



AC500 PLC

AC500 – IEC60870-5-104 Protocol Interoperability / Compatibility List

For AC500 V2 and V3 CPU 's

AC500 PLC

AC500 – IEC60870-5-104 Protocol Interoperability / Compatibility List For AC500 V2 and V3 CPU 's

NOTICE

This document contains information about one or more ABB products and may include a description of or a reference to one or more standards that may be generally relevant to the ABB products. The presence of any such description of a standard or reference to a standard is not a representation that all of the ABB products referenced in this document support all of the features of the described or referenced standard. In order to determine the specific features supported by a particular ABB product, the reader should consult the product specifications for the particular ABB product.

ABB may have one or more patents or pending patent applications protecting the intellectual property in the ABB products described in this document.

The information in this document is subject to change without notice and should not be construed as a commitment by ABB. ABB assumes no responsibility for any errors that may appear in this document.

Products described or referenced in this document are designed to be connected and to communicate information and data through network interfaces, which should be connected to a secure network. It is the sole responsibility of the system/product owner to provide and continuously ensure a secure connection between the product and the system network and/or any other networks that may be connected.

The system/product owners must establish and maintain appropriate measures, including, but not limited to, the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, and so on, to protect these products, the network, its system, and interfaces against security breaches, unauthorized access, interference, intrusion, leakage, and/or theft of data or information.

ABB performs functionality testing on the products and updates that we release. However, system/product owners are ultimately responsible for ensuring that any product updates or other major system updates (to include but not limited to code changes, configuration file changes, third-party software updates or patches, hardware change out, and so on) are compatible with the security measures implemented. The system/product owners must verify that the system and associated products function as expected in the environment in which they are deployed.

In no event shall ABB be liable for direct, indirect, special, incidental or consequential damages of any nature or kind arising from the use of this document, nor shall ABB be liable for incidental or consequential damages arising from use of any software or hardware described in this document.

This document and parts thereof must not be reproduced or copied without written permission from ABB, and the contents thereof must not be imparted to a third party nor used for any unauthorized purpose.

The software or hardware described in this document is furnished under a license and may be used, copied, or disclosed only in accordance with the terms of such license. This product meets the requirements specified in EMC Directive 2014/30/EU and in Low Voltage Directive 2014/35/EU.

A. For customers domiciled outside Germany /

Für Kunden mit Sitz außerhalb Deutschlands

„Warranty, Liability:

The user shall be solely responsible for the use of this products described within this file. ABB shall be under no warranty whatsoever. ABB's liability in connection with application of the products or examples provided or the files included within this products, irrespective of the legal ground, shall be excluded. The exclusion of liability shall not apply in the case of intention or gross negligence. The present declaration shall be governed by and construed in accordance with the laws of Switzerland under exclusion of its conflict of laws rules and of the Vienna Convention on the International Sale of Goods (CISG)."

„Gewährleistung und Haftung:

Der Nutzer ist allein für die Verwendung des in diesem Dokument beschriebenen Produkte und beschriebenen Anwendungsbeispiele verantwortlich.

ABB unterliegt keiner Gewährleistung. Die Haftung von ABB im Zusammenhang mit diesem Anwendungsbeispiel oder den in dieser Datei enthaltenen Dateien - gleich aus welchem Rechtsgrund - ist ausgeschlossen. Dieser Ausschluß gilt nicht im Falle von Vorsatz oder grober Fahrlässigkeit. Diese Erklärung unterliegt Schweizer Recht unter Ausschluß der Verweisungsnormen und des UN-Kaufrechts (CISG)."

B. Nur für Kunden mit Sitz in Deutschland

„Gewährleistung und Haftung:

Die in diesem dokument beschriebenen Anwendungsbeispiele oder enthaltenen Dateien beschreiben eine mögliche Anwendung der AC500 bzw. zeigen eine mögliche Einsatzart. Sie stellen nur Beispiele für Programmierungen dar, sind aber keine fertigen Lösungen. Eine Gewähr kann nicht übernommen werden.

Der Nutzer ist für die ordnungsgemäße, insbesondere vollständige und fehlerfreie Programmierung der Steuerungen selbst verantwortlich. Im Falle der teilweisen oder ganzen Übernahme der Programmierbeispiele können gegen ABB keine Ansprüche geltend gemacht werden.

