

Data communication for HVAC Application Management Net —

**Part 2: System neutral data
transmission by open communication
for building automation (FND)**

ICS 35.240.60; 97.120

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The preparation of this Draft for Development was entrusted by Technical Committee RHE/16, Controls for HVAC, to Subcommittee RHE/16/1, Management systems for buildings, upon which the following bodies were represented:

- Association of Consulting Engineers
- Association of Control Manufacturers [TACMA (BEAMA Ltd.)]
- British Combustion Equipment Manufacturers' Association
- Building Services Research and Information Association
- Department of the Environment (Building Research Establishment)
- Electrical Contractors' Association
- Energy Systems Trade Associations
- HEVAC Association
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National foreword

This Draft for Development has been prepared by Subcommittee RHE/16/1 and is the English language version of ENV 1805 *Data communication for HVAC application management net* — Part 2:1995 *System neutral data transmission by open communication for building automation (FND)*, published by the European Committee for Standardization (CEN). ENV 1805-2:1995 was produced as a result of international discussions in which the UK took an active part.

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature. It should be applied on this provisional basis so that information and experience of its practical application may be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the European organization responsible for its conversion to a European Standard. A review of this publication will be initiated 2 years after its publication by the European organization so that a decision can be taken on its status at the end of its three-year life. The commencement of the review will be notified by an announcement in *BSI News*.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into a European Standard, to extend the life of the prestandard or to withdraw it. Comments should be sent in writing to the Secretary of BSI Technical Committee RHE/16 at 389 Chiswick High Road, London W4 4AL giving the document reference and clause number and proposing, where possible, and appropriate revision of the text.

Cross-reference

Publication referred to	Corresponding British Standard
ISO 4903:1989	BS ISO 4903:1989 <i>Information technology. Data communication. 15-pole DTE/DCE interface connector and contact number assignments</i>

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the ENV title page, pages 2 to 76, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Descriptors: Automation, buildings, control device, data processing, data transfer, FND

English version

Data Communication for HVAC Application Management Net — Part 2: System neutral data transmission by open communication for building automation (FND)

This European Prestandard (ENV) was approved by CEN on 1995-06-29 as a prospective standard for provisional application. The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into an European Standard (EN).

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

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CEN

European Committee for Standardization
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Foreword

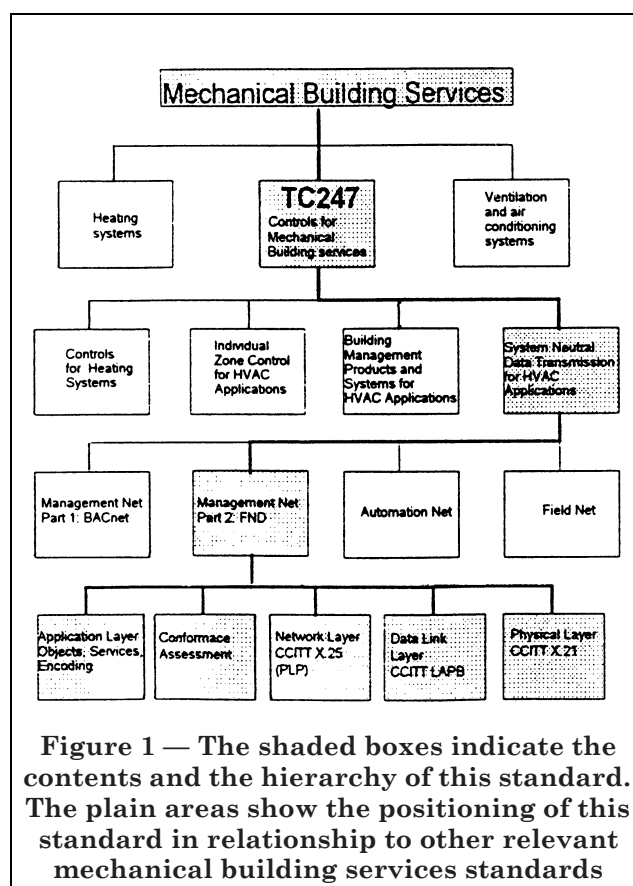
This European prestandard (ENV) has been prepared by the Technical Committee CEN TC 247, Control for mechanical building service, of which the secretariat is held by SNV.

This ENV 1805-2 prestandard is part of a series of standards for system-neutral data communications in HVAC systems. This ENV 1805-2 (FND) prestandard and the ENV 1805-1 (BACnet) cover the data communications on the management level and together form the prestandard for the management level. ENV 1805-2 is an adoption of the German prestandard DIN V 32735

“System-neutral data transmission by open communication for building automation (FND)” from January 1991.

The position of this standard in the whole range of standards for mechanical building services and the normative sections of the BACnet standard included is illustrated in Figure 1.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to announce the European Prestandard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.



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0 Introduction

The FND is a communication protocol for building automation and control systems on the management net level. It is used for data transmission between a central station and one or more autonomous islands of automation stations. FND means vendor-independent and system-neutral data transmission.

The FND standard specifies the hardware, the software, the behaviour and the functionality of the interfaces provided by the central station and the corresponding island of automation stations. The protocol definition is based on the ISO/OSI Basic Reference Model. The FND protocol stack uses the layers 1 to 3 and layer 7.

The lower layers are identical to the International Standard CCITT X.21/X.25. Because of this WAN communication via public networks is possible. The realisation of the communication link between the stations is a kind of a local matter. The network can be any kind of LAN, WAN or even a point to point connection providing the FND interface.

The layer 7 contains the FND protocol. Using the communication objects specified all basic functions in building automation and control systems can be handled, i.e. read and command analogue and digital datapoints and values, change limits of analogue datapoints and alarm handling. The main communication objects of layer 7 are:

- Signalling point (digital input)
- Switching point (digital output)
- Measuring point (analogue input)
- Positioning point (analogue output)
- Counting point

For error handling, authentication and transparent data transmission (e.g. files) additional objects are specified in the standard.

The communication initiated by the central station uses the FND layer 7 services *command* and *response*. The command service can contain a request for a value, a value for setting a datapoint etc. The automation station sends a response either with or without an information depending on the previous command.

