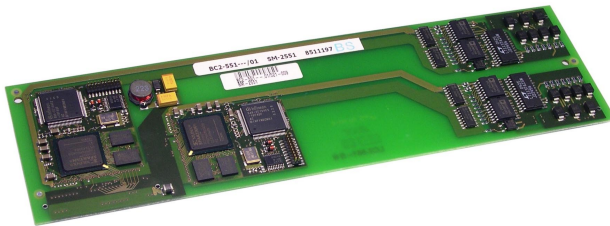


ACP 1703

SM-x551/PROTOCOL

Protocol Elements (V.28)



SM-2551



SM-0551

Protocol elements based on a Serial Interface Module (SIM) with serial interfaces

- SM-2551: two interfaces
- SM-0551: one interface

Protocol element (serial)

- Standard protocols according to IEC 60870-5-101/103 for
 - point-to-point traffic
 - multi-point traffic
 - dial-up traffic
- protocols subject to license
- with byte-asynchronous or byte-isochronous puls code modulation
- all interface signals (RS-232) and all interfaces are galvanically insulated from each other
- protocol selectable per interface

SM-2551 can be attached to master control and communication elements of ACP 1703 and Ax 1703 platforms.

SM-0551 can be attached to selected SIM's SM-25xx.

Applications

The protocol elements described herein are used in several automation units based on ACP 1703 and Ax 1703 platforms.

Common Information on Protocol Elements

A protocol element is used for the exchange of data - and thereby for the transmission of messages - over a communication interface to other automation units or devices of third-party manufacturers, e.g. control systems.

The hardware of a protocol element is a communication interface which - dependent on system and interface - can be available in different ways:

- integrated on a basic system element
- on a serial interface module (SIM), which is installed - directly or cascaded (SIM on SIM) - on the basic system element

In order to be able to communicate with as many systems as possible, SIEMENS has decided not only to employ standard protocols, which are normalized by IEC, but to considerably take part in the creation of these standards. Therefore, the automation unit communicates externally as well as internally according to these standards:

- IEC 60870-5-101 in case of serial communication
- IEC 60870-5-103 in case of serial communication with protective devices
- IEC 60870-5-104 in case of LAN/WAN networks

Protocol elements process specific communication protocols when 1703 automation units communicate with each other or with devices of third-party manufacturers, in the field of telecontrol, automation, and protection.

Due to its features, protocol element technology has a successful tradition for many years at SIEMENS. A fundamental characteristic is the separation of protocol-bound communication from application tasks of an automation unit.

- Each interface has its own protocol processor
 - communication has no impact on the application, and vice versa
 - each processor runs one communication protocol
 - various different protocols run on one and the same hardware
 - all protocols can be loaded with TOOLBOX II
- You can change the communication protocol, for instance from serial to LAN, without retroactive effect to the application tasks of an automation unit
- Each automation unit can be equipped with various protocols This allows easy implementation of data nodes and frontends.

Engineering is done using TOOLBOX II.

Amongst other documents, configuration examples can be found in ACP 1703 Platforms Configuration Automation Units and Automation Networks (DC0-021-1).

The protocol elements described in this document are based on the following hardware:

SM-2551/PROTOCOL (VC0-019--)

Module	Designation	Note
SM-2551	Serieller Interface Prozessor 2 SS	<ul style="list-style-type: none"> one protocol element per interface SM-2551/PROTOCOL contains one license for a standard protocol per interface SM-2551 can be attached to master control and communication elements of ACP 1703 and Ax 1703 platforms

SM-0551/PROTOCOL (VC0-020--)

Module	Designation	Note
SM-0551	Serial Interface Processor 1 SS	<ul style="list-style-type: none"> one protocol element SM-0551/PROTOCOL contains the license for a standard protocol SM-0551 can be attached to selected SIM's (SM-2546, SM-2556) (these SIM's can be attached to master control and communication elements of ACP 1703 and Ax 1703 platforms)

The protocol elements can be used on ACP 1703 and Ax 1703 platforms:

Standard Protocols	Standard	Protocol Element(s)	Note
for point-to-point traffic (BPP)	IEC 60870-5-101	SM-2551/BPPA0 SM-0551/BPPA0	
for multi-point traffic (UMP)	IEC 60870-5-101	SM-2551/UMPMA0 SM-0551/UMPMA0 SM-2551/UMPSA0 SM-0551/UMPSA0	controlling station controlled station
for fieldbus master/slave (SFB)	IEC 60870-5-101	SM-2551/SFBMA1 SM-0551/SFBMA1 SM-2551/SFBSA1 SM-0551/SFBSA1	controlling station controlled station
for dial-up traffic (DIA)	IEC 60870-5-101	SM-2551/DIAMA0 SM-0551/DIAMA0 SM-2551/DIASA0 SM-0551/DIASA0	controlling station controlled station
for interfacing of protective devices (103)	IEC 60870-5-103	SM-2551/103MA0 SM-0551/103MA0 SM-2551/103SA0 SM-0551/103SA0	controlling station controlled station

Subject-to-license protocols on request.