Die Haftung von ABB, gleich aus welchem Rechtsgrund, im Zusammenhang mit den Anwendungsbeispielen oder den in dieser Datei enthaltenen Beschreibung wird ausgeschlossen. Der Haftungsausschluß gilt jedoch nicht in Fällen des Vorsatzes, der groben Fahrlässigkeit, bei Ansprüchen nach dem Produkthaftungsgesetz, im Falle der Verletzung des Lebens, des Körpers oder der Gesundheit oder bei schuldhafter Verletzung einer wesentlichen Vertragspflicht. Im Falle der Verletzung einer wesentlichen Vertragspflicht ist die Haftung jedoch auf den vertragstypischen, vorhersehbaren Schaden begrenzt, soweit nicht zugleich ein anderer der in Satz 2 dieses Unterabsatzes erwähnten Fälle gegeben ist. Eine Änderung der Beweislast zum Nachteil des Nutzers ist hiermit nicht verbunden.

Es gilt materielles deutsches Recht unter Ausschluß des UN-Kaufrechts."

TRADEMARKS

All rights to copyrights, registered trademarks, and trademarks reside with their respective owners.

Copyright © 2023 ABB.

All rights reserved.

Release: November 2021

Document number: 3ADR011172

9 Interoperability

This companion standard presents sets of parameters and alternatives from which subsets must be selected to implement particular telecontrol systems. Certain parameter values, such as the choice of "structured" or "unstructured" fields of the INFORMATION OBJECT ADDRESS of ASDUs represent mutually exclusive alternatives. This means that only one value of the defined parameters is admitted per system. Other parameters, such as the listed set of different process information in command and in monitor direction allow the specification of the complete set or subsets, as appropriate for given applications. This clause summarizes the parameters of the previous clauses to facilitate a suitable selection for a specific application. If a system is composed of equipment stemming from different manufacturers, it is necessary that all partners agree on the selected parameters.

The interoperability list is defined as in IEC 60870-5-101 and extended with parameters used in this standard. The text descriptions of parameters which are not applicable to this companion standard are strike-through (corresponding check box is marked black).

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

The selected parameters should be marked in the white boxes as follows:

- Function or ASDU is not used
- Function or ASDU is used as standardized (default)
- Function or ASDU is used in reverse mode
- Function or ASDU is used in standard and reverse mode

The possible selection (blank, X, R, or B) is specified for each specific clause or parameter.

A black check box indicates that the option cannot be selected in this companion standard.

9.1 System or device

(system-specific parameter, indicate definition of a system or a device by marking one of the following with "X")

- System definition
- Controlling station definition (Master)
- Controlled station definition (Slave)

9.2 Network configuration

(network-specific parameter, all configurations that are used are to be marked "X")

- | | |
|---|---|
| <input checked="" type="checkbox"/> Point-to-point | <input checked="" type="checkbox"/> Multipoint- |
| <input checked="" type="checkbox"/> Multiple point-to-point | <input checked="" type="checkbox"/> Multipoint-star |

9.3 Physical layer

(network-specific parameter, all interfaces and data rates that are used are to be marked "X")

Transmission speed (control direction)

| Unbalanced interchange Circuit V.24/V.28 Standard | Unbalanced interchange Circuit V.24/V.28 Recommended if >1 200 bit/s | Balanced interchange Circuit X.24/X.27 | |
|---|--|---|---------------------------------------|
| <input type="checkbox"/> 100 bit/s | <input type="checkbox"/> 2 400 bit/s | <input type="checkbox"/> 2 400 bit/s | <input type="checkbox"/> 56 000 bit/s |
| <input type="checkbox"/> 200 bit/s | <input type="checkbox"/> 4 800 bit/s | <input type="checkbox"/> 4 800 bit/s | <input type="checkbox"/> 64 000 bit/s |
| <input type="checkbox"/> 300 bit/s | <input type="checkbox"/> 9 600 bit/s | <input type="checkbox"/> 9 600 bit/s | |
| <input type="checkbox"/> 600 bit/s | | <input type="checkbox"/> 19 200 bit/s | |
| <input type="checkbox"/> 1 200 bit/s | | <input type="checkbox"/> 38 400 bit/s | |

