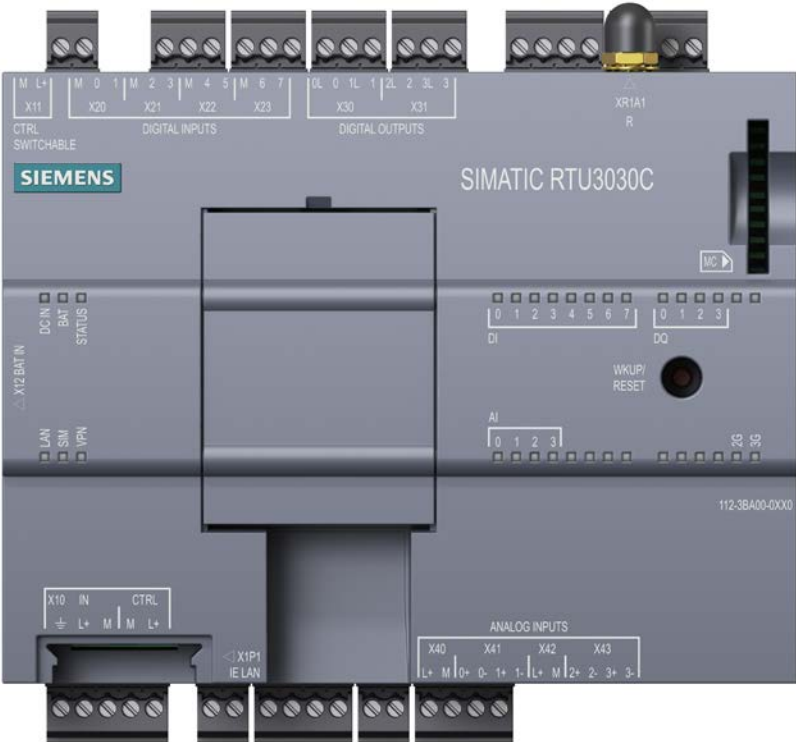
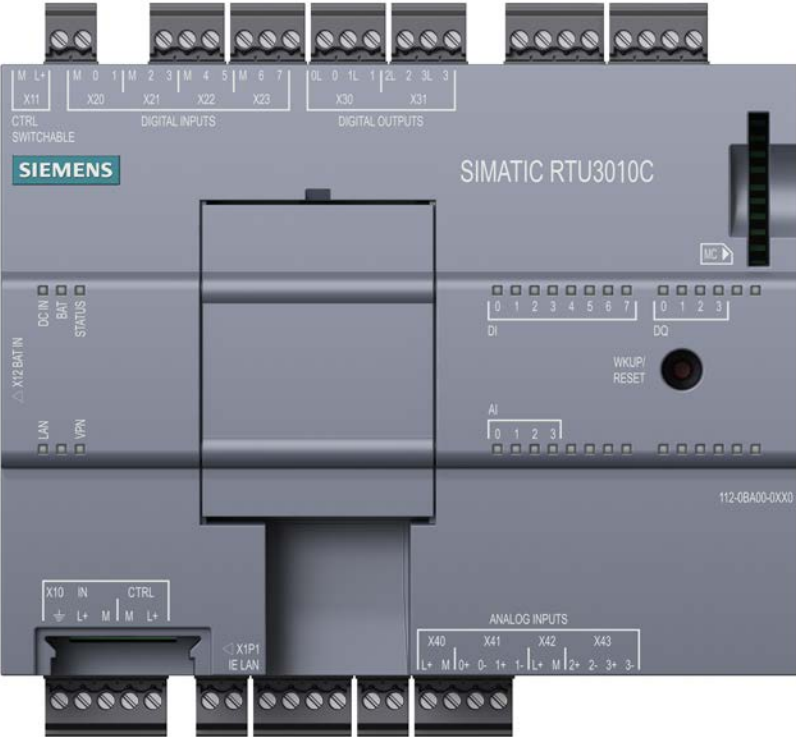
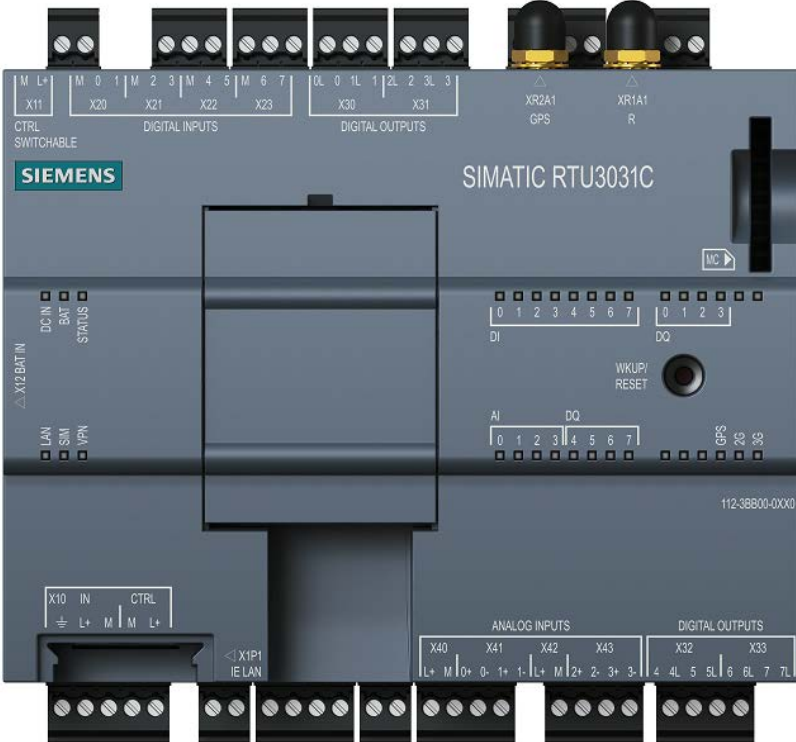