Standard Protocol for Point-to-Point Traffic (BPP)

SM-x551/BPPA0

Funktionen

Communication with a remote station

- Balanced Point-to-Point (point-to-point traffic) according to IEC 60870-5-101
 - Supported functionality according to
 - [ACP 1703 Interoperability IEC 60870-5-101/104 \(DC0-013-1\)](#)
 - [Ax 1703 Interoperability IEC 60870-5-101/104 \(DA0-046-1\)](#)
 - Acquisition of events (transmission of data ready to be sent)
 - General interrogation, outstation interrogation
 - Clock synchronization
 - Cyclic, at least 1 times per minute
 - Command transmission
 - Set control location, control location check
 - Transmission of integrated totals
 - Acquisition of transmission delay (for the correction of time synchronisation)
- Optimized parameters for selected transmission facilities
- Functions for supporting redundant communication routes
- Special functions

The above mentioned functions are described in detail in the document [ACP 1703 • Ax 1703 Common Functions Protocol Elements](#).

Modes of Operation

Operating mode	Patch Plug	Extras ¹⁾	Note
Unbalanced interchange circuit V.24/V.28 V.23 Dedicated line	CM-2860 ^{a)}	CE-0700	<ul style="list-style-type: none"> • 300 / 1,200 Bit/s • Signals and levels according to V.24, V.28, RS-232 • RJ45 connector to CE-0700 RXD, TXD, CTS, RTS, DCD, DTR, GND • 4-pin screw terminals on CE-0700 NF-an a, NF-an b, NF-ab a / NF-a, NF-ab b / NF-b
Unbalanced interchange circuit V.24/V.28 VFT channel	CM-2860 ^{a)}	CE-0701	<ul style="list-style-type: none"> • 50 .. 2,400 bps • Signals and levels according to V.24, V.28, RS-232 • RJ45 connector to CE-0701 RXD, TXD, CTS, RTS, DCD, SQ, GND • 4-pin screw terminals on CE-0701 NF-an a, NF-an b, NF-ab a / NF-a, NF-ab b / NF-b
Balanced interchange circuit X.24/X.27 V.11 isochronous	CM-2860 ^{a)}	CM-0829	<ul style="list-style-type: none"> • 2,400 .. 64,000 bps • Signals and levels according to RS-422 • RJ45 connector to CM-0829 RXD, TXD, CTS, TXC, DCD, DTR, DSR/+5V, GND or RXD, TXD, RTS, RXC, DCD, DTR, DSR/+5V, GND • 15-pin D-SUB connector on CM-0829 corresponds with SM-2541 operating mode 2a, V.11 isochronous
Balanced interface RS-422 V.11 asynchronous	CM-2860 ^{a)}	CM-0829	<ul style="list-style-type: none"> • 50 .. 115,200 bps • Signals and levels according to V.11, RS-422 • RJ45 connector to CM-0829 RXD, TXD, CTS, RTS, DCD, DTR, DSR/+5V, GND • 15-pin D-SUB connector on CM-0829 corresponds with SM-2541 operating mode 2a, V.11/RS-422 asynchronous
Optical interface (multimode fibre optic) Star/Tree	CM-2872 ^{a)} CM-5862 ^{b)}	CM-0827	<ul style="list-style-type: none"> • 50 .. 115,200 bps • RJ45 connector to CM-0827 • 820nm signals • 50/125µ and 62.5/125µ fibres • ST compatible connector on CM-0827
Unbalanced interchange circuit V.24/V.28 V.28 asynchronous	CM-2860 ^{a)} CM-5860 ^{b)}	---	<ul style="list-style-type: none"> • 50 .. 115,200 bps • Signals and levels according to V.24, V.28, RS-232 • RJ45 connector RXD, TXD, CTS, RTS, DCD, DTR, DSR/+5V, GND • <i>RJ45 connector pin assignment corresponds with SM-2541 operating mode 1a, V.28 asynchronous</i>

1) Extras is optional equipment

a) Patch Plug for AK 1703 ACP, TM 1703 ACP; AK 1703, AMC 1703, AM 1703, BC 1703

b) Patch Module for BC 1703 ACP

Configuration

For the stations to communicate with each other, suitable transmission facilities and/or network components may be needed in addition.