Transmission speed (monitor direction)

| Unbalanced interchange Circuit V.24/V.28 Standard | Unbalanced interchange Circuit V.24/V.28 Recommended if >1 200 bit/s | Balanced interchange Circuit X.24/X.27 | |
|---|--|---|---------------------------------------|
| <input type="checkbox"/> 100 bit/s | <input type="checkbox"/> 2 400 bit/s | <input type="checkbox"/> 2 400 bit/s | <input type="checkbox"/> 56 000 bit/s |
| <input type="checkbox"/> 200 bit/s | <input type="checkbox"/> 4 800 bit/s | <input type="checkbox"/> 4 800 bit/s | <input type="checkbox"/> 64 000 bit/s |
| <input type="checkbox"/> 300 bit/s | <input type="checkbox"/> 9 600 bit/s | <input type="checkbox"/> 9 600 bit/s | |
| <input type="checkbox"/> 600 bit/s | | <input type="checkbox"/> 19 200 bit/s | |
| <input type="checkbox"/> 1 200 bit/s | | <input type="checkbox"/> 38 400 bit/s | |

9.4 Link layer

(network-specific parameter, all options that are used are to be marked "X". Specify the maximum frame length. If a non-standard assignment of class 2 messages is implemented for unbalanced transmission, indicate the Type ID and COT of all messages assigned to class 2.)

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

Link transmission

- Balanced transmission
- Unbalanced transmission

Frame length

- Maximum length L
(number of octets)

Address field of the link

- not present (balanced transmission only)
- One octet
- Two octets
- Structured
- Unstructured

When using an unbalanced link layer, the following ASDU types are returned in class 2 messages (low priority) with the indicated causes of transmission:

The standard assignment of ASDUs to class 2 messages is used as follows:

| Type identification | Cause of transmission |
|---------------------|-----------------------|
| 9, 11, 13, 21 | <1> |

A special assignment of ASDUs to class 2 messages is used as follows:

| Type identification | Cause of transmission |
|---------------------|-----------------------|
| | |
| | |
| | |
| | |

Note: (In response to a class 2 poll, a controlled station may respond with class 1 data when there is no class 2 data available).

9.5 Application layer

Transmission mode for application data

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

Common address of ASDU

(system-specific parameter, all configurations that are used are to be marked "X")

One octet Two octets

Information object address

(system-specific parameter, all configurations that are used are to be marked "X")

One octet Structured
 Two octets Unstructured
 Three octets

Cause of transmission

(system-specific parameter, all configurations that are used are to be marked "X")

One octet Two octets (with originator address). Originator address is set to zero if not used

Length of APDU

(system-specific parameter, specify the maximum length of the APDU per system)

The maximum length of APDU for both directions is 253. It is a fixed system parameter.

Maximum length of APDU per system in control direction

 Maximum length of APDU per system in monitor direction

Selection of standard ASDUs

Process information in monitor direction

(station-specific parameter, mark each Type ID "X" if it is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

