

Data communication for HVAC application field net —

Part 2: Protocols

ICS 35.240.99; 97.120

National foreword

This Draft for Development is the English language version of ENV 13154-2:1998.

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 because it is necessary to obtain further experience in application. 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 into 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 period will be notified by an announcement in *Update Standards*.

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, Performance requirements for control systems, at 389 Chiswick High Road, London W4 4AL, giving the document reference and clause number and proposing, where possible, an appropriate revision of the text.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

Summary of pages

This document comprises a front cover, an inside front cover, the ENV title page, pages 2 to 609 and a back cover.

Amendments issued since publication

Amd. No.	Date	Text affected

This Draft for Development, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 July 1998

© BSI 1998

ISBN 0 580 30048 X

ICS 35.240.99; 97.120

Descriptors: open systems interconnection, network interconnection, buildings, heating, ventilation, air conditioning, data bus, data transmission, protocols

English version

Data communication for HVAC application field net - Part 2: Protocols

This European Prestandard (ENV) was approved by CEN on 29 May 1998 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 a European Standard.

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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword	3
Introduction	4
1 Scope	5
2 Normative Reference	5
3 Definitions	5
4 General Requirements	6
4.1 Protocols	6
4.2 Physical Layer	6
Annex A (normative) BatiBUS	7
Annex B (normative) EHS	90
Annex C (normative) EIB	407
Annex D (normative) LonTalk	505

Foreword

This European Prestandard has been prepared by Technical Committee CEN/TC 247 "Controls for mechanical building services", the secretariat of which is held by SNV.

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

This ENV 13154-2 prestandard is part of a series of standards for system-neutral data communications in HVAC systems. The content of this prestandard covers the data communications on the field level. The position of this standard in the whole range of standards for mechanical building services, especially in the data communication field of controls for mechanical building services is illustrated in figure 1.

No existing European standards are superseded. At present this document exists only in English.

Attention is drawn to the fact that the protocols contained in the Annexes to this prestandard are claimed to be the subject of patent, trademark and other Intellectual Property Rights (IPR). The proprietors of these protocols have given undertakings to CEN concerning the licensing of such intellectual property (where applicable) on fair and reasonable terms and on a non-discriminatory basis. These undertakings are the subject of dossiers maintained by CEN which may be inspected by interested third parties upon application to the CEN Central Secretariat in accordance with the provisions of CEN/CENELEC Technical Memorandum N°8.

Further information may be obtained from:-

Annex A: BatiBUS	BatiBUS Club International (BCI) 11 rue Hamlin F- 75016 Paris
Annex B: EHS	European Home Systems Association (EHSA) Excelsiorlaan 11 - Bus 1 B-1930 Zaventem
Annex C: EIB	European Installation Bus Association sc. (EIBA) Av. de la Tanche 5 B-1160 Bruxelles
Annex D: LonTalk® ¹	The Chief Financial Officer Echelon Corporation 4015 Miranda Avenue Palo Alto, CA 94304, USA

¹ Lontalk® is a registered trademark of the Echelon Corporation of Palo Alto, Ca United States of America

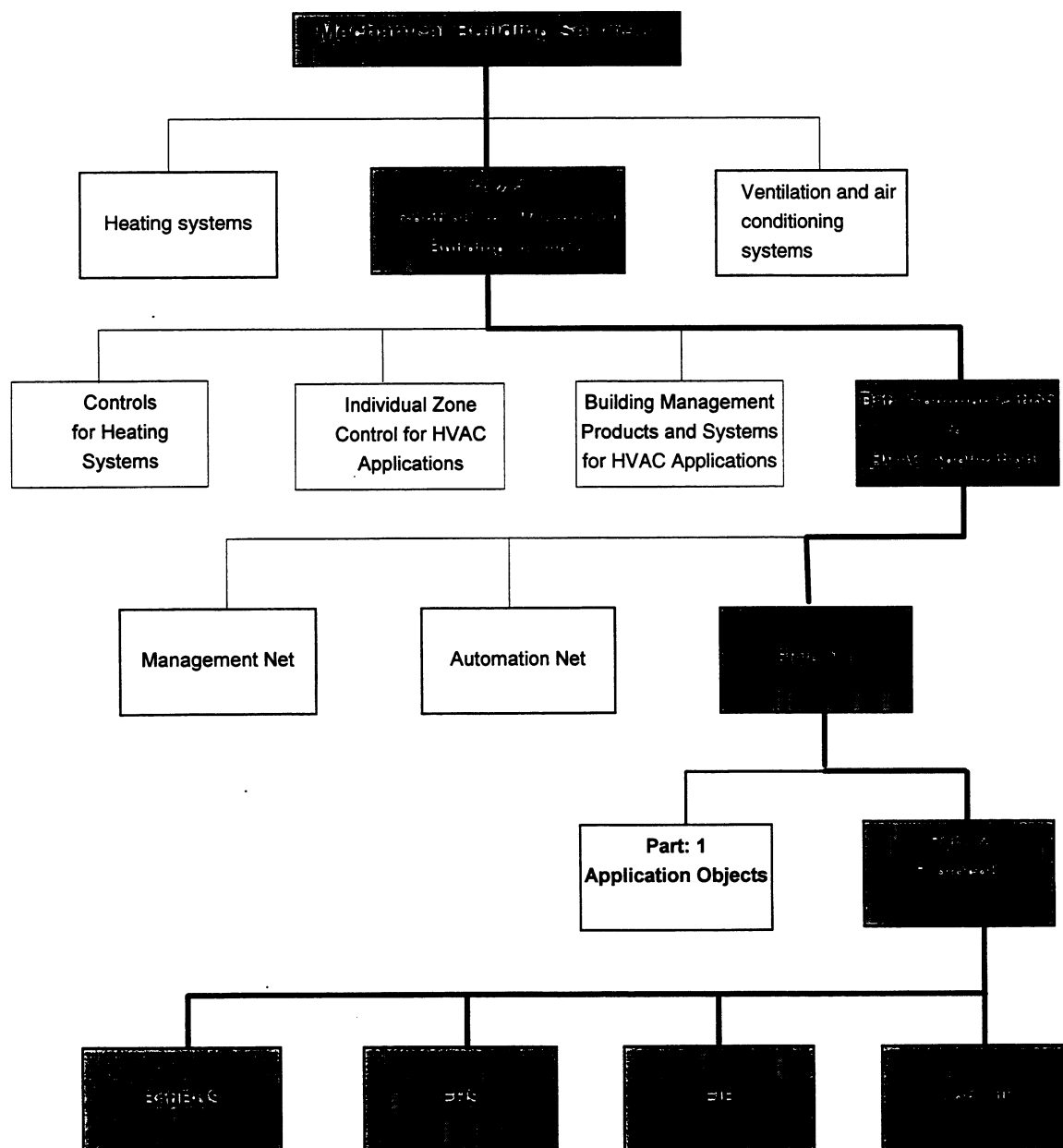


Figure 1: The shaded boxes indicate the contents and the hierarchy of this standard. The plain areas show the positioning of this standard in relationship to other relevant mechanical building services standards.

Introduction

This ENV 13154-2 has been prepared to provide mechanisms through which various vendors of building automation systems may exchange information in a standardised way. It defines communication capabilities and not control functionality.

This standard applies to the field level network according to the hierarchical levels defined by CEN/TC 247 in an EN in preparation "Building management products for HVAC applications, Part 1: System Structure and Definitions". This standard is to be used by all involved in design, manufacture, engineering, installation and commissioning activities.

This standard has been made in response to the essential requirements of the Constructive Products Directive

1 Scope

This European Prestandard defines a system neutral data communication mechanism for use at the field level in heating, ventilating, air-conditioning and related building management applications.