Own station

System	System Element	Protocol Element	Note
AK 1703 ACP	CP-2010/CPC25 CP-2012/PCCE25	SM-2551/BPPA0 SM-0551/BPPA0	
BC 1703 ACP	CP-5000/CPC55	SM-2551/BPPA0 SM-0551/BPPA0	
TM 1703 ACP	CP-6003/CPC10	SM-2551/BPPA0	
AK 1703	CP-2000/CPC00 CP-2002/PCCE00 CP-2002/CE00 CP-2012/CE20	SM-2551/BPPA0 SM-0551/BPPA0	
AMC 1703	CP-4000/CPC4x CP-4003/CCP4x	SM-2551/BPPA0 SM-0551/BPPA0	

Remote station

System	System Element	Protocol Element	Note
AK 1703 ACP	CP-2010/CPC25 CP-2012/PCCE25	SM-2551/BPPA0 SM-0551/BPPA0 SM-2541/BPP00 ¹⁾	
BC 1703 ACP	CP-5000/CPC55	SM-2551/BPPA0 SM-0551/BPPA0 SM-2541/BPP00 ¹⁾	
TM 1703 ACP	CP-6003/CPC10	SM-2551/BPPA0 SM-0551/BPPA0 SM-2541/BPP00 ¹⁾	
AK 1703	CP-2000/CPC00 CP-2002/PCCE00 CP-2002/CE00 CP-2012/CE20	SM-2551/BPPA0 SM-0551/BPPA0 SM-2541/BPP00 ¹⁾	
AMC 1703	CP-4000/CPC4x CP-4003/CCP4x	SM-2551/BPPA0 SM-0551/BPPA0 SM-2541/BPP00 ¹⁾	
AM 1703	CP-1001/CPC10	SM-1543/BPP00	
BC 1703	CP-5001/CPC51	SM-1543/BPP00	
SICAM 230	---	---	
SAT 250	---	---	
Third-party system	---	---	IEC 60870-5-101 balanced point-to-point, according to ACP 1703 Interoperability IEC 60870-5-101/104 (DC0-013-1) or Ax 1703 Interoperability IEC 60870-5-101/104 (DA0-046-1)

¹⁾ not for new projects

Standard Protocol for Multi-Point Traffic (UMP)

SM-x551/UMPMA0 • SM-x551/UMPSA0

Functions

Communication between one central station and up to 100 remote stations (IEC 60870-5-101)

- Unbalanced multi-point (multi-point traffic) according to IEC 60870-5-101
UMPMA0 is controlling station (primary station), UMPSA0 is controlled station (secondary station).
 - Supported functionality according to
 - [ACP 1703 Interoperability IEC 60870-5-101/104 \(DC0-013-1\)](#)
 - [Ax 1703 Interoperability IEC 60870-5-101/104 \(DA0-046-1\)](#)
 - Data acquisition by polling (station interrogation)
 - Acquisition of events (transmission of data ready to be sent)
 - General interrogation, outstation interrogation
 - Clock synchronization
 - Cyclic, can be set in a minute grid; at least 1x per minute.
 - Command transmission
 - Set control location, control location check
 - Transmission of integrated totals
 - Acquisition of transmission delay (for the correction of time synchronisation)
- Standby transmission line over the public telephone network (PSTN)
- Data transmission using time slot radio
- Co-ordination of several masters
- Optimized parameters for selected transmission facilities
- Functions for supporting redundant communication routes
- Special functions

Communication between one central station and up to 100 remote stations (relay operation)

- Unbalanced multi-point in relay operation mode (multi-point traffic with routing) based on IEC 60870-5-101
UMPMA0 is controlling station (primary station), UMPSA0 is controlled station (secondary station).
 - Supported functionality according to
 - [ACP 1703 Interoperability IEC 60870-5-101/104 \(DC0-013-1\)](#)
 - [Ax 1703 Interoperability IEC 60870-5-101/104 \(DA0-046-1\)](#)
 - Data acquisition by polling (station interrogation)
 - Acquisition of events (transmission of data ready to be sent)
 - General interrogation, outstation interrogation
 - Clock synchronization
 - Cyclic, can be set in a minutes grid

- Command transmission
 - Set control location, control location check
- Transmission of integrated totals
- Acquisition of transmission delay (for the correction of time synchronisation)
- Standby transmission line over the public telephone network (PSTN)
- Data transmission in relay operation mode (multi-point traffic with routing)
- Co-ordination of several masters
- Optimized parameters for selected transmission facilities
- Functions for supporting redundant communication routes
- Special functions

The above mentioned functions are described in detail in the document [ACP 1703 • Ax 1703 Common Functions Protocol Elements](#).