If the automation station initiates the communication, the services *unsolicited message* and *acknowledge* are used. In that case something had happened in the automation island, e.g. a change of state, an alarm, that has to be reported to the central station. The unsolicited message is sent and the central station responds with an acknowledge. So, every communication between the automation systems uses a handshake procedure.

1 Scope

1.1 Field of application

The FND is a communication protocol for building automation and control systems on the management net level. It is used for data transmission between a central station and one or more autonomous islands of automation stations.

The standard specifies the interface of the central station and of the island of automation stations for communicating with each other. The network used for internetworking these systems is not part of this standard.

The communication objects defined in this standard correspond to the basic functions of building automation and control systems. Therefore the information needed by the central station is available from automation stations even if the vendors of the different systems are not identical.

1.2 Purpose

This standard specifies the communication protocol on the interface of a central station and an island of automation stations. The protocol specification is based on the ISO/OSI Basic Reference Model. The mechanical, electrical and functional behaviour of the interface is described and the bit structures and communication objects are specified.

This standard can be used for implementing the specified communication protocol and for describing the requirements for interworking with stations from different vendors. This standard describes the requirements that have to be placed on a building automation system with regard to a communication interface. The basic functions of the communication, the interface to (long-distance traffic capable) networks and the functionality that this standard makes available to the connected systems are determined.

2 Normative references

ISO 4903:1989, *Information technology; Data communication; 15-pin DTE/DCE interface connector and contact number assignments*.

ISO/DIS 9506-2:1989, *Manufacturing message specification — Part 2: Protocol specification*.

CCITT RED BOOKDATA, *COMMUNICATION NETWORKS INTERFACES RECOMMENDATIONS X.20 – X.32*.

CCITT RED BOOK, *FUNCTIONAL SPECIFICATION AND DESCRIPTION LANGUAGE (SDL) RECOMMENDATIONS Z.100 Z.104*.

3 FND communication model

3.1 Information exchange

As can be seen from Figure 1, the information exchange realized via FND is accomplished in a logic point-to-point connection between central station (CS) and the manufacturer-specific DDC islands. By working as functionally terminated and independent DDC subsystems, they are represented to the outside by their island control stations (IS).

The conversion of the manufacturer-specific frame formats, addressing types and protocols to the FND interface, is accomplished via standard interface adapters (SIA) which in Figure 1 are represented as special logic units called GATEWAYS. In practical operation, however, they are integrated into the IS and CS (as an additional plug-in card e.g.).

The communication network is a transportation system that has the task of transmitting telegrams. Connection to the communication network is accomplished via network access units (NAU), which do not allow the internal and logic structure of the network to appear to the outside. The termination and transition of the NAU to the relevant standard interface adapter (SIA) consists of a 15-pin socket according to ISO 4903:1989 (see Figure 2). CS and SIA or IS and SIA form one functional unit in each case.

