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EnOcean Equipment Profiles (EEP)

Version: 2.6 - Dec 17, 2013

Published by
EnOcean Alliance – Technical Task Group Interoperability
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    - D2-30-03: Type 0x03 (description: see table)
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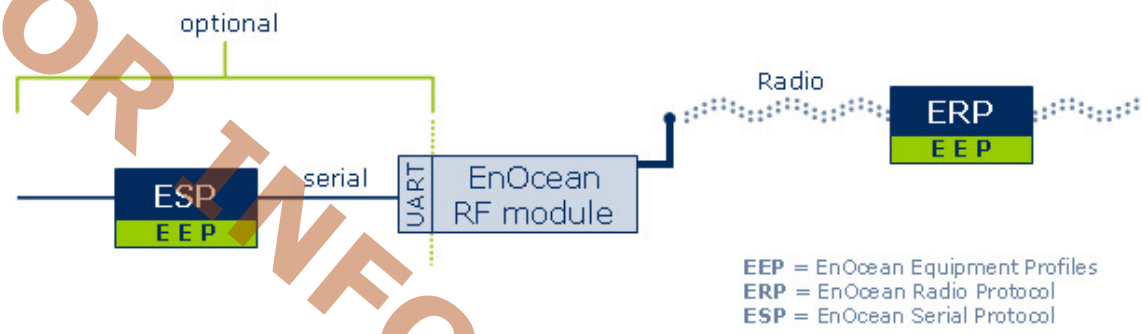
1) Introduction

1.1) Terms, Abbreviations

1BS	EnOcean 1 Byte Communication
4BS	EnOcean 4 Byte Communication
BAS	Building Automation System
Choice	Unique identification of EnOcean radio telegram types (RPS, 1BS, 4BS, ...); equivalent with RORG
Client	Bidirectional Smart Ack Device
Data	Payload of ERP telegrams or ESP packets
EEP	EnOcean Equipment Profiles
ERP	EnOcean Radio Protocol
ESP	EnOcean Serial Protocol
HTML	Hyper Text Markup Language; HTML can be displayed using a internet browser
MSC	Manufacturer Specific Communication
N/A	Not applicable
ORG	Organizational number for EnOcean radio telegram types (out-dated with EEP 2.1; used for ESP2 interface)
RORG	Radio ORG = organization number for EnOcean radio telegram types (new with EEP 2.1); equivalent with 'Choice'
RMCC	Remote Management Control Commands
RPC	Remote Procedure Calls
RPS	EnOcean telegram type for Repeated Switch Communication
Smart Ack	Smart Acknowledge EnOcean standard for energy-optimized bidirectional transmission
UART	Universal Asynchronous Receiver Transmitter
VLD	EnOcean Variable Length Data telegram
XML	Extensible Markup Language; designed to transport and store data
XSL	Extensible Stylesheet Language; XML based language to visualize XML (data)

1.2) General

The EnOcean radio protocol (ERP) is optimized to transmit information with utmost reliability using extremely little power while ensuring that the products of customers applying EnOcean technology are compatible with each other. Only the very shortest transmission period (< 1ms) for an EnOcean telegram allows the design of, for example, a battery-free radio switch, which can produce a full radio command with just approx. 50 µWs (50 µJ) of energy. At the same time, the reliability of the system increases, as the possibility of data collision is strongly reduced.
Every data bit in the radio telegram is essential. For each '0' or '1' state, content descriptions are definied, which must be followed by the sender and the receiver likewise. Depending on the telegram type and the function of the device the user data (payload) is defined in:
EEP (EnOcean Equipment Profiles)



The ERP specification defines the structure of the entire radio telegram. The user data embedded in this structure is defined by the EEP.

The objective of interoperability is easier to reach with as less profiles as required. Therefore, it is EnOcean Alliance's goal to configure each profile as universally as possible, to target a spectrum of devices in the building automation sector for all manufacturers.

It is of high interest to the EnOcean Alliance that Alliance members verify new devices or newly joined companies verify their products against the existing EEP Profiles and adopt these during testing. Every newly defined EEP would increase diversity and therefore decrease interoperability.

The technical characteristics of a device define three profile elements, which make up the organizational description of all profiles:

1. The ERP radio telegram type (RORG)
2. Basic functionality of the data content (FUNC)
3. Type of device in its individual characteristics (TYPE)

Therefore, every EEP profile has a number, reflecting these three components:

EEP 2.0:	ORG	FUNC	TYPE
EEP 2.5:	**RORG**	**FUNC**	**TYPE**
Range (hex):	00 ... FF	00 ... 3F	00 ... 7F
	8 bit	6 bit	7 bit

Every field is represented by a hexadecimal number, where the maximum value is limited by the available bits.

Before the definition of a new profile existing profiles should be checked first for suitability. A new profile is to be defined only if the existing profiles would not be adequate.

Once a new profile is to be developed it should be submitted to the TWG of the EnOcean Alliance. The information to be provided is

- the XML-data, plus
- the profile as text in a pdf-file (the .pdf-data is to be generated from the XML-data)

The TWG will review and ratify the profile. Following the recommendation by the TWG the BoD will disapprove or approve the profile.

When defining a new profile rules, abbreviations and terms as per this document have to be applied.

To maintain the XML-data and the linked pdf-document in a proper way a document maintenance process is defined. For details refer to appendix 3.14 Data + document maintenance process.

1.3) What's new in EEP 2.6 ?

New RDS profiles:

- F6-02-04 - Light and Blind Control ERP2
- F6-04-02 - Key Card Activated Switch ERP2
- F6-05-01 - Liquid Sensor (mechanic harvester)
- F6-10-01 - Window Handle ERP2

New 4BS profiles:

- A5-09-08 - Pure CO2 Sensor
- A5-10-20 - ROP with Temperature and Set Point with Special Heating States
- A5-10-21 - ROP with Temperature, Humidity and Set Point with Special Heating States
- A5-30-03 - 4 Digital Inputs, Wake and Temperature
- A5-30-04 - 3 Digital Inputs, 1 Digital Input 8 bits

New VLD profiles:

- D2-01-0A - Type 0x0A
- D2-03-10 - Mechanical Handle
- D2-04-xx - CO2, humidity, temperature, day/night and autonomy
- D2-30-xx - Floor Heating Controls and Automated Meter Reading
- D2-31-xx - Automated Meter Reading Gateway
- D2-A0-01 - Valve Control

1.4) Telegram types (RORG)

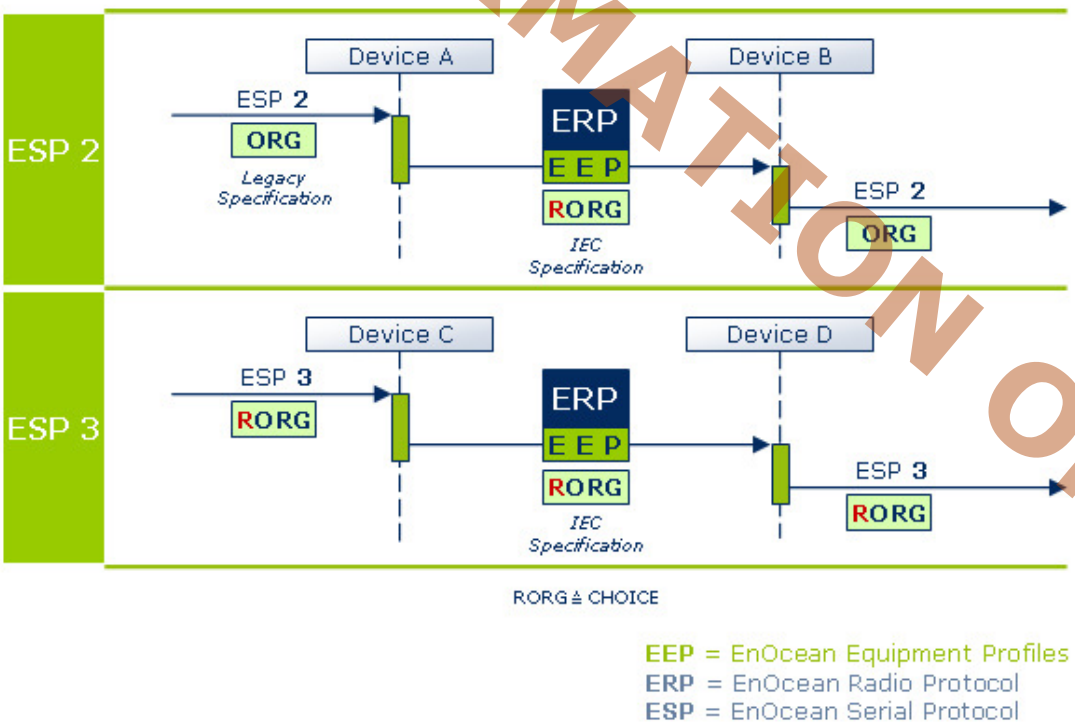
The various **R**adio-Telegram types are grouped **org**anizationally.

The specifications of ERP (EnOcean Radio Protocol) and of ESP (EnOcean Serial Protocol) group telegram types by 'CHOICE' number. 'RORG' at EEP 2.1(2.5) corresponds to 'CHOICE'.

The following RORG are used in EEP 2.5:

Telegram	RORG	ORG	
RPS	F6	05	Repeated Switch Communication
1BS	D5	06	1 Byte Communication
4BS	A5	07	4 Byte Communication
VLD	D2	=RORG	Variable Length Data
MSC	D1	=RORG	Manufacturer Specific Communication
ADT	A6	=RORG	Adressing Destination Telegram
SM_LRN_REQ	C6	=RORG	Smart Ack Learn Request
SM_LRN_ANS	C7	=RORG	Smart Ack Learn Answer
SM_REC	A7	=RORG	Smart Ack Reclaim
SYS_EX	C5	=RORG	Remote Management
SEC	30	=RORG	Secure telegram
SEC_ENCAPS	31	=RORG	Secure telegram with R-ORG encapsulation

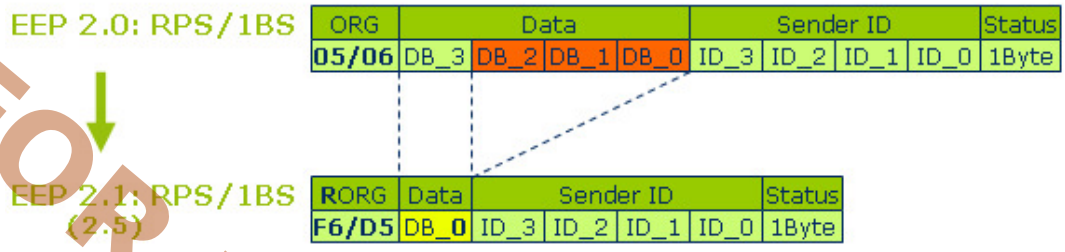
For compatibility reasons, the old ORG values on the serial ESP2 interfaces remain valid. However, on the air interface, each ESP2 telegram is transported with the appropriate RORG (= CHOICE).



1.5) EEP modifications at RPS and 1BS data telegram

Both telegram types carry a one byte payload (DB_0) on the wireless interface (ERP).

EEP 2.0 follows the specification of the serial interface / ESP2, which defines the payload to be carried in DB_3 (see succeeding figure). The trailing bytes, DB_2, DB_1 and DB_0 are marked as 'unused'.



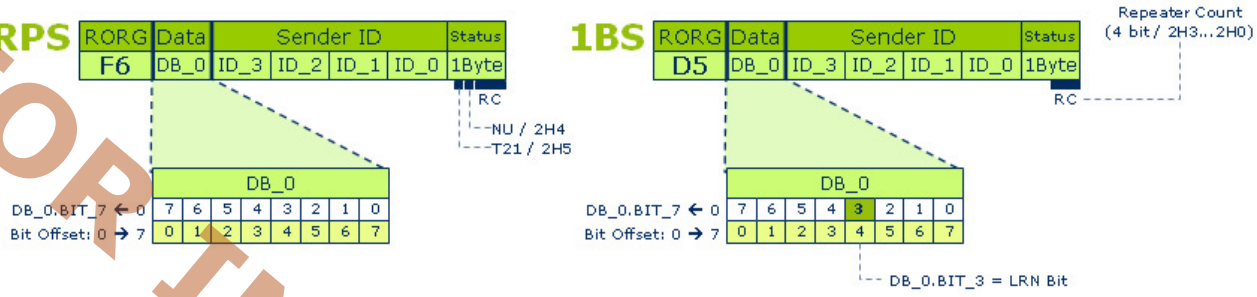
For orthogonal data structural reasons, this deviation will be avoided with EPP 2.1, 2.5 and future versions. The new ESP3 serial interface already respects this.