2 Normative Reference

This European Standard incorporates, by dated or undated reference, provisions from other publications. These Normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 507498-1	Information processing systems - Open System Interconnection - Basic Reference Model
EN 50065-1	Signalling on low voltage electrical installations in the frequency range 3 kHz to 148.5 kHz
EN 50090	Home and Building Electronic Systems
EN 60950	Safety of information technology equipment
EN/IEC 1140	SELV
ISO/IS 9545,	Information technology - Open Systems Interconnection - Application Layer structure, December 1989.
ISO/TR 8509,	Information processing systems - Open Systems Interconnection - Service conventions, September 1987.

3 Definitions

The Definitions for each protocol are introduced in Annex A, B, C and D.

4 General Requirements

4.1 Protocols

The used protocol shall be a protocol described in:

Annex A (normative)	BatiBUS
Annex B (normative)	EHS
Annex C (normative)	EIB
Annex D (normative)	LonTalk

Conformance to this standard implies conformity to one of the protocols in Annexe A, B, C or D.

Products complying with Annex A shall be designated BatiBUS
Products complying with Annex B shall be designated EHS
Products complying with Annex C shall be designated EIB conform
Products complying with Annex D shall be designated LonTalk

4.2 Physical Layer

For each protocol, the physical layer shall be chosen as follows

The physical layer chosen for the BatiBUS protocol shall be specified according to Annex A.
The physical layer chosen for the EHS protocol shall be specified according to Annex B
The physical layer chosen for the EIB protocol shall be specified according to Annex C
The physical layer chosen for the LonTalk protocol shall be specified according to Annex D

Annex A (Normative)

BatiBUS

Contents

A.1 Overview of the Batibus Protocol	8
A.2. Definitions, Abbreviations and Notations	8
A.2.1. Definitions	8
A.2.2. Notations used in this annex.	9
A.2.3 Notation of frames	9
A.3. Physical interface and frame structure	10
A.3.1 Topology	10
A.3.2 Connection mode	10
A.3.3 Medium	10
A.3.4 Line connection	10
A.3.5 Network operation	10
A.3.6 Physical layer	10
A.3.7 Bus power supply on a segment	12
A.3.8 Electrical data encoding	13
A.3.9 Network load	14
A.3.10 Medium Access	14
A.3.11 Frame description	14
A.3.12 Protection against transmissions errors	15
A.3.13 Addressing	15
A.3.14 Acknowledgements	16
A.3.15 Frame acceptance criteria	17
A.3.16 Network access control	17
A.3.17 Frame field descriptions	17
A.3.18 Priority frames	19
A.3.19 Checksum calculation	19
A.3.20 Frame length calculation	19
A.4. Application Layer and Command code table.	20
A.4.1 Modelling an analog point (structure of corresponding frames)	20
A.4.2 Structure of private mail frames	22
A.4.3 List of destination and source type codes	23
A.4.4 Companion standard identifiers codes	24
A.4.5 Tables of approved frames.	25
A.4.6 Frame data coding table	57
A.4.7 Physical address assignment	87

A.1 Overview of the BatiBUS protocol

The BatiBUS protocol is based on a low cost physical interface, based on a free-topology twisted pair transmission. The corresponding interface is easy to design from various available and non-specific components, such as 4 ou 8 bit microcontrollers. The physical transmission also allows for remote power supply of electronic products, via the same line.

The necessary definitions and abbreviations are defined in clause A.2 Definitions, abbreviations and notations.

The physical layer, as well as the data link layer, are described in clause A.3. Physical interface and frame structure.

The BatiBUS protocol also provides a comprehensive set of messages, that can be used for various applications, as well as system and network management. Some of these messages, or frames, are quite generic, and are automation object oriented ; others are more specific, and correspond to a command orientation.

The application layer and network management functionalities are presented in clause A.4. Application Layer and command code tables.

A.2. Definitions, abbreviations and notations

A.2.1. Definitions

For the purpose of this annex, the following definitions apply:

Acknowledgement waiting time: maximum time the source will wait for acknowledgement of a message containing an ACK request.

Acknowledgement response time: time between the end of a frame containing an ACK request and the beginning of the corresponding acknowledgement frame.

Address: information used to reach a specific station.

Bit: binary digit: unit of information circulating on the line (value 0 or 1).

Broadcast: frame transmission to multiple destinations.

Character: 11 bits set including 8 data bits and 1 check bit and two synchronisation bits (start bit and stop bit)

Collision: event occurring when two or more stations transmit simultaneously after detecting a free line condition.

Data link: protocol elements ensuring reliable message exchanges on the line; the manipulated data elements are known as frames.

Destination: station to which a frame is addressed.

Distortion: percentage ratio expressing the deviation between the instant a transition occurs and the ideal transition instant, divided by the bit duration (208 μ sec); the deviation is determined for each bit of a character from the start bit.

Frame: data packet comprising the information component of the data link layer. Two types of frames are distinguished: data frames carry messages; acknowledgement frames carry only information specific to the data link layer, acknowledging a previous data frame (acknowledgement frames are frequently referred to simply as ``acknowledgements'' or ACKs).

Inter frame time: time between the end of a frame (end of stop bit for the last character) and the beginning of the next frame (beginning of the start bit for the first character).

Line: physical medium (twisted pair) over which data exchange occurs.

Line load: percentage ratio representing the proportion of actual character transmission during a specified integration time interval.

Message: data bytes manipulated by the user. Three types of messages may be distinguished:

request messages require the recipient of the message to send a **response** message back to the source;

spontaneous message is transmitted in response to user-defined events (e.g. when a specified threshold is exceeded).

Odd parity bit: check bit whose value is such that there is an odd number of "0" within the data and parity fields.

Point: see station.

Response time: time between the end of a request frame and the beginning of the corresponding response frame.

Retry: re transmission of a request if an acknowledgement is not received within a specified time interval.

Source: station initiating a frame transmission.

Station: any device connected to the network; a station may have one or more addresses.

A.2.2. Notations used in this annex.

- "*" indicates that a frame may be used with the urgent priority mechanism.
- During emission bits are transmitted in the following order: D0,D1..D7.
- D7..D0 represents one byte of the data field.
- D7..D0 = N represents the value of the byte (in hexadecimal).
- Dz..Dy = N represents a bit string value (in hexadecimal).
- Dz..Dy-D7..D0 = N represents a value coded on more than one byte.

A.2.3 Notation of frames

This annex describes the different frames used in BatiBUS protocol. They are coded in this document with a number which can be simple (i.e. Frame 02, Frame 28) or compound (i.e. Frame 07-2, Frame 44-3).

The standardised variants are noted with a letter.

Examples:

Frame 45-a: Frame 45 variant a

Frame 43-3-a: Frame 43-3 variant a

A.3. Physical interface and frame structure

A.3.1 Topology

Bus, ring or star topologies or any combination thereof.

A.3.2 Connection mode

Multidrop.

A.3.3 Medium

Use of one twisted pair (shielded if necessary).

A.3.4 Line connection

Line polarity must be observed.

A.3.5 Network operation

Diffusion network.