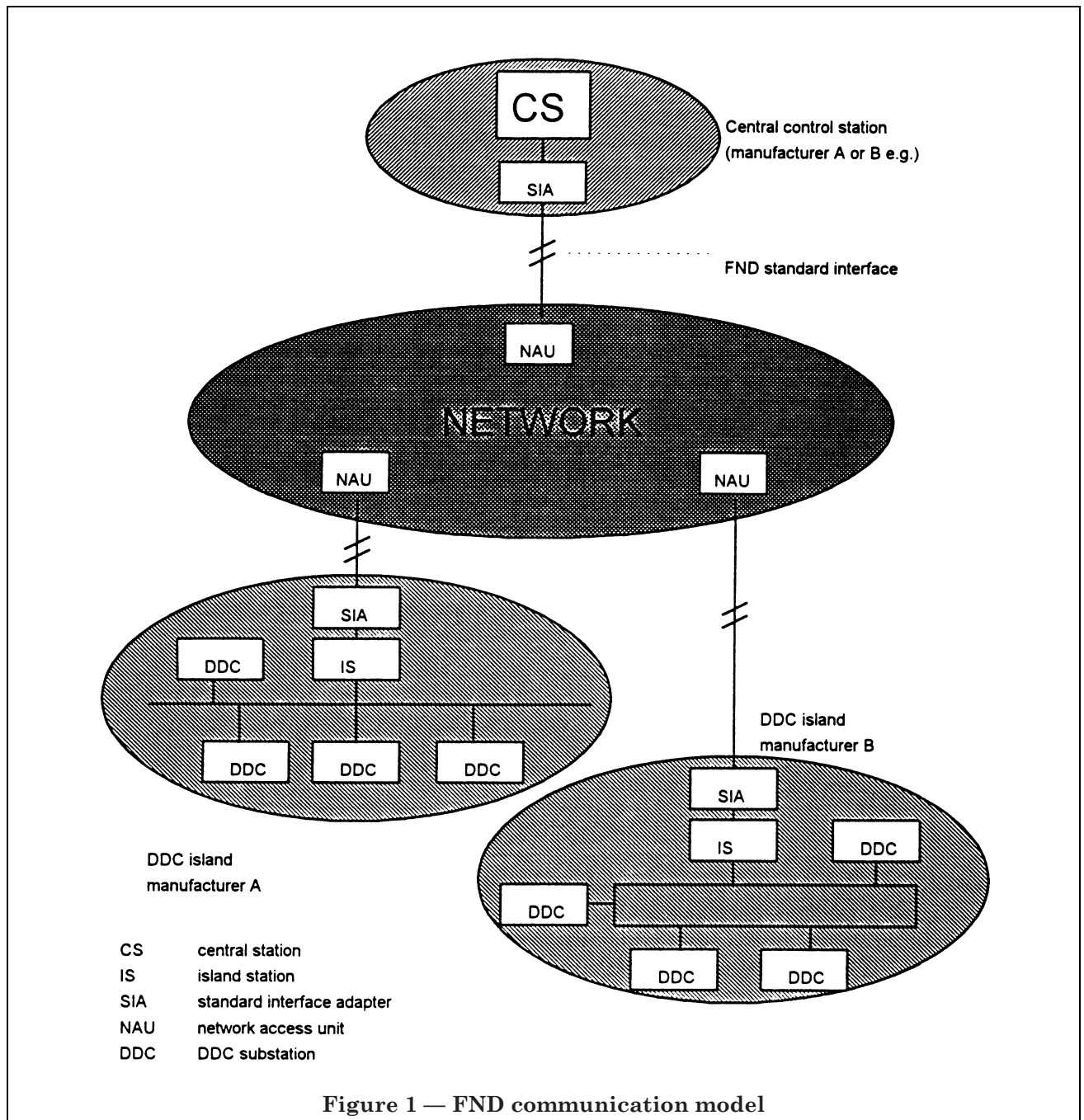


Table 1

Connection number	Dimensions in mm	
	X.21	
	X.26 ^a	X.27
1	Shield	Shield
2	T	T(A)
3	C	C(A)
4	R(A)	R(A)
5	I(A)	I(A)
6	S(A)	S(A)
7	B(A)	B(A)
8	G	G
9	Ga	T(B)
10	Ga	C(B)
11	R(B)	R(B)
12	I(B)	I(B)
13	S(B)	S(B)
14	B(B)	B(B)
15	reserved	reserved
^a not for FND		

Dimensions in mm

Figure 2 — X.21 plug according to ISO 4903:1989

3.2 Positioning of FND inside building automation systems

Figure 3 shows the position of the FND inside the building automation and control system which is hierarchically structured into individual, group, and central control level. FND is the communication system for the connection of the higher control and management functions between central and group control levels. Information exchange inside the DDC island between subcentral stations, substations and field level is regulated specifically by manufacturer and will not be influenced by the FND.

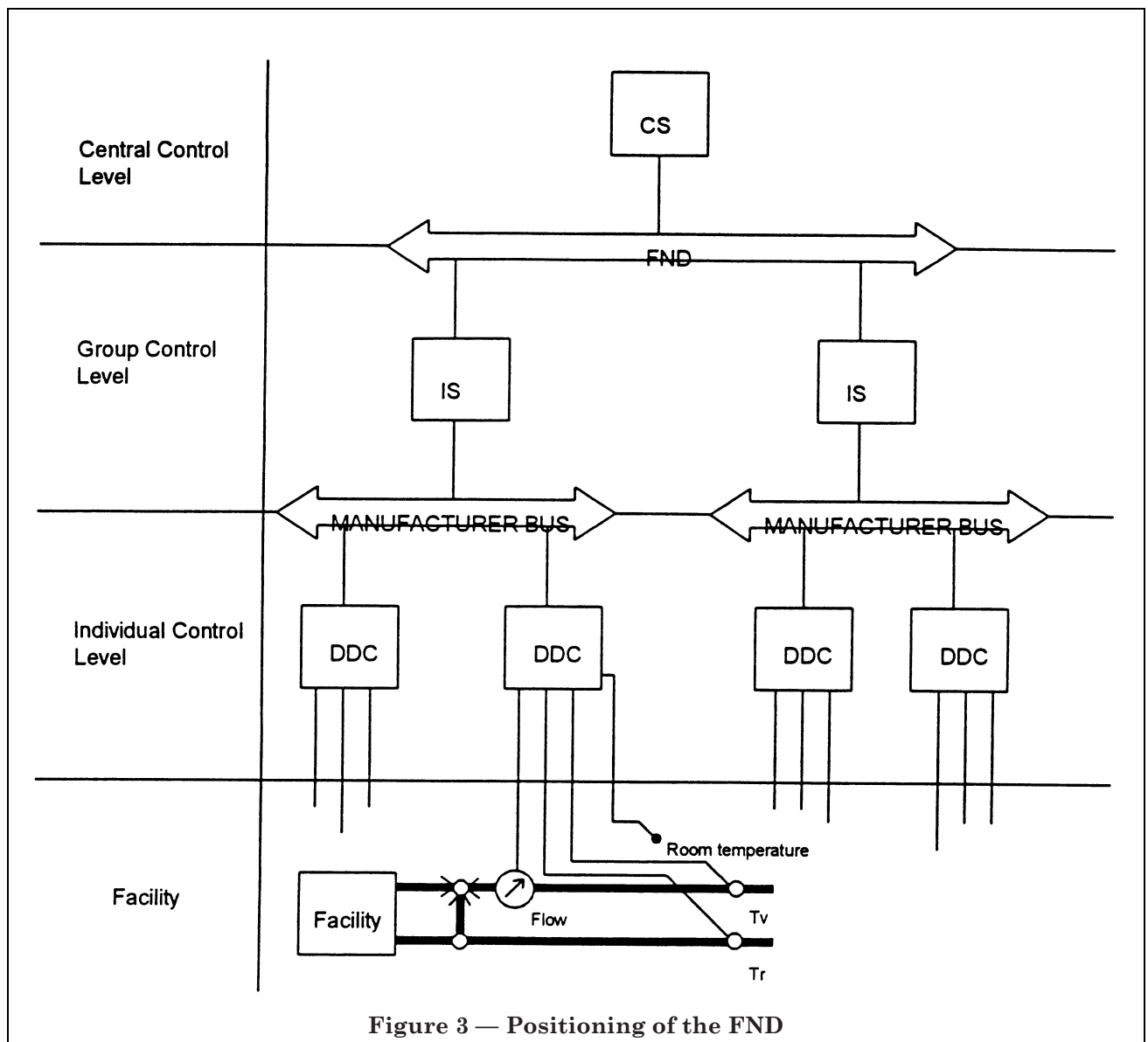
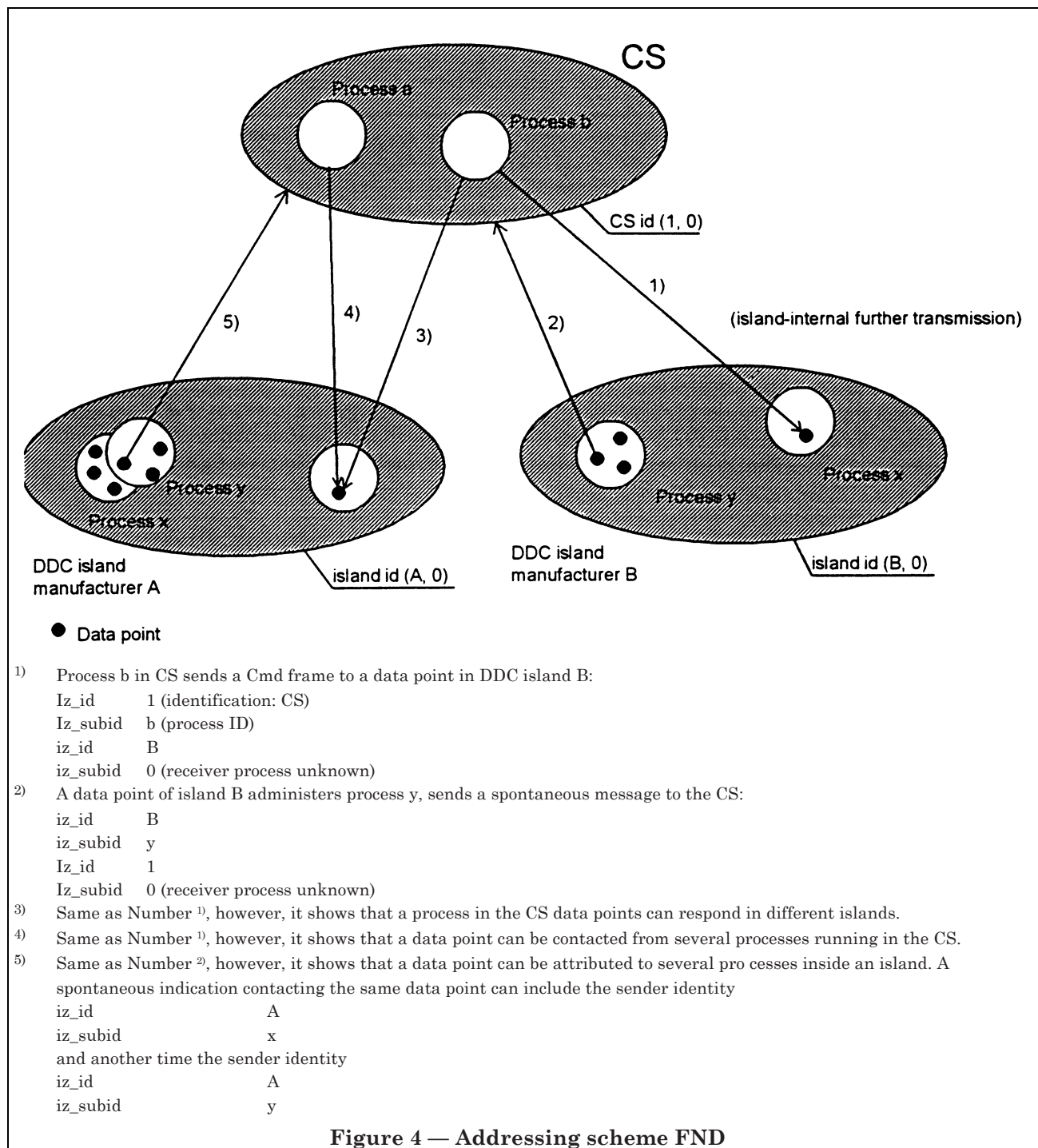