For reasons of compatibility of end devices, the ESP2 interface remains unaltered, i.e. the DB_0 byte (radio) will continue to be transferred as a DB_3 byte (serial) (including the 3 unused bytes).
The conversation has to happen on the application layer as the XML-data structure of EEP 2.1 / 2.5 only refers to the DB_0 byte.

As a consequence of this modification the LRN bit is now described in a row for the 1BS and 4BS telegram types as standardized with the DB_0.BIT_3 position.

1.6) Structure and addressing of the telegram types

1.6.1) RPS / 1BS

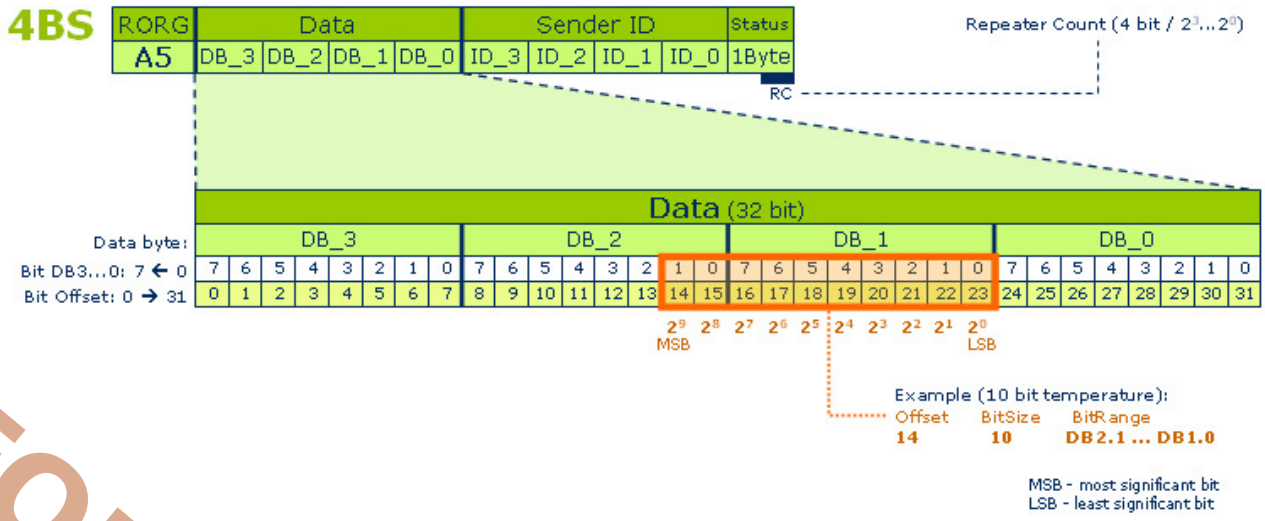


The RPS and the 1BS telegrams offer only 1 byte user data. These two telegrams differ in the respective learning operations (the 1BS has a LRN bit), and in the way the status byte is used.
Comment for RPS status bits:
T21 = 0 = PTM switch module of type 1 / synonymous for module PTM1xx
T21 = 1 = PTM switch module of type 2 / synonymous for module PTM2xx
NU = 1 = N-message (N = normal)
NU = 0 = U-message (U = unassigned)

1.6.2) 4BS

A 4BS telegram carries a payload of 4 bytes. The sequence of the 4 data bytes is historically reversed, so that DB_3 appears first and DB_0 last on the radio interface. The bits are addressed in the sequence of the data flow, however (offset). Hence, DB_3.BIT_7 has the offset position 0 and DB_0.BIT_3 (LRN bit) has the offset position 28. The actual content-bits in a byte are not affected by this, i.e., they are described from right (2H0) to left (2H7) in the ascending order.

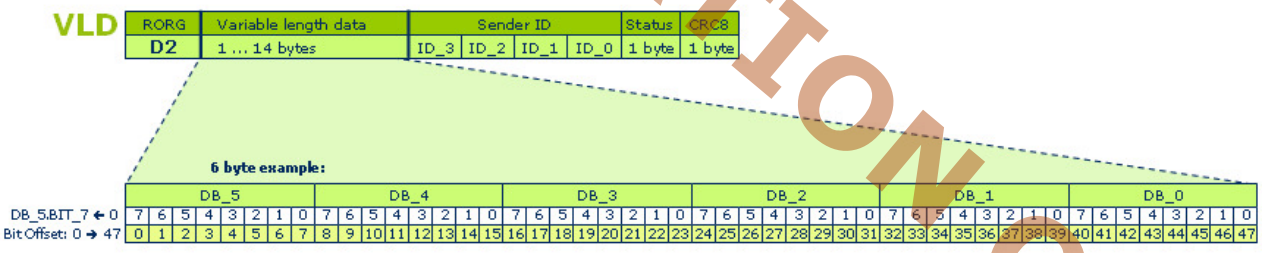
The example of a 10-bit temperature profile (see below) illustrates the binary valuation of the individual bits, so that a number range from 0 ... 1023 can be addressed.



1.6.3) VLD

VLD telegrams carry a variable payload between one and 14 bytes, depending on their design. The teach-in process applies the Smart Ack procedure (see appendices 3.4 and 3.5).

The example following displays a VLD telegram with 6 bytes user data. DB_5.BIT_7 is the first transmitted bit with offset 0.



1.7) Teach-in procedures

The 'Teach-in' defines the mutual communication between wireless devices in an 868 (315) MHz radio network.
The 'Teach-in' defines to which transmitter(s) a receiver needs to listen to.
For this purpose of a determined relationship between transmitter and receiver each transmitting device has a unique Sender-ID which is part of each radio telegram. The receiving device detects from the Sender-ID whether the device is known, i.e., was already learned, or unknown.
A telegram with unknown Sender-ID is disregarded.

The 'teach-in' process is different for each telegram type (RPS, 1BS, 4BS, Smart Ack), but the following points are valid for all telegrams:

- First, the receiver must be switched into learning mode. Now, the Sender-ID of an arriving telegram is interpreted as an authorized information source and will be stored at the receiver. The further steps of 'teach-in' are defined by the device type or the telegram type. Thus, normal data telegrams or special teach-in telegrams can be used. Frequently, a learn button triggers the teach-in process.

- The telegram of the respective transmitter should be triggered at least once (by pressing the desired switch rocker or triggering a sensor).
- The bits of the payload (data bytes) can have multiple functions depending on the interpretation set by identification or status bits. Only in the 1BS and 4BS telegram the 'LRN BIT' DB_0.BIT_3 is reserved exclusively and must not be used elsewhere.

The following issues are relevant for a number of application but not mandatory for specification perspective:

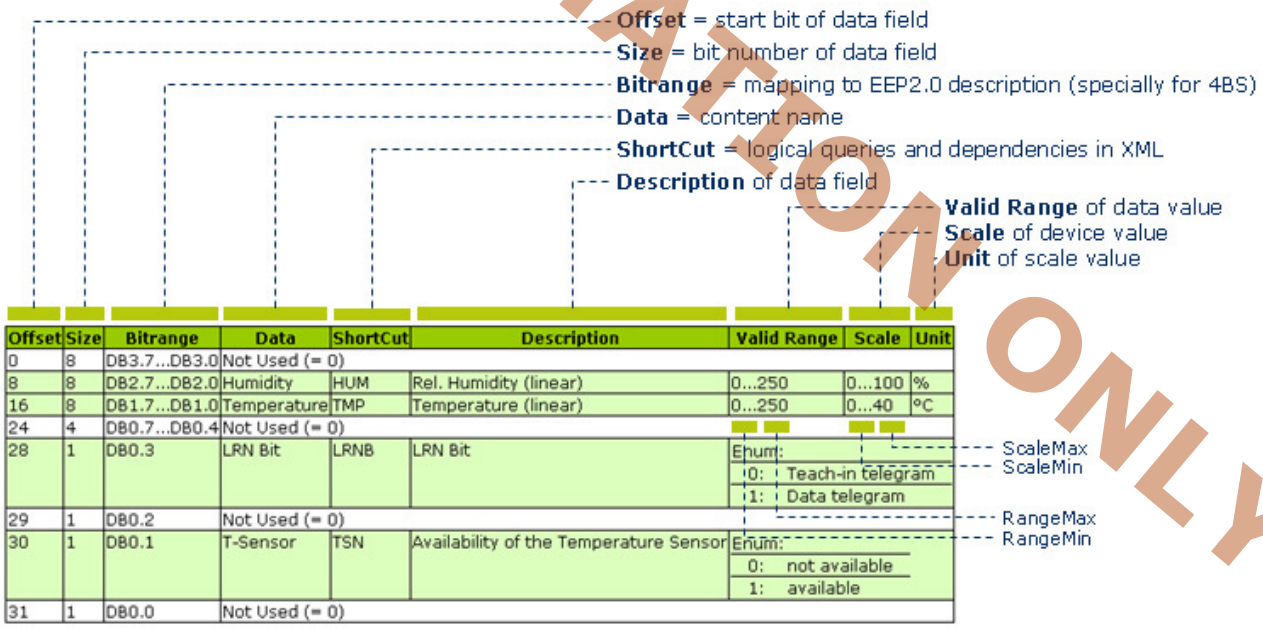
- To prevent unwanted devices from being learned the input sensitivity of the receiver is often restricted, and thus an IN-ROOM operation is created. Typically, the device to be learned is placed close by the receiver.
- Dolphin-based transmitters (e.g. TCM 300 or TCM 2x with Dolphin library) can also be switched into the learn-mode via a remote management command. This remote 'teach-in' mode can only be activated within the first 30 min after receiver power-up. To avoid inadvertent learning the transmitter telegrams have to be triggered 3 times within 2 seconds.

For further details on the 'Teach-in' processes refer to appendices 3.1 to 3.6.

1.8) Viewing XML-data

- The XML-file and all the associated files (CSS, DTD, XSL) and the 'graphics' folder must be stored in the same directory.
- The XML-file is best opened using an Internet browser, generating an HTML-view which displays the describing chapters, graphics and data tables.
- Mozilla Firefox V3.6 or upwards is recommended for optimum screen and print view.

The following example illustrates the HTML-view of the XML-data of a 4BS telegram (= payload of 32 bits).



Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	8	DB2.7...DB2.0	Humidity	HUM	Rel. Humidity (linear)	0...250	0...100	%
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...250	0...40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	T-Sensor	TSN	Availability of the Temperature Sensor	Enum: 0: not available 1: available		
31	1	DB0.0	Not Used (= 0)					

Data ranges unused are displayed in the table as white rows.

The 'Bit range' column displays the starting-point and the end-point of the respective data.

The 'Valid range', 'Scale' and 'Unit' columns are displayed separately only for measurement values. However, these 3 columns are merged into one if the data comes from an enumeration (enum).

Assuming a linear conversion between the value to be measured and the 'valid range' of data the resolution can be calculated as follows:

Conversion: Valid Range ---> Scale
$\text{Multiplier} = \frac{\text{Scale}_{MAX} - \text{Scale}_{MIN}}{\text{Range}_{MAX} - \text{Range}_{MIN}}$
$\text{Device value} = \text{Multiplier} * (\text{rawValue} - \text{Range}_{MIN}) + \text{Scale}_{MIN}$

F6: RPS Telegram

Repeated Switch Communication

F6-ALL: RPS EEP usage on ERP 2

RORG	F6	RPS Telegram
FUNC	ALL	RPS EEP usage on ERP 2
TYPE	ALL	ALL

Submitter: EnOcean

ERP 2 (EnOcean Radio Protocol 2) is the radio protocol with FSK encoding. It is compatible on the application level with ERP 1. With ERP 2 all EPPs, Protocols (Security / Smart Acknowledge) can be used as it was before. Only difference are the RPS profiles. The ERP 2 (EnOcean Radio Protocol 2) – does not use the RPS telegrams as ERP 1 did. The biggest difference is the usage of the Status Field. The Status field in ERP 2 is defined as a repeater count field (also other position in the telegram). Other functionalities and fields T21 and NU are not present any more. Therefore a new encoding was developed.

