1 EN/IEC60870-5-101 Interoperability Document for RTU870 Compact Telemetry Outstation

1.1 Network configuration (network-specific parameter)

- ☒ Point-to-point
- ☒ Multiple point-to-point
- ☒ Multipoint-party line
- ☐ Multipoint-star

1.2 Physical layer (network-specific parameter)

Transmission speed on RS232

- ☒ 300 bit/s
- ☒ 600 bit/s
- ☒ 1200 bit/s
- ☒ 2400 bit/s
- ☒ 4800 bit/s
- ☒ 9600 bit/s

Transmission speed V23

- ☒ 1200 bit/s

1.3 Link layer (network-specific parameter)

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

Link transmission procedure

- ☐ Balanced transmission
- ☒ Unbalanced transmission

Address field of link

- ☐Not present (balanced transmission only)
- ☒ One octet
- ☒ Two octets

Frame length

- ☐ Structured
- 255 Maximum length L (number of octets)
- ☒ Unstructured

1.4 Application Layer

1.4.1 Transmission mode for application data

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

1.4.2 Common address of ASDU (system-specific parameter)

☒ One octet ☒ Two octets
Follow the link address.

1.4.3 Information object address (system-specific parameter)

☐ One octet ☐ structured
☒ Two octets ☒ unstructured
☐ Three octets

1.4.4 Cause of transmission (system-specific parameter)

☒ One octet ☐ Two octets (with originator address)

1.4.5 Selection of standard ASDUs

Process information in monitor direction (station-specific parameter)

☒ <1>	:= Single-point information	M_SP_NA_1
☒ <2>	:= Single-point information with time tag	M_SP_TA_1
☒ <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 value	M_ME_NC_I
☐ <14>	:= Measured value, short floating point value with time tag	M_ME_TC_1
☒ <15>	:= Integrated totals	M_IT_NA_1
☒ <16>	:= Integrated totals with time tag	M_IT_TA_1
☐ <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 w/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 value 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 w/time tag CP56time2A	M_EP_TE_1
☐ <40> := Packed output circuit information of protection equipment w/time tag CP56Time2a	M_EP_TF_1

Process information in control direction (station-specific parameter)

☒ <45> := Single command Short pulse output , 500 ms pulse. (configurable) Persistent output Activation and activation termination	C_SC_NA_1
☒ <46> := Double command Short pulse output , 500 ms pulse. (configurable) Persistent output Activation and activation termination	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 Activation confirmation	C_SE_NB_1
☐ <50> := Set point command, short floating point value	C_SE_NC_1
☐ <51> := Bitstring of 32 bit	C_BO_NA_1

System information in monitor direction (station-specific parameter)

☒ <70> := End of initialization COI=0, local power switch on, is sent at cold and warm start.	M_EI_NA_1

System information in control direction (station-specific parameter)

☒<100> := Interrogation command	C_IC_NA_1
☐<101> := Counter interrogation command	C_CI_NA_1
☐<102> := Read command	C_RD_NA_1
☒<103> := Clock synchronization command Spontaneous and activation confirmation	C_CS_NA_1
☐<104> := Test command	C_TS_NB_1
☐<105> := Reset process command	C_RP_NC_1
☐<106> := Delay acquisition command	C_CD_NA_1

Parameter in control direction (station-specific parameter)

☐<110> := Parameter of measured value, 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 value	P_ME_NC_1
☐<113> := Parameter activation	P_AC_NA_1

File transfer (station-specific parameter)

☐<120> := File ready	F_FR_NA_1

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

1.5 Basic application functions

1.5.1 Station initialization (station-specific parameter)

☒ Remote initialization

1.5.2 General Interrogation (system- or station-specific parameter)

Addresses are not defined by the firmware. Address mapping implemented by B-CON can be found in chapters 1.6 and 1.7

☒ Global

☐ group 1	☐ group 7	☐ group 13
☐ group 2	☐ group 8	☐ group l4
☐ group 3	☐ group 9	☐ group 15
☐ group 4	☐ group 10	☐ group 16
☐ group 5	☐ group 11	
☐ group 6	☐ group 12	

1.5.3 Clock synchronization (station-specific parameter)

☒ Clock synchronization
Clock adjustment accuracy +/-2 seconds

1.5.4 Command transmission (object-specific parameter)

☒ Direct command transmission	☐ Select and execute command
☒ Direct set point command transmission	☐ 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

1.5.5 Transmission of Integrated totals (station- or object-specific parameter)

Addresses are not defined by the firmware. Address mapping implemented by B-CON can be found in chapter 1.6

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

1.5.6 Parameter loading (object-specific parameter)

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

1.5.7 Parameter activation (object-specific parameter)

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

1.5.8 File transfer (station-specific parameter)

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

1.6 RTU870 outstation configuration

The configuration program IOTOOL870 can be used to configure the IEC60870-5-101 protocol in the RTU870 Outstations.

In IOTOOL870 you can assign IOA addresses to the physical I/O on a RTU870 system.

1.7 IEC870 Functions and data queues in RTU870

Physical I/O	**IOA type**	**General interrogation**	**FIFO**		**Cyclic**	
			Class 1	**Class 2**	**Class 1**	**Class 2**
DI	Single point	X	X			
DI x 2	Double point	X	X			
AI	Measured normalised value					X
AO	Measured normalised value					
Status Word Old Status Word	Measured scaled value	X	X X			
DI0-0..DI0-1 Counter	Integrated totals		X			
M9.6 Battery Error	Single point	X	X			
M9.7 Mains Error	Single point	X	X			
DO	Single command					
DO x 2	Double command					
Responses to different requests/events						
Activation/Deactivation responses			X			
Clock synchronise response			X			
Meter driver transparent messages				X		