A.3.6 Physical layer

Sending Station

- Maximum closed-circuit voltage across transmitter terminals: 1.5V @ 330 mA
- Maximum open-circuit leakage current: 100 μ A @ 18V
- Maximum distortion: 10 %

Receiving Station

- Maximum input resistance: 500 k Ω
- Minimum current drain per station: 30 μ A
- Threshold voltage: 8 V $\pm$ 1 V
- Minimum permissible distortion: 30 %

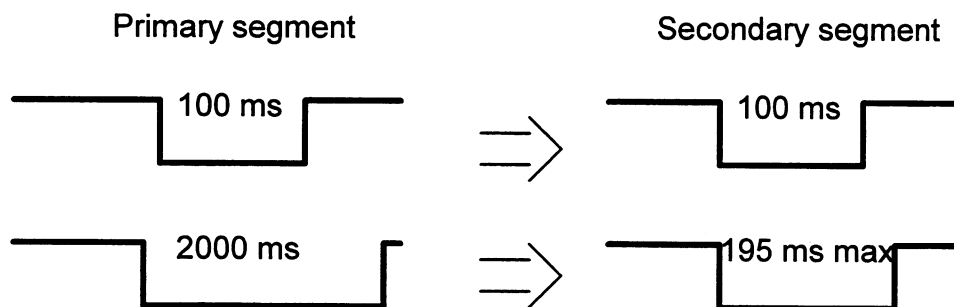
Data Link

- Maximum line resistance: 12 Ω between power supply and most remote station
- Maximum line capacitance: 250 nF
- Maximum station capacitance: 50 pF
- Maximum total station protection capacitance: 150 nF
- Open/closed and closed/open switching time (unloaded line): 0,5 μ s minimum, 5 μ s maxi
- Modulation rate: 4800 baud

Repeater

Connects a primary segment to a secondary segment. It is made of two receivers, two transmitters and optionally one or two power supplies. Between any two BatiBUS point two repeaters maximum are allowed. The information flow transfer logic is transparent to data. A short-circuit detected on one segment shall not be transmitted on the other segment for longer than 195 ms. A segment is declared short-circuited when it is in close-circuit state for longer than 165 ms. The turning logic shall not disturb collision detection and arbitration between points on different segments and shall not increase distortion by more than 5 %.

Examples :



Technology

- Maximum coupling capacitance
Input/line: 5 pF per station connected to bus
Output/line: 5 pF per station connected to bus
Line/230 V mains: 50 pF
 - Line/earth and mains/earth isolation: have to comply with applicable standards
 - Decoupling capacitors line / ground or mains / ground are allowed but have to comply with relevant standards.
 - Dielectric strength: Line / 230 V mains: 4 kV for 1 minimum @ 50 Hz
Line/metal masses connected to protection conductor: 2 kV for 1 minimum @ 50 Hz
 - Insulation resistance: Line / 230 V mains: 5 MΩ @ 500 V
 - Minimum creepage distance: Line / 230 V mains: 8 mm
Line/metal masses connected to protection conductor: 3 mm
 - Impulse voltage performance as per IEC 60-2:
Common mode: 4 kV, series resistance < 50 Ω, energy 2 J
Differential mode: 2 kV, series resistance < 50 Ω, energy 0,5 J
- The tests results shall be considered satisfactory if the device specifications are maintained after 3 positive pulses and 3 negative pulses in both common and differential mode.

Electromagnetic Compatibility

- Electrostatic discharges (IEC 801-2): Level 3 (8 kV) minimum
- Electromagnetic field (IEC 801-3): Level 4 (10 V/m)
- Conducted interference (IEC 801-4):
Unshielded BatiBUS line: Level 4 (2 kV)
Shielded BatiBUS line: Level X (4 kV)
- Auxiliary power supply with enclosed device: Level 4 (4 kV for 230 V mains)
- Auxiliary power supply with exposed device: Level 3 (2 kV for 230 V mains)
- Emitted radiation: EN 55022 level A

Satisfaction to 801-2, 801-3, 801-4 tests.

During the test voltage application :
acceptable

bit errors

behaviour errors when they affect subordinate functions of the equipment (e.g. display errors). These errors shall cease with the end of test voltage application.

NOT acceptable

all behaviour errors when they affect main functions of the equipment.

Medium Installation Requirements

The medium is supplied at Safety or Protective Extra Low Voltage ; a suitably stripped cable with an insulating sheath having a dielectric strength of 4 kV may be used. In this case, no other provisions are necessary to ensure electrical safety.

A.3.7 Bus power supply on a segment

The modulation technique used allows connection to the bus of stations supplied with power from the bus, and stations supplied by an external source (e.g. 230 V mains). The available bus-supply current can reach 150 mA.

Bus-supplied stations must ensure retention of required data during a up to 200 ms line closed-circuit condition.

Bus-Supplied Station Current Consumption

To simplify system engineering, the supply current of a station (both power supply and point) is expressed by a factor "C", defined as :

$C = \text{actual current} / \text{reference station supply current}$

C shall be calculated for the average and peak current drain, and the higher of the two values shall be rounded up to the next higher integer value.

Standard station supply current :

average (quiescent): 0.5 mA maxi

peak (reception): 0.825 mA maxi

Line supply current for a station supplied by an external source: average: $C = 0.2$

average (quiescent): 100 μA maxi

peak (reception): 165 μA maxi

For an installation $C = 300$ maxi and

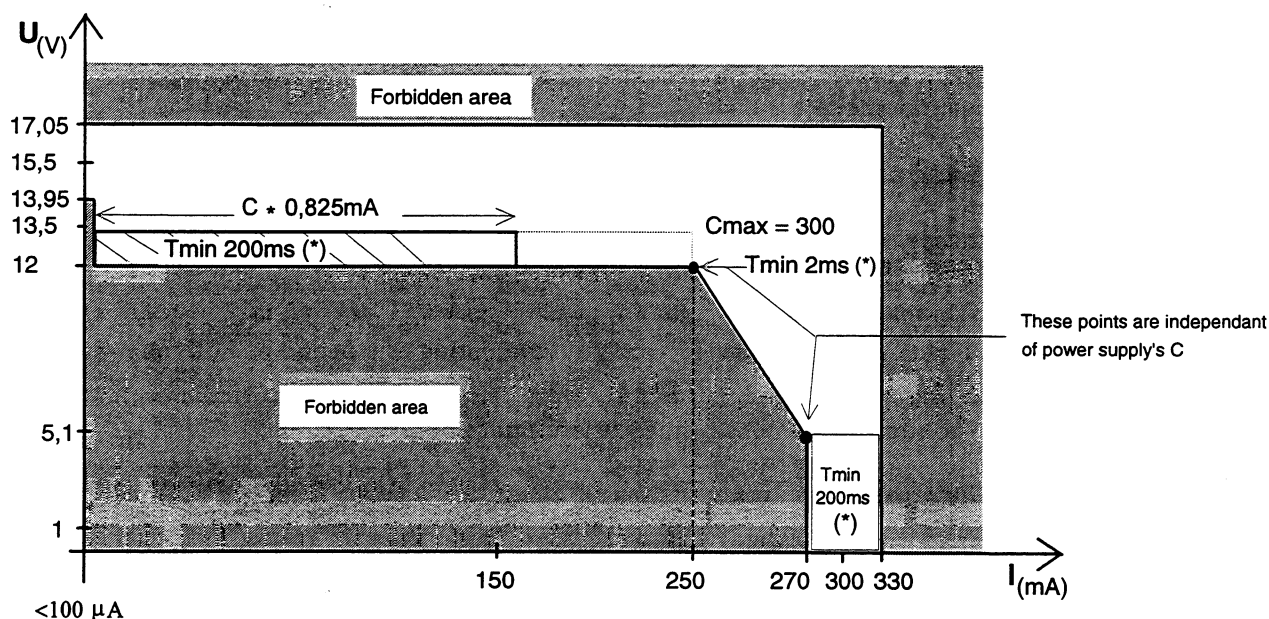
C of power supply > C used by points

Bus Power Supply General Requirements

- Power on/off switching shall be provided (leakage current < 1 mA on short circuit).
- Power supply must withstand a permanent line short-circuit condition and shall recover its characteristics within 5 mn after short-circuit suppression.
- Sum of bus-supplied station capacitance values: 40 mF, corresponding to a power-on time of 3 s max.
- Operation voltage for bus-supplied station: 9.5 V minimum