EEP describe an equipment – device - application. The meaning of the data did not change only the coding. The logic and semantic of the application is still the same. So it is defined that RPS profiles on ERP 2 have different coding of the actual telegram data, but the logic is same on ERP 1 and ERP 2.

The new coding is published as new profiles. This is required to keep the same interfaces on the EEP processing (e.g. existing gateways / IP gateways - we do not want have additional information which radio protocol was used – ERP1/ERP2). The exact details are listed below.

The profiles are defined in way that a seamless translation between ERP 1 and ERP 2 vice versa is possible without contextual information, what profile it is in particular.

F6-02: Rocker Switch, 2 Rocker

For clarification reasons the following picture shows a PTM200 transmitter module from EnOcean GmbH which transmits RPS telegrams and is one possibility to be used in applications that require an EEP F6-02-xx. Please note that PTM200 does not support transmission of teach-in telegrams.

The button naming used below is referring to CHANNEL and STATE of the PTM200. Thus "Button AI" means STATE „I" on CHANNEL „A".

There are two different message types, the N-message and the U-message, which need to be identified from the Status Field of an EnOcean RPS telegram. For that reason not only the data bytes are given for each EEP but the T21 and NU bits of the Status Field are listed as well.

RORG	F6	**RPS Telegram**
FUNC	02	Rocker Switch, 2 Rocker
TYPE	01	Light and Blind Control - Application Style 1

This EEP definition is based on the assumption that a RPS switch module (e.g. PTM200) is installed in a 0-STATE up position! Application Style 1 is widely used in EU but may be found in other markets as well.

Statusfield:

Offset	Size	Data	Value
2	1	T21	1
3	1	NU	1

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	DB0.7...DB0.5	Rocker 1st action	R1	....	Enum: 0: Button AI: "Switch light on" or "Dim light down" or "Move blind closed " 1: Button A0: "Switch light off" or "Dim light up" or "Move blind open " 2: Button BI: "Switch light on" or "Dim light down" or "Move blind closed" 3: Button B0: "Switch light off" or "Dim light up" or "Move blind open"		
3	1	DB0.4	Energy Bow	EB	....	Enum: 0: released 1: pressed		
4	3	DB0.3...DB0.1	Rocker 2nd action	R2	....	Enum: 0: Button AI: "Switch light on" or "Dim light down" or "Move blind closed " 1: Button A0: "Switch light off" or "Dim light up" or "Move blind open " 2: Button BI: "Switch light on" or "Dim light down" or "Move blind closed" 3: Button B0: "Switch light off" or "Dim light up" or "Move blind open"		
7	1	DB0.0	2nd Action	SA	....	Enum: 0: No 2nd action 1: 2nd action valid		

Statusfield:

Offset	Size	Data	Value
2	1	T21	1
3	1	NU	0

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	DB0.7...DB0.5	Number of buttons pressed simultaneously (other bit combinations are not valid)	R1	....	Enum: 0: no button		

						3: 3 or 4 buttons
3	1	DB0.4	Energy Bow	EB	....	Enum: 0: released 1: pressed
4	4	DB0.3...DB0.0	Not Used (= 0)			

RORG	F6	**RPS Telegram**
FUNC	02	Rocker Switch, 2 Rocker
TYPE	02	Light and Blind Control - Application Style 2

This EEP definition is based on the assumption that a RPS switch module (e.g. PTM200) is installed in an I-STATE up position! Application Style 2 is typically used in US and CAN but may be found in other markets as well.

Statusfield:

Offset	Size	Data	Value
2	1	T21	1
3	1	NU	1

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	DB0.7...DB0.5	Rocker 1st action	R1	....	Enum: 0: Button AI: "Switch light on" or "Dim light up" or "Move blind open " 1: Button A0: "switch light off" or "Dim light down" or "Move blind closed " 2: Button BI: “Switch light on” or "Dim light up” or "Move blind open” 3: Button B0: “Switch light off” or “Dim light down” or "Move blind closed”		
3	1	DB0.4	Energy Bow	EB	....	Enum: 0: released 1: pressed		
4	3	DB0.3...DB0.1	Rocker 2nd action	R2	....	Enum: 0: Button AI: "Switch light on" or "Dim light up" or "Move blind open " 1: Button A0: "switch light off" or "Dim light down" or "Move blind closed " 2: Button BI: “Switch light on” or "Dim light up” or "Move blind open” 3: Button B0: “Switch light off” or “Dim light down” or "Move blind closed”		
7	1	DB0.0	2nd Action	SA	....	Enum: 0: No 2nd action 1: 2nd action valid		

Statusfield:

Offset	Size	Data	Value
2	1	T21	1
3	1	NU	0

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	DB0.7...DB0.5	Number of buttons pressed simultaneously (other bit combinations are not valid)	R1	....	Enum: 0: no button 3: 3 or 4 buttons		
3	1	DB0.4	Energy Bow	EB	....	Enum: 0: released 1: pressed		
4	4	DB0.3...DB0.0	Not Used (= 0)					

RORG	F6	RPS Telegram
FUNC	02	Rocker Switch, 2 Rocker
TYPE	03	Light Control - Application Style 1

Submitter: Servodan

Definition of Auto, I/O for Rocker switch, Dim control (PTM200)

Statusfield:

Offset	Size	Data	Value
2	1	T21	1
3	1	NU	1

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB0.7...DB0.0	Rocker action	RA	....	Enum: 0x30: Button A0: Set the controller in automatic mode 0x10: Button A1: Set the controller in manually mode and toggles between switch light on and switch light off 0x70: Button B0: Dim light up 0x50: Button B1: Dim light down		

RORG	F6	RPS Telegram
FUNC	02	Rocker Switch, 2 Rocker
TYPE	04	Light and blind control ERP2

Submitter: EnOcean GmbH

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	1	DB0.7	Energy Bow	EBO	State of the energy bow	Enum: 0: released 1: pressed		
1	1	DB0.6	Button coding	BC	Signalize button coding	Enum: 0: button		
2	2	DB0.5...DB0.4	Not Used (= 0)					
4	1	DB0.3	BI	RBI	State I of the rocker B	Enum: 0: not pressed 1: pressed		

5	1	DB0.2	B0	RB0	State 0 of the rocker B	Enum: 0: not pressed 1: pressed
6	1	DB0.1	AI	RAI	State I of the rocker A	Enum: 0: not pressed 1: pressed
7	1	DB0.0	A0	RA0	State 0 of the rocker A	Enum: 0: not pressed 1: pressed

F6-03: Rocker Switch, 4 Rocker

RORG	F6	**RPS Telegram**
FUNC	03	Rocker Switch, 4 Rocker
TYPE	01	Light and Blind Control - Application Style 1

This EEP definition is based on the assumption that a RPS switch module is installed in a 0-STATE up position!
Application Style 1 is widely used in EU but may be found in other markets as well.

Statusfield:

Offset	Size	Data	Value
2	1	T21	0
3	1	NU	1

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	DB0.7...DB0.5	Rocker 1st action	R1	....	Enum: 0: Button AI: "Switch light on" or "Dim light down" or "Move blind closed " 1: Button A0: "Switch light off" or "Dim light up" or "Move blind open " 2: Button BI: "Switch light on" or "Dim light down" or "Move blind closed" 3: Button B0: "Switch light off" or "Dim light up" or "Move blind open" 4: Button CI: "Switch light on" or "Dim light down" or "Move blind closed " 5: Button C0: "Switch light off" or "Dim light up" or "Move blind open " 6: Button DI: "Switch light on" or "Dim light down" or "Move blind closed" 7: Button D0: "Switch light off" or "Dim light up" or "Move blind open"		
3	1	DB0.4	Energy Bow	EB	....	Enum: 0: released 1: pressed		
4	3	DB0.3...DB0.1	Rocker 2nd action	R2	....	Enum: 0: Button AI: "Switch light on" or "Dim light down" or "Move blind closed " 1: Button A0: "Switch light off" or "Dim light up" or "Move blind open "		

						2: Button BI: "Switch light on" or "Dim light down" or "Move blind closed" 3: Button B0: "Switch light off" or "Dim light up" or "Move blind open" 4: Button CI: "Switch light on" or "Dim light down" or "Move blind closed " 5: Button C0: "Switch light off" or "Dim light up" or "Move blind open " 6: Button DI: "Switch light on" or "Dim light down" or "Move blind closed" 7: Button D0: "Switch light off" or "Dim light up" or "Move blind open"
7	1	DB0.0	2nd Action	SA	....	Enum: 0: No 2nd action 1: 2nd action valid

Statusfield:

Offset	Size	Data	Value
2	1	T21	0
3	1	NU	0

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	DB0.7...DB0.5	Number of buttons pressed simultaneously	R1	....	Enum: 0: no Button pressed 1: 2 buttons pressed 2: 3 buttons pressed 3: 4 buttons pressed 4: 5 buttons pressed 5: 6 buttons pressed 6: 7 buttons pressed 7: 8 buttons pressed		
3	1	DB0.4	Energy Bow	EB	....	Enum: 0: released 1: pressed		
4	4	DB0.3...DB0.0	Not Used (= 0)					

RORG	F6	RPS Telegram
FUNC	03	Rocker Switch, 4 Rocker
TYPE	02	Light and Blind Control - Application Style 2

A This EEP definition is based on the assumption that a RPS switch module is installed in a I-STATE up position!
Application Style 2 is typically used in US and CAN but may be found in other markets as well.

Statusfield:

Offset	Size	Data	Value
2	1	T21	0

3	1	NU	1

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	DB0.7...DB0.5	Rocker 1st action	R1	....	Enum: 0: Button AI: "Switch light on" or "Dim light up" or "Move blind open" 1: Button A0: "Switch light off" or "Dim light down" or "Move blind closed" 2: Button BI: "Switch light on" or "Dim light up" or "Move blind open" 3: Button B0: "Switch light off" or "Dim light down" or "Move blind closed" 4: Button CI: "Switch light on" or "Dim light up" or "Move blind open" 5: Button C0: "Switch light off" or "Dim light down" or "Move blind closed" 6: Button DI: "Switch light on" or "Dim light up" or "Move blind open" 7: Button D0: "Switch light off" or "Dim light down" or "Move blind closed"		
3	1	DB0.4	Energy Bow	EB	....	Enum: 0: released 1: pressed		
4	3	DB0.3...DB0.1	Rocker 2nd action	R2	....	Enum: 0: Button AI: "Switch light on" or "Dim light up" or "Move blind open" 1: Button A0: "Switch light off" or "Dim light down" or "Move blind closed" 2: Button BI: "Switch light on" or "Dim light up" or "Move blind open" 3: Button B0: "Switch light off" or "Dim light down" or "Move blind closed" 4: Button CI: "Switch light on" or "Dim light up" or "Move blind open" 5: Button C0: "Switch light off" or "Dim light down" or "Move blind closed" 6: Button DI: "Switch light on" or "Dim light up" or "Move blind open" 7: Button D0: "Switch light off" or "Dim light down" or "Move blind closed"		
7	1	DB0.0	2nd Action	SA	....	Enum: 0: No 2nd action 1: 2nd action valid		

Statusfield:

Offset	Size	Data	Value
2	1	T21	0
3	1	NU	0

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	DB0.7...DB0.5	Number of buttons pressed simultaneously	R1	....	Enum: 0: no button pressed 1: 2 buttons pressed 2: 3 buttons pressed 3: 4 buttons pressed 4: 5 buttons pressed 5: 6 buttons pressed 6: 7 buttons pressed 7: 8 buttons pressed		
3	1	DB0.4	Energy Bow	EB	....	Enum: 0: released 1: pressed		
4	4	DB0.3...DB0.0	Not Used (= 0)					

F6-04: Position Switch, Home and Office Application

RORG	F6	RPS Telegram
FUNC	04	Position Switch, Home and Office Application
TYPE	01	Key Card Activated Switch

Insertion of Key Card generates an N-Message, take-out a U-Message

Statusfield:

Offset	Size	Data	Value
2	1	T21	1
3	1	NU	1

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB0.7...DB0.0	Key Card	KC	...	Enum: 112: inserted (0x70)		

Statusfield:

Offset	Size	Data	Value
2	1	T21	1
3	1	NU	0

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB0.7...DB0.0	Key Card	KC	...	Enum: 0: taken out		

RORG	F6	RPS Telegram
FUNC	04	Position Switch, Home and Office Application
TYPE	02	Key Card Activated Switch ERP2

Submitter: EnOcean GmbH

When card is inserted field EBO and SOC are both having value 1. When take out, both are having value 0. This coding is required to have a context less translation of RPS profiles between ERP 1 and ERP 2.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	1	DB0.7	Energy Bow	EBO	State of the energy bow	Enum: 0: taken out 1: card inserted		
1	1	DB0.6	Button coding	BC	Signalize button coding	Enum: 0: button		
2	3	DB0.5...DB0.3	Not Used (= 0)					
5	1	DB0.2	State of card	SOC	State of the card	Enum: 0: taken out 1: card inserted		
6	2	DB0.1...DB0.0	Not Used (= 0)					

F6-05: Detectors

RORG	F6	**RPS Telegram**
FUNC	05	Detectors
TYPE	01	Liquid Leakage Sensor (mechanic harvester)

Submitter: Afriso / EnOcean

Description:
This profile is used for devices detecting leakage. It is commonly placed on ground where a leakage causes damage. The principle is that "paper rings" swell in water and trigger an ECO 200 (generator) based transmitter.