| | | | |
|-------------------------------------|------|---|-----------|
| <input checked="" type="checkbox"/> | <1> | := Single-point information | M_SP_NA_1 |
| <input type="checkbox"/> | <2> | := Single-point information with time tag | M_SP_TA_1 |
| <input checked="" type="checkbox"/> | <3> | := Double-point information | M_DP_NA_1 |
| <input type="checkbox"/> | <4> | := Double-point information with time tag | M_DP_TA_1 |
| <input type="checkbox"/> | <5> | := Step position information | M_ST_NA_1 |
| <input type="checkbox"/> | <6> | := Step position information with time tag | M_ST_TA_1 |
| <input type="checkbox"/> | <7> | := Bitstring of 32 bit | M_BO_NA_1 |
| <input type="checkbox"/> | <8> | := Bitstring of 32 bit with time tag | M_BO_TA_1 |
| <input checked="" type="checkbox"/> | <9> | := Measured value, normalized value | M_ME_NA_1 |
| <input type="checkbox"/> | <10> | := Measured value, normalized value with time tag | M_ME_TA_1 |
| <input checked="" type="checkbox"/> | <11> | := Measured value, scaled value | M_ME_NB_1 |
| <input type="checkbox"/> | <12> | := Measured value, scaled value with time tag | M_ME_TB_1 |
| <input checked="" type="checkbox"/> | <13> | := Measured value, short floating point value | M_ME_NC_1 |
| <input type="checkbox"/> | <14> | := Measured value, short floating point value with time tag | M_ME_TC_1 |
| <input checked="" type="checkbox"/> | <15> | := Integrated totals | M_IT_NA_1 |
| <input type="checkbox"/> | <16> | := Integrated totals with time tag | M_IT_TA_1 |
| <input type="checkbox"/> | <17> | := Event of protection equipment with time tag | M_EP_TA_1 |
| <input type="checkbox"/> | <18> | := Packed start events of protection equipment with time tag | M_EP_TB_1 |
| <input type="checkbox"/> | <19> | := Packed output circuit information of protection equipment with time tag | M_EP_TC_1 |
| <input type="checkbox"/> | <20> | := Packed single-point information with status change detection | M_SP_NA_1 |
| <input type="checkbox"/> | <21> | := Measured value, normalized value without quality descriptor | M_ME_ND_1 |
| <input checked="" type="checkbox"/> | <30> | := Single-point information with time tag CP56Time2a | M_SP_TB_1 |
| <input checked="" type="checkbox"/> | <31> | := Double-point information with time tag CP56Time2a | M_DP_TB_1 |
| <input type="checkbox"/> | <32> | := Step position information with time tag CP56Time2a | M_ST_TB_1 |
| <input type="checkbox"/> | <33> | := Bitstring of 32 bit with time tag CP56Time2a | M_BO_TB_1 |
| <input checked="" type="checkbox"/> | <34> | := Measured value, normalized value with time tag CP56Time2a | M_ME_TD_1 |
| <input type="checkbox"/> | <35> | := Measured value, scaled value with time tag CP56Time2a | M_ME_TE_1 |
| <input checked="" type="checkbox"/> | <36> | := Measured value, short floating point value with time tag CP56Time2a | M_ME_TF_1 |
| <input checked="" type="checkbox"/> | <37> | := Integrated totals with time tag CP56Time2a | M_IT_TB_1 |
| <input type="checkbox"/> | <38> | := Event of protection equipment with time tag CP56Time2a | M_EP_TD_1 |
| <input type="checkbox"/> | <39> | := Packed start events of protection equipment with time tag CP56Time2a | M_EP_TE_1 |
| <input type="checkbox"/> | <40> | := Packed output circuit information of protection equipment with time tag CP56Time2a | M_EP_TF_1 |

In this companion standard only the use of the set <30> – <40> for ASDUs with time tag is permitted.

Process information in control direction

(station-specific parameter, mark each Type ID "X" if it is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

| | | |
|-------------------------------------|--|-----------|
| <input checked="" type="checkbox"/> | <45> := Single command | C_SC_NA_1 |
| <input checked="" type="checkbox"/> | <46> := Double command | C_DC_NA_1 |
| <input type="checkbox"/> | <47> := Regulating step command | C_RC_NA_1 |
| <input checked="" type="checkbox"/> | <48> := Set point command, normalized value | C_SE_NA_1 |
| <input type="checkbox"/> | <49> := Set point command, scaled value | C_SE_NB_1 |
| <input checked="" type="checkbox"/> | <50> := Set point command, short floating point value | C_SE_NC_1 |
| <input type="checkbox"/> | <51> := Bitstring of 32 bit | C_BO_NA_1 |
| <input checked="" type="checkbox"/> | <58> := Single command with time tag CP56Time2a | C_SC_TA_1 |
| <input checked="" type="checkbox"/> | <59> := Double command with time tag CP56Time2a | C_DC_TA_1 |
| <input type="checkbox"/> | <60> := Regulating step command with time tag CP56Time2a | C_RC_TA_1 |
| <input checked="" type="checkbox"/> | <61> := Set point command, normalized value with time tag CP56Time2a | C_SE_TA_1 |
| <input type="checkbox"/> | <62> := Set point command, scaled value with time tag CP56Time2a | C_SE_TB_1 |
| <input checked="" type="checkbox"/> | <63> := Set point command, short floating point value with time tag CP56Time2a | C_SE_TC_1 |
| <input type="checkbox"/> | <64> := Bitstring of 32 bit with time tag CP56Time2a | C_BO_TA_1 |

Either the ASDUs of the set <45> – <51> or of the set <58> – <64> are used.

