
IEC 60870-5-101

Interoperability Profile

The marked points with "■" will have to be implemented for UTE acquired equipments

1 System or device

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

2 Network configuration

- Point to point
- Multiple point to point
- Multipoint-partyline
- Multipoint star

3 Physical layer

Transmission speed (control direction)

Unbalanced interchange Circuit V.24/V.28 Standard	Unbalanced interchange Circuit X.24/X.27 Standard Recommended if >1 200 bit/s	Balanced interchange Circuit X.24/X.27
<input type="checkbox"/> 100 bit/s	■ 2400 bit/s	<input type="checkbox"/> 2400 bit/s
<input type="checkbox"/> 200 bit/s	■ 4800 bit/s	<input type="checkbox"/> 4800 bit/s
<input type="checkbox"/> 300 bit/s	■ 9600 bit/s	<input type="checkbox"/> 9600 bit/s
<input type="checkbox"/> 600 bit/s		<input type="checkbox"/> 19200 bit/s
<input type="checkbox"/> 1200 bit/s		<input type="checkbox"/> 38400 bit/s
		<input type="checkbox"/> 56000 bit/s
		<input type="checkbox"/> 64000 bit/s

Transmission speed (monitor direction)

Unbalanced interchange Circuit V.24/V.28 Standard	Unbalanced interchange Circuit X.24/X.27 Standard Recommended if >1 200 bit/s	Balanced interchange Circuit X.24/X.27
<input type="checkbox"/> 100 bit/s	■ 2400 bit/s	<input type="checkbox"/> 2400 bit/s
<input type="checkbox"/> 200 bit/s	■ 4800 bit/s	<input type="checkbox"/> 4800 bit/s
<input type="checkbox"/> 300 bit/s	■ 9600 bit/s	<input type="checkbox"/> 9600 bit/s

<input type="checkbox"/> 600 bit/s		<input type="checkbox"/> 19200 bit/s
<input type="checkbox"/> 1200 bit/s		<input type="checkbox"/> 38400 bit/s
		<input type="checkbox"/> 56000 bit/s
		<input type="checkbox"/> 64000 bit/s

4 Link layer

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 the link

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

Frame length

255 Maximum length L

- ☐ 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.

5 Application layer

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 (station-specific parameter)

- | | |
|------------------------------------|--|
| <input type="checkbox"/> One octet | <input checked="" type="checkbox"/> Two octets |
|------------------------------------|--|

Information object address (station-specific parameter)

- | | |
|--|--|
| <input type="checkbox"/> One octet | <input type="checkbox"/> Structured |
| <input checked="" type="checkbox"/> Two octets | <input checked="" type="checkbox"/> Unstructured |
| <input type="checkbox"/> Three octets | |

Cause of transmission (station-specific parameter)

- | | |
|---|-------------------------------------|
| <input checked="" type="checkbox"/> One octet | <input type="checkbox"/> Two octets |
|---|-------------------------------------|

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.

Selection of standard ASDUs (station-specific parameter)

Process information in monitor direction

■ <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	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_1
□ <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 with time	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 with time tag CP56Time2a	M_EP_TE_1
□ <40> := Packed output circuit information of protection equipment with time tag CP56Time2a	M_EP_TF_1

Process information in control direction (station-specific parameter)

■ <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 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	M_EI_NA_1
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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	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

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 {blank or X, only available in monitor (standard) direction}	F_DR_TA_1

Type identifier and cause of transmission assignments
(station-specific parameter)

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	
<50>	C_SE_NC_1																				
<51>	C_BO_NA_1																				
Type identification					X																
<100>	C_IC_NA_1						X	X	8	9	X						44	45	46	47	
<101>	C_CI_NA_1																				
<102>	M_SP_NA_1																				
<103>	M_CS_NA_1			X			X	X													
<104>	M_TS_NA_1																				
<105>	M_DP_NA_1						X	X													
<106>	M_ST_NA_1																				
<110>	M_ME_NA_1																				
<111>	M_ME_NB_1																				
<112>	M_ME_NC_1																				
<113>	M_ME_NA_1																				
<120>	M_ME_NA_1																				
<121>	M_ME_NB_1																				
<122>	M_ME_TB_1																				
<123>	M_ME_NC_1																				
<124>	M_ME_TC_1																				
<125>	M_ME_NA_1																				
<126>	M_DR_FA_1*			X																	
<17>	M_EP_TA_1				* Blank or X only.																
<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																				
<35>	M_ME_TE_1																				
<36>	M_ME_TF_1																				
<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										
<46>	C_DC_NA_1																				
<47>	C_RC_NA_1																				
<48>	C_SE_NA_1																				
<49>	C_SE_NB_1																				

6 Basic application functions

Station initialization

(station-specific parameter)

- Remote initialization

Cyclic data transmission

(station-specific parameter)

- Cyclic data transmission

Read procedure

(station-specific parameter)

- ☐ Read procedure

Spontaneous transmission

(station-specific parameter)

- Spontaneous transmission

Double transmission of information objects with cause of transmission spontaneous

(station-specific parameter)

- ☐ Single-point information M_SP_NA_1, MSPTA1, 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)

- global

- | | | |
|----------------------------------|-----------------------------------|-----------------------------------|
| <input type="checkbox"/> group 1 | <input type="checkbox"/> group 7 | <input type="checkbox"/> group 13 |
| <input type="checkbox"/> group 2 | <input type="checkbox"/> group 8 | <input type="checkbox"/> group 14 |
| <input type="checkbox"/> group 3 | <input type="checkbox"/> group 9 | <input type="checkbox"/> group 15 |
| <input type="checkbox"/> group 4 | <input type="checkbox"/> group 10 | <input type="checkbox"/> group 16 |
| <input type="checkbox"/> group 5 | <input type="checkbox"/> group 10 | |

- ☐ group 6 ☐ group 12

Clock synchronization

(station-specific parameter)

- Clock synchronization

Command transmission

(station-specific parameter)

- ☐ 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 controlled station)
- Long-pulse duration (duration determined by a system parameter in the controlled station)
- ☐ Persistent output

Transmission of integrated totals

(station-specific parameter)

- Mode A: local freeze with spontaneous
- Mode B: local freeze with counter interrogation
- Mode C: freeze and transmit by counter interrogation
- ☐ 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

Parameter loading

(object-specific parameter)

- ☐ Threshold value

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

Parameter activation

(object-specific parameter)

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

Test procedure

(object-specific parameter)

- ☐ Test procedure

File transfer

(station-specific parameter)

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)

- ☐ Background scan

Acquisition of transmission delay

(station-specific parameter)

- ☐ Acquisition of transmission delay