Data exchange
Direction: unidirectional
Addressing: broadcast
Communication trigger: event-triggered
Communication interval: NA
Trigger event: (water detection)
Teach-in method: RPS teach-in

Statusfield:

Offset	Size	Data	Value
2	1	T21	1
3	1	NU	1

Datafield:

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB0.7...DB0.0	Water sensor	WAS	Alert signal that the sensor detected water leakage	Enum: 0x11: Water detected		

F6-10: Mechanical Handle

RORG	F6	**RPS Telegram**
FUNC	10	Mechanical Handle
TYPE	00	Window Handle

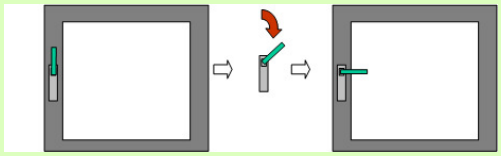
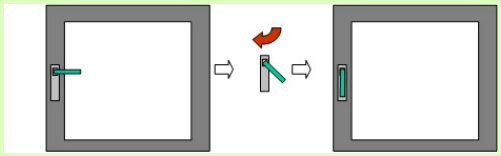
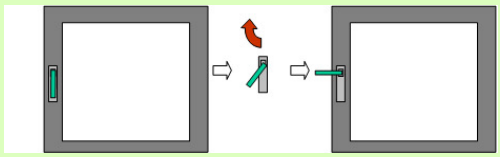
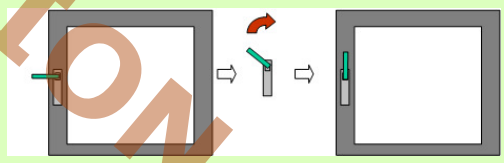
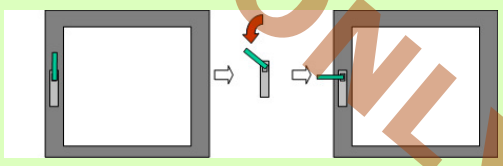
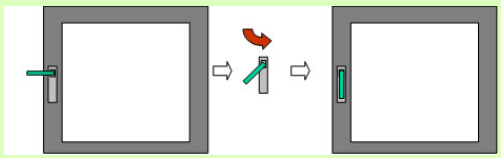
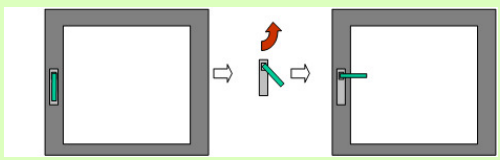
Submitter: HOPPE AG

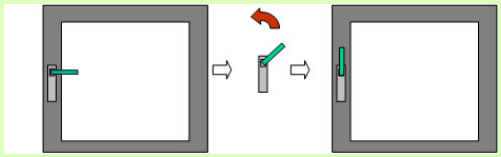
The bits marked with 'X' in DB_0 should not be checked. These bits can be '1' or '0' and should not be assumed to be a defined value, because both of them are allowed and not predictable!

Statusfield:

Offset	Size	Data	Value
2	1	T21	1
3	1	NU	0

Datafield:

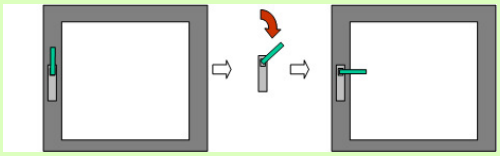
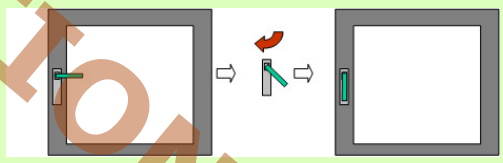
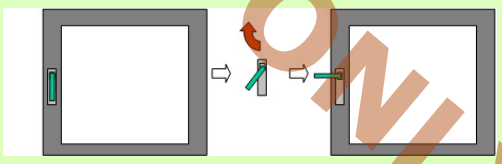
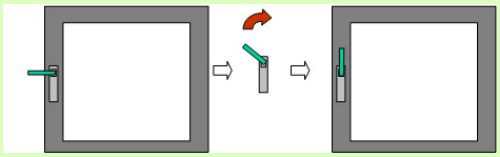
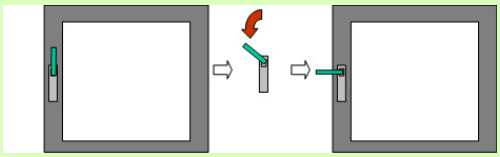
Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB0.7...DB0.0	Window handle	WIN	Movement of the window handle	Enum: 0b11X0XXXX:  0b1111XXXX:  0b11X0XXXX:  0b1101XXXX:  0b11X0XXXX:  0b1111XXXX:  0b11X0XXXX: 		

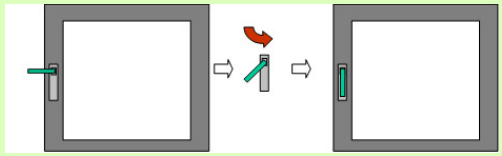
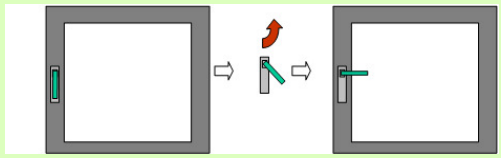
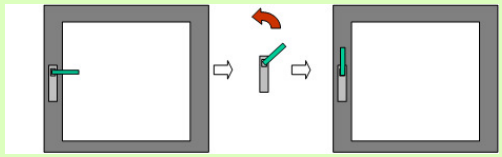
						0b1101XXXX: 

RORG	F6	RPS Telegram
FUNC	10	Mechanical Handle
TYPE	01	Window Handle ERP2

Submitter: HOPPE AG

DB0.6 – needs to show that RPS/ERP2 has a different coding as RPS/ERP1.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	1	DB0.7	Not Used (= 0)					
1	1	DB0.6	Handle coding	HC	Signalize window handle coding	Enum: 1: handle		
2	2	DB0.5...DB0.4	Not Used (= 0)					
4	4	DB0.3...DB0.0	Handle value	HVL	Value of the 4MSB of the Data field of ERP1 coding	Enum: 0b11X0:  0b1111:  0b11X0:  0b1101:  0b11X0: 		

						0b1111: 
						0b11X0: 
						0b1101: 

D5: 1BS Telegram

D5-00: Contacts and Switches

RORG	D5	**1BS Telegram**
FUNC	00	Contacts and Switches
TYPE	01	Single Input Contact

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
4	1	DB0.3	Learn Button	LRN	..	Enum: 0: pressed 1: not pressed		
7	1	DB0.0	Contact	CO		Enum: 0: open 1: closed		

A5: 4BS Telegram

A5-02: Temperature Sensors

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	01	Temperature Sensor Range -40°C to 0°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	-40...0	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					

28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	3	DB0.2...DB0.0	Not Used (= 0)			

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	02	Temperature Sensor Range -30°C to +10°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	-30...+10	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	03	Temperature Sensor Range -20°C to +20°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	-20...+20	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	04	Temperature Sensor Range -10°C to +30°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	-10...+30	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	05	Temperature Sensor Range 0°C to +40°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	06	Temperature Sensor Range +10°C to +50°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+10...+50	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	07	Temperature Sensor Range +20°C to +60°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+20...+60	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	08	Temperature Sensor Range +30°C to +70°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit

0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+30...+70	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	09	Temperature Sensor Range +40°C to +80°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+40...+80	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	0A	Temperature Sensor Range +50°C to +90°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+50...+90	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	0B	Temperature Sensor Range +60°C to +100°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+60...+100	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	10	Temperature Sensor Range -60°C to +20°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	-60...+20	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	11	Temperature Sensor Range -50°C to +30°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	-50...+30	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	12	Temperature Sensor Range -40°C to +40°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	-40...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	13	Temperature Sensor Range -30°C to +50°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	-30...+50	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	14	Temperature Sensor Range -20°C to +60°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	-20...+60	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	15	Temperature Sensor Range -10°C to +70°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	-10...+70	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	16	Temperature Sensor Range 0°C to +80°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+80	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					

28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	3	DB0.2...DB0.0	Not Used (= 0)			

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	17	Temperature Sensor Range +10°C to +90°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+10...+90	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	18	Temperature Sensor Range +20°C to +100°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+20...+100	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	02	Temperature Sensors
TYPE	19	Temperature Sensor Range +30°C to +110°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+30...+110	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	1A	Temperature Sensor Range +40°C to +120°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+40...+120	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	1B	Temperature Sensor Range +50°C to +130°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	+50...+130	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	20	10 Bit Temperature Sensor Range -10°C to +41.2°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	14	DB3.7...DB2.2	Not Used (= 0)					
14	10	DB2.1...DB1.0	Temperature	TMP	Temperature (linear)	1023...0	-10...+41.2	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	02	Temperature Sensors
TYPE	30	10 Bit Temperature Sensor Range -40°C to +62.3°C

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit

0	14	DB3.7...DB2.2	Not Used (= 0)					
14	10	DB2.1...DB1.0	Temperature	TMP	Temperature (linear)	1023...0	-40...+62.3	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

A5-04: Temperature and Humidity Sensor

RORG	A5	**4BS Telegram**
FUNC	04	Temperature and Humidity Sensor
TYPE	01	Range 0°C to +40°C and 0% to 100%

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	8	DB2.7...DB2.0	Humidity	HUM	Rel. Humidity (linear)	0...250	0...100	%
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...250	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	T-Sensor	TSN	Availability of the Temperature Sensor	Enum: 0: not available 1: available		
31	1	DB0.0	Not Used (= 0)					

A5-06: Light Sensor

RORG	A5	**4BS Telegram**
FUNC	06	Light Sensor
TYPE	01	Range 300lx to 60.000lx

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage (linear)	0...255	0...5.1	V
8	8	DB2.7...DB2.0	Illumination	ILL2	Illumination (linear)	0...255	300...30000	lx
16	8	DB1.7...DB1.0	Illumination	ILL1	Illumination (linear)	0...255	600...60000	lx
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Range select	RS	Range	Enum: 0: Range acc. to DB_1 (ILL1) 1: Range acc. to DB_2 (ILL2)		

RORG	A5	**4BS Telegram**

FUNC	06	Light Sensor
TYPE	02	Range 0lx to 1.020lx

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage (linear)	0...255	0...5.1	V
8	8	DB2.7...DB2.0	Illumination	ILL2	Illumination (linear)	0...255	0...510	lx
16	8	DB1.7...DB1.0	Illumination	ILL1	Illumination (linear)	0...255	0...1020	lx
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Range select	RS	Range	Enum: 0: Range acc. to DB_1 (ILL1) 1: Range acc. to DB_2 (ILL2)		

RORG	A5	**4BS Telegram**
FUNC	06	Light Sensor
TYPE	03	10-bit measurement (1-Lux resolution) with range 0lx to 1000lx

Submitter: Lutuo Technology

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage (linear) 251...255: reserved for error code	0...250	0...5.0	V
8	10	DB2.7...DB1.6	Illumination	ILL	Illumination (linear) DB2 = 8 MSB, DB1 = 2 LSB 1001: over range, 1002...1024: reserved	0...1000	0...1000	lx
18	10	DB1.5...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

A5-07: Occupancy Sensor

RORG	A5	**4BS Telegram**
FUNC	07	Occupancy Sensor
TYPE	01	Occupancy with Supply voltage monitor