Figure 3 — Positioning of the FND

3.3 FND building automation model

FND, from a user-oriented standpoint, sees the building control technique from the aspect of abstract (i.e. real or virtual) “transmitters”. Each of these transmitters clearly identified by a user address will be designated as a data point (DP).

A DDC island is a homogeneous system of DDC subcenters and stations, generally coupled via a (LAN) local area network. A LAN represents itself to the FND as a unit consisting of data points and processes operating on them (see Figure 4).



The naturally asymmetric distribution of tasks between the communication partners control station and DDC islands has a special form of dialogue, which differentiates on application level between the four following types of message sending

- Cmd frame (“Command”)
- Rsp frame (“Response”)
- Usm frame (“Unsolicited Message”)
- Ack frame (“Acknowledge”)

(see Figure 5).

Only the CS is allowed to send out Cmd frames which must receive response from the individual islands with Rsp frames. Spontaneous indication of the island central stations will address the CS which must acknowledge the latter by an Ack frame. Since a DDC island in general consists of a variety of data points, and the IS identity alone is not sufficient for clear identification, the address of a DP will be determined by the two components:

- IS identity: identification of the DDC island included in the data points
- DP address: identity of the DP determined by the user.

The first will not show for the user. As per the hierarchic addressing scheme, transportation of a frame addressed by the CS to one of the data points will be accomplished in two partial steps: the first consists of the transport to the DDC island regulated by FND, and the second of the island-internal (i.e. manufacturer-dependent) further transmission of the message to the final address. In the other direction, an indication originating from a data point in the direction of the CS will first be transmitted to the IS in an island-internal way, which then in its role as gate controller gives this message to the CS via FND.

