

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

**Telecontrol equipment and systems –
Part 5-101: Transmission protocols – Companion standard for basic telecontrol
tasks**

**Matériels et systèmes de téléconduite –
Partie 5-101: Protocoles de transmission – Norme d'accompagnement pour les
tâches élémentaires de téléconduite**





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FOREWORD

This amendment has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

The text of this amendment is based on the following documents:

CDV	Report on voting
57/1530/CDV	57/1592/RVC

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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[IEC 60870-5-101:2003/AMD1:2015](https://standards.iteh.ai/catalog/standards/sist/3dcf7bd3-896f-44fb-bcdb-d1e5e166410e/iec-60870-5-101-2003-amd1-2015)

<https://standards.iteh.ai/catalog/standards/sist/3dcf7bd3-896f-44fb-bcdb-d1e5e166410e/iec-60870-5-101-2003-amd1-2015>

4.3 Link layer

Replace the first sentence of the first paragraph of 4.3 with the following new text:

IEC 60870-5-2 defines a set of link transmission procedures using a control field and the optional address field.

Replace the last sentence of the 5th paragraph of 4.3 with the following new text:

In addition a companion standard specifies the time-out interval (T_0) of the primary station (see A.1 of IEC 60870-5-2 for details of link timing).

Figure 5 – State transition diagram for unbalanced transmission primary to secondary

Replace (twice) in Figure 5 the phrase "Rx[error]/ and Trp not time out"

by the following new phrase:

"Rx[error and Trp not time out]"

Replace (twice) in Figure 5 the phrase "Rx[error]/Trp not time out/"

by the following new phrase:

"Rx[error and Trp not time out]" (standards.iteh.ai)

Add, after Figure 6, the following new subclause heading:

6.2.1.2 Balanced transmission procedures

Replace the first sentence of the first paragraph of 6.2.1.2 by the following new text:

The request to the standardized function codes in primary direction (0 up to 3 and 9) have to receive positive or negative responses.

7.1 Selections from IEC 60870-5-3: General structure of application data

Add at the end of the 3rd paragraph of 7.1, the following new text:

ASDU's containing no INFORMATION OBJECT are permitted too.
Additionally: In some cases the ASDU consist of the DATA UNIT IDENTIFIER only.

Replace the second sentence of the 6th paragraph of 7.1 by the following new text:

The COMMON ADDRESS is the station address, which permits the addressing of the whole station or just a particular station sector.

7.2 Selections from IEC 60870-5-4: Definitions and coding of application information elements

Add, at the end of 7.2, the following new text:

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

Table 9 – Semantics of TYPE IDENTIFICATION – Process information in control direction

Replace the existing Note below Table 9 with the following new Note:

NOTE ASDUs marked (**CON**) in control direction are confirmed application services and have to be mirrored in monitor direction with different causes of transmission. These mirrored ASDUs are used for positive/negative acknowledgements (verifications). The causes of transmission are defined in 7.2.3.

Table 13 – Semantics of TYPE IDENTIFICATION – File transfer

Replace the existing Note below Table with the following new Note:

NOTE ASDUs marked (**CON**) in control direction are confirmed application services and have to be mirrored in monitor direction with different causes of transmission. These mirrored ASDUs are used for positive/negative acknowledgements (verifications). The causes of transmission are defined in 7.2.3.

7.2.3 Cause of transmission:

Replace the first sentence of the first paragraph of 7.2.3 with the following new text:

Octet 3 (and optionally Octet 4) of the DATA UNIT IDENTIFIER of the ASDU defines the CAUSE OF TRANSMISSION field which is specified in the following.

7.2.3 Cause of transmission

Replace the subheading after Figure 14 with the following new numbered subheading:

7.2.3.1 Definition of the semantics of values of the CAUSE OF TRANSMISSION field

Replace the 6th paragraph of 7.2.3.1 with the following new text:

<https://standards.iteh.ai/catalog/standards/sist/3dcf7bd3-896f-44fb-bcdb-1ec60870-5-101-2003/ASDU.2015>

ASDUs marked (**CON**) in control direction are confirmed application services and shall be mirrored in monitor direction with different CAUSES OF TRANSMISSION (see Tables 9, 11 and 12). The originator address directs these mirrored ASDUs and interrogated ASDUs in monitor direction (e.g. interrogated by station interrogation) to the source that activated the procedure.

Replace the 13th paragraph of 7.2.3.1 with the following new text:

ASDUs in the control direction and ASDUs defined for monitor direction used in reverse mode (see clause 8. Interoperability) with not supported values in the data unit identifier (except the variable structure qualifier) and the information object address are mirrored by the controlled station with bit “P/N:= <1> negative confirm” and the following causes of transmission:

7.2.4 COMMON ADDRESS OF ASDUs:

Replace the first sentence of the first paragraph of 7.2.4 with the following new text:

Octet 4 and optionally Octet 5 (or – if the originator address is used – Octet 5 and optionally Octet 6) of the DATA UNIT IDENTIFIER of the ASDU define the station address which is specified in the following.