Modes of Operation

Operating mode	Patch Plug	Extras ¹⁾	Note
Unbalanced interchange circuit V.24/V.28 V.23 Dedicated line	CM-2860 ^{a)}	CE-0700	<ul style="list-style-type: none"> • 300 / 1,200 Bit/s • Signals and levels according to V.24, V.28, RS-232 • RJ45 connector to CE-0700 RXD, TXD, CTS, RTS, DCD, DTR, GND • 4-pin screw terminals on CE-0700 NF-an a, NF-an b, NF-ab a / NF-a, NF-ab b / NF-b
Unbalanced interchange circuit V.24/V.28 VFT channel	CM-2860 ^{a)}	CE-0701	<ul style="list-style-type: none"> • 50 .. 2,400 bps • Signals and levels according to V.24, V.28, RS-232 • RJ45 connector to CE-0701 RXD, TXD, CTS, RTS, DCD, SQ, GND • 4-pin screw terminals on CE-0701 NF-an a, NF-an b, NF-ab a / NF-a, NF-ab b / NF-b
Balanced interface RS-485 V.11 asynchronous	CM-2860 ^{a)}	CM-0829 CM-0819	<ul style="list-style-type: none"> • 50 .. 115,200 bps • Signals and levels according to V.11, RS-485 • RJ45 connector to CM-0819 or CM-0829 RXD, TXD, CTS, RTS, DCD, DTR, DSR/+5V, GND • 5-pin terminals on CM-0819 and CM-0829 corresponds with SM-2541 operating mode 2a, V.11/RS-485 asynchronous
Optical interface (multimode fibre optic) Ring	CM-2860 ^{a)} CM-5860 ^{b)}	CM-0821	<ul style="list-style-type: none"> • 50 .. 115,200 bps • RJ45 connector to CM-0821 RXD, TXD, +5V, GND, Status • 820nm signals • 50/125µ and 62.5/125µ fibres • ST compatible connector on CM-0821
Unbalanced interchange circuit V.24/V.28 V.28 asynchronous	CM-2860 ^{a)} CM-5860 ^{b)}	---	<ul style="list-style-type: none"> • 50 .. 115,200 bps • Signals and levels according to V.24, V.28, RS-232 • RJ45 connector RXD, TXD, CTS, RTS, DCD, DTR, DSR/+5V, GND • <i>RJ45 connector pin assignment corresponds with SM-2541 operating mode 1a, V.28 asynchronous</i>

1) Extras is optional equipment

a) Patch Plug for AK 1703 ACP, TM 1703 ACP; AK 1703, AMC 1703, AM 1703, BC 1703

b) Patch Module for BC 1703 ACP

Configuration

For the stations to communicate with each other, suitable transmission facilities and/or network components may be needed in addition.

Controlling station

System	System Element	Protocol Element	Note
AK 1703 ACP	CP-2010/CPC25 CP-2012/PCCE25	SM-2551/UMPMA0 SM-0551/UMPMA0	
BC 1703 ACP	CP-5000/CPC55	SM-2551/UMPMA0 SM-0551/UMPMA0	
TM 1703 ACP	CP-6003/CPC10	SM-2551/UMPMA0 SM-0551/UMPMA0	
AK 1703	CP-2000/CPC00 CP-2002/PCCE00 CP-2002/CE00 CP-2012/CE20	SM-2551/UMPMA0 SM-0551/UMPMA0	
AMC 1703	CP-4000/CPC4x CP-4003/CCP4x	SM-2551/UMPMA0 SM-0551/UMPMA0	

Controlled Station

System	System Element	Protocol Element	Note
AK 1703 ACP	CP-2010/CPC25 CP-2012/PCCE25	SM-2551/UMPSA0 SM-0551/UMPSA0 SM-2541/UMPS00	
BC 1703 ACP	CP-5000/CPC55	SM-2551/UMPSA0 SM-0551/UMPSA0 SM-2541/UMPS00	
TM 1703 ACP	CP-6003/CPC10	SM-2551/UMPSA0 SM-0551/UMPSA0 SM-2541/UMPS00	
AK 1703	CP-2000/CPC00 CP-2002/PCCE00 CP-2002/CE00 CP-2012/CE20	SM-2551/UMPSA0 SM-0551/UMPSA0 SM-2541/UMPS00	
AMC 1703	CP-4000/CPC4x CP-4003/CCP4x	SM-2551/UMPSA0 SM-0551/UMPSA0 SM-2541/UMPS00	
	CP-4000/CPC42	SM-4599/UMPS40	
AM 1703	CP-1001/CPC10	SM-1543/UMPS00	
BC 1703	CP-5001/CPC51	SM-1543/UMPS00	
TM 1703 mic	CP-6020/CPC60	---	
Third-party system	---	---	according to ACP 1703 Interoperability IEC 60870-5-101/104 (DC0-013-1) or Ax 1703 Interoperability IEC 60870-5-101/104 (DA0-046-1)

Standard SAT Field Bus Protocol (SFB)

SM-x551/SFBMA1 • SM-x551/SFBSA1

Functions

Communication between one central station and up to 100 remote stations

- Unbalanced multi-point (multi-point traffic)
SFBMxx is controlling station (primary station), SFBSxx is controlled station (secondary station).
 - Data acquisition by polling (station interrogation)
 - Acquisition of events (transmission of data ready to be sent)
 - General interrogation, outstation interrogation
 - Clock synchronization
 - Cyclic, every 5 seconds
 - Command transmission
 - Transmission of integrated totals
- Optimized parameters for selected transmission facilities
- Functions for supporting redundant communication routes

The above mentioned functions are described in detail in the document [ACP 1703 • Ax 1703 Common Functions Protocol Elements](#)