## SIMATIC RTU3000C V3.1 Protocol IEC 60870-5-104 - Interoperability list





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Technical data subject to change

## 1 IEC870-5-104

This documentation is used to match the functionality required/demanded for communication of PCS7 Telecontrol with PLC, RTU or IED devices based on telecommunication standard IEC 60870-5-104. PCS7 Telecontrol provides master functionality.

### 1.1 General information

Legend:

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

Notice:

- B only possible, if the packages of master and slave are combined.

### 1.2 Device function

(system-specific parameter; mark system- or station function "X")

- System specification
- Controlling Station (Master)
- X Controlled Station (Slave)

### 1.3 Network configuration

(network-specific parameters; mark each used configuration "X")

- Point to Point \*
- Multiple Point to Point \*
- Multipoint \*\*
- Multipoint Star \*\*

~~\*) balanced~~

~~\*\*)-unbalanced~~

## 1.4 Physical layer

(network-specific parameters; mark each supported interface and data rates "X")

### Transmission rate

Automatic detection of transmission rate (Mobile Wireless Network (RTU3030C – RTU3031C), RJ45 10/100 MBits/s (RTU3000C))

Unbalanced interface  
V.24/V.28  
Standard

<input type="checkbox"/>	300 bits/s
<input type="checkbox"/>	600 bits/s
<input type="checkbox"/>	1200 bits/s
<input type="checkbox"/>	2400 bits/s
<input type="checkbox"/>	4800 bits/s
<input type="checkbox"/>	9600 bits/s
<input type="checkbox"/>	19200 bits/s
<input type="checkbox"/>	38400 bits/s
<input type="checkbox"/>	57600 bits/s
<input type="checkbox"/>	76800 bits/s
<input type="checkbox"/>	115200 bits/s