Submitter: Lutuo Technology

The transmission of "PIR off" telegrams is optional.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage (OPTIONAL)	SVC	Supply voltage / super cap. (linear); 251 – 255 reserved for error code	0...250	0...5.0	V
8	8	DB2.7...DB2.0	Not Used (= 0)					

16	8	DB1.7...DB1.0	PIR Status	PIRS	PIR Status	Enum: 0...127: PIR off 128...255: PIR on
24	4	DB0.7...DB0.4	Not Used (= 0)			
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	2	DB0.2...DB0.1	Not Used (= 0)			
31	1	DB0.0	Supply voltage availability	SVA	Supply voltage availability at DB_3	Enum: 0: Supply voltage is not supported 1: Supply voltage is supported

RORG	A5	**4BS Telegram**
FUNC	07	Occupancy Sensor
TYPE	02	Occupancy with Supply voltage monitor

Submitter: Lutuo Technology

The transmission of "PIR off" telegrams is optional.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage (REQUIRED)	SVC	Supply voltage / super cap. (linear); 251 – 255 reserved for error code	0...250	0...5.0	V
8	16	DB2.7...DB1.0	Not Used (= 0)					
24	1	DB0.7	PIR Status	PIRS	PIR Status	Enum: 0: Uncertain of occupancy status 1: Motion detected		
25	3	DB0.6...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	07	Occupancy Sensor
TYPE	03	Occupancy with Supply voltage monitor and 10-bit illumination measurement

Submitter: Lutuo Technology

The transmission of "PIR off" telegrams is optional.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage (REQUIRED)	SVC	Supply voltage (linear); 251 – 255 reserved for error code	0...250	0...5.0	V
8	10	DB2.7...DB1.6	Illumination	ILL	Illumination (linear); DB2 = 8 MSB, DB1 = 2 LSB 1001: over range, 1002...1024: reserved	0...1000	0...1000	lx
18	6	DB1.5...DB1.0	Not Used (= 0)					

24	1	DB0.7	PIR Status	PIRS	PIR Status	Enum: 1: Motion detected 0: Uncertain of occupancy status
25	3	DB0.6...DB0.4	Not Used (= 0)			
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	3	DB0.2...DB0.0	Not Used (= 0)			

A5-08: Light, Temperature and Occupancy Sensor

RORG	A5	**4BS Telegram**
FUNC	08	Light, Temperature and Occupancy Sensor
TYPE	01	Range 0lx to 510lx, 0°C to +51°C and Occupancy Button

E.g. for ceiling suspended sensor.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage (linear)	0...255	0...5.1	V
8	8	DB2.7...DB2.0	Illumination	ILL	Illumination (linear)	0...255	0...510	lx
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...255	0...+51	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	PIR Status	PIRS	PIR Status	Enum: 0: PIR on 1: PIR off		
31	1	DB0.0	Occupancy Button	OCC	...	Enum: 0: Button pressed 1: Button released		

RORG	A5	**4BS Telegram**
FUNC	08	Light, Temperature and Occupancy Sensor
TYPE	02	Range 0lx to 1020lx, 0°C to +51°C and Occupancy Button

E.g. for wall mounted sensor.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage (linear)	0...255	0...5.1	V
8	8	DB2.7...DB2.0	Illumination	ILL	Illumination (linear)	0...255	0...1020	lx
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...255	0...+51	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	PIR Status	PIRS	PIR Status	Enum: 0: PIR on 1: PIR off		
31	1	DB0.0	Occupancy Button	OCC	...	Enum: 0: Button pressed 1: Button released		

RORG	A5	4BS Telegram
FUNC	08	Light, Temperature and Occupancy Sensor
TYPE	03	Range 0lx to 1530lx, -30°C to +50°C and Occupancy Button

E.g. for outdoor sensor.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage (linear)	0...255	0...5.1	V
8	8	DB2.7...DB2.0	Illumination	ILL	Illumination (linear)	0...255	0...1530	lx
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...255	-30...+50	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	PIR Status	PIRS	PIR Status	Enum: 0: PIR on 1: PIR off		
31	1	DB0.0	Occupancy Button	OCC	..	Enum: 0: Button pressed 1: Button released		

A5-09: Gas Sensor

RORG	A5	4BS Telegram
FUNC	09	Gas Sensor
TYPE	01	CO Sensor (not in use)

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Concentration	Conc	Concentration	0...255	0...255	ppm
8	8	DB2.7...DB2.0	Concentration	Conc	Concentration (tbd!)	.....	.....	...
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...255	0...+255	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	T-Sensor	TSN	..	Enum: 0: Temperature Sensor not available 1: Temperature Sensor available		
31	1	DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	09	Gas Sensor
TYPE	02	CO-Sensor 0 ppm to 1020 ppm

Submitter: Unitronic AG

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit

0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage (linear)	0...255	0...5.1	V
8	8	DB2.7...DB2.0	Concentration	Conc	Gas concentration	0...255	0...1020	ppm
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...255	0...+51	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	T-Sensor	TSN	..	Enum: 0: Temperature Sensor not available 1: Temperature Sensor available		
31	1	DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	09	Gas Sensor
TYPE	04	CO2 Sensor

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Humidity	HUM	Rel. Humidity (linear), 0.5 % = 1 bit	0...200	0...100	%
8	8	DB2.7...DB2.0	Concentration	Conc	Concentration (linear), increment = 10 ppm	0...255	0...2550	ppm
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear), increment = 0.2 °C	0...255	0...+51.0	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	H-Sensor	HSN	..	Enum: 0: Humidity Sensor not available 1: Humidity Sensor available		
30	1	DB0.1	T-Sensor	TSN	..	Enum: 0: Temperature Sensor not available 1: Temperature Sensor available		
31	1	DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	09	Gas Sensor
TYPE	05	VOC Sensor

Submitter: NanoSense

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	VOC	Conc	VOC Concentration	0...65535	0...65535	ppb
16	8	DB1.7...DB1.0	VOC ID	VOC_ID	VOC identification	Enum: 0: VOCT (total) 1: Formaldehyde 2: Benzene		

						3: Styrene 4: Toluene 5: Tetrachloroethylene 6: Xylene 7: n-Hexane 8: n-Octane 9: Cyclopentane 10: Methanol 11: Ethanol 12: 1-Pentanol 13: Acetone 14: ethylene Oxide 15: Acetaldehyde ue 16: Acetic Acid 17: Propionice Acid 18: Valeric Acid 19: Butyric Acid 20: Ammoniac 22: Hydrogen Sulfide 23: Dimethylsulfide 24: 2-Butanol (butyl Alcohol) 25: 2-Methylpropanol 26: Diethyl ether 255: ozone
24	4	DB0.7...DB0.4	Not Used (= 0)			
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	1	DB0.2	Not Used (= 0)			
30	2	DB0.1...DB0.0	Scale Multiplier	SCM	Scale Multiplier	Enum: 0: 0.01 1: 0.1 2: 1 3: 10

RORG	A5	**4BS Telegram**
FUNC	09	Gas Sensor
TYPE	06	Radon

Submitter: NanoSense

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	10	DB3.7...DB2.6	Radon	Act	Radon activity (regulation is an average of 100 Bq/m3/24h)	0...1023	0...1023	Bq/m3
10	18	DB2.5...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	09	Gas Sensor
TYPE	07	Particles

Submitter: NanoSense

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	9	DB3.7...DB2.7	Particles_10	PM10	Dust less than 10 µm (PM10)	0...511	0...511	µg/m3
9	9	DB2.6...DB1.6	Particles_2.5	PM2.5	Dust less than 2.5 µm (PM2.5)	0...511	0...511	µg/m3
18	9	DB1.5...DB0.5	Particles_1	PM1	Dust less than 1 µm (PM1)	0...511	0...511	µg/m3
27	1	DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	PM10 active	PM10a		Enum: 0: PM10 not active 1: PM10 active		
30	1	DB0.1	PM2.5 active	PM2.5a		Enum: 0: PM2.5 not active 1: PM2.5 active		
31	1	DB0.0	PM1 active	PM1a		Enum: 0: PM1 not active 1: PM1 active		

RORG	A5	**4BS Telegram**
FUNC	09	Gas Sensor
TYPE	08	Pure CO2 Sensor

Submitter: Afriso / EnOcean

Description:
Pure CO2 sensor with 8 bit resolution and 0 – 2000ppm.

Data exchange
Direction: unidirectional
Addressing: broadcast
Communication trigger: event- & time-triggered
Trigger event: change of value over threshold, heartbeat
Teach-in method: 4BS teach-in 2

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	CO2	CO2	CO2 measurement	0...255	0...2000	ppm
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

A5-10: Room Operating Panel

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	01	Temperature Sensor, Set Point, Fan Speed and Occupancy Control

Submitter: Kieback + Peter GmbH

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Turn-switch for fan speed	FAN	Turn-switch for fan speed	Enum: 210...255: Stage Auto		

						Stage 0 190...209: Stage 1 165...189: Stage 2 145...164: 0...144: Stage 3		
8	8	DB2.7...DB2.0	Set point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Occupancy	OCC	Occupancy button	Enum: 1: Button released 0: Button pressed		

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	02	Temperature Sensor, Set Point, Fan Speed and Day/Night Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Turn-switch for fan speed	FAN	Turn-switch for fan speed	Enum: 210...255: Stage Auto 190...209: Stage 0 165...189: Stage 1 145...164: Stage 2 0...144: Stage 3		
8	8	DB2.7...DB2.0	Set point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Slide switch 0/I	SLSW	Slide switch or Slide switch Day/Night	Enum: 0: Position I / Night / Off 1: Position O / Day / On		

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	03	Temperature Sensor, Set Point Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	8	DB2.7...DB2.0	Set point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A

16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	04	Temperature Sensor, Set Point and Fan Speed Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Turn-switch for fan speed	FAN	..	Enum: 210...255: Stage Auto 190...209: Stage 0 165...189: Stage 1 145...164: Stage 2 0...144: Stage 3		
8	8	DB2.7...DB2.0	Set point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	05	Temperature Sensor, Set Point and Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	8	DB2.7...DB2.0	Set point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Occupancy	OCC	Occupancy button	Enum: 1: Button released 0: Button pressed		

RORG	A5	4BS Telegram
FUNC	10	Room Operating Panel
TYPE	06	Temperature Sensor, Set Point and Day/Night Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	8	DB2.7...DB2.0	Set point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Slide switch 0/I	SLSW	Slide switch or Slide switch Day/Night	Enum: 0: Position I / Night / Off 1: Position O / Day / On		

RORG	A5	4BS Telegram
FUNC	10	Room Operating Panel
TYPE	07	Temperature Sensor, Fan Speed Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Turn-switch for fan speed	FAN	..	Enum: 210...255: Stage Auto 190...209: Stage 0 165...189: Stage 1 145...164: Stage 2 0...144: Stage 3		
8	8	DB2.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	10	Room Operating Panel
TYPE	08	Temperature Sensor, Fan Speed and Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Turn-switch for fan speed	FAN	..	Enum: 210...255: Stage Auto 190...209: Stage 0 165...189: Stage 1 145...164: Stage 2 0...144: Stage 3		

8	8	DB2.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Occupancy	OCC	Occupancy button	Enum: 1: Button released 0: Button pressed		

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	09	Temperature Sensor, Fan Speed and Day/Night Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Turn-switch for fan speed	FAN	..	Enum: 210...255: Stage Auto 190...209: Stage 0 165...189: Stage 1 145...164: Stage 2 0...144: Stage 3		
8	8	DB2.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Slide switch 0/I	SLSW	Slide switch or Slide switch Day/Night	Enum: 0: Position I / Night / Off 1: Position O / Day / On		

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	0A	Temperature Sensor, Set Point Adjust and Single Input Contact

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	8	DB2.7...DB2.0	Set point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					

31	1	DB0.0	Contact State	CTST	Contact state	Enum: 0: closed 1: open

RORG	A5 **4BS Telegram**
FUNC	10 Room Operating Panel
TYPE	0B Temperature Sensor and Single Input Contact

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Contact State	CTST	Contact state	Enum: 0: closed 1: open		

RORG	A5 **4BS Telegram**
FUNC	10 Room Operating Panel
TYPE	0C Temperature Sensor and Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Occupancy	OCC	Occupancy button	Enum: 1: Button released 0: Button pressed		

RORG	A5 **4BS Telegram**
FUNC	10 Room Operating Panel
TYPE	0D Temperature Sensor and Day/Night Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					