System information in monitor direction

(station-specific parameter, mark with an "X" if it is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

| | | |
|-------------------------------------|-------------------------------|-----------|
| <input checked="" type="checkbox"/> | <70> := End of initialization | M_EI_NA_1 |
|-------------------------------------|-------------------------------|-----------|

System information in control direction

(station-specific parameter, mark each Type ID "X" if it is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

| | | |
|-------------------------------------|--|----------------------|
| <input checked="" type="checkbox"/> | <100>:= Interrogation command | C_IC_NA_1 |
| <input checked="" type="checkbox"/> | <101>:= Counter interrogation command | C_CI_NA_1 |
| <input checked="" type="checkbox"/> | <102>:= Read command | C_RD_NA_1 |
| <input checked="" type="checkbox"/> | <103>:= Clock synchronization command (option see 7.6) | C_CS_NA_1 |
| <input type="checkbox"/> | <104>:= Test command | C_TS_NA_1 |
| <input checked="" type="checkbox"/> | <105>:= Reset process command | C_RP_NA_1 |
| <input type="checkbox"/> | <106>:= Delay acquisition command | C_CD_NA_1 |
| <input checked="" type="checkbox"/> | <107>:= Test command with time tag CP56Time2a | C_TS_TA_1 |

Parameter in control direction

(station-specific parameter, mark each Type ID "X" if it is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

| | |
|---|-----------|
| <input checked="" type="checkbox"/> <110>:= Parameter of measured value, normalized value | P_ME_NA_1 |
| <input type="checkbox"/> <111>:= Parameter of measured value, scaled value | P_ME_NB_1 |
| <input checked="" type="checkbox"/> <112>:= Parameter of measured value, short floating point value | P_ME_NC_1 |
| <input type="checkbox"/> <113>:= Parameter activation | P_AC_NA_1 |

File transfer

(station-specific parameter, mark each Type ID "X" if it is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

| | |
|---|-----------|
| <input type="checkbox"/> <120>:= File ready | F_FR_NA_1 |
| <input type="checkbox"/> <121>:= Section ready | F_SR_NA_1 |
| <input type="checkbox"/> <122>:= Call directory, select file, call file, call section | F_SC_NA_1 |
| <input type="checkbox"/> <123>:= Last section, last segment | F_LS_NA_1 |
| <input type="checkbox"/> <124>:= Ack file, ack section | F_AF_NA_1 |
| <input type="checkbox"/> <125>:= Segment | F_SG_NA_1 |
| <input type="checkbox"/> <126>:= Directory {blank or X, only available in monitor (standard) direction} | F_DR_TA_1 |
| <input type="checkbox"/> <127>:= Query Log – Request archive file | F_SC_NB_1 |

Type identifier and cause of transmission assignments

(station-specific parameters)

Shaded boxes: option not required.

Black boxes: option not permitted in this companion standard

Blank: functions or ASDU not used.

Mark Type Identification/Cause of transmission combinations:

"X" if only used in the standard direction;

"R" if only used in the reverse direction;

"B" if used in both directions.

| Type identification | | Cause of transmission | | | | | | | | | | | | | | | | | | | |
|---------------------|-----------|-----------------------|---|---|---|---|---|---|---|---|----|----|----|----|----------|----------|----|----|----|----|--|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 20 to 36 | 37 to 41 | 44 | 45 | 46 | 47 | |
| <1> | M_SP_NA_1 | | X | X | | X | | | | | | | | | X | | | | | | |
| <2> | M_SP_TA_1 | | | | | | | | | | | | | | | | | | | | |
| <3> | M_DP_NA_1 | | X | X | | X | | | | | | | | | X | | | | | | |
| <4> | M_DP_TA_1 | | | | | | | | | | | | | | | | | | | | |
| <5> | M_ST_NA_1 | | | | | | | | | | | | | | | | | | | | |
| <6> | M_ST_TA_1 | | | | | | | | | | | | | | | | | | | | |
| <7> | M_BO_NA_1 | | | | | | | | | | | | | | | | | | | | |
| <8> | M_BO_TA_1 | | | | | | | | | | | | | | | | | | | | |
| <9> | M_ME_NA_1 | X | X | X | | X | | | | | | | | | X | | | | | | |
| <10> | M_ME_TA_1 | | | | | | | | | | | | | | | | | | | | |
| <11> | M_ME_NB_1 | | | | | | | | | | | | | | | | | | | | |
| <12> | M_ME_TB_1 | | | | | | | | | | | | | | | | | | | | |