Power supply voltage

- No-load voltage:
15.5 V $\pm$ 10% (static, $I < 100 \mu\text{A}$)
- Minimum voltage under load:
13.5 V @ $C \cdot 0.825 \text{ mA}$ (250 mA if $C = 300$), (200 ms minimum current pulse duration)
12 V @ 250 mA (2 ms minimum current pulse)
- Closed-circuit current:
300 mA $\pm$ 10 % independently of power supply's C (200 ms minimum with 5,1 V and 1 V maxi)



(*) electrical parameters have to comply at least during mentioned time

BatiBUS' power supply gauge

Note 1: above mentioned specifications are given for a mains powered system. A system with battery backup, may be designed so that parameters "no-load voltage", "C on one segment", "line resistance" and "line voltage drop" are different during a power down but their arrangement shall ensure a minimum noise margin of 0.5 V in open circuit state for all points of the system (opened voltage 9.5 V minimum). The resulting installation constraints shall be clearly explained in the product documentation

Note 2: peak supply current measurement shall be made at least 800 ms after the beginning of sending frames made of the same number of '0' and '1' separated by a 22 ms inter frame time to the point under test

Note 3: for PELV circuits the negative pole of the power supply shall be grounded. The link from the bus to the ground shall be made at only (and only one point) of the BatiBUS power supply. In the case when one bus is composed of more than one segment without isolation between segments, only one point must be grounded.

Quiescent state:

stations are placed on standby (minimum supply current) for a preset time of 15 sec by a special frame.

A.3.8 Electrical data encoding

Line open/closed-circuit modulation:

Receiver	Start: $U < 7 \text{ V}$
	Stop: $U > 9 \text{ V}$
	Logic ``0``: $U > 9 \text{ V}$ (open)
	Logic ``1``: $U < 7 \text{ V}$ (closed)
Sender Start:	$U < 1.5 \text{ V @ } 330 \text{ mA}$
	Stop: $I < 100 \mu\text{A @ } 18 \text{ V}$
	Logic ``0``: $I < 100 \mu\text{A @ } 18 \text{ V}$ (open)
	Logic ``1``: $U < 1.5 \text{ V @ } 330 \text{ mA}$ (closed)

NRZ (non-return to zero) code.

Fault orientation: circuits shall be designed so the most likely failure mode of any component will not close the line.

A.3.9 Network load

In order to ensure rated network response time, the mean line load shall not exceed 30% of capacity Integration period: 1 minute maximum.

In order to ensure proper power supply of bus-supplied stations, the line shall not be in close-circuit condition more than 25% of the time during any period of 800 ms max.

Note: As the time interval between frames is 22 ms, this requirement is met without need of flow control for frames with less than 2 data bytes.

A.3.10 Medium Access

Medium Monitoring and Collision Detection

The access provisions and type of modulation adopted ensure priority frame transmission in the event of a collision.

Collision Detection and Arbitration

A collision occurs when two or more stations transmit simultaneously after detecting a free line condition. A station may detect a collision by a discrepancy between the message sent and the message received. A station shall consider that a collision has occurred and terminate the transmission if the line switches to close-circuit condition between the moment it detects a free line and the moment it transmits.

A sender that transmits a "0" and receives a "1" shall terminate the transmission of its frame after the first bit in collision.

During make/break and break/make transitions, the system time constants cause an apparent fault condition that must not be considered as a collision.

In order to prevent loss of frames in the event of a collision, all stations shall store any data received while they are transmitting.

Free Line Detection

The line shall be considered free if no line close-circuit condition occurs during at least 2.288 consecutive milliseconds. The time required for this test may be included in the inter frame time.

A.3.11 Frame description

The frame comprises a character string in standard asynchronous format: start bit, 8 data bits, odd parity bit, stop bit. Each character is transmitted with the least significant bit first.

The frame is divided into fields as follows:

Msg	message type	5 bits
Ack	acknowledgement request	1 bit
Ext	extension code	3 bits
Dest	destination type	5 bits
Emet	source type	5 bits
Lg	frame length	5 bits
@dest	destination address	8 bits
@emet	source address	8 bits

Emsg	message type extension	8 bits	) e bytes (optional)
Edest	destination type extension	8 bits	)
Eemet	source type extension	8 bits	)
Tae	extended addressing type	8 bits	)m + 3 bytes (optional)
Eng	group number extension	8 bits	)
Eadr	Address extension	8*m bits	)
Ico	Manufacturer identification	8 bits	)
	data bytes	8 * n bits	((e + m + 3 + n) < 26)
CKS	checksum	16 bits	

total: 56 frame structure bits
 $3 \cdot (7 + e + m + 3 + n)$ synchronisation bits
 $8 \cdot n$ data bits

- Character spacing: 1 character (i.e. 2.288 ms) maxi
- Time to free line in case of collision: 180 μ s maxi.
- Inter frame time: 20 ms minimum for priority frame
22 ms minimum for non priority frame.
- filtration time of the collision detection during open/closed transition 20 μ s minimum.
- Line access retry delay after collision: 1 inter frame time unit after collisioning frame.
- An inter character time interval exceeding 2.288 ms shall be considered as an "end-of-frame" condition.

A.3.12 Protection against transmissions errors

Transmission integrity is ensured by an odd parity bit per character together with a 16-bit checksum calculated for the entire frame and transmitted as two characters.

A.3.13 Addressing

Each station is identified by:

- an address specified at installation time (e.g. by a thumbwheel selector)
- a source type)
- a destination type) hardware-dependent
- an extension code)

Frame destinations are stations for which the address and destination type and extension code are identical with the frame "destination address", "destination type" and "extension code" fields.

The BatiBUS can reach stations by four addressing modes: point-to-point, family, broadcast addressing and extended addressing.

Point-to-point addressing

The frame is sent to one or more stations with the same address as the contents of the "destination address" field (assuming the "destination type" and "extension code" fields also correspond). In this case, the number of stations with the same address must be limited.

Family addressing

A frame can be sent simultaneously to several stations on the line constituting a "family". A family comprises all stations for which the 4 high-order bits of the address byte have the same value (assuming the "destination type" and "extension code" fields also correspond). The "F" family does not exist. When a frame is sent to a family, the value of the 4 high-order bits of the "destination address" field is "F"; the 4 low-order bits of the "destination address" field then identify the relevant family. A frame with a "destination address" field containing "FF" is addressed to all stations whose the destination type and extension code are identical with the frame "destination type" and "extension code" fields.

Broadcast addressing

A special "destination type" code is used to reach all stations for which the destination address and extension code are identical with the frame "destination address" and "extension code" fields. A broadcast address frame with a "destination address" field of "FF" is addressed to all stations whose the extension code is identical with the frame "extension code" field.

The broadcast and family addressing modes are mutually exclusive.

Extended addressing

The station is addressed in direct addressing mode (@dest = point address) or family addressing (@dest = FXH or FFH) and extension code is equal to 4..

Tae and Eadr contains extended addressing informations.

The combination broadcast addressing and extended addressing is forbidden

Group addressing mode

Each receiver of the frame will check if the group logic number is one of the logical groups whom it belongs to.

List of address addressing mode

Each receiver of the frame will check if its own address belongs to the list.

List of zone addressing mode

A zone is defined by 2 addresses (the first one is the beginning of the zone, and the second the end of it) : all addresses included between them, and these 2 themselves belongs to the zone.

Each receiver of the frame will check if its own address belongs to one of the zones of the list.

Source addressing mode

Each receiver of the frame will check if the source address is one of whom it is waiting for a frame.