28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	2	DB0.2...DB0.1	Not Used (= 0)			
31	1	DB0.0	Slide switch	SLSW	Slide switch 0/I or Slide switch Day/Night	Enum: 0: Position I / Night / Off 1: Position O / Day / On

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	10	Temperature and Humidity Sensor, Set Point and Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Set point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
8	8	DB2.7...DB2.0	Humidity	HUM	Rel. Humidity (linear)	0...250	0...100	%
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...250	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Occupancy	OCC	Occupancy button	Enum: 1: Button released 0: Button pressed		

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	11	Temperature and Humidity Sensor, Set Point and Day/Night Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Set point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
8	8	DB2.7...DB2.0	Humidity	HUM	Rel. Humidity (linear)	0...250	0...100	%
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...250	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Slide switch	SLSW	Slide switch 0/I or Slide switch Day/Night	Enum: 0: Position I / Night / Off 1: Position O / Day / On		

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	12	Temperature and Humidity Sensor and Set Point

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Set point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
8	8	DB2.7...DB2.0	Humidity	HUM	Rel. Humidity (linear)	0...250	0...100	%
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...250	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	13	Temperature and Humidity Sensor, Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	8	DB2.7...DB2.0	Humidity	HUM	Rel. Humidity (linear)	0...250	0...100	%
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...250	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Occupancy	OCC	Occupancy button	Enum: 1: Button released 0: Button pressed		

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	14	Temperature and Humidity Sensor, Day/Night Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	8	DB2.7...DB2.0	Humidity	HUM	Rel. Humidity (linear)	0...250	0...100	%
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...250	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Slide switch	SLSW	Slide switch 0/I or Slide switch Day/Night	Enum: 0: Position I / Night / Off 1: Position O / Day / On		

RORG	A5	4BS Telegram
FUNC	10	Room Operating Panel
TYPE	15	10 Bit Temperature Sensor, 6 bit Set Point Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	6	DB2.7...DB2.2	Set point	SP	Set point (6 bit, linear) Min.- ... Max+	0...63	0...63	N/A
14	10	DB2.1...DB1.0	Temperature	TMP	Temperature 10 bit (linear)	1023...0	-10...+41.2	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	10	Room Operating Panel
TYPE	16	10 Bit Temperature Sensor, 6 bit Set Point Control;Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	6	DB2.7...DB2.2	Set point	SP	Set point (linear) Min.- ... Max+	0...63	0...63	N/A
14	10	DB2.1...DB1.0	Temperature	TMP	Temperature 10 bit (linear)	1023...0	-10...+41.2	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Occupancy	OCC	Occupancy button	Enum: 1: Button released 0: Button pressed		

RORG	A5	4BS Telegram
FUNC	10	Room Operating Panel
TYPE	17	10 Bit Temperature Sensor, Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	14	DB3.7...DB2.2	Not Used (= 0)					
14	10	DB2.1...DB1.0	Temperature	TMP	Temperature 10 bit (linear)	1023...0	-10...+41.2	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Occupancy	OCC	Occupancy button	Enum: 1: Button released 0: Button pressed		

RORG	A5	4BS Telegram
FUNC	10	Room Operating Panel
TYPE	18	Illumination, Temperature Set Point, Temperature Sensor, Fan Speed and Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Illumination	ILL	Illumination (linear), 251: Over range, 252-255: reserved	0...250	0...1000	lx
8	8	DB2.7...DB2.0	Temp Setpoint	TMPSP	Temperature Set point (linear)	250...0	0...+40	°C
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	250...0	0...+40	°C
24	1	DB0.7	Not Used (= 0)					
25	3	DB0.6...DB0.4	Fan Speed	FAN	Fan Speed	Enum: 0: Auto 1: Speed 0 2: Speed 1 3: Speed 2 4: Speed 3 5: Speed 4 6: Speed 5 7: Off		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	Occupancy enable/disable	OED	Occupancy enable/disable; if occupancy is disabled ignore DB0.0 (occu. button)	Enum: 0: Occupancy enabled 1: Occupancy disabled		
31	1	DB0.0	Occupancy button	OB	...	Enum: 0: Button pressed 1: Button released		

RORG	A5	4BS Telegram
FUNC	10	Room Operating Panel
TYPE	19	Humidity, Temperature Set Point, Temperature Sensor, Fan Speed and Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Humidity	HUM	Rel. Humidity (linear)	0...250	0...100	%
8	8	DB2.7...DB2.0	Temp Setpoint	TMP Sp	Temperature Set point (linear)	250...0	0...+40	°C
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	250...0	0...+40	°C
24	1	DB0.7	Not Used (= 0)					
25	3	DB0.6...DB0.4	Fan speed	FAN	Fan Speed	Enum: 0: Auto 1: Speed 0 2: Speed 1 3: Speed 2		

						4: Speed 3 5: Speed 4 6: Speed 5 7: Off
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	1	DB0.2	Not Used (= 0)			
30	1	DB0.1	Occupancy button	OB		Enum: 0: Button pressed 1: Button released
31	1	DB0.0	Occupancy enable/disable	OED		Enum: 0: Occupancy enabled 1: Occupancy disabled

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	1A	Supply voltage monitor, Temperature Set Point, Temperature Sensor, Fan Speed and Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply Voltage	SV	0 ... 5.0 V linear (super cap); 251-255 reserved for error code	0...250	0...5	V
8	8	DB2.7...DB2.0	Temp Setpoint	TMP Sp	Temperature Set Point (linear)	250...0	0...+40	°C
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	250...0	0...+40	°C
24	1	DB0.7	Not Used (= 0)					
25	3	DB0.6...DB0.4	Fan speed	FAN	Fan Speed	Enum: 0: Auto 1: Speed 0 2: Speed 1 3: Speed 2 4: Speed 3 5: Speed 4 6: Speed 5 7: Off		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	Occupancy enable/disable	OED		Enum: 0: Occupancy enabled 1: Occupancy disabled		
31	1	DB0.0	Occupancy button	OB		Enum: 0: Button pressed 1: Button released		

RORG	A5	**4BS Telegram**

FUNC	10	Room Operating Panel
TYPE	1B	Supply Voltage Monitor, Illumination, Temperature Sensor, Fan Speed and Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply Voltage	SV	(super cap) 251 – 255 reserved for error code	0...250	0...5	V
8	8	DB2.7...DB2.0	Illumination	ILL	Illumination (linear), 251: Over range, 252-255: reserved	0...250	0...1000	lx
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	250...0	0...+40	°C
24	1	DB0.7	Not Used (= 0)					
25	3	DB0.6...DB0.4	Fan speed	FAN	Fan Speed	Enum: 0: Auto 1: Speed 0 2: Speed 1 3: Speed 2 4: Speed 3 5: Speed 4 6: Speed 5 7: Off		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	Occupancy enable/disable	OED		Enum: 0: Occupancy enabled 1: Occupancy disabled		
31	1	DB0.0	Occupancy button	OB		Enum: 0: Button pressed 1: Button released		

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	1C	Illumination, Illumination Set Point, Temperature Sensor, Fan Speed and Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Illumination	ILL	Illumination (linear), 251: Over range, 252-255: reserved	0...250	0...1000	lx
8	8	DB2.7...DB2.0	Illumination Set Point	ILLSP		0...250	0...1000	lx
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	250...0	0...+40	°C
24	1	DB0.7	Not Used (= 0)					
25	3	DB0.6...DB0.4	Fan speed	FAN		Enum: 0: Auto 1: Speed 0 2: Speed 1 3: Speed 2 4: Speed 3 5: Speed 4		

						6: Speed 5 7: Off
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	1	DB0.2	Not Used (= 0)			
30	1	DB0.1	Occupancy enable/disable	OED		Enum: 0: Occupancy enabled 1: Occupancy disabled
31	1	DB0.0	Occupancy button	OB		Enum: 0: Button pressed 1: Button released

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	1D	Humidity, Humidity Set Point, Temperature Sensor, Fan Speed and Occupancy Control

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Humidity	HUM	Rel. Humidity (linear)	0...250	0...100	%
8	8	DB2.7...DB2.0	Humidity Set Point	HUMSP	Humidity Set Point (linear)	0...250	0...100	%
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	250...0	0...+40	°C
24	1	DB0.7	Not Used (= 0)					
25	3	DB0.6...DB0.4	Fan speed	FAN	Fan Speed	Enum: 0: Auto 1: Speed 0 2: Speed 1 3: Speed 2 4: Speed 3 5: Speed 4 6: Speed 5 7: Off		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	Occupancy enable/disable	OED		Enum: 0: Occupancy enabled 1: Occupancy disabled		
31	1	DB0.0	Occupancy button	OB		Enum: 0: Button pressed 1: Button released		

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	1E	see A5-10-1B

RORG	A5	4BS Telegram
FUNC	10	Room Operating Panel
TYPE	1F	Temperature Sensor, Set Point, Fan Speed, Occupancy and Unoccupancy Control

Submitter: Distech Controls

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Turn-switch for fan speed	FAN	Turn-switch for fan speed	Enum: 210...255: Stage auto 190...209: Stage 0 165...189: Stage 1 145...164: Stage 2 0...144: Stage 3		
8	8	DB2.7...DB2.0	Set Point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	255...0	0...+40	°C
24	1	DB0.7	Not Used (= 0)					
25	1	DB0.6	Temperature flag	TMP_F	Temperature flag	Enum: 1: Temperature present 0: Temperature absent		
26	1	DB0.5	Set point flag	SP_F	Set point flag	Enum: 1: Set point present 0: Set point absent		
27	1	DB0.4	Fan speed flag	FAN_F	Fan speed flag	Enum: 1: Fan speed present 0: Fan speed absent		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	Unoccupancy	UNOCC	Unoccupancy button	Enum: 0: Button pressed 1: Button released		
31	1	DB0.0	Occupancy	OCC	Occupancy button	Enum: 0: Button pressed 1: Button released		

RORG	A5	4BS Telegram
FUNC	10	Room Operating Panel
TYPE	20	Temperature and Set Point with Special Heating States

Submitter: MSR-Solutions GmbH, Wangen i.Allg.

Description:
Set Point for Heating Control, Temperature, User Activity.

This EEP defines a Room Operating Panel that contains a sensor for temperature measurement. The set point selector knob determines the desired room temperature with the ability to set special set point modes for heating control. User activity and the sensor's battery state are indicated in the telegram.

Data exchange
Direction: unidirectional
Addressing: broadcast
Communication trigger: event- & time-triggered
Communication intervall: 1200 s
Trigger event: change of any input signal

Tx delay: n/a
Rx timeout: 0 ms (minimum time between two received messages)
Teach-in method: 4BS teach-in 2 / Universal teach-in
Security Encryption required: no
Security level format: -

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Set Point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
8	8	DB2.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...250	0...+40	°C
24	1	DB0.7	Not Used (= 0)					
25	2	DB0.6...DB0.5	Set point mode	SPM	Selection of heating mode	Enum: 0: Room temperature defined by SP 1: Frost protection 2: Automatic control (e.g. defined by time program) 3: Reserved		
27	1	DB0.4	Battery state	BATT	Battery change needed	Enum: 0: Battery ok 1: Battery low		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	User activity	ACT	User intervention action on device	Enum: 0: No user action 1: User interaction		

RORG	A5	**4BS Telegram**
FUNC	10	Room Operating Panel
TYPE	21	Temperature, Humidity and Set Point with Special Heating States

Submitter: MSR-Solutions GmbH, Wangen i.Allg.

Description:
Set Point for Heating Control, Temperature, Humidity, User Activity.

This EEP defines a Room Operating Panel that contains sensors for temperature and humidity. The set point selector knob determines the desired room temperature with the ability to set special set point modes for heating control. User activity and the sensor's battery state are indicated in the telegram.