AC500 V2.4 IEC60870-5-104 Compatibility List

| Type identification | | Cause of transmission | | | | | | | | | | | | | | | | | | |
|---------------------|------------|-----------------------|---|---|---|---|---|---|---|---|----|----|----|----|----------------|----------------|----|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 20 to 36 | 37 to 41 | 44 | 45 | 46 | 47 |
| <13> | M_ME_NC_1 | x | x | x | | x | | | | | | | | | X | | | | | |
| <14> | M_ME_TC_1 | | | | | | | | | | | | | | | | | | | |
| <15> | M_IT_NA_1 | | | x | | | | | | | | | | | | X | | | | |
| <16> | M_IT_TA_1 | | | | | | | | | | | | | | | | | | | |
| <17> | M_EP_TA_1 | | | | | | | | | | | | | | | | | | | |
| <18> | M_EP_TB_1 | | | | | | | | | | | | | | | | | | | |
| <19> | M_EP_TC_1 | | | | | | | | | | | | | | | | | | | |
| <20> | M_PS_NA_1 | | | | | | | | | | | | | | | | | | | |
| <21> | M_ME_ND_1 | | | | | | | | | | | | | | | | | | | |
| <30> | M_SP_TB_1 | | | x | | x | | | | | | | | | | | | | | |
| <31> | M_DP_TB_1 | | | x | | x | | | | | | | | | | | | | | |
| <32> | M_ST_TB_1 | | | | | | | | | | | | | | | | | | | |
| <33> | M_BO_TB_1 | | | | | | | | | | | | | | | | | | | |
| <34> | M_ME_TD_1 | | | x | | x | | | | | | | | | | | | | | |
| <35> | M_ME_TE_1 | | | | | | | | | | | | | | | | | | | |
| <36> | M_ME_TF_1 | | | x | | x | | | | | | | | | | | | | | |
| <37> | M_IT_TB_1 | | | x | | | | | | | | | | | | X | | | | |
| <38> | M_EP_TD_1 | | | | | | | | | | | | | | | | | | | |
| <39> | M_EP_TE_1 | | | | | | | | | | | | | | | | | | | |
| <40> | M_EP_TF_1 | | | | | | | | | | | | | | | | | | | |
| <45> | C_SC_NA_1 | | | | | | x | x | | | x | | | | | | | | | |
| <46> | C_DC_NA_1 | | | | | | x | x | | | x | | | | | | | | | |
| <47> | C_RC_NA_1 | | | | | | | | | | | | | | | | | | | |
| <48> | C_SE_NA_1 | | | | | | x | x | | | x | | | | | | | | | |
| <49> | C_SE_NB_1 | | | | | | | | | | | | | | | | | | | |
| <50> | C_SE_NC_1 | | | | | | x | x | | | x | | | | | | | | | |
| <51> | C_BO_NA_1 | | | | | | | | | | | | | | | | | | | |
| <58> | C_SC_TA_1 | | | | | | x | x | | | x | | | | | | | | | |
| <59> | C_DC_TA_1 | | | | | | x | x | | | x | | | | | | | | | |
| <60> | C_RC_TA_1 | | | | | | | | | | | | | | | | | | | |
| <61> | C_SE_TA_1 | | | | | | x | x | | | x | | | | | | | | | |
| <62> | C_SE_TB_1 | | | | | | | | | | | | | | | | | | | |
| <63> | C_SE_TC_1 | | | | | | x | x | | | x | | | | | | | | | |
| <64> | C_BO_TA_1 | | | | | | | | | | | | | | | | | | | |
| <70> | M_EI_NA_1* | | | | x | | | | | | | | | | | | | | | |
| <100> | C_IC_NA_1 | | | | | | x | x | | | x | | | | | | | | | |
| <101> | C_CI_NA_1 | | | | | | x | x | | | x | | | | | | | | | |
| <102> | C_RD_NA_1 | | | | x | | | | | | | | | | | | | | | |
| <103> | C_CS_NA_1 | | | | | | x | x | | | | | | | | | | | | |
| <104> | G_TS_NA_1 | | | | | | | | | | | | | | | | | | | |
| <105> | C_RP_NA_1 | | | | | | x | | | | | | | | | | | | | |
| <106> | C_CD_NA_1 | | | | | | | | | | | | | | | | | | | |
| <107> | C_TS_TA_1 | | | | | | | | | | | | | | | | | | | |
| <110> | P_ME_NA_1 | | | | | | x | x | | | | | | | X | | | | | |
| <111> | P_ME_NB_1 | | | | | | | | | | | | | | | | | | | |
| <112> | P_ME_NC_1 | | | | | | x | x | | | | | | | X | | | | | |
| <113> | P_AC_NA_1 | | | | | | | | | | | | | | | | | | | |
| <120> | F_FR_NA_1 | | | | | | | | | | | | | | | | | | | |
| <121> | F_SR_NA_1 | | | | | | | | | | | | | | | | | | | |
| <122> | F_SC_NA_1 | | | | | | | | | | | | | | | | | | | |
| <123> | F_LS_NA_1 | | | | | | | | | | | | | | | | | | | |
| <124> | F_AF_NA_1 | | | | | | | | | | | | | | | | | | | |
| <125> | F_SG_NA_1 | | | | | | | | | | | | | | | | | | | |
| <126> | F_DR_TA_1* | | | | | | | | | | | | | | | | | | | |