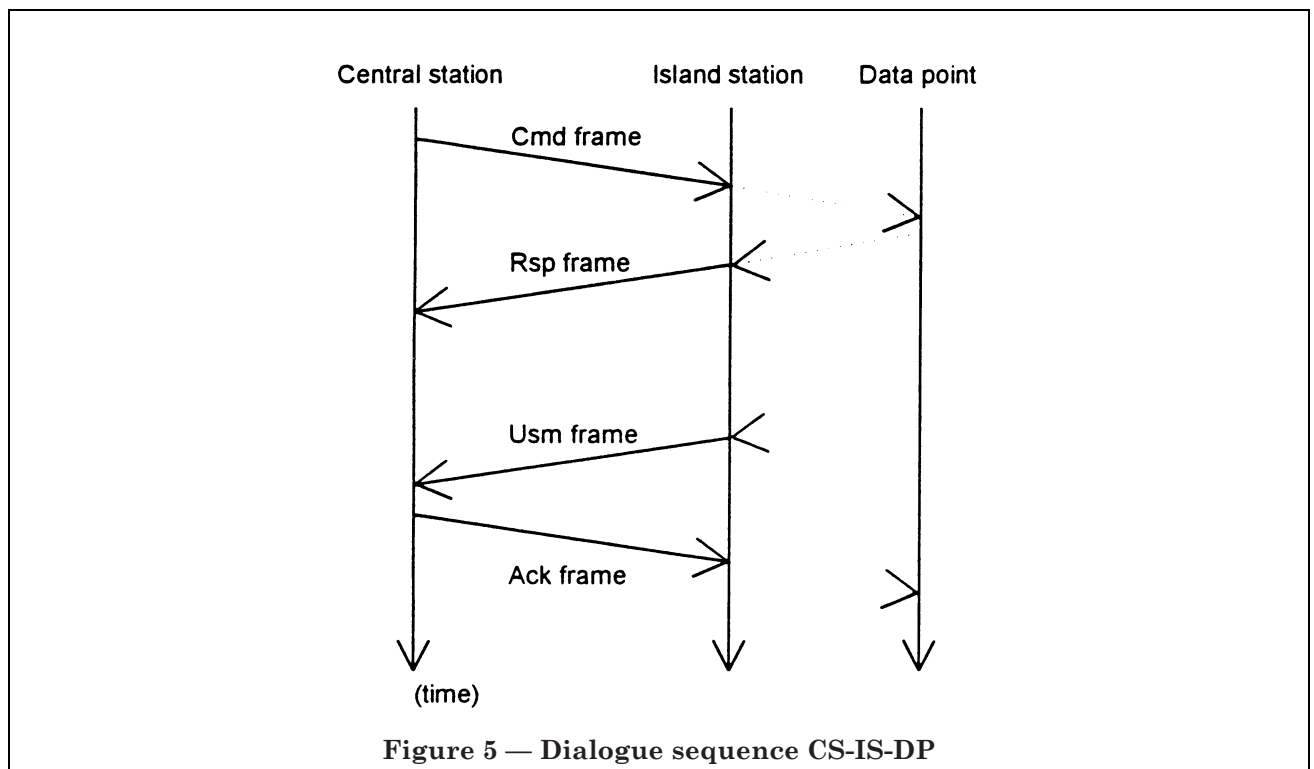


Figure 5 — Dialogue sequence CS-IS-DP

3.4 Data points

FND differentiates between the 6 data point types:

- signalling point
- switching point (with or without feedback)
- measuring point
- positioning point
- counting point
- collection point

Additionally the “typeless”

- transfer point

which represents no data point in the sense of the 6 above described categories, but is used for special purposes (such as the transparent data transmission within homogeneous systems).

When describing the data points, FND orients itself to the conceptual scheme of a relational data bank in which the characteristics of every data point are shown in a tabulated form. FND functions, such as indicating, switching, parametering etc. thus present themselves as reading and/or writing operations to the data bank. Number and structure of the DP tables are dependent on the data point type with the following classification being taken as a basis:

Table 2

DP table	Information content	Functions
DP_0	Data point status	Indication of events/status blocking/releasing of event sources
DP_1	DP-specific useful	Reading data (switch position), Modifying measuring/positioning Indicating value etc.
DP 2	Configuration	Parametrizing

3.5 Definitions

Definitions, terms and methods of notation frequently used in this specification are summarized in the following tabulation. For further definition of these terms, refer to the literature noted in the bibliography.