Modes of Operation

Operating mode	Patch Plug	Extras ¹⁾	Note
Optical interface (multimode fibre optic) Ring	CM-2860 ^{a)} CM-5860 ^{b)}	CM-0821	<ul style="list-style-type: none"> • 50 .. 115,200 bps • RJ45 connector to CM-0821 RXD, TXD, +5V, GND, Status • 820nm signals • 50/125µ and 62.5/125µ fibres • ST compatible connector on CM-0821 •
Optical interface (multimode fibre optic)	CM-2872 ^{a)}	CM-0827	<ul style="list-style-type: none"> • RJ45-connector to CM-0827 RXD, TXD, +5V, GND, Status
Balanced interface RS-485 V.11 asynchronous	CM-2860 ^{a)}	CM-0829 CM-0819	<ul style="list-style-type: none"> • 50 .. 115,200 bps • Signals and levels according to V.11, RS-485 • RJ45 connector to CM-0819 or CM-0829 RXD, TXD, CTS, RTS, DCD, DTR, DSR/+5V, GND • 5-pin terminals on CM-0819 and CM-0829 corresponds with SM-2541 operating mode 2a, V.11/RS-485 asynchronous •
Unbalanced interchange circuit V.24/V.28 V.28 asynchronous	CM-2860 ^{a)} CM-5860 ^{b)}	---	<ul style="list-style-type: none"> • 50 .. 115,200 bps • Signals and levels according to V.24, V.28, RS-232 • RJ45 connector RXD, TXD, CTS, RTS, DCD, DTR, DSR/+5V, GND • <i>RJ45 connector pin assignment corresponds with SM-2541 operating mode 1a, V.28 asynchronous</i> •

¹⁾ Extras is optional equipment

^{a)} Patch Plug for AK 1703 ACP, TM 1703 ACP; AK 1703, AMC 1703, AM 1703, BC 1703

^{b)} Patch Module for BC 1703 ACP

Configuration

For the stations to communicate with each other, suitable transmission facilities and/or network components may be needed in addition.

Controlling station

System	System Element	Protocol Element	Note
AK 1703 ACP	CP-2010/CPC25 CP-2012/PCCE25	SM-2551/SFBMA1 SM-0551/SFBMA1	
BC 1703 ACP	CP-5000/CPC55	SM-2551/SFBMA1 SM-0551/SFBMA1	
TM 1703 ACP	CP-6003/CPC10	SM-2551/SFBMA1 SM-0551/SFBMA1	
AK 1703	CP-2000/CPC00 CP-2002/PCCE00 CP-2002/CE00 CP-2012/CE20	SM-2551/SFBMA1 SM-0551/SFBMA1	
AMC 1703	CP-4000/CPC4x CP-4003/CCP4x	SM-2551/SFBMA1 SM-0551/SFBMA1	

Controlled Station

System	System Element	Protocol Element	Note
AK 1703 ACP	CP-2010/CPC25 CP-2012/PCCE25	SM-2551/SFBSA1 SM-0551/SFBSA1 SM-2541/UMPS01	
BC 1703 ACP	CP-5000/CPC55	SM-2551/SFBSA1 SM-0551/SFBSA1 SM-2541/UMPS01	
TM 1703 ACP	CP-6003/CPC10	SM-2551/SFBSA1 SM-0551/SFBSA1 SM-2541/UMPS01	
AK 1703	CP-2000/CPC00 CP-2002/PCCE00 CP-2002/CE00 CP-2012/CE20	SM-2551/SFBSA1 SM-0551/SFBSA1 SM-2541/UMPS01	
AMC 1703	CP-4000/CPC4x CP-4003/CCP4x	SM-2551/SFBSA1 SM-0551/SFBSA1 SM-2541/UMPS01	
AM 1703	CP-1001/CPC10	SM-1543/UMPS01	
BC 1703	CP-5001/CPC51	SM-1543/UMPS01	

Standard Protocol for Dial-Up Traffic (DIA)

SM-x551/DIAMA0 • SM-x551/DIASA0

Functions

Communication between one central station and up to 100 remote stations

- Unbalanced multi-point (dial-up traffic) based on IEC 60870-5-101
DIAMxx is controlling station (primary station), DIASxx is controlled station (secondary station).
- Controlling connection establishment and disconnection
 - Connection establishment spontaneously and cyclically, controlling station ⇔ controlled station
 - Establishing a connection cyclically at a settable interval (monitoring cycle)
 - * for transmission of low-priority data
 - * for monitoring the station availability
 - * for clock synchronization
 - Controlling connection establishment by means of modem commands
 - AT Hayes, V.25bis, X.20, X.28
 - Arbitrary main telephone number of a telephone network (PSTN)
 - Access control (LOGIN with password) in the private range of IEC 60870-5-101
 - Disconnection control in the private range of IEC 60870-5-101
- Communication when a connection is established according to unbalanced multi-point (dial-up traffic) based on IEC 60870-5-101
 - Data acquisition by polling (station interrogation)
 - Acquisition of events (transmission of data ready to be sent)
 - General interrogation, outstation interrogation
 - Clock synchronization
 - Each time a connection has been established
 - When a connection is established, one time per minute
 - Command transmission
 - Transmission of integrated totals
- Co-ordination of several masters in "multi-master operation" (availability and data throughput)
 - The controlling station can simultaneously establish connections to different controlled stations
- Standby transmission line(s) by means of standby telephone numbers of the same or another (PSTN) telephone network
- Multi-hierarchical configurations
- Optimized parameters for selected transmission facilities
- Toll-Saving Transmission Strategies
- Having a telephone set connected in parallel
- Functions for supporting redundant communication routes