7.2.6.18 Seven octet binary time

Replace the paragraph beginning "The summer-time bit SU ..." with the following new text:

The summer-time bit SU may optionally be used, but is not recommended. A time tag having the SU flag set will indicate the same time value as time tag having the SU flag clear and indicating a time value exactly one hour earlier. The use of the SU-Bit may be useful to assign

the correct hour to information objects which are generated during the first hour after switching from summer-time to standard time.

7.2.6.21 Cause of initialization

Replace

COI := CP8{UI7[1..7],BS1[8]} (Type 1.1)
UI7[1..7]<0..127>

with the following new text:

COI := CP8{UI7[1..7],BS1[8]} (Type 1.1)
UI7[1..7]<0..127>

7.2.6.38 Status of file

Replace

SOF := CP8{STATUS,LFD,FOR,FA} (Type 1.1)
STATUS := UI5[1..5]<0..32>
<0> := default
<1..15> := reserved for standard definitions of this companion standard
(compatible range)
<16..32>:= reserved for special use (private range)

with the following new text:

SOF := CP8{STATUS,LFD,FOR,FA} (Type 1.1)
STATUS := UI5[1..5]<0..31>
<0> := default
<1..15> := reserved for standard definitions of this companion standard
(compatible range)
<16..31>:= reserved for special use (private range)

7.3.1.20 TYPE IDENT 20: M_PS_NA_1

Packed single-point information with status change detection

Add, at the end of 7.3.1.20, the following new Note:

NOTE OV within the QDS is not used in this Information Object and is always set to <0>.

Figure 50 – ASDU: M_PS_NA_1 Sequence of packed single-point information with status change detection

Replace the description of Status change detection in Information Object j in Figure 50 with the following new text:

SCD = Status + status change detection, 32 bit, defined in 7.2.6.40
Belongs to information object address A+16*(j-1)

7.3.4.2 TYPE IDENT 101:C_CI_NS_1 Counter interrogation command

Replace the following existing text:

CAUSE OF TRANSMISSION

in control direction:

<6>:= activation
<8>:= deactivation

in monitor direction:
<7>:= activation confirmation
<9>:= deactivation confirmation
<10>:= activation termination
<44>:= unknown type identification
<45>:= unknown cause of transmission
<46>:= unknown common address of ASDU
<47>:= unknown information object address

with the following new text:

CAUSE OF TRANSMISSION

in control direction:
<6>:= activation

in monitor direction:
<7>:= activation confirmation
<10>:= activation termination
<44>:= unknown type identification
<45>:= unknown cause of transmission
<46>:= unknown common address of ASDU
<47>:= unknown information object address

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Figure 79 – ASDU – P_ME_NA_1 Parameter of measured values, normalized value

Replace, in Figure 79 within the last Octet of the ASDU figure, "UI8" with "CP8".

[IEC 60870-5-101:2003/AMD1:2015](https://standards.iteh.ai/catalog/standards/sist/63167302-1006-448-1-1015/d1e5e166410e/iec-60870-5-101-2003-amd1-2015)

Figure 80 – ASDU – P_ME_NB_1 Parameter of measured values, scaled value

Replace, in Figure 80 within the last Octet of the ASDU figure, "UI8" by "CP8"

7.4 Selections from IEC 60870-5-5: Basic application functions

Replace, in the 1st paragraph of 7.4, "General interrogation (6.6)" with "General interrogation, Outstation interrogation (6.6)"

7.4.5 Selection from station interrogation, outstation interrogation

Replace, in the 3rd paragraph after Table 17, "general interrogation" with "station interrogation"

7.4.6 Selections from clock synchronization

Replace the last sentence of the 3rd paragraph of 7.4.6 with the following new text:

The summer-time bit SU shall be set to <0> if summer-time is not used.

7.4.11.1 General addressing structure of file transfer

7.4.11.1.1 Introduction

Replace the 3rd paragraph of 7.4.11.1.1 with the following new text:

The following names of files are defined:

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Name of file:

<0>	:=	default (for directories containing different file types and for "Call directory" by all types calling)
<1>	:=	transparent file
<2>	:=	disturbance data of protection equipment
<3>	:=	sequences of events
<4>	:=	sequences of recorded analogue values
<5..127>	:=	reserved for further compatible definitions
<128..255>	:=	reserved for special use (private range)

The second octet of the name of the file is reserved for further compatible definitions.

7.4.11.2.4 Structure of disturbance data files

Replace in the 1st, 3rd and 4th paragraphs of 7.4.11.2.4, "time-tags" by "tags".

Figure 100 – Structure of disturbance data of a protection equipment

Replace within Figure 100 the description

"Last section
Parameter of channel n"

with the following new text:

"Penultimate section
Parameter of channel n"

7.4.11.2.5 Mapping of the list of recorded disturbances to the directory

Replace, in the last sentence of the 1st paragraph of 7.4.11.2.5, the term "binary time tags" with "tags".

Figure 104 – Sequential procedure, transmission of disturbance data files

Replace Figure 104 "Sequential procedure, transmission of disturbance data files" with the following updated Figure 104.