Station identification

To simplify the BatiBUS system installation and operation procedures, the addressing label "00" is not used. Decimal addressing codes "01/01" to "16/16" therefore correspond to BatiBUS addresses 00h to FFh.

A.3.14 Acknowledgements

Data frames are acknowledged point-to-point in blocked mode. The sender of a data frame containing an ACK request shall not transmit any other data frames until the acknowledgment is received.

Pending acknowledgment, outgoing data frames are queued in the order they are received from the application; received data frames are processed and any necessary acknowledgments are transmitted.

If after a predetermined time delay the sender has not received the expected acknowledgment, it shall retransmit the data frame. After a predetermined number of retries, the destination shall be declared inoperative.

Point-to-point address data frames with more than one recipient, and all multidrop or broadcast address frames shall never contain an ACK request.

The data link protocol does not prevent data frame duplication due to certain error conditions (e.g. loss of acknowledgment). The application software shall be capable of handling possible duplications.

The recipient of a data frame containing an ACK request shall only transmit an acknowledgment if the received frame is considered valid by the Data Link layer.

When a station contains more than one destination (e.g. I/O block), the relevant destination (e.g. I) shall generate the acknowledgment.

- Acknowledgment time delay: 0.8 to 3 sec
- Number of retries: 2 (i.e. 3 attempts in all)

Composition of the ACK frame:

- Message type: 07
- ACK request: 0
- Extension code: extension code of frame to be acknowledged
- Destination type: source type of frame to be acknowledged
- Source type: destination type of frame to be acknowledged
- Frame length: 07
- Source address: destination address of frame to be acknowledged
- Destination address: source address of frame to be acknowledged
- Data: byte 1 of frame to be acknowledged, where B1 = 0
- Checksum: value calculated as per §A.3.19.

Note:

A frame using extended addressing mode shall not be acknowledged.

A.3.15 Frame acceptance criteria

A frame shall be considered valid when the number of characters received without any parity error is equal to the contents of the "frame length" field, and the checksum calculated for the received frame is equal to the contents of the "checksum" field. For the application layer following criteria apply in addition: a frame is transmitted to the user only if the combination {Dest, Emet, Msg, Lg} is valid i.e. listed in DBTA 37. Otherwise the frame is ignored by the application layer.

Any invalid frame shall be ignored.

A frame shall be intended for a station if the addressing requirements are met.

A.3.16 Network access control

For network security, network access controls shall be implemented at the interfaces with external networks.

A.3.17 Frame field descriptions

Byte 1:	B7 to B3	message type
	B2	most significant extension bit

	B1	ACK request	
	B0	intermediate extension bit	
Byte 2:	B7	Least significant extension bit	
	B6	most significant destination type bit	
	B5	most significant source type bit	
	B4 to B0	frame length	
Byte 3	B7 to B0	destination address	
Byte 4	B7 to B0	source address	
Byte 5	B7 to B4	least significant destination type bit	
	B3 to B0	least significant source type bit	
Byte 6 and following (0 to E bytes)			
		extended addressing type if present	)
		group number extension if present	)
		address extension if present	)
		destination type extension if present	)
		source type extension if present	) E bytes
		message type extension if present	)
		manufacturer identification if present	)
Bytes (6 + E) to N		Data ($N \leq 30$)	
Bytes N + 1 and N + 2		Checksum calculated for N bytes in the frame	

Message type extension is present if message type is equal to the corresponding escape encoding (00).

Destination type extension is present if destination type is equal to the corresponding escape encoding (1FH).

Source type extension is present if source type is equal to the corresponding escape encoding (1FH).

Extended addressing type and address extension is present if extension code is equal to 4

Group number extension is present if the group number content in Tae is equal to 00 (escape)

Manufacturer identification is present if message type is equal to 0F

Extended addressing type description.

B7..B6 = 0 group addressing
B5..B0 = group number (LSB)
= 0 escape

B7..B6 = 1 not used
= 2 not used
B5..B0 = 0 not used

B7..B6 = 3
B5..B4 = 0 : list of zone addressing mode
B5..B4 = 1 : source addressing mode
B5..B4 = 2 : list of address addressing mode
B5..B4 = 3 : not used
B3..B0 = number of addresses in the list B4..B4 = 0 or 2
= 0 for source addressing B5..B4 = 1
= 0 when B5..B4 = 3

Corresponding addresses are in the address extension field.

Group number coding

Group number (LSB)	Extension	Group number
0 (escape)	40 à FF	40 à FF
0 (escape)	0 à 3F	forbidden
1 à 3F	do not exist	1 à 3F

A.3.18 Priority frames

Priority frames

Priority frames can be transmitted 2 ms before non priority frames. Publication DBTA 0037 lists possible priority frames. In a system, the priority frame traffic shall not exceed 5% of the total traffic (integration period: 1 minute maximum).

Collision priority frames

The adopted modulation principle is such that in the event of a collision, the logic "1" state (open circuit) takes precedence over logic "0" (closed circuit). The state of the first bit therefore determines frame priority in the event of a collision.

A.3.19 Checksum calculation

The checksum is the complement of the 16-bit sum of the data complement for all the bytes in the frame (excluding the checksum bytes).

A.3.20 Frame length calculation

The ``frame length'' field value is 6 + the number of data bytes (``frame length'' = number of bytes in the frame - 1).

A.4. Application Layer and Command code table.

This chapter contains :

a destination and source type list.

Tables defining for each source, respectively, source type, the different frames they can use.

In these tables "*" indicates frames which can be used with a "high priority level".

A table defining the different frames that can be used in "broadcast addressing".

A large table defining the frame data coding.

Note :

In the following tables all that is not yet described is reserved for a future use.

In a frame, all that is noted "reserved" will be defined later and must be coded "0".

In a frame, bits or fields that are noted "private" are defined by each manufacturer and so are not usable by other manufacturers. They don't allow interoperability of products of several manufacturers. They are coded "0" when not used.

A.4.1 Modelling an analog point (structure of corresponding frames)

Modelling

An **analog variable** is made of **1** or more **values**.

It can be :