Die oben angeführten Funktionen sind im Dokument [ACP 1703 • Ax 1703 Gemeinsame Funktionen Protokollelemente](#) detailliert beschrieben.

Modes of Operation

Operating mode	Patch Plug	Extras ¹⁾	Note
Unbalanced interchange circuit V.24/V.28 Dial-up modem	CM-2860 ^{a)} CM-5860 ^{b)}	Dial-up modem ²⁾	<ul style="list-style-type: none"> • 50 .. 115,200 bps • Signals and levels according to V.24, V.28, RS-232 • RJ45 connector to the modem RXD, TXD, CTS, RTS, DCD, DTR, DSR/+5V, GND •

1) Extras is optional equipment

2) According to ACP 1703 Platforms Configuration Automation Units and Automation Networks (DC0-021-1)

a) Patch Plug for AK 1703 ACP, TM 1703 ACP; AK 1703, AMC 1703, AM 1703, BC 1703

b) Patch Module for BC 1703 ACP

Configuration

For the stations to communicate with each other, suitable transmission facilities and/or network components may be needed in addition.

Controlling station

System	System Element	Protocol Element	Note
AK 1703 ACP	CP-2010/CPC25 CP-2012/PCCE25	SM-2551/DIAMA0 SM-0551/DIAMA0	
BC 1703 ACP	CP-5000/CPC55	SM-2551/DIAMA0 SM-0551/DIAMA0	
TM 1703 ACP	CP-6003/CPC10	SM-2551/DIAMA0 SM-0551/DIAMA0	
AK 1703	CP-2000/CPC00 CP-2002/PCCE00 CP-2002/CE00 CP-2012/CE20	SM-2551/DIAMA0 SM-0551/DIAMA0	
AMC 1703	CP-4000/CPC4x CP-4003/CCP43	SM-2551/DIAMA0 SM-0551/DIAMA0	

Controlled Station

System	System Element	Protocol Element	Note
AK 1703 ACP	CP-2010/CPC25 CP-2012/PCCE25	SM-2551/DIASA0 SM-0551/DIASA0 SM-2541/DIAS00	
BC 1703 ACP	CP-5000/CPC55	SM-2551/DIASA0 SM-0551/DIASA0 SM-2541/DIAS00	
TM 1703 ACP	CP-6003/CPC10	SM-2551/DIASA0 SM-0551/DIASA0 SM-2541/DIAS00	
AK 1703	CP-2000/CPC00 CP-2002/PCCE00 CP-2002/CE00 CP-2012/CE20	SM-2551/DIASA0 SM-0551/DIASA0 SM-2541/DIAS00	
AMC 1703	CP-4000/CPC4x CP-4003/CCP43	SM-2551/DIASA0 SM-0551/DIASA0 SM-2541/DIAS00	
	CP-4000/CPC42	SM-4599/DIAS40	
AM 1703	CP-1001/CPC10	SM-1543/DIAS00	
BC 1703	CP-5001/CPC51	SM-1543/DIAS00	
TM 1703 mic	CP-6020/CPC60	---	

Standard Protocol for Interfacing of Protective Devices (103)

SM-x551/103MA0 • SM-x551/103SA0

Functions

Communication between one central station and up to 100 protective devices (see note below)

- Unbalanced multi-point (multi-point traffic) according to IEC 60870-5-103
103Mxx is controlling station (primary station), 103Sxx / protective device is controlled station (secondary station).
 - Supported functionality according to
 - [ACP 1703 Interoperability IEC 60870-5-103 \(DC0-026-1\)](#)
 - [Ax 1703 Interoperability IEC 60870-5-103 \(DA0-063-1\)](#)
 - Data acquisition by polling (station interrogation)
 - Acquisition of events (transmission of data ready to be sent)
 - General interrogation, outstation interrogation
 - Clock synchronization
 - Cyclic, can be set in a seconds grid
 - Command transmission
 - Set control location, control location check
 - File transfer
 - Disturbance records to SICAM DISTO
 - Disturbance records to control centre systems according to IEC 60870-5-101/104
 - Generic functions
 - Acquisition of transmission delay (for the correction of time synchronisation)
- Resetting the short-circuit location values
- Measured value change monitoring
- Monitoring intermediate and faulty positions of double-point information
- Transmission of parameters and diagnostic information for Reyrolle protection equipment (Embedded REYDISP)
- Optimized parameters for selected transmission facilities
- Functions for supporting redundant communication routes
- Special functions

Note: The figure 100 is the theoretical limit based on the organization of multi-point traffic. Considering configuration and performance, a maximum number of protective devices is recommended and can be found in [ACP 1703 Platforms Configuration Automation Units and Automation Networks \(DC0-021-1\)](#).