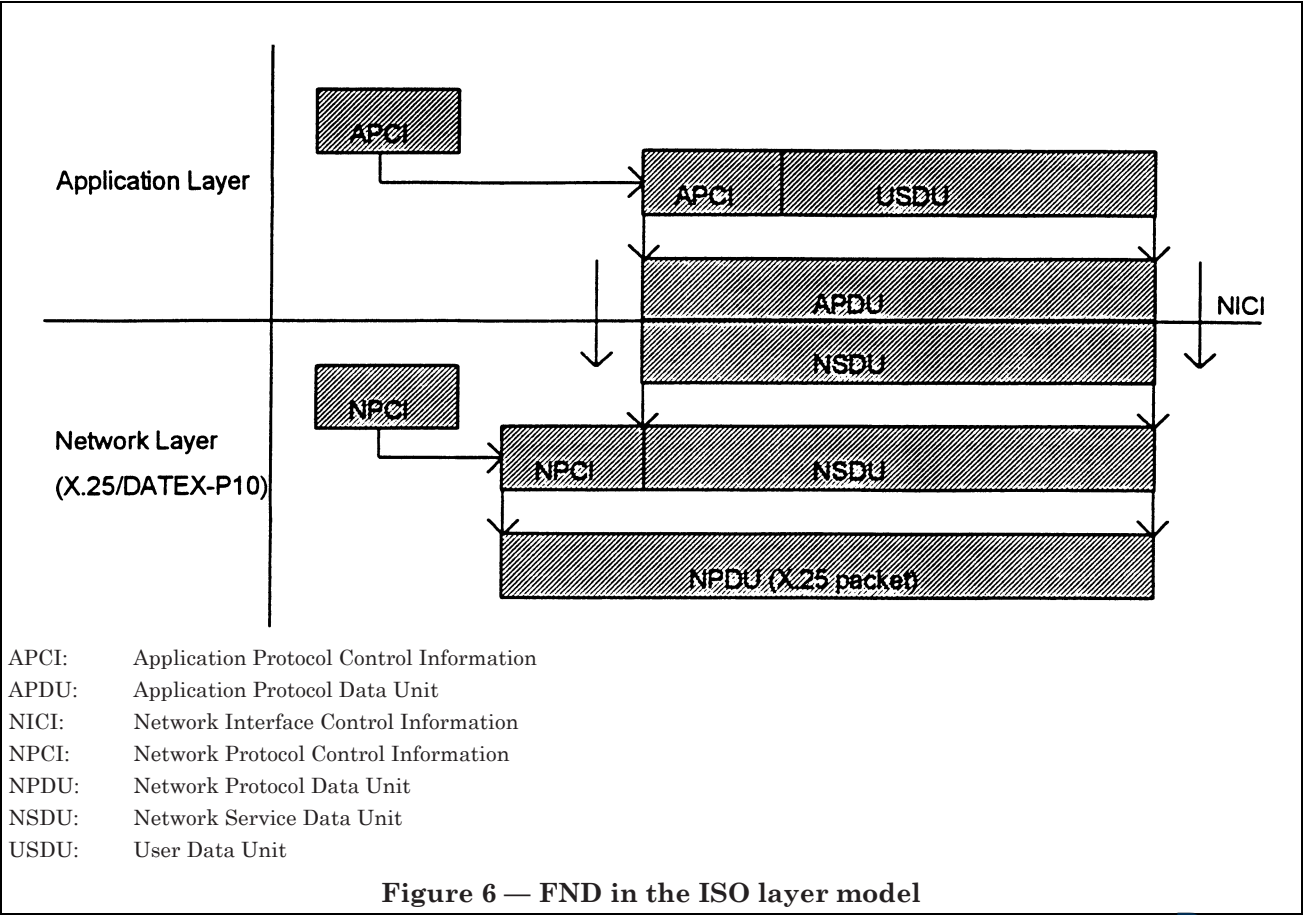
3.5.1 O/CCITT definitions

APCI “Application protocol control information”

The application-specific control information enclosed by the application level of the USDU; APCI and USDU together result in the information content of an APDU.

APDU “Application protocol data unit”

The data unit which (in the case of FND) will be transmitted to the transport system X.25/DATEX-P10.



NSDU “Network service data unit”

The data unit which is transmitted to the network layer by the above located OSI level (in case of FND the application layer) for transparent transportation.

NICI “Network interface control information”NPCI “Network protocol control information”NPDU “Network protocol data unit”

Figure 6 shows the connection between the above described information units.

Octet

Sequence of 8 bits, numbered from 1 to 8; in the graphical presentation used in this specification

8	7	6	5	4	3	2	1
X	X	X	X	X	X	X	X

the left-hand (most significant) 8th bit will be designated with MSB and the right-hand (least significant) 1st bit will be designated with LSB.

Octet sequence

Sequence consisting of n Octets, numbered from 0 to n-1; in the graphical presentation used here, an Octet sequence will be symbolized as shown:

	8	7	6	5	4	3	2	1
0	X	X	X	X	X	X	X	X
1	X	X	X	X	X	X	X	X
...	..	..	..	..	..	..	..	..
	.	.	.	.	.	.	.	.
n-2	X	X	X	X	X	X	X	X
n-1	X	X	X	X	X	X	X	X

3.5.2 General definitionsSyntactic-semantic faults

A syntactic-semantic fault is a specification and project planning fault that can be rectified exclusively by a system reconfiguration. Examples for this could be an undefined physical dimension or a data point address unknown to the receiver system.

Process fault

Contrary to syntactic-semantic faults which can be derivated from the static configuration conditions, process faults will result from the present status of the dynamically variable system surrounding. Examples for this are indications of block, reject of access attempt, consequential faults in case of segmentation processes and the like.

Single frame

Frame which does not belong to a segment sequence.

Final element/frame

Last element of a segment sequence.

Partial element/frame

Element of a segment sequence.

Information/message

Designation for the information transmitted in a frame to the communication partner.

Signal character

Confirmation of the receipt of a Cmd or Usm frame (however not final) frame.

Segmentation

Segmentation of an USDU with a total length > 90 bytes in a sequence of non-empty partial units

USDU(0), USDU(1),..., USDU(n)

in a way that

- a) SDU(0),..., USDU(n-1) have a length of exactly 90 bytes
- b) USDU is the concatenation of the segments numbered in that way,
i.e. $\text{USDU} = \text{USDU}(0) \wedge \text{USDU}(1) \wedge \dots \wedge \text{USDU}(n)$.

Segment sequence

Segmentation of an USDU with a total length > 90 bytes in a sequence of partial USDUs with length_90.

Start element/frame

First element of a segment sequence.

3.5.3 Ways of writing

Concatentation

For two Octet sequences A and B, the concatenation $A \wedge B$ is defined as composition of the Octet sequences A and B.

Hexadecimal presentation

Hexadecimal numbers will be written in the form 'XXXX...XX'H with "X" standing for one of the valid hexadecimal ciphers 0–9 or A–F.

Binary presentation

Binary numbers have the presentation 'XXXX..XX'B with "X" standing for 0 or 1.

3.5.4 Symbols and characters

number

equ: equivalent

3.5.5 Synonyms

Byte equ Octet

Data part equ USDU

Header equ APCI

Frame equ APDU

3.5.6 Coding

TRUE

Octet with LSB = 1, all other bits = 0

FALSE

Octet of which all bits equal 0

3.5.7 Agreements

Bits within Octets which are occupied in this specification with 0 or 1 shall be regarded as reserved.

4 Description of data points

4.1 Transfer point

Description:

Transfer points are assigned to such tasks which cannot be classified in the DP categories 1 to 6. The FND defines the three transfer point sub-categories:

- a) address point for the transparent data transfer between homogeneous systems
- b) address point for fault indications
- c) address point for fault indications

For the identification of these three classes, the variable `dp_subtype` will be used as follows:

Table 3

<code>dp_subtype</code>	Sub-category
0	Address point for transparent data transfer
1	Address point for fault indications
2	Authentication point

`Fct_id` and `tab_id` have the value '0000'B on principle in case of transfer points.

4.1.1 Address point for transparent data transfer

For the data communication between homogeneous (sub)systems, it is expedient to make available the corresponding means of transport from the FND side for utilization of all available functions in this system. An address point for the transparent data transfer fulfils this purpose to the extent that the information exchanged between two such data points — contained in the data part of the FND-APDU — is not interpreted by the application layer. However, the flow control mechanism implemented through the `invoke_id` remains in force just as do the regulations regarding segmentation. Segment sequences with a theoretical element number up to 256 can be realized by utilization of the FND dialogue rule, according to which `Rsp` and `Ack` frames are in principle not acknowledged. This can be used effectively in particular in the transmission of larger files, such as is the case if programs have to be loaded in substations by the CS.