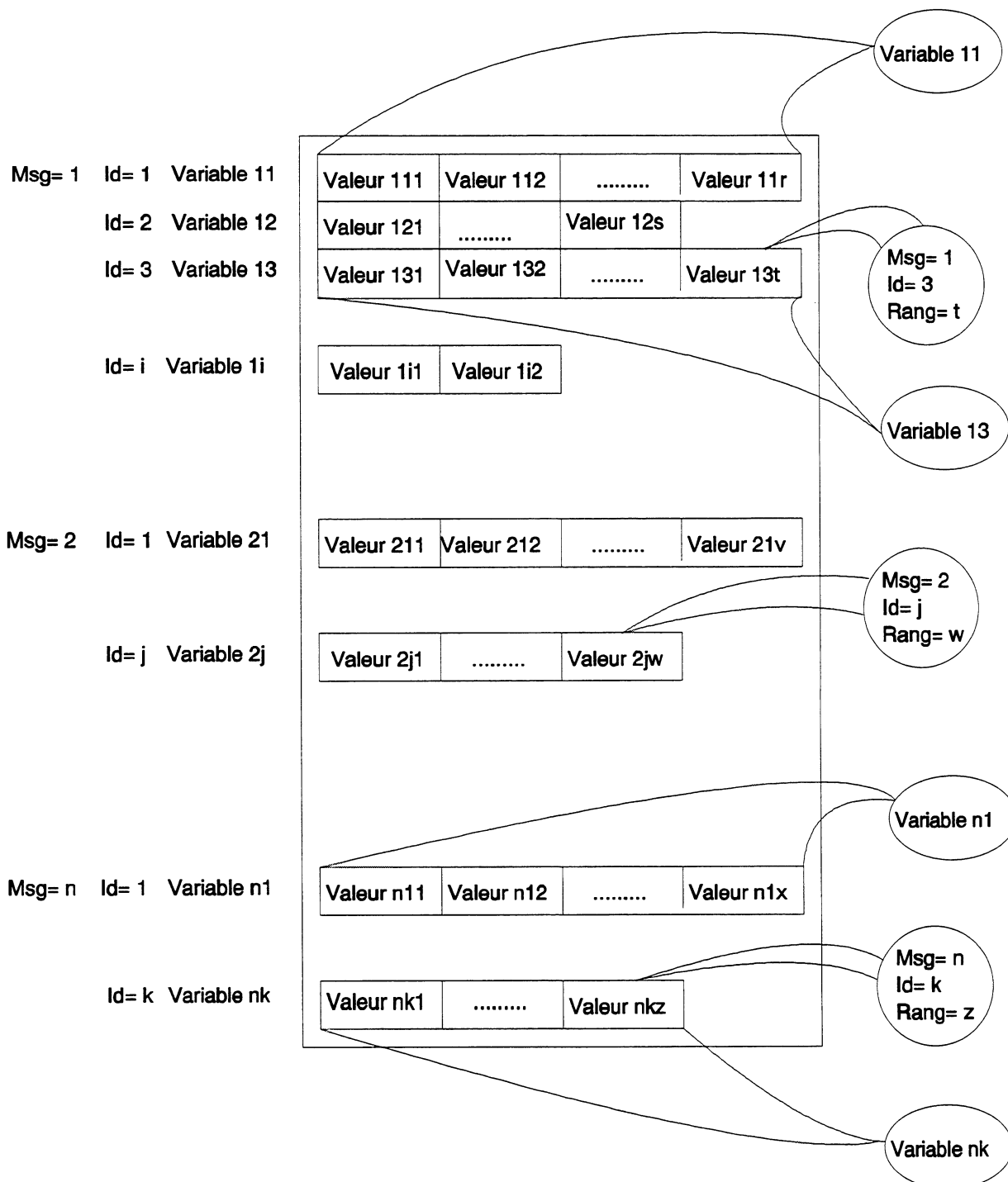
- sent when requested or spontaneously by a "analog input",... The frame bears values which can be measured variables, thresholds,...
- sent when requested or spontaneously by a "analog output",... The frame bears values which can be operation reference points, output levels,...
- received by a "analog input" (write). The frame bears values which can be a threshold,...
- received by a "analog output" (write). The frame bears values which can be operation reference points, output levels,...

In one product the couple "message type + identification" is used to define one variable.

The coding of the values of the variable is called "format".

All values of a variable are contained in one frame and are coded with the same format.

Analog point pattern



Structure of a frame containing an analog variable

The first data byte is called "header". It is composed of:

- D7..D5 = Identification (Id)
- D4..D0 = Format (Fmt)

Coding of the values:

Fmt = 0 or (only one byte in the data field)

D7..D0 = 8 bits value (absolute value)

Fmt = 1: D7..D0 = 8 bits value (2's complement)

Fmt = 2: D7..D0-D7..D0 = 16 bits value (absolute)

Fmt = 3: D7..D0-D7..D0 = 16 bits value (2's complement)

Fmt = 4: IEEE 754-1985 single format

D7 = sign (S)

D6..D0-D7 = exponent (E)

D6..D0-D7..D0-D7..D0 = mantiss (M)

The value is given by:

$$X = (-1)^S * (1 + M * 2^{-23}) * 2^{(E-127)}$$

Fmt = 5: D7..D0-D7..D0-D7..D0-D7..D0 = 32 bits value

Fmt > 7: manufacturer format

Structure of a frame requesting a value

The frame has one data byte:

D7..D5 = Identification

D4..D0 = Msg

These information indicate the variable which is to be read.

The frame has no data byte: all variables of the point are to be read.

A.4.2 Structure of private mail frames

These frames are defined by a manufacturer for its own purpose, not usable by any other manufacturer. They do not allow inter-operability of products from different manufacturers. Their structure is identical to other frames, the data field only is defined by the manufacturer (see frame 48).

List of manufacturer codes

Note : the following list is currently maintained by BatiBUS Club ; it is not limitative and can be extended. The maintenance of this list can be transferred to CEN.

- 00 Escape
- 01 Merlin Gerin

02	Landis & Gyr
03	Airelec
04	Somfy
05	Philips lighting
06	Telemecanique
07	Seebi / TIA
08	Waters & Gijsbers
09	Urmet
0A	Philips CE
0B	Thorn Security
0C	Trend
0D	Elkron
0E	Logicool
0F	SIMU
10	Delta Dore
11	Trilogie
12	Saft

C0 Electric heating companion standard

A.4.3 List of destination and source type codes

00	Central Unit
01	Phone transmitter
02	Test equipment
03	Complex application
04	Binary Output
05	Binary Input
06	Analog Input
07	Analog Output
08	Peripherals
09	
0A	Shared resource
0B	
0C	Regulation apparatus
0D	
0E	Manual command apparatus

0F Broadcasting (destination only)

10

11

12

13

14

15

1F Escape

A.4.4 Companion standard identifiers codes

00 Escape

01 Electrical heating

02 Fan coil application

04

08

10

20

40

80

A.4.5 Tables of approved frames.

EXTENSION CODE 0 or 4

DESTINATION TYPE 00 Central unit

MESSAGE TYPE

00	Escape	
01	Time request	Frame 07-6
02	Regulation reference point Analog variable write (reference)	Frame 08-5 Frame 44-3
03	Diagnostic request Diagnostic report	Frame 07-2 Frame 06
04 23, 40	Status report	Frames 02,
05		
06		
07	Acknowledgement	
08	Operating control 2	Frame 29
09	On/off + Analog control Operating control 3	Frame 19 Frame 27
0A	Status of thresholds	Frame 38
0B	Text transfer	Frame 24
0C	Confidential code	Frame 26
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48

EXTENSION CODE 0 or 4

DESTINATION TYPE 00 Central unit

MESSAGE TYPE

10	Inside temperature Information report	Frames 08-4 Frames 10, 20, 21
11	Analog variable write (parameter)	Frame 44-1
12	Floor heating Temperature (5 to 35 °C)	Frame 08-3
13		
14	Temperature range value -40 to 60°C	Frame 17
15	Application Acknowledgement	Frame 28
16		
17	Analog variable write (measurement) Counter value report	Frame 44-2 Frame 47
18	Analog variable read	Frame 45
19		
1A		
1B		
1C	Alarm	Frame 30
1D	Self-test and immediate response	Frame 16-2
1E	Supervisory / Self-test response Supervisory configuration/Self-test request	Frame 15-1,2 Frame 32-1,2
1F	Operating mode	Frame 41-
1,2,3,4		

EXTENSION CODE 0 or 4

SOURCE TYPE 00 Central Unit

MESSAGE TYPE

00	Escape	
01	Time request	Frame 07-6
	Time setting	Frame 12
	On/off output, input Configuration	Frames 13,
14		
02	Reference point setting request	Frame 07-4
	Idling	Frame 07-5
	Regulation reference point	Frame 08-5
	Analog variable write (reference)	Frame 44-3
03	System status	Frame 05
	Diagnostic report	Frame 06
	Diagnostic request	Frame 07-2
04	Status request	Frame 07-3
05		
06	Phone transmitter service	Frame 37
07	Acknowledgement	
08	Operation reference	Frames 11,
22		
	TT3 Control	Frame 36
09	On/off + Analog control	Frame 19
	Operating control 3	Frame 27
	TT2 Control	Frame 35
0A	Signalling command	Frame 18
	Siren operation	Frame 31
	Threshold status request	Frame 07-7
0B	Text transfer	Frame 24
0C	Confidential code	Frame 26
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48