Unbalanced interface  
RS485/RS422

<input type="checkbox"/>	300 bits/s
<input type="checkbox"/>	600 bits/s
<input type="checkbox"/>	1200 bits/s
<input type="checkbox"/>	2400 bits/s
<input type="checkbox"/>	4800 bits/s
<input type="checkbox"/>	9600 bits/s
<input type="checkbox"/>	19200 bits/s
<input type="checkbox"/>	38400 bits/s
<input type="checkbox"/>	57600 bits/s
<input type="checkbox"/>	76800 bits/s
<input type="checkbox"/>	115200 bits/s

Balanced interface  
X.24/X.27

<input type="checkbox"/>	300 bits/s
<input type="checkbox"/>	600 bits/s
<input type="checkbox"/>	1200 bits/s
<input type="checkbox"/>	2400 bits/s
<input type="checkbox"/>	4800 bits/s
<input type="checkbox"/>	9600 bits/s
<input type="checkbox"/>	19200 bits/s
<input type="checkbox"/>	38400 bits/s
<input type="checkbox"/>	57600 bits/s
<input type="checkbox"/>	76800 bits/s
<input type="checkbox"/>	115200 bits/s

## 1.5 Data link layer

(network-specific parameter; mark each supported option "X" and mark the maximum user data octets. If there is implemented a not standard classification of class 2 informations for the multi-point traffic, then type identification and transmission cause of all informations who are assigned to class 2 have to be indicated.)

### Transmission procedure of the data link layer

- Balanced transmission
- Unbalanced transmission

### Address of information object

- Non-existent (only balanced transmission.)
- 1-Octet
- 2-Octets

### Telegram length

Maximum length L (number of Octets)

## 1.6 Application layer

### Transmission mode for application data

Mode 1 (least significant octet first), as defined in IEC 870-5-4, chapter 4.10, is used exclusively in this companion standard.

### Common address of the ASDU

(system-specific parameters; mark each supported option "X")

1 Octet                       2 Octets

### Information object address

(system-specific parameter, mark all supported configurations 'X')

1 Octet                       structured  
 2 Octets                     unstructured  
 3 Octets

### Cause of transmission

(system-specific parameter, mark all supported configurations "X")

1 Octet                       2 Octets (with address of origin)

### Selection of standard ASDU

### Process information in monitor direction

(station-specific parameter; mark each supported Type ID "X" (if supported in standard direction), or "R" (if supported in reverse direction), or "B" (if supported in both directions))

<1> := Single-point information M\_SP\_NA\_1  
 <2> := Single-point information with time tag M\_SP\_TA\_1  
 <3> := Double-point information M\_DP\_NA\_1  
 <4> := Double-point information with time tag M\_DP\_TA\_1  
 <5> := Step position information M\_ST\_NA\_1  
 <6> := Step position information with time tag M\_ST\_TA\_1  
 <7> := Bitstring of 32 bit M\_BO\_NA\_1  
 <8> := Bitstring of 32 bit with time tag M\_BO\_TA\_1  
 <9> := Measured value, normalized value M\_ME\_NA\_1  
 <10> := Measured value, normalized value with time tag M\_ME\_TA\_1  
 <11> := Measured value, scaled value M\_ME\_NB\_1  
 <12> := Measured value, scaled value with time tag M\_ME\_TB\_1  
 <13> := Measured value, short floating point number M\_ME\_NC\_1  
 <14> := Measured value, short floating point number with time tag M\_ME\_TC\_1  
 <15> := Integrated totals M\_IT\_NA\_1  
 <16> := Integrated totals with time tag M\_IT\_TA\_1  
 <17> := Event of protection equipment with time tag M\_EP\_TA\_1