The above mentioned functions are described in detail in the document [ACP 1703 • Ax 1703 Common Functions Protocol Elements](#).

Modes of Operation

Operating mode	Patch Plug	Extras ¹⁾	Note
Optical interface (multimode fibre optic) Ring	CM-2860 ^{a)} CM-5860 ^{b)}	CM-0821	<ul style="list-style-type: none"> • 50 .. 115,200 bps • RJ45 connector to CM-0821 • RXD, TXD, +5V, GND, Status • 820nm signals • 50/125µ and 62.5/125µ fibres • ST compatible connector on CM-0821
Optical interface (multimode fibre optic)	CM-2872 ^{a)}	CM-0827	<ul style="list-style-type: none"> • RJ45 connector to CM-0827 • RXD, TXD, +5V, GND, Status
Balanced interface RS-485 V.11 asynchronous	CM-2860 ^{a)}	CM-0829 CM-0819	<ul style="list-style-type: none"> • 50 .. 115,200 bps • Signals and levels according to V.11, RS-485 • RJ45 connector to CM-0819 or CM-0829 • RXD, TXD, CTS, RTS, DCD, DTR, DSR/+5V, GND • 5-pin terminals on CM-0819 and CM-0829 corresponds with SM-2541 operating mode 2a, V.11/RS-485 asynchronous
Unbalanced interchange circuit V.24/V.28 V.28 asynchronous	CM-2860 ^{a)} CM-5860 ^{b)}	---	<ul style="list-style-type: none"> • 50 .. 115,200 bps • Signals and levels according to V.24, V.28, RS-232 • RJ45 connector • RXD, TXD, CTS, RTS, DCD, DTR, DSR/+5V, GND • <i>RJ45 connector pin assignment corresponds with SM-2541 operating mode 1a, V.28 asynchronous</i>

¹⁾ Extras is optional equipment

^{a)} Patch Plug for AK 1703 ACP, TM 1703 ACP; AK 1703, AMC 1703, AM 1703, BC 1703

^{b)} Patch Module for BC 1703 ACP

Configuration

For the stations to communicate with each other, suitable transmission facilities and/or network components may be needed in addition.

Controlling station

System	System Element	Protocol Element	Note
AK 1703 ACP	CP-2010/CPC25 CP-2012/PCCE25	SM-2551/103MA0 SM-0551/103MA0	
BC 1703 ACP	CP-5000/CPC55	SM-2551/103MA0 SM-0551/103MA0	
TM 1703 ACP	CP-6003/CPC10	SM-2551/103MA0 SM-0551/103MA0	
AK 1703	CP-2000/CPC00 CP-2002/PCCE00 CP-2002/CE00 CP-2012/CE20	SM-2551/103MA0 SM-0551/103MA0	
AMC 1703	CP-4000/CPC4x CP-4003/CCP4x	SM-2551/103MA0 SM-0551/103MA0	

Protective Device

System	System Element	Protocol Element	Note
BC 1703 ACP	CP-5000/CPC55	SM-2551/103SA0 SM-0551/103SA0 SM-2541/103S00	electrical
		Optical serial interface (LOC)	optical
Third-party system	---	---	IEC 60870-5-103 unbalanced slave (secondary), according to ACP 1703 Interoperability IEC 60870-5-103 (DC0-026-1) or Ax 1703 Interoperability IEC 60870-5-103 (DA0-063-1)

SM-2551 - Serieller Interface Prozessor 2 SS

The following table lists supported configurations. In addition to one (SI0/SI1 or SI2/SI3) or two (SI0/SI1 and SI2/SI3) SM-2551, all parts (carrier module, connection board, patch plug, etc.) listed for the chosen configuration are needed:

Configuration			Interfaces			
Carrier Module	Connection Board ¹⁾	Patch Plug ¹⁾	SI0	SI1	SI2	SI3
CP-2010	CM-2837	2)	✓	✓		
CP-2012	CM-2838	2)	✓	✓	✓	✓
CP-5000	one integrated patch module per SIx ³⁾		✓	✓		
CP-6003	---	2)	✓	✓	✓	✓
CP-2000	CM-2857	2)	✓	✓		
CP-2002	CM-2858	2)	✓	✓	✓	✓
CP-4000	---	2)		✓	✓	
CP-4003	---	2)	✓	✓	✓	✓