EXTENSION CODE 0 or 4

SOURCE TYPE 00 Central Unit

MESSAGE TYPE

10	Information request	Frames 07-1,
09		
11	Analog variable write (parameter)	Frame 44-1
12	Power cut	Frame 03
	TT4 Control	Frame 34
13		
14		
15	Application Acknowledgement	Frame 28
16		
17	Analog variable write (measurement)	Frame 44-2
	Counter value report	Frame 47
18	Convactor mode regulation configuration	Frame 04
	Analog variable read	Frame 45
	Counter value request	Frame 46
19	Limitation floor heating configuration	Frame 08-2
1A	Duration of operation/Self-sampling period	Frame 25-1,2
1B	Installation status	Frame 39
1C		
1D	Supervisory and immediate response configuration	Frame 16-1
	Self-test and immediate response	Frame 16-2
1E	Self-test response	Frame 15-2
	Supervisory configuration/Self-test request	Frame 32-1,
32-2		
1F	Synchronisation supervision	Frame 33
	Operating mode configuration	Frame 41-
1,3,4		

EXTENSION CODE 0 or 4

DESTINATION TYPE 01 PHONE TRANSMITTER

MESSAGE TYPE

00	Escape	
01		
02		
03	Diagnostic request	Frame 07-2
04		
05		
06	Phone transmitter Service	Frame 37
07	Acknowledgement	
08	Operating control 2	Frame 29
	TT3 Control	Frame 36
09	TT2 Control	Frame 35
0A		
0B	Text transfer	Frame 24
0C	Confidential code	Frame 26
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10		
11		
12	TT4 Control	Frame 34
13	Supported transmitted frames	Frame 54
14		
15	Application Acknowledgement	Frame 28
16		
17		
18		
19		
1A		
1B	Installation status	Frame 39
1C		
1D	Supervisory and immediate response configuration	Frame 16-1
	Self-test and immediate response	Frame 16-2
1E	Supervisory configuration/Self-test request	Frame 32-1,2
1F	Operating mode configuration	Frame
41-1,2,3,4		

EXTENSION CODE 0 or 4

SOURCE TYPE 01 PHONE TRANSMITTER

MESSAGE TYPE

00	Escape	
01		
02		
03	Diagnostic report	Frame 06
04		
05		
06		
07	Acknowledgement	
08	Operating control 2	Frame 29
09	Operating control 3	Frame 27
0A	Siren operation	Frame 31
0B	Text transfer	Frame 24
0C	Confidential code	Frame 26
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10		
11		
12		
13		
14		
15	Application Acknowledgement	Frame 28
16		
17		
18		
19		
1A		
1B		
1C	Alarm	Frame 30
1D		
1E	Supervisory*/Self-test response	Frame 15-1,2
1F	Operating mode	Frame 41-
1,3,4		

EXTENSION CODE 0 or 4

DESTINATION TYPE 02 TEST EQUIPMENT

MESSAGE TYPE

00	Escape	
01	Private	
02	Private	
03	Diagnostic request	Frame 07-2
04	Private	
05	Private	
06	Private	
07	Acknowledgement	
08	Private	
09	Private	
0A	Private	
0B	Private	
0C	Private	
0D	Parameters	Frame 43
0E	Private	
0F	Private mail system	Frame 48
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
1A		
1B		
1C		
1D		
1E		
1F	Operating mode configuration	Frame 41-4

EXTENSION CODE 0 or 4

SOURCE TYPE 02 TEST EQUIPMENT

MESSAGE TYPE

00	Escape	
01		
02		
03	Diagnostic report	Frame 06
04		
05		
06		
07	Acknowledgement	
08	Private	
09	Private	
0A	Private	
0B	Private	
0C	Private	
0D	Parameters	Frame 43
0E	Private	
0F	Private mail system	Frame 48
10		
11		
12		
13	Supported transmitted frames	Frame 54
14		
15		
16		
17		
18		
19		
1A		
1B		
1C		
1D		
1E		
1F	Operating mode	Frame 41-2,3

EXTENSION CODE 0 or 4

DESTINATION TYPE 03 Complex application

MESSAGE TYPE

00	Escape	
01		
02	Regulation reference point	Frame 08-5
03	Diagnostic request	Frame 07-2
04		
05		
06		
07	Acknowledgement	
08	Operation reference setting	Frame 22
09		
0A		
0B		
0C		
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10		
11		
12		
13	Complex application Supported transmitted frames	Frame 53 Frame 54
14		
15		
16		
17		
18		
19		
1A		
1B		
1C		
1D	Supervisory and immediate response configuration Self-test and immediate response	Frame 16-1 Frame 16-2
1E	Supervisory configuration/Self-test request	Frame 32-1,2
1F 1,2,3	Operating mode configuration	Frame 41-

EXTENSION CODE 0 or 4
SOURCE TYPE 03 Complex application
MESSAGE TYPE

00	Escape	
01		
02		
03	Diagnostic report	Frame 06
04		
05		
06		
07	Acknowledgement	
08		
09		
0A		
0B		
0C		
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10	Inside Temperature	Frame 08-4
11		
12		
13	Complex application	Frame 53
14		
15		
16		
17		
18		
19		
1A		
1B		
1C		
1D		
1E	Supervisory*/Self-test response	Frame 15-1,2
1F	Operating mode	Frame 41-4

EXTENSION CODE 0 or 4

DESTINATION TYPE 04 Binary Output

MESSAGE TYPE

00	Escape	
01	Configuration	Frame 13
02	Regulation reference point Analog variable write (reference)	Frame 08-5 Frame 44-3
03	Diagnostic request	Frame 07-2
04	Status request	Frame 07-3
05		
06		
07	Acknowledgement	
08	Operation reference setting	Frame 22
09		
0A	Siren operation Status of thresholds	Frame 31 Frame 38
0B		
0C		
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10	Information request Inside Temperature	Frame 07-1 Frame 08-4
11		
12	Floor heating Temperature	Frame 08-3
13	Supported transmitted frames	Frame 54
14		
15		
16		
17	Counter value report	Frame 47
18	Convactor mode regulation configuration Counter value request	Frame 04 Frame 46
19	Limitation floor heating configuration	Frame 08-2
1A	Duration of operation	Frame 25-1
1B		
1C		
1D	Supervisory and immediate response configuration Self-test and immediate response	Frame 16-1 Frame 16-2

1E Supervisory/Self-test configuration
1F Operating mode configuration
41-1,2,3

Frame 32-1,2
Frame

EXTENSION CODE 0 or 4

SOURCE TYPE 04 Binary Output

MESSAGE TYPE

00	Escape	
01		
02		
03	Diagnostic report	Frame 06
04	On/off output block status report	Frame 02
05		
06		
07	Acknowledgement	
08		
09		
0A		
0B		
0C		
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10	On/off output block values report	Frame 21
11		
12		
13		
14		
15		
16		
17		
18	Counter value report	Frame 47
19		
1A		
1B		
1C	Alarm	Frame 30
1D		
1E	Supervisory*/Self-test response	Frame 15-1,2
1F	Operating mode	Frame 41-4

EXTENSION CODE 0 or 4

DESTINATION TYPE 05 Binary Input

MESSAGE TYPE

00	Escape	
01	On/off input configuration	Frame 14
02		
03	Diagnostic request	Frame 07-2
04	Status request	Frame 07-3
05		
06		
07	Acknowledgement	
08		
09		
0A		
0B		
0C		
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10	Digital information request	Frame 07-1
11		
12		
13	Supported transmitted frames	Frame 54
14		
15		
16		
17	Counter value report	Frame 47
18	Counter value request	Frame 46
19		
1A	Self-sampling period	Frame 25-2
1B		
1C		
1D	Supervisory and immediate response configuration Self-test and immediate response	Frame 16-1 Frame 16-2
1E	Supervisory configuration/Self-test request	Frame 32-1,2
1F	Operating mode configuration	Frame 41-
1,2,3		