- <18> := Packed start events of protection equipment with time tag M\_EP\_TB\_1
- <19> := Packed output circuit information of protection equipment with time tag M\_EP\_TC\_1
- <20> := Packed single-point information with status change detection M\_PS\_NA\_1
- <21> := Measured value, normalized value without quality descriptor M\_ME\_ND\_1
- <30> := Single-point information with time tag CP56Time2a M\_SP\_TB\_1
- <31> := Double-point information with time tag CP56Time2a M\_DP\_TB\_1
- <32> := Step position information with time tag CP56Time2a M\_ST\_TB\_1
- <33> := Bitstring of 32 bit with time tag CP56Time2a M\_BO\_TB\_1
- <34> := Measured value, normalized value with time tag CP56Time2a M\_ME\_TD\_1
- <35> := Measured value, scaled value with time tag CP56Time2a M\_ME\_TE\_1
- <36> := Measured value, short floating point number with time tag CP56Time2a M\_ME\_TF\_1
- <37> := Integrated totals with time tag CP56Time2a M\_IT\_TB\_1
- <38> := Event of protection equipment with time tag CP56Time2a M\_EP\_TD\_1
- <39> := Packed start events of protection equipment with time tag CP56Time2a M\_EP\_TE\_1
- <40> := Packed output circuit information of protection equipment with time tag CP56Time2a M\_EP\_TF\_1

Either use ASDU-type <2>,<4>,<6>,<8>,<10>,<12>,<14>,<16>,<17>,<18>,<19> or ASDU-type <30-40>.

### Process information in control direction

(station-specific parameters; mark each supported Type ID "X" (if supported in standard direction), or "R" (if supported in opposite direction), or "B" (if supported in both directions))

- <45> := Single command C\_SC\_NA\_1
- <46> := Double command C\_DC\_NA\_1
- <47> := Regulating step command C\_RC\_NA\_1
- <48> := Set point command, normalized value C\_SE\_NA\_1
- <49> := Set point command, scaled value C\_SE\_NB\_1
- <50> := Set point command, short floating point number C\_SE\_NC\_1
- <51> := Bitstring of 32 bit C\_BO\_NA\_1

### Process information in control direction with time tag

- <58> := Single command C\_SC\_TA\_1
- <59> := Double command C\_DC\_TA\_1
- <60> := Regulating step command C\_RC\_TA\_1
- <61> := Set point command, normalized value C\_SE\_TA\_1
- <62> := Set point command, scaled value C\_SE\_TB\_1
- <63> := Set point command, short floating point number C\_SE\_TC\_1
- <64> := Bitstring of 32 Bit C\_BO\_TA\_1

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

## System information in monitoring direction

(station-specific parameters; mark "X" if supported)

<70> := End of initialization M\_EI\_NA\_1

## System information in control direction

(station-specific parameters; mark each supported Type ID "X" (if supported in standard direction), or "R"(if supported in opposite direction), or "B" (if supported in both directions))

<100> := Interrogation command C\_IC\_NA\_1

<101> := Counter interrogation command C\_CI\_NA\_1

<102> := Read command C\_RD\_NA\_1

<103> := Clock synchronization command C\_CS\_NA\_1

<104> := Test command C\_TS\_NA\_1

<105> := Reset process command C\_RP\_NA\_1

<106> := Delay acquisition command C\_CD\_NA\_1

<107> := Test command with time tag CP56time2a C\_TS\_TA\_1

## Parameter in control direction

(station-specific parameters; mark each supported Type ID "X" (if supported in standard direction), or "R"(if supported in opposite direction), or "B" (if supported in both directions))

<110> := Parameter of measured value, normalized value P\_ME\_NA\_1

<111> := Parameter of measured value, scaled value P\_ME\_NB\_1

<112> := Parameter of measured value, short floating point number P\_ME\_NC\_1

<113> := Parameter activation P\_AC\_NA\_1

## File transfer

(station-specific parameters; mark each supported Type ID "X" (if supported in standard direction), or "R"(if supported in opposite direction), or "B" (if supported in both directions))

<120> := File ready F\_FR\_NA\_1

<121> := Section ready F\_SR\_NA\_1

<122> := Call directory, select file, call file, call section F\_SC\_NA\_1

<123> := Last section, last segment F\_LS\_NA\_1

<124> := ACK file, ACK section F\_AF\_NA\_1

<125> := Segment F\_SG\_NA\_1

<126> := Directory F\_DR\_TA\_1



**Type Identifier and Cause of Transmission assignments**  
(station-specific parameters)

Empty box = combination of Type Identifier and Transmission Assignments are not used.