4.1.2 Address point for error messages

Frames received by an IS and classified as syntactically faulty represent serious protocol errors about which the CS is notified by means of so-called ERROR frames. The header of the error APDU is taken over in this case into the data part of a special frame directed to the CS which contains as center the address of the IS "Fault Manager" (please refer to Annex D for details about this).

4.1.3 Authentication point

In connection with authentication questions, target points taking over the administration of the agreed authentication procedure must be defined. For this purpose FND provides a correspondingly designated transfer point (please also refer to Annex A in this connection).

4.2 Signalling point

Description:

Simple signalling points represent binary (Boolean) quantities which generally, in case of physical transmitters, reflect the condition of electrical contacts ("open"/"closed"). In case of logic (virtual) transmitters signalling points, reflect the activity status of a process. Multi-step operational messages are accomplished by multiple single contacts within a step switch. Logic (virtual) data points that vary in sequence (modi), such as time or event programs, use the multi-step operation messages through physical transmitters.

Only read-accesses are allowed.

Data point tables:

Table 4 — DP_0

mask	P_1
info event	

Table 5 — DP_1

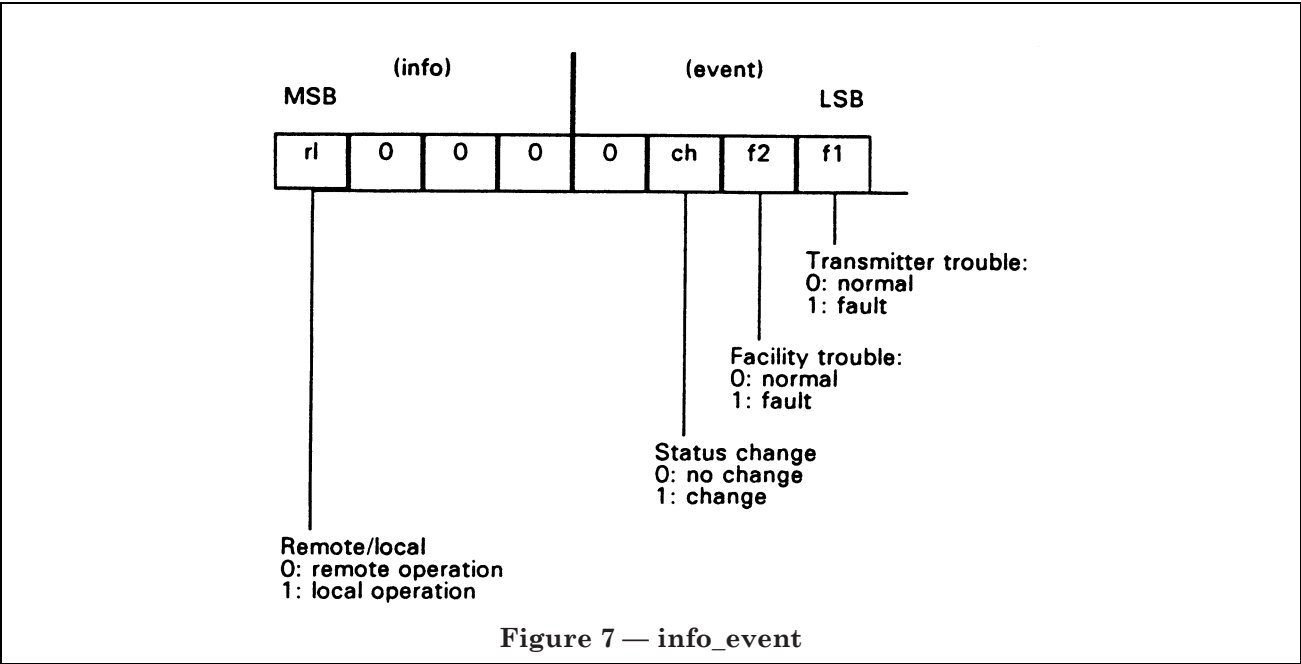
<code>atb_id</code>
actual

Description of variables:

`DP_0`

mask: (P_1)

NOTE For the description of this Octet, see section 5.3 "Disabling event messages".



Explanations to info_event:

— f1 (primary fault):

A set f1 bit means a failure of the transmitter which is interpreted in case of virtual data points as a recognized internal hardware or software fault. The type and reason of the trouble will be specified in closer detail by the info code (exc).

— f2 (secondary fault):

Trouble of the facility (warning, alarm status etc.) will be indicated by the f2 bit.

— ch (change):

The status change of an signalling point will be signaled by setting the ch bit. Reset is accomplished on the basis of the CS-side confirmation of the message, and/or in the case of non-occurrence after an internally set timeout, the reset process will not be seen as an event.

As long as ch is on 1, further status changes do not effect any message. If events of this type are disabled by IS or CS, then ch has the value 0 during this time.

— rl (remote/local):

The status remote/local operation are differentiated by the rl bit. This identity is of particular importance for such data points which represent operation indication to the switching points.

Table 6 — Parameter survey

Parameter	Name	Explanation
P_1	mask	Oppressing the spontaneous messages due to special events

DP_1

atb_id:

To identify the (in the physical sense) dimensionless messages, a (if necessary extendible) list of coded attribute combinations which is tailored to the specific requirements of building automation is used; examples for this are the combinations (“ON”/“OFF”), (“OPEN/CLOSED”) or (“STEP 0”/“STEP I”/“STEP II”). The significance of the message (single or multi-step) is thus implicitly given by the number of attributes included in the combination. The value atb_id is identical with the code number of the attribute combination, for which reasons atb_id is also referred to as the “address” for the latter.

The attribute combinations defined presently including their codings are listed in Annex B. actual:

If not equal to 'FF'H (the identification for a non-valid value), this Octet includes the current message(s stage), where

- a maximum of one bit is set, and
- the position of this bit (1–8) may be at the most equal to the number of the attribute present in the attribute combination addressed by atb_id less one.