EXTENSION CODE 0 or 4

SOURCE TYPE 05 Binary Input

MESSAGE TYPE

00	Escape	
01		
02		
03	Diagnostic report	Frame 06
04	On/off input block status report	Frame 23
05		
06		
07	Acknowledgement	
08		
09		
0A		
0B		
0C		
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10	On/off input block values report	Frame 20
11		
12		
13		
14		
15		
16		
17	Counter value report	Frame 47
18		
19		
1A		
1B		
1C	Alarm	Frame 30
1D		
1E	Supervisory*/Self-test response	Frame 15-1,2
1F	Operating mode	Frame 41-4

EXTENSION CODE 0 or 4

DESTINATION TYPE 06 Analog Input

MESSAGE TYPE

00	Escape	
01		
02	Reference point setting request Analog variable write (reference)	Frame 07-4 Frame 44-3
03	Diagnostic request	Frame 07-2
04	Status request	Frame 07-3
05		
06		
07	Acknowledgement	
08		
09		
0A	Threshold status request	Frame 07-7
0B		
0C		
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10	Digital information request	Frame 07-1
11	Analog variable write (parameter)	Frame 44-1
12		
13	Supported transmitted frames	Frame 54
14		
15		
16		
17	Analog variable write (measurement)	Frame 44-2
18	Analog variable read	Frame 45
19		
1A	Self-sampling period	Frame 25-2
1B		
1C		
1D	Supervisory and immediate response configuration Self-test and immediate response	Frame 16-1 Frame 16-2
1E	Supervisory configuration/Self-test request	Frame 32-1,2
1F	Operating mode configuration	Frame
41-1,2,3		

EXTENSION CODE 0 or 4

SOURCE TYPE 06 Analog Input

MESSAGE TYPE

00	Escape	
01		
02	Regulation reference point Analog variable write (reference)	Frame 08-5 Frame 44-3
03	Diagnostic report	Frame 06
04		
05		
06		
07	Acknowledgement	
08		
09		
0A	Status of thresholds	Frame 38
0B		
0C		
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10	Inside Temperature	Frame 08-4
11	Analog variable write (parameter)	Frame 44-1
12	Floor heating temperature	Frame 08-3
13		
14	Temperature range value -40 to 60°C	Frame 17
15		
16		
17	Analog variable write (measurement)	Frame 44-2
18	Analog variable read	Frame 45
19		
1A		
1B		
1C		
1D		
1E	Supervisory*/Self-test response	Frame 15-1,2
1F	Operating mode	Frame 41-4

EXTENSION CODE 0 or 4

DESTINATION TYPE 07 Analog Output

MESSAGE TYPE

00	Escape	
01		
02	Analog variable write (reference)	Frame 44-3
03	Diagnostic request	Frame 07-2
04	Status request	Frame 07-3
05		
06		
07	Acknowledgement	
08		
09	On/off + Analog control	Frame 19
0A	Threshold status request	Frame 07-7
0B		
0C		
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10		
11	Analog variable write (parameter)	Frame 44-1
12		
13	Supported transmitted frames	Frame 54
14		
15		
16		
17	Analog variable write (measurement)	Frame 44-2
18	Analog variable read	Frame 45
19		
1A	Duration of operation	Frame 25-1
1B		
1C		
1D	Supervisory and immediate response configuration	Frame 16-1
	Self-test and immediate response	Frame 16-2
1E	Supervisory configuration/Self-test request	Frame 32-1,2
1F	Operating mode configuration	Frame
41-1,2,3		

EXTENSION CODE 0 or 4

SOURCE TYPE 07 Analog Output

MESSAGE TYPE

00	Escape	
01		
02	Analog variable write (reference)	Frame 44-3
03	Diagnostic report	Frame 06
04	On/off + Analog status	Frame 40
05		
06		
07	Acknowledgement	
08		
09		
0A	Status of thresholds	Frame 38
0B		
0C		
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10		
11	Analog variable write (parameter)	Frame 44-1
12		
13		
14		
15		
16		
17	Analog variable write (measurement)	Frame 44-2
18	Analog variable read	Frame 45
19		
1A		
1B		
1C		
1D		
1E	Supervisory*/Self-test response	Frame 15-1,2
1F	Operating mode	Frame 41-4

EXTENSION CODE 0 or 4

DESTINATION TYPE 08 Peripherals

MESSAGE TYPE

00	Escape	
01		
02	Analog variable write (reference)	Frame 44-3
03	Diagnostic request	Frame 07-2
04	Output/input status report	Frame 02, 23
05		
06		
07	Acknowledgement	
08	TT3 control	Frame 36
09	Operating control 3	Frame 27
0A	Signalling command	Frame 18
0B	Text transfer	Frame 24
0C	Confidential code	Frame 26
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10	Inside temperature Input/output values report	Frame 08-4 Frame 20, 21
11	Analog variable write (parameter)	Frame 44-1
12	Floor heating temperature	Frame 08-3
13	Supported transmitted frames	Frame 54
14	Temperature range value -40 to 60°C	Frame 17
15	Application Ack	Frame 28
16		
17	Analog variable write (measurement) Counter value report	Frame 44-2 Frame 47
18	Analog variable read	Frame 45
19		
1A		
1B		
1C		
1D	Supervisory and immediate response configuration Self-test and immediate response	Frame 16-1 Frame 16-2

1E Self-test response
Supervisory configuration/Self-test request

1F Operating mode configuration
41-1,2,3,4

Frame 15-2
Frame 32-1,2

Frame

EXTENSION CODE 0 or 4
SOURCE TYPE 08 Peripherals
MESSAGE TYPE

00	Escape	
01		
02	Analog variable write (reference)	Frame 44-3
03	Diagnostic report	Frame 06
04	Status request	Frame 07-3
05		
06		
07	Acknowledgement	
08	Operation reference setting Operating control 2	Frame 22 Frame 29
09	Operating control 3	Frame 27
0A	Signalling command	Frame 18
0B	Text transfer	Frame 24
0C	Confidential code	Frame 26
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10	Digital information request	Frame 07-1
11	Analog variable write (parameter)	Frame 44-1
12		
13		
14		
15	Application Ack	Frame 28
16		
17	Analog variable write (measurement) Counter value report	Frame 44-2 Frame 47
18	Analog variable read Counter value request	Frame 45 Frame 46
19		
1A	Duration of operation/Self-sampling period	Frame 25-1,2
1B		
1C	Alarm	Frame 30
1D	Self-test and immediate response	Frame 16-2
1E	Supervisory*/Self-test response Self-test request	Frame 15-1,2 Frame 32-2

1F Operating mode
41-1,3,4

Frame

EXTENSION CODE 0 or 4

DESTINATION TYPE 0A Shared resource

MESSAGE TYPE

00	Escape	
01		
02		
03	Diagnostic request	Frame 07-2
04	Resource affectation request	Frame 49
05		
06		
07	Acknowledgement	
08	Engaged resource	Frame 50
09		
0A	Assigned resource	Frame 51
0B		
0C	Released resource	Frame 52
0D	Parameters	Frame 43
0E		
0F	Private mail system	Frame 48
10		
11		
12		
13	Supported transmitted frames	Frame 54
14		
15		
16		
17		
18		
19		
1A		
1B		
1C		
1D	Self-test and immediate response	Frame 16-2
1E	Self-test request	Frame 32-2
1F	Operating mode configuration	Frame
41-1,2,3		