Mark Type Identification/Cause of transmission combinations:

'X' if used in standard direction

'R' if used in 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 up to 36	37 up to 41	44	45	46	47
<1>	M_SP_NA_1			X											X					
<2>	M_SP_TA_1																			
<3>	M_DP_NA_1																			
<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						
<10>	M_ME_TA_1																			
<11>	M_ME_NB_1																			
<12>	M_ME_TB_1																			
<13>	M_ME_NC_1			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																
<31>	M_DP_TB_1																			
<32>	M_ST_TB_1																			
<33>	M_BO_TB_1																			
<34>	M_ME_TD_1			X																
<35>	M_ME_TE_1																			
<36>	M_ME_TF_1			X																
<37>	M_IT_TB_1															X				
<38>	M_EP_TD_1																			
<39>	M_EP_TE_1																			
<40>	M_EP_TF_1																			
<45>	C_SC_NA_1						X	X	X	X	X						X	X	X	X
<46>	C_DC_NA_1																			
<47>	C_RC_NA_1																			
<48>	C_SE_NA_1																			
<49>	C_SE_NB_1																			
<50>	C_SE_NC_1						X	X	X	X	X						X	X	X	X
<51>	C_BO_NA_1																			

Type Identification		Cause of transmission																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	20 up to 36	37 up to 41	44	45	46	47
<58>	C_SC_TA_1																			
<59>	C_DC_TA_1																			
<60>	C_RC_TA_1																			
<61>	C_SE_TA_1																			
<62>	C_SE_TB_1																			
<63>	C_SE_TC_1																			
<64>	C_BO_TA_1																			
<70>	M_EI_NA_1*)				X															
<100>	C_IC_NA_1						X	X	X	X	X						X	X	X	X
<101>	C_CI_NA_1						X	X			X						X	X	X	X
<102>	C_RD_NA_1																			
<103>	C_CS_NA_1						X	X									X	X	X	X
<104>	C_TS_NA_1																			
<105>	C_RP_NA_1						X	X									X	X	X	X
<106>	C_CD_NA_1																			
<107>	C_TS_TA_1																			
<110>	P_ME_NA_1																			
<111>	P_ME_NB_1																			
<112>	P_ME_NC_1																			
<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*)																			

## 1.7 Basic application functions

### Station initialization

(station-specific parameters; mark "X" if function is supported)

Remote initialization

### Cyclic data transmission

(station-specific parameter; mark "X" if function is supported in standard direction, or "R" if supported in reverse direction, or "B" if supported in both directions)

Cyclic data transmission

### Read procedure

(station-specific parameter; mark "X" if function is supported in standard direction, or "R" if supported in reverse direction, or "B" if supported in both directions)

Read procedure

### Spontaneous transmission

(station-specific parameter; mark "X" if function is supported in standard direction, or "R" if supported in reverse direction, or "B" if supported in both directions)

Spontaneous transmission

Note: no spontaneous transmission (empty box) is not supported

### 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
- 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 supported in standard direction, or "R" if supported in reverse direction, or "B" if supported in both directions)

<input checked="" type="checkbox"/>	Global				
<input type="checkbox"/>	Group 1	<input type="checkbox"/>	Group 2	<input type="checkbox"/>	Group 3
<input type="checkbox"/>	Group 5	<input type="checkbox"/>	Group 6	<input type="checkbox"/>	Group 7
<input type="checkbox"/>	Group 9	<input type="checkbox"/>	Group 10	<input type="checkbox"/>	Group 11
<input type="checkbox"/>	Group 13	<input type="checkbox"/>	Group 14	<input type="checkbox"/>	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 supported in standard direction, or "R" if supported in reverse direction, or "B" if supported in both directions)

