick-up	The change of this parameter required profoundness communication knowledge. A specialist should be contacted before.	[0] NO [1] YES
master-standby switchover	The change of this parameter required profoundness communication knowledge. A specialist should be contacted before.	[0] NO [1] YES
stop_serialtest_after_comm_error	The change of this parameter required profoundness communication knowledge. A specialist should be contacted before.	[0] NO [1] YES

B.14. advanced parameters | Table for Mulit-point-traffic (MP) | List 1

List 1

Parameter	Description	Values/Ranges
End message number for List	Last telegramm number which is sent in this list	Integer [#####] 0 to 1023
Start message number for List	1. telegramm number which is sent in this list	Integer [#####] 0 to 1023

B.15. advanced parameters | Table for Mulit-point-traffic (MP) | List 2

List 2

Parameter	Description	Values/Ranges
End message number for List	Last telegramm number which is sent in this list	Integer [#####] 0 to 1023
Start message number for List	1. telegramm number which is sent in this list	Integer [#####] 0 to 1023

B.16. advanced parameters | Table for Mulit-point-traffic (MP) | List 3

List 3

Parameter	Description	Values/Ranges
End message number for List	Last telegramm number which is sent in this list	Integer [#####] 0 to 1023
Start message number for List	1. telegramm number which is sent in this list	Integer [#####] 0 to 1023

B.17. advanced parameters | Table for Mulit-point-traffic (MP) | List 4

List 4

Parameter	Description	Values/Ranges
End message number for List	Last telegramm number which is sent in this list	Integer [#####] 0 to 1023
Start message number for List	1. telegramm number which is sent in this list	Integer [#####] 0 to 1023

B.18. advanced parameters | advanced time settings

advanced time settings

Parameter	Description	Values/Ranges
pause time "time base" (tp)	Parametrized times in bits depend on the the baudrate!	[0] Bit [1] ms
pause time (tp)	Before a message transmission the set pause time is waited before switching on the transmit carrier (RTS).	Integer [#####] 0 to 32767 [ms / Bit]
run-out time "time base" (tn)	Parametrized times in bits depend on the the baudrate!	[0] Bit [1] ms
run-out time (tn)	After message transmission, the transmit carrier (RTS) is switched off after run-out time.	Integer [#####] 0 to 32767 [ms / Bit]
set up time "time base" (tv)	Parametrized times in bits depend on the the baudrate!	[0] Bit [1] ms
set up time (tv)	After switching the carrier to ON (RTS) the message transmission is started after set up time. Note: If "tv=0" no carrier switching is used (RTS=OFF)!	Integer [#####] 0 to 32767 [ms / Bit]

B.19. advanced parameters | monitoring times

monitoring times

Parameter	Description	Values/Ranges
call monitoring time	If the station call monitoring time expires (SLAVE is no longer called from the MASTER), a failure of the interface is signalled.	Float [####.] 0 to 60000 [s]
monit. time SDA-inquiry	Monitoring time for the request/response procedure of the short term data archiv	Integer [###] 0 to 255 [s]
monit. time testcommand containermode	failure monitoring time in listening mode (0 = no monitoring)	Integer [###] 0 to 255 [s]

B.20. advanced parameters | qualifier of command | qualifier of command 0

qualifier of command 0

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.21. advanced parameters | qualifier of command | qualifier of command 1

qualifier of command 1

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.22. advanced parameters | qualifier of command | qualifier of command 10

qualifier of command 10

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.23. advanced parameters | qualifier of command | qualifier of command 11

qualifier of command 11

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.24. advanced parameters | qualifier of command | qualifier of command 12

qualifier of command 12

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.25. advanced parameters | qualifier of command | qualifier of command 13

qualifier of command 13

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.26. advanced parameters | qualifier of command | qualifier of command 14

qualifier of command 14

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.27. advanced parameters | qualifier of command | qualifier of command 15

qualifier of command 15

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.28. advanced parameters | qualifier of command | qualifier of command 2

qualifier of command 2

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.29. advanced parameters | qualifier of command | qualifier of command 3

qualifier of command 3

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.30. advanced parameters | qualifier of command | qualifier of command 4

qualifier of command 4

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.31. advanced parameters | qualifier of command | qualifier of command 5

qualifier of command 5

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.32. advanced parameters | qualifier of command | qualifier of command 6

qualifier of command 6

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.33. advanced parameters | qualifier of command | qualifier of command 7

qualifier of command 7

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.34. advanced parameters | qualifier of command | qualifier of command 8

qualifier of command 8

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31

B.35. advanced parameters | qualifier of command | qualifier of command 9

qualifier of command 9

Parameter	Description	Values/Ranges
coarse time	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	[0] 50ms [1] 500ms [2] 1s [3] 10s
multiplicator	Command output time for commands with ti=160 The command output time is defined by the "time code"(0-15) in the received SINAUT8-command message.	Integer [##] 0 to 31