AC500 V2.4 IEC60870-5-104 Compatibility List

| Type identification | | Cause of transmission | | | | | | | | | | | | | | | | | | | |
|---------------------|------------|-----------------------|---|---|---|---|---|---|---|---|----|----|----|----|----------------|----------------|----|----|----|----|--|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 20 to 36 | 37 to 41 | 44 | 45 | 46 | 47 | |
| <127> | F_SC_NB_1* | | | | | | | | | | | | | | | | | | | | |
| * Blank or X only | | | | | | | | | | | | | | | | | | | | | |

9.6 Basic application functions

Station initialization

(station-specific parameter, mark "X" if function is used)

Remote initialization

Cyclic data transmission

(station-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions)

Cyclic data transmission

Read procedure

(station-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions)

Read procedure

Spontaneous transmission

(station-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions)

Spontaneous transmission

Double transmission of information objects with cause of transmission spontaneous

(station-specific parameter, mark each information type "X" where both a Type ID without time and corresponding Type ID with time are issued in response to a single spontaneous change of a monitored object)

The following type identifications may be transmitted in succession caused by a single status change of an information object. The particular information object addresses for which double transmission is enabled are defined in a project-specific list.

- Single-point information M_SP_NA_1, M_SP_TA_1, M_SP_TB_1 and M_PS_NA_1
- Double-point information M_DP_NA_1, M_DP_TA_1 and M_DP_TB_1
- Step position information M_ST_NA_1, M_ST_TA_1 and M_ST_TB_1
- Bitstring of 32 bit M_BO_NA_1, M_BO_TA_1 and M_BO_TB_1 (if defined for a specific project)
- Measured value, normalized value M_ME_NA_1, M_ME_TA_1, M_ME_ND_1 and M_ME_TD_1
- Measured value, scaled value M_ME_NB_1, M_ME_TB_1 and M_ME_TE_1
- Measured value, short floating point number M_ME_NC_1, M_ME_TC_1 and M_ME_TF_1

Station interrogation

(station-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

- global
 - group 1
 - group 2
 - group 3
 - group 4
 - group 5
 - group 6
 - group 7
 - group 8
 - group 9
 - group 10
 - group 11
 - group 12
 - group 13
 - group 14
 - group 15
 - group 16
- Information object addresses assigned to each group must be shown in a separate table.