Data exchange
Direction: unidirectional
Addressing: broadcast
Communication trigger: event- & time-triggered
Communication intervall: 1200 s
Trigger event: change of any input signal
Tx delay: n/a
Rx timeout: 0 ms (minimum time between two received messages)
Teach-in method: 4BS teach-in 2 / Universal teach-in
Security Encryption required: no
Security level format: -

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Set Point	SP	Set point (linear) Min.- ... Max+	0...255	0...255	N/A
8	8	DB2.7...DB2.0	Humidity	HUM	Rel. humidity (linear)	0...250	0...100	%
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...250	0...+40	°C
24	1	DB0.7	Not Used (= 0)					

25	2	DB0.6...DB0.5	Set point mode	SPM	Selection of heating mode	Enum: 0: Room temperature defined by SP 1: Frost protection 2: Automatic control (e.g. defined by time program) 3: Reserved
27	1	DB0.4	Battery state	BATT	Battery change needed	Enum: 0: Battery ok 1: Battery low
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	2	DB0.2...DB0.1	Not Used (= 0)			
31	1	DB0.0	User activity	ACT	User intervention action on device	Enum: 0: No user action 1: User interaction

A5-11: Controller Status

RORG	A5	**4BS Telegram**
FUNC	11	Controller Status
TYPE	01	Lighting Controller

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Illumination	ILL	Illumination (linear)	0...255	0...510	lx
8	8	DB2.7...DB2.0	Illumination Set Point	ISP	Illumination Set Point (Min. ... Max.) (linear)	0...255	0...255	N/A
16	8	DB1.7...DB1.0	Dimming Output Level	DIM	Dimming Output Level (Min. ... Max.) (linear)	0...255	0...255	N/A
24	1	DB0.7	Repeater	REP	Repeater	Enum: 0: disabled 1: enabled		
25	1	DB0.6	Power Relay Timer	PRT	Power Relay Timer	Enum: 0: disabled 1: enabled		
26	1	DB0.5	Daylight Harvesting	DHV	Daylight Harvesting	Enum: 0: disabled 1: enabled		
27	1	DB0.4	Dimming	EDIM	Dimming	Enum: 0: switching load 1: dimming load		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Magnet Contact	MGC	Magnet Contact	Enum: 0: open 1: closed		
30	1	DB0.1	Occupancy	OCC	Occupancy	Enum: 0: unoccupied 1: occupied		
31	1	DB0.0	Power Relay	PWR	Power Relay	Enum: 0: off		

					1: on	

RORG	A5	4BS Telegram
FUNC	11	Controller Status
TYPE	02	Temperature Controller Output

Submitter: Thermokon Sensortechnik GmbH

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Control Variable	CVAR	Actual value of controller	0...255	0...100	%
8	8	DB2.7...DB2.0	FanStage	FAN	Actual value of fan	Enum: 0: Stage 0 Manual 1: Stage 1 Manual 2: Stage 2 Manual 3: Stage 3 Manual 16: Stage 0 Automatic 17: Stage 1 Automatic 18: Stage 2 Automatic 19: Stage 3 Automatic 255: Not Available		
16	8	DB1.7...DB1.0	Actual Setpoint	ASP	Occupied: Basic setpoint occupied + Setpoint shift + Sensor offset StandBy: Basic setpoint standBy + Setpoint shift Unoccupied: Basic setpoint unoccupied + setpoint shift	0...255	0...+51.2	°C
24	1	DB0.7	Alarm	ALR	In case of internal error alarm is set	Enum: 0: No alarm 1: Alarm		
25	2	DB0.6...DB0.5	Controller mode	CTM	Actual state of controller	Enum: 1: Heating 2: Cooling 3: Off		
27	1	DB0.4	Controller state	CST	Automatic control, or is controlled from another device	Enum: 0: Automatic 1: Override		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Energy hold-off	ERH	Stop control if window is opened	Enum: 0: Normal 1: Energy hold-off/ Dew point		
30	2	DB0.1...DB0.0	Room occupancy	RO	Actual room occupancy	Enum: 0: Occupied 1: Unoccupied 2: StandBy 3: Frost		

RORG	A5	4BS Telegram

FUNC	11	Controller Status
TYPE	03	Blind Status

Submitter: PEHA / infratec

This controller status is specific for blinds, awning and shutter modules. All modules can use this 4BS telegram to send all information about the status, the position and errors of the module, if these data are available.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Blind/shutter pos.	BSP		0...100	0...100	%
8	1	DB2.7	Angle sign	AS		Enum: 0: Positive sign 1: Negative sign		
9	7	DB2.6...DB2.0	Angle	AN	Angle in 2° steps (e.g. 0 = 0°, 90 = 180°)	0...180	0...360	°
16	1	DB1.7	Position value flag	PVF		Enum: 0: No Position value available 1: Position value available		
17	1	DB1.6	Angle value flag	AVF		Enum: 0: No Angle value available 1: Angle value available		
18	2	DB1.5...DB1.4	Error state	ES		Enum: 0: No error present 1: End-positions are not configured 2: Internal failure 3: Not used		
20	2	DB1.3...DB1.2	End-position	EP		Enum: 0: No End-position available 1: No End-position reached 2: Blind fully open 3: Blind fully closed		
22	2	DB1.1...DB1.0	Status	ST		Enum: 0: No Status available 1: Blind is stopped 2: Blind opens 3: Blind closes		
24	1	DB0.7	Service Mode	SM		Enum: 0: Normal mode 1: Service mode is activated (For example for maintenance)		
25	1	DB0.6	Mode of the position	MOTP		Enum: 0: Normal mode: 0% Blind fully open / 100% Blind fully close 1: Inverse mode: 100% Blind fully open / 0% Blind fully close		
26	2	DB0.5...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	11	Controller Status
TYPE	04	Extended Lighting Status

Submitter: PEHA / infratec

This status is an extended answer of new lighting-controllers. All modules can use this 4BS telegram to send all information about the status and errors of the module, if these data are available.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Parameter 1	P1		Enum: Mode 0: Dimm-Value (0 .. 255) Mode 1: R - Red (0 .. 255) Mode 2: Energy metering value (MSB 15 .. 8) Mode 3: Not used		
8	8	DB2.7...DB2.0	Parameter 2	P2		Enum: Mode 0: Lamp operating hours (MSB 15 .. 8) Mode 1: G - Green (0 .. 255) Mode 2: Energy metering value (7 .. 0 LSB) Mode 3: Not used		
16	8	DB1.7...DB1.0	Parameter 3	P3		Enum: Mode 0: Lamp operating hours (7 .. 0 LSB) Mode 1: B - Blue (0 .. 255) Mode 2: Unit for energy values: Enum: 0 = mW 1 = W 2 = kW 3 = MW 4 = Wh 5 = kWh 6 = MWh 7 = GWh 8 = mA 9 = 1/10 A 10 = mV 11 = 1/10 V 12 .. 15 Not used Mode 3: Not used		
24	1	DB0.7	Service Mode	SM		Enum: 0: Normal mode 1: Service mode is activated. (For example for maintenance)		
25	1	DB0.6	Operating hours flag	OHF	For Mode 0	Enum: 0: No lamp operating hours available 1: Lamp operating hours available		
26	2	DB0.5...DB0.4	Error state	ES		Enum: 0: No error present 1: Lamp-failure 2: Internal failure 3: Failure on the external periphery		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Parameter Mode	PM		Enum: 0: 8 Bit Dimmer Value and Lamp operating hours 1: RGB Value 2: Energy metering value 3: Not used		
31	1	DB0.0	Status	ST		Enum: 0: Lighting off 1: Lighting on		

A5-12: Automated meter reading (AMR)

The meter reading is represented by 3 data bytes, a divisor and a flag that indicates it as a cumulative or a current value. A 4 bit info field gives additional information and is TYPE specific.

RORG	A5	**4BS Telegram**
FUNC	12	Automated meter reading (AMR)
TYPE	00	Counter

Submitter: EnOcean GmbH

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	24	DB3.7...DB1.0	Meter reading	MR	Current value or cumulative counter value	0...16777215	according to **DIV**	according to **DT**
24	4	DB0.7...DB0.4	Measurement channel	CH		0...15	0...15	1
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Data type (unit)	DT	Current value or cumulative counter value	Enum: 0: Cumulative value 1 1: Current value 1/s		
30	2	DB0.1...DB0.0	Divisor (scale)	DIV	Divisor for counter value	Enum: 0: x/1 1: x/10 2: x/100 3: x/1000		

RORG	A5	**4BS Telegram**
FUNC	12	Automated meter reading (AMR)
TYPE	01	Electricity

Submitter: EnOcean GmbH

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	24	DB3.7...DB1.0	Meter reading	MR	current value in W or cumulative value in kWh	0...16777215	according to **DIV**	according to **DT**
24	4	DB0.7...DB0.4	Tariff info	TI		0...15	0...15	1
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Data type (unit)	DT	Current value or cumulative value	Enum: 0: Cumulative value kWh 1: Current value W		
30	2	DB0.1...DB0.0	Divisor (scale)	DIV	Divisor for value	Enum: 0: x/1 1: x/10 2: x/100 3: x/1000		

RORG	A5	**4BS Telegram**
FUNC	12	Automated meter reading (AMR)
TYPE	02	Gas

Submitter: EnOcean GmbH

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	24	DB3.7...DB1.0	meter reading	MR	Cumulative value in m³ or Current value in liter/s	0...16777215	according to **DIV**	according to **DT**
24	4	DB0.7...DB0.4	Tariff info	TI		0...15	0...15	1
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	data type (unit)	DT	Current value or cumulative value	Enum: 0: Cumulative value m³ 1: Current value liter/s		
30	2	DB0.1...DB0.0	divisor (scale)	DIV	Divisor for value	Enum: 0: x/1 1: x/10 2: x/100 3: x/1000		

RORG	A5	**4BS Telegram**
FUNC	12	Automated meter reading (AMR)
TYPE	03	Water

Submitter: EnOcean GmbH

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	24	DB3.7...DB1.0	Meter reading	MR	Cumulative value in m³ or Current value in liter/s	0...16777215	according to **DIV**	according to **DT**
24	4	DB0.7...DB0.4	Tariff info	TI		0...15	0...15	1
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Data type (unit)	DT	Current value or cumulative value	Enum: 0: Cumulative value m³ 1: Current value Liter/s		
30	2	DB0.1...DB0.0	Divisor (scale)	DIV	Divisor for value	Enum: 0: x/1 1: x/10 2: x/100 3: x/1000		

A5-13: Environmental Applications

RORG	A5	**4BS Telegram**
FUNC	13	Environmental Applications
TYPE	01	Weather Station

A receiver that accepts EEP A5-13-01 at teach-in automatically needs to accept telegrams from the same ID that comply to the definitions of EEP A5-13-02 thru EEP A5-13-06. Different telegrams received from that ID need to be distinguished by their 4 bit identifiers.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Dawn sensor	DWS	Dawn sensor	0...255	0...999	lx
8	8	DB2.7...DB2.0	Temperature	TMP	Outdoor Temp	0...255	-40...+80	°C
16	8	DB1.7...DB1.0	Wind speed	WND	Wind speed	0...255	0...70	m/s
24	4	DB0.7...DB0.4	Identifier	ID	Identifier	Enum: 0x1:		

28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	1	DB0.2	Day / Night	D/N	Day / Night	Enum: 0: Day 1: Night
30	1	DB0.1	Rain Indication	RAN	Rain Indication	Enum: 0: No Rain 1: Rain
31	1	DB0.0	Not Used (= 0)			

RORG	A5	**4BS Telegram**
FUNC	13	Environmental Applications
TYPE	02	Sun Intensity

Submitter: Elsner electronics

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Sun – West	SNW	Sun - West,linear	0...255	0...150	klx
8	8	DB2.7...DB2.0	Sun – South	SNS	Sun - South,linear	0...255	0...150	klx
16	8	DB1.7...DB1.0	Sun – East	SNE	Sun - East,linear	0...255	0...150	klx
24	4	DB0.7...DB0.4	Identifier	ID	Identifier	Enum: 0x2:		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Hemisphere	HEM	0 = north / 1 = south, then swith Sun south to Sun North when in southern hemisphere	Enum: 0: North 1: South		
30	2	DB0.1...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	13	Environmental Applications
TYPE	03	Date Exchange

Submitter: Elsner electronics

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	DB3.7...DB3.5	Not Used (= 0)					
3	5	DB3.4...DB3.0	Day	DY	Day	1...31	1...31	N/A
8	4	DB2.7...DB2.4	Not Used (= 0)					
12	4	DB2.3...DB2.0	Month	MTH	Month (1->January)	1...12	1...12	N/A
16	1	DB1.7	Not Used (= 0)					
17	7	DB1.6...DB1.0	Year	YR	Year (0->Year 2000)	0...99	2000...2099	N/A
24	4	DB0.7...DB0.4	Identifier	ID	Identifier	Enum: 0x3:		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					

31	1	DB0.0	Source	SRC	Source	Enum: 0: Real Time Clock 1: GPS or equivalent (e.g. DCF77, WWV)