- 1) One connection board for each carrier module, one patch plug for each interface
- 2) For patch plugs for standard protocols in standard configurations as described above see these standard protocols; for patch plugs in other than standard configurations see [ACP 1703 Platforms Configuration Automation Units and Automation Networks \(DC0-021-1\)](#)
- 3) Each variant of the BC 1703 ACP (Bay Controller) which can be ordered comes with a determined patch module for each interface

Technical Specifications

Communication Circuits	
2 serial interfaces	<ul style="list-style-type: none"> Interface characteristics, interface signals, modes of operation, transmission rates <ul style="list-style-type: none"> – see description of the respective protocol, "Modes of operation" Instead of the interface signal DSR the gate circuit voltage (+5VDC) can be provided (settable) Ability to be connected in parallel <ul style="list-style-type: none"> – outgoing interface signals in tristate technology – up to 2 interfaces can be connected in parallel – circuits for incoming interface signals always active The signals are galvanically insulated from logic circuits Line lengths V.28 <ul style="list-style-type: none"> – 50 bps up to 25m – 115,200 bps up to 5m
Power supply	
Operating voltage	4.75 .. 5.25 VDC, typ. 300 mA, max. 540 mA @5V The voltage is supplied by the carrier module.
Gate circuit voltage +5VDC instead of DSR	<ul style="list-style-type: none"> Voltage 4.7 .. 5.6 VDC Max. output current 150 mA at U > 4.75V Max. output power 750 mW Max. idle voltage ≤ 5.6V DC Not short-circuit proof Not overload proof Galvanically insulated from logic voltage The voltage (data circuit voltage) is supplied by the carrier module (galvanically insulated).
Mechanics	
Dimensions	227.3 x 63.5 mm
Weight	Approx. 200 g

SM-0551 - Serieller Interface Prozessor 1 SS

The following table lists supported configurations. In addition SM-0551, all parts (SIM, carrier module, connection board, patch plug, etc.) listed for the choosen configuration are needed:

Configuration				Interfaces			
Carrier Module	SIM	Connection Board ¹⁾	Patch Plug ²⁾	SI0	SI1	SI2	SI3
CP-2010	4)	CM-2837	2)	✓	6)		
CP-2012	4)	CM-2838	2)	✓	6)	✓	6)
CP-5000	5)	one integrated patch module per Six ³⁾		✓	6)		
CP-6003	4)	---	2)	✓	6)	✓	6)
CP-2000	4)	CM-2857	2)	✓	6)		
CP-2002	4)	CM-2858	2)	✓	6)	✓	6)
CP-4000	4)	---	2)		✓	6)	
CP-4003	4)	---	2)	✓	6)	✓	6)

- 1) One connection board for each carrier module, one patch plug for each interface
- 2) see chapter Modes of Operation
- 3) Each variant of the BC 1703 ACP (Bay Controller) which can be ordered comes with a determined patch module for each interface
- 4) SM-2556 required, on which SM-0551 can be installed
- 5) SM-2546 or SM-2556 required, on which SM-0551 can be installed
- 6) Interface is not operated by SM-0551 but directly by SM-2546 / SM-2556

Technical Specifications

Communication Circuits	
1 serial interface	<ul style="list-style-type: none"> Interface characteristics, interface signals, modes of operation, transmission rates <ul style="list-style-type: none"> see description of the respective protocol, "Modes of operation" Instead of the interface signal DSR the gate circuit voltage (+5VDC) can be provided (settable) Ability to be connected in parallel <ul style="list-style-type: none"> outgoing interface signals in tristate technology up to 2 interfaces can be connected in parallel circuits for incoming interface signals always active The signals are galvanically insulated from logic circuits Line lengths V.28 <ul style="list-style-type: none"> 50 bps up to 25m 115,200 bps up to 5m
Power supply	
Operating voltage	4.75 .. 5.25 VDC, typ. 25 mA, max. 50 mA @5V 3.14 .. 3.47 VDC, typ. 150 mA, max. 330 mA @3.3V The voltage is supplied by the carrier module.
Gate circuit voltage +5VDC instead of DSR	<ul style="list-style-type: none"> Voltage 4.7 .. 5.6 VDC Max. output current 150 mA at U > 4.75V Max. output power 750 mW Max. idle voltage ≤ 5.6V DC Not short-circuit proof Not overload proof Galvanically insulated from logic voltage The voltage (data circuit voltage) is supplied by the carrier module (galvanically insulated).
Mechanics	
Dimensions	56 x 43 x 5,5 mm
Weight	Approx. 15 g

Literature

ACP 1703 • Ax 1703 Common Functions Protocol Elements	DC0-023-2
ACP 1703 Platforms Configuration Automation Units and Automation Networks	DC0-021-2

Documents on Interoperability

Ax 1703 Interoperability IEC 60870-5-101/104	DA0-046-2
ACP 1703 Interoperability IEC 60870-5-101/104	DC0-013-2
Ax 1703 Interoperability IEC 60870-5-103	DA0-063-2
ACP 1703 Interoperability IEC 60870-5-103	DC0-026-2