Clock synchronization

(station-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

- Clock synchronization
- Day of week used
- RES1, GEN (time tag substituted/ not substituted) used
- SU-bit (summertime) used

optional, see 7.6

Command transmission

(object-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

- Direct command transmission
- Direct set point command transmission
- Select and execute command
- Select and execute set point command
- C_SE ACTTERM used
- No additional definition
- Short-pulse duration (duration determined by a system parameter in the outstation)
- Long-pulse duration (duration determined by a system parameter in the outstation)
- Persistent output
- Supervision of maximum delay in command direction of commands and set point commands
- Maximum allowable delay of commands and set point commands

Transmission of integrated totals

(station- or object-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

- Mode A: Local freeze with spontaneous transmission
- Mode B: Local freeze with counter interrogation
- Mode C: Freeze and transmit by counter-interrogation commands
- Mode D: Freeze by counter-interrogation command, frozen values reported

- Counter read
- Counter freeze without reset
- Counter freeze with reset
- Counter reset

- General request
- Request counter group 1
- Request counter group
- Request counter group 3
- Request counter group 4

Parameter loading

(object-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

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

Parameter activation

(object-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

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

Test procedure

(station-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

- Test procedure

File transfer

(station-specific parameter, mark "X" if function is used).

File transfer in monitor direction

- Transparent file
- Transmission of disturbance data of protection equipment
- Transmission of sequences of events
- Transmission of sequences of recorded analogue values

File transfer in control direction

- Transparent file

Background scan

(station-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

- Background scan

Acquisition of transmission delay

(station-specific parameter, mark "X" if function is only used in the standard direction, "R" if only used in the reverse direction, and "B" if used in both directions).

Acquisition of transmission delay

Definition of time outs

| Parameter | Default value | Remarks | Selected value |
|-----------|---------------|---|----------------|
| t_0 | 30 s | Time-out of connection establishment | |
| t_1 | 15 s | Time-out of send or test APDUs | |
| t_2 | 10 s | Time-out for acknowledges in case of no data messages $t_2 < t_1$ | |
| t_3 | 20 s | Time-out for sending test frames in case of a long idle state | |

Maximum range for timeouts t_0 to t_2 : 1 s to 255 s, accuracy 1 s.

Recommended range for timeout t_3 : 1 s to 48 h, resolution 1 s.

Long timeouts for t_3 may be needed in special cases where satellite links or dialup connections are used (for instance to establish connection and collect values only once per day or week).

Maximum number of outstanding I format APDUs k and latest acknowledge APDUs (w)

| Parameter | Default value | Remarks | Selected value |
|-----------|---------------|---|----------------|
| k | 12 APDUs | Maximum difference receive sequence number to send state variable | |
| w | 8 APDUs | Latest acknowledge after receiving w I format APDUs | |

Maximum range of values k : 1 to 32767 ($2^{15}-1$) APDUs, accuracy 1 APDU

Maximum range of values w : 1 to 32767 APDUs, accuracy 1 APDU (Recommendation: w should not exceed two-thirds of k).

Portnumber

| Parameter | Value | Remarks |
|------------|-------|--------------|
| Portnumber | 2404 | In all cases |

Redundant connections

2 Number N of redundancy group connections used

RFC 2200 suite

RFC 2200 is an official Internet Standard which describes the state of standardization of protocols used in the Internet as determined by the Internet Architecture Board (IAB). It offers a broad spectrum of actual standards used in the Internet. The suitable selection of documents from RFC 2200 defined in this standard for given projects has to be chosen by the user of this standard.

- Ethernet 802.3
- Serial X.21 interface
- Other selection from RFC 2200:

List of valid documents from RFC 2200

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7. etc.

REVISION HISTORY

| Rev. | Page | Change Description | Date / Initial |
|------|------|--|--------------------------|
| -r1 | all | New Form for ABB Library (no content change) | 2023-04-17 ABB AG ACP |
| | | | |
| | | | |
| | | | |

ABB AG
Eppelheimer Straße 82
69123 Heidelberg, Germany
Phone: +49 62 21 701 1444
Fax: +49 62 21 701 1382
E-Mail: plc.support@de.abb.com
www.abb.com/plc

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB AG does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB AG.
Copyright© 2023 ABB. All rights reserved