Actual must be interpreted here as follows as index in the value range from 0 to 8 in the attribute combination addressed by atb_id (which is viewed as max 9-dimensional string table) as follows:

Table 7

actual (binary)	Index
0000 0000	0
0000 0001	1
0000 0010	2
0000 0100	3
0000 1000	4
0001 0000	5
0010 0000	6
0100 0000	7
1000 0000	8

Two examples shall clarify the above described explanations:

EXAMPLE 1: For a data point with the message ("ON"/"OFF"), as per the coding given in Annex B for the DP table DP_1 there will be the following values

atb_id	0000 1010	(Code for "ON"/"OFF")
actual	0000 0000	Index: 0

for "ON" and

atb_id	0000 1010	(Code for "ON"/"OFF")
actual	0000 0001	Index: 1

for "OFF".

EXAMPLE 2: A three-step signalling point for the statuses "NORMAL"/"WARNING"/"ALARM" shall be as follows:

atb_id	0010 1100	Code 44
actual	0000 0000	Index: 0

for "NORMAL",

atb_id	0010 1100	Code 44
actual	0000 0001	Index: 1

for "WARNING" and

atb_id	0010 1100	Code 44
actual	0000 0010	Index: 2

for "ALARM".

Table 8 — Operation survey

Signalling point		fct_id	
d_r	tab_id	‘0001’B	‘0010’B
“Cmd”	‘0000’B	A	B
	‘0001’B	C	
“Rsp”	‘0000’B	D	E
	‘0001’B	F	
“Usm”	‘0001’B	G	
“Ack”	‘0001’B	H	
Shaded area: not applicable Please refer to Section 4, FND-APDU format for the meaning of the variables d_r, tab_id and fct_id.			

Table 9 — Symbol explanation

Operation	Meaning	Data portion
A	Request DP status	(empty)
B	Modify message control field	(empty)
C	Request DP table DP_1	(empty)
D	Transmit DP status	(empty)
E	Modification acknowledgement of message control field	(empty)
F	Transmit DP table DP_1	DP_1
G	Spontaneous message	DP_1
H	Acknowledgement spontaneous message	(empty)
For further explanations of this tabular survey, please refer to Section 5 "Operational description".		

4.3 Switching point (with and without feedback)

Description:

A switching point with remote position indication (feedback) represents "integrated feedback", i.e. the associated operational message is available through the same address.

Data point tables:

Table 10 — DP_0

mask	P_1
info_event	

Table 11 — DP_1

atb_id	P_1
actual	
nominal	

Description of variables:

DP_0

mask: (P_1)

NOTE Regarding the description of this Octet, see Section 5.3 "Disabling event messages".

If events of this type are disabled by IS or CS, then ch has the value 0 during this time.

— tl (temporary lock):

Temporarily limited interlocking of the switching point controlled by the island is shown by the tl bit. Any switching commands by the FND will be rejected during this time.

— rl (remote/local):

The status remote/local operation are differentiated by the rl bit.

Table 12 — Parameter survey

Parameter	Name	Explanation
P_1	mask	Oppressing the spontaneous messages due to special events

DP_1

atb_id:

To identify the (in the physical sense) dimensionless messages, a (if necessary extendible) list of coded attribute combinations which is tailored to the specific requirements of building automation is used; examples for this are the combinations (“ON”/“OFF”), (“OPEN/CLOSED”) or (“STEP 0”/“STEP I”/“STEP II”). The significance of the message (single or multi-step) is thus implicitly given by the number of attributes included in the combination. The value atb_id is identical with the code number of the attribute combination, for which reasons atb_id is also referred to as the “address” for the latter.

The attribute combinations defined presently including their codings are listed in Annex B. actual:

If not equal to ‘FF’H (the identification for a non-valid value), this Octet includes the current message(s stage), where

- a maximum of one bit is set, and
- the position of this bit (1–8) may be at the most equal to the number of the attribute present in the attribute combination addressed by atb_id less one.

“Actual” must be interpreted here as follows as index in the value range from 0 to 8 in the attribute combination addressed by atb_id (which is viewed as max 9-dimensional string table).

nominal: (P_1)

This Octet includes the FND standard of the switching value, whereby (analogous to the value actual of an indication point)

- a maximum of one bit may be set (which corresponds to the switching value), and
- the number of this bit (1–8) may be at the most equal to the number of the attribute present in the attribute combination addressed by atb_id less one.

(Regarding the coding in connection with the variable atb_id, please refer to the relative note in the description of the signalling points.)

Table 13 — Parameter survey

Parameter	Name	Explanation
1	nominal	Value of the corresponding switching command

Table 14 — Operation survey

Switching point		fct_id	
d_r	tab_id	‘0001’B	‘0010’B
“Cmd”	‘0000’B	A	B
	‘0001’B	C	D
“Rsp”	‘0000’B	E	F
	‘0001’B	G	H
“Usm”	‘0001’B	I	
“Ack”	‘0001’B	J	
Shaded area: not applicable			
Please refer to Section 4, FND-APDU format for the meaning of the variables d_r, tab_id and fct_id.			

Table 15 — Symbol explanation

Operation	Meaning	Data portion
A	Request DP status	(empty)
B	Modify message control field	(empty)
C	Request DP table DP_1	(empty)
D	Switching	DP_1
E	Transmit DP status	(empty)
F	Modification acknowledgement of message control field	(empty)
G	Transmit DP table DP_1	DP_1
H	Circuit acknowledgement	DP_1
I	Spontaneous message	DP_1
J	Acknowledgement spontaneous message	(empty)
For further explanations of this tabular survey, please refer to Section 5 "Operational description".		

4.4 Measuring point

Description

Measuring points are continuously changeable and can be monitored to keep within given limit values. The real or logic (virtual) natures of the measuring value can be the temperature, the position of a final control element, or can also be a function value calculated from several terms.

Data point tables:

Table 16 — DP_0

mask	P_1
info event	

Table 17 — DP_1

atb_id
actual