<input checked="" type="checkbox"/>	Clock synchronization
<input type="checkbox"/>	Day of the week
<input type="checkbox"/>	Bit RES1 or GEN (time tag substitute or not substitute)
<input type="checkbox"/>	Bit SU (summer time)

### Command transmission

(object-specific parameter; mark "X" if function is supported in standard direction, or "R" if supported in reverse direction, or "B" if supported in both directions)

<input checked="" type="checkbox"/>	Direct command transmission
<input checked="" type="checkbox"/>	Direct set point command transmission
<input checked="" type="checkbox"/>	Select and execute command
<input checked="" type="checkbox"/>	Select and execute set point command
<input checked="" type="checkbox"/>	C_SE ACTTERM used
<input checked="" type="checkbox"/>	No additional definition
<input type="checkbox"/>	Short pulse duration (duration determined by a system parameter in the outstation)
<input type="checkbox"/>	Long pulse duration (duration determined by a system parameter in the outstation)
<input checked="" type="checkbox"/>	Persistent output

### Transmission of integrated totals

(station- or object-specific parameter; mark "X" if function is supported in standard direction, or "R" if supported in reverse direction, or "B" if supported 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 spontaneously
  
- Counter read
- Counter freeze without reset
- Counter freeze with reset
- Counter reset
  
- General request counter
- Request counter group 1       Request counter group 2
- Request counter group 3       Request counter group 4

The addresses for each group have to be specified.

### Parameter loading

(object-specific parameter; mark "X" if function is supported in standard direction, or "R" if supported in reverse direction, or "B" if supported in both directions)

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

### Parameter activation

(object-specific parameter; mark "X" if function is supported in standard direction, or "R" if supported in reverse direction, or "B" if supported 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 supported in standard direction, or "R" if supported in reverse direction, or "B" if supported in both directions)

- Test procedure

## File transfer

(station-specific parameter, mark each supported function 'X')

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 supported in standard direction, or "R" if supported in reverse direction, or "B" if supported in both directions)

- Background scan

Note: used for data of a not required (triggering independently) general query

## Acquisition of transmission delay

(station-specific parameter; mark "X" if function is supported in standard direction, or "R" if supported in reverse direction, or "B" if supported in both directions)

- Acquisition of transmission delay

## Definition of time outs

Parameter	Default Value	Remarks	Selected value (Default)
t <sub>0</sub>	30 s	Time-out of connection establishment	30 s
t <sub>1</sub>	15 s	Time-out of send or test APDUs	15 s
t <sub>2</sub>	10 s	Time-out for acknowledges in case of no data messages t <sub>2</sub> < t <sub>1</sub>	10 s
t <sub>3</sub>	30 s	Time-out for sending test frames in case of a long idle state	30 s

Maximum range of values for time-out t<sub>1</sub> : 1 to 65535 s, accuracy 1 s.

Maximum range of values for time-out t<sub>2</sub> to t<sub>3</sub> : 0 to 65535 s, accuracy 1 s.

Great time-out values t<sub>3</sub> are needed in special cases where satellites or switched communications are used (for example at only daily or weekly connection set-up for the data transmission).

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

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

Maximum range of values k: 1 to 12 APDUs, accuracy 1 APDU

Maximum range of values w: 1 to 65535 APDUs, accuracy 1 APDU (Recommendation: w should not exceed two-thirds of k).

**Portnummer**

Parameter	Default Value	Remarks	Selected value (Default)
Portnummer	2404	Adjustable, for redundancy both connections use same Portnummer	2404

**Redundant Connections**

2
---

Number N of connections in a redundancy group