Controlling station	Communication services	Controlled station	Action
A_SELECT_FILE.req	F_SC_NA_1 file	A_SELECT_FILE.ind	Selection of disturbance to be transmitted (automatically or by operator)
A_FILE_READY.ind	F_FR_NA_1 file	A_FILE_READY.req	Selected disturbance is ready to be transmitted (pos/neg)
A_CALL_FILE.req	F_SC_NA_1 file	A_CALL_FILE.ind	Request of disturbance to be transmitted (automatically or by operator)
A_SECTION1_READY.ind	F_SR_NA_1 file	A_SECTION1_READY.req	Section 1 (parameter of disturbance) is ready to be transmitted (pos/neg)
A_CALL_SECTION1.req	F_SC_NA_1 file	A_CALL_SECTION1.ind	Request of Section 1
A_SEGMENT1.ind	F_SG_NA_1 file	A_SEGMENT1.req	Section 1, Segment 1 (parameter of a disturbance is being transmitted)
A_SEGMENT2.ind	F_SG_NA_1 file	A_SEGMENT2.req	Section 1, Segment 2 (parameter of a disturbance) is being transmitted
A_LAST_SEGMENT1.ind	F_LS_NA_1 file	A_LAST_SEGMENT1.req	Last segment Section 1 (parameter of disturbance) is transmitted (pos/neg)
A_ACK_SECTION1.req	F_AF_NA_1 file	A_ACK_SECTION1.ind	Acknowledge of transmission of Section 1 (pos/neg)
A_SECTION2_READY.ind	F_SR_NA_1 file	A_SECTION2_READY.req	Section 2 (tags of a disturbance) is ready to be transmitted (pos/neg)
A_CALL_SECTION2.req	F_SC_NA_1 file	A_CALL_SECTION2.ind	Request of section 2

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<https://standards.iteh.ai/catalog/standards/sist/232105-8/iec-60870-5-101-2003-amd1-2015>
d1e5e166410e/iec-60870-5-101-2003-amd1-2015

Controlling station	Communication services	Controlled station	Action
A_SEGMENT1.ind	F_SG_NA_1 file	A_SEGMENT1.req	Section 2, Segment 1 (tags of disturbance) is being transmitted
A_SEGMENT2.ind	F_SG_NA_1 file	A_SEGMENT2.req	Section 2, Segment 2 (tags of disturbance) is being transmitted
	...		
A_LAST_SEGMENT2.ind	F_LS_NA_1 file	A_LAST_SEGMENT2.req	Last segment Section 2 (tags of disturbance) is transmitted (pos/neg)
A_ACK_SECTION2.req	F_AF_NA_1 file	A_ACK_SECTION2.ind	Acknowledge of transmission Section 2 (pos/neg)
A_SECTION3_READY.ind	F_SR_NA_1 file	A_SECTION3_READY.req	Section 3 (parameter of channel 1) is ready to be transmitted (pos/neg)
A_CALL_SECTION3.req	F_SC_NA_1 file	A_CALL_SECTION3.ind	Request of Section 3
A_SEGMENT1.ind	F_SG_NA_1 file	A_SEGMENT1.req	Section 3, Segment 1 (parameter of channel 1) is being transmitted
A_SEGMENT2.ind	F_SG_NA_1 file	A_SEGMENT2.req	Section 3, Segment 2 (parameter of channel 1) is being transmitted
A_LAST_SEGMENT3.ind	F_LS_NA_1 file	A_LAST_SEGMENT3.req	Last Segment Section 3 (parameter of channel 1) is transmitted (pos/neg)
A_ACK_SECTION3.req	F_AF_NA_1 file	A_ACK_SECTION3.ind	Acknowledge of transmission Section 3 (pos/neg)
A_SECTION4_READY.ind	F_SR_NA_1 file	A_SECTION4_READY.req	Section 4 (disturbance data of channel 1) is ready to be transmitted (pos/neg)
A_CALL_SECTION4.req	F_SC_NA_1 file	A_CALL_SECTION4.ind	Request of Section 4
A_SEGMENT1.ind	F_SG_NA_1 file	A_SEGMENT1.req	Section 4, Segment 1 (disturbance data of channel 1) is being transmitted
A_SEGMENT2.ind	F_SG_NA_1 file	A_SEGMENT2.req	Section 4, Segment 2 (disturbance data of channel 1) is being transmitted
	...		
A_LAST_SEGMENT4.ind	F_LS_NA_1 file	A_LAST_SEGMENT4.req	Last Segment Section 4 (parameter of channel 1) is transmitted (pos/neg)
A_ACK_SECTION4.req	F_AF_NA_1 file	A_ACK_SECTION4.ind	Acknowledge of transmission Section 4 (pos/neg)
	⋮		
A_SECTIONm_READY.ind	F_SR_NA_1 file	A_SECTION m_READY.req	Section m (parameter of channel n) is ready to be transmitted (pos/neg)
A_CALL_SECTION m .req	F_SC_NA_1 file	A_CALL_SECTION m.ind	Request of section m