RORG	A5	**4BS Telegram**
FUNC	13	Environmental Applications
TYPE	04	Time and Day Exchange

Submitter: Elsner electronics

Recommendation: always transmit time in 24 hrs format

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	DB3.7...DB3.5	Weekday	WDY	Weekday (1 -> Monday)	Enum: 1: Monday 2: Tuesday 3: Wednesday 4: Thursday 5: Friday 6: Saturday 7: Sunday		
3	5	DB3.4...DB3.0	Hour	HR	Hour	0...23	0...23	N/A
8	2	DB2.7...DB2.6	Not Used (= 0)					
10	6	DB2.5...DB2.0	Minute	MIN	Minute	0...59	0...59	N/A
16	2	DB1.7...DB1.6	Not Used (= 0)					
18	6	DB1.5...DB1.0	Second	SEC	Second	0...59	0...59	N/A
24	4	DB0.7...DB0.4	Identifier	ID	Identifier	Enum: 0x4:		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Time Format	TMF	Time Format	Enum: 0: 24 hours 1: 12 hours		
30	1	DB0.1	AM/PM	A/PM	AM or PM	Enum: 0: AM 1: PM		
31	1	DB0.0	Source	SRC	Source	Enum: 0: Real Time Clock 1: GPS or equivalent (e.g. DCF77, WWV)		

RORG	A5	**4BS Telegram**
FUNC	13	Environmental Applications
TYPE	05	Direction Exchange

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Elevation	ELV	Elevation ("0° -> horizon")	0...180	-90...+90	°
8	7	DB2.7...DB2.1	Not Used (= 0)					
15	9	DB2.0...DB1.0	Azimut	AZM	Azimuth ("0° -> True north"; "clockwise")	0...359	0...359	°
24	4	DB0.7...DB0.4	Identifier	ID	Identifier	Enum: 0x5:		

28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	3	DB0.2...DB0.0	Not Used (= 0)			

RORG	A5	**4BS Telegram**
FUNC	13	Environmental Applications
TYPE	06	Geographic Position Exchange

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	DB3.7...DB3.4	Latitude(MSB)	LAT(MSB)	Latitude MSB	according to **LAT(LSB)**	according to **LAT(LSB)**	according to **LAT(LSB)**
4	4	DB3.3...DB3.0	Longitude(MSB)	LOT(MSB)	Longitude MSB	according to **LOT(LSB)**	according to **LOT(LSB)**	according to **LOT(LSB)**
8	8	DB2.7...DB2.0	Latitude(LSB)	LAT(LSB)	Latitude LSB	0...4095	-90...+90	°
16	8	DB1.7...DB1.0	Longitude(LSB)	LOT(LSB)	Longitude LSB	0...4095	-180...+180	°
24	4	DB0.7...DB0.4	Identifier	ID	Identifier	Enum: 0x6:		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	13	Environmental Applications
TYPE	10	Sun position and radiation

Submitter: NanoSense

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	7	DB3.7...DB3.1	Sun Elevation	SNE	Sun Elevation (linear); 91 - 127: reserved	0...90	0...90	°
7	1	DB3.0	Day / Night	D/N	Day / Night	Enum: 0: Day 1: Night		
8	8	DB2.7...DB2.0	Sun Azimuth	SNA	Sun Azimuth 181 - 255: reserved	0...180	-90...+90	°
16	8	DB1.7...DB1.0	Solar Radiation (MSB)	SRA (MSB)	Solar Radiation (MSB)	according to **SRA (LSB)**	according to **SRA (LSB)**	according to **SRA (LSB)**
24	4	DB0.7...DB0.4	Identifier	ID	Identifier	Enum: 0x7:		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Solar Radiation (LSB)	SRA (LSB)	Solar Radiation (LSB) (Linear); 2001..2048: reserved	0...2000	0...2000	W/m2

A5-14: Multi-Func Sensor

RORG	A5	4BS Telegram
FUNC	14	Multi-Func Sensor
TYPE	01	Single Input Contact (Window/Door), Supply voltage monitor

Submitter: Lutuo Technology

Purpose (eg): Ventilation, Lighting, Alarm

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage / super cap. (linear); 251 – 255 reserved for error code	0...250	0...5.0	V
8	20	DB2.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Contact	CT		Enum: 0b0: Contact closed 0b1: Contact open		

RORG	A5	4BS Telegram
FUNC	14	Multi-Func Sensor
TYPE	02	Single Input Contact (Window/Door), Supply voltage monitor and Illumination

Submitter: Lutuo Technology

Purpose (eg): Ventilation, Lighting, Alarm

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage / super cap. (linear); 251 – 255 reserved for error code	0...250	0...5.0	V
8	8	DB2.7...DB2.0	Illumination	ILL	Illumination (linear); 251 – over range, 252 - 255 reserved	0...250	0...1000	lx
16	12	DB1.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Contact	CT		Enum: 0b0: Contact closed 0b1: Contact open		

RORG	A5	4BS Telegram
FUNC	14	Multi-Func Sensor
TYPE	03	Single Input Contact (Window/Door), Supply voltage monitor and Vibration

Submitter: Lutuo Technology

Purpose (eg): Ventilation, Lighting, Alarm , Intrusion (breakage of glass), Calling system

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit

0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage / super cap. (linear); 251 – 255 reserved for error code	0...250	0...5.0	V
8	20	DB2.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	Vibration	VIB		Enum: 0b0: No vibration detected 0b1: Vibration detected		
31	1	DB0.0	Contact	CT		Enum: 0b0: Contact closed 0b1: Contact open		

RORG	A5	**4BS Telegram**
FUNC	14	Multi-Func Sensor
TYPE	04	Single Input Contact (Window/Door), Supply voltage monitor, Vibration and Illumination

Submitter: Lutuo Technology

Purpose (eg): Ventilation, Lighting, Alarm , Intrusion (breakage of glass), Calling system

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage / super cap. (linear); 251 – 255 reserved for error code	0...250	0...5.0	V
8	8	DB2.7...DB2.0	Illumination	ILL	Illumination (linear); 251 – over range, 252 - 255 reserved	0...250	0...1000	lx
16	12	DB1.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	Vibration	VIB		Enum: 0b0: No vibration detected 0b1: Vibration detected		
31	1	DB0.0	Contact	CT		Enum: 0b0: Contact closed 0b1: Contact open		

RORG	A5	**4BS Telegram**
FUNC	14	Multi-Func Sensor
TYPE	05	Vibration/Tilt, Supply voltage monitor

Submitter: Lutuo Technology

Purpose (eg): Intrusion (breakage of glass), Calling system

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage / super cap. (linear); 251 – 255 reserved for error code	0...250	0...5.0	V

8	20	DB2.7...DB0.4	Not Used (= 0)			
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	1	DB0.2	Not Used (= 0)			
30	1	DB0.1	Vibration	VIB		Enum: 0b0: No vibration detected 0b1: Vibration detected
31	1	DB0.0	Not Used (= 0)			

RORG	A5	**4BS Telegram**
FUNC	14	Multi-Func Sensor
TYPE	06	Vibration/Tilt, Illumination and Supply voltage monitor

Submitter: Lutuo Technology

Purpose (eg): Intrusion (breakage of glass), Calling system

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Supply voltage	SVC	Supply voltage / super cap. (linear); 251 – 255 reserved for error code	0...250	0...5.0	V
8	8	DB2.7...DB2.0	Illumination	ILL	Illumination (linear); 251 – over range, 252 - 255 reserved	0...250	0...1000	lx
16	12	DB1.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Not Used (= 0)					
30	1	DB0.1	Vibration	VIB		Enum: 0b0: No vibration detected 0b1: Vibration detected		
31	1	DB0.0	Not Used (= 0)					

A5-20: HVAC Components

RORG	A5	**4BS Telegram**
FUNC	20	HVAC Components
TYPE	01	Battery Powered Actuator (BI-DIR)

Submitter: Kieback + Peter GmbH

DIRECTION-1 = Transmit mode: Message from the actuator to the controller
DIRECTION-2 = Receive mode: Commands from the controller to the actuator; max. reponse time 1 sec.

DIRECTION-1

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Current Value	CV	Current value	0...100	0...100	%
8	1	DB2.7	Service On	SO	Service On	Enum: 1: on		

9	1	DB2.6	Energy input enabled	ENIE	Energy input enabled	Enum: 1: true		
10	1	DB2.5	Energy Storage	ES	Energy storage sufficiently charged	Enum: 1: true		
11	1	DB2.4	Battery capacity	BCAP	Battery capacity; change battery next days	Enum: 0: true		
12	1	DB2.3	Contact, cover open	CCO	Contact, cover open	Enum: 1: true		
13	1	DB2.2	Failure temperature sensor, out off range	FTS	Failure Temperature sensor, out off range	Enum: 1: true		
14	1	DB2.1	Detection, window open	DWO	Detection, window open	Enum: 1: true		
15	1	DB2.0	Actuator obstructed	ACO	Actuator obstructed	Enum: 1: true		
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...255	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

DIRECTION-2

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Valve position or Temperature Setpoint	SP	Valve position or Temperature set point (linear); selection with DB1.2 Valve position 0…100% in combination with compatible classic controllers the actuator used DB_3; Temperature set point: The actuator can be used as self-sufficient room controller (pi controller) without integration in automation systems. Wherever the user wants room conditions to be individually controlled, the actuator can work in combination with a wireless room device (RCU).	0...100 or 255	0...100 or +40	% or °C
8	8	DB2.7...DB2.0	Temperature from RCU	TMP	Temperature actual from RCU = 0b0 (Room controller-unit), see DB1.0 Maintenance mode ("service on"): DB_2.BIT_5: energy memory sufficiently charged =1 DB_2.BIT_4: battery capacity changing battery in the next days, need changing batteries = 0 Status feedback signal (service on, DB_2.BIT_7	255...0	0...+40	°C
16	1	DB1.7	Run init sequence	RIN	The limit switching measures the travel and signals when an end position has been reached. This end position (valve zero point) in the actuator is stored.	Enum: 1: true		
17	1	DB1.6	Lift set	LFS	Initialization, adjustment to the valve stroke. The Initialization is switched after receiving the command. The valve is completely opened and closed during initialization.	Enum: 1: true		

18	1	DB1.5	Valve open / maintenance	VO	After receiving an operation command, the actuator moves the valve in direction open or close. when reaching the end position, an automatic switch-off procedure is started. In service mode the valve can be set to open or closed always.	Enum: 1: true
19	1	DB1.4	Valve closed	VC	valve closed	Enum: 1: true
20	1	DB1.3	Summer bit, Reduction of energy consumption	SB	The radio communication between the actuator and the controller is restricted, sleep mode is extended. This functionality can be used for battery powered actuators.	Enum: 1: true
21	1	DB1.2	Set Point Selection	SPS	Set Point Selection for DB3	Enum: 0: Valve position (0-100%). Unit respond to controller. 1: Temperature set point 0...40°C. Unit respond to room sensor and use internal PI loop.
22	1	DB1.1	Set point inverse	SPN	Valve set point can be sent to the actuator normal or inverted. The selection is done by DB_1.Bit1. The implementation is done and is controlled in the actuator with DB_3. This function is used in dependence on the type of valve.	Enum: 1: true
23	1	DB1.0	Select function	RCU	RCU or "Service on": After transmitting the command to the actuator, it can be send from the controller or a service device, the actuator sends a status feedback signal (service on, DB_2.BIT_7).	Enum: 0: RCU 1: service on
24	4	DB0.7...DB0.4	Not Used (= 0)			
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	3	DB0.2...DB0.0	Not Used (= 0)			

RORG	A5	**4BS Telegram**
FUNC	20	HVAC Components
TYPE	02	Basic Actuator (BI-DIR)

Submitter: Spartan Peripheral Devices

Basic Actuator can be used by any manufacturer for linear or rotary actuator.

DIRECTION-1 = Transmit mode: Message from the actuator to the controller.
DIRECTION-2 = Receive mode: Commands from the controller to the actuator. To use with a BAS/Gateway system; max. reponse time 1 sec.

DIRECTION-1

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Actual Value	AV	Actual value (linear); can be a linear or rotation motion.	0...100	0...100	%
8	14	DB2.7...DB1.2	Not Used (= 0)					

22	1	DB1.1	Set point inverse	SPI	Set point inverse (Needs to be defined by manufacturer what zero(0) is equal to, and one(1) is equal to. Default state to be define as per product manufacturer	Enum: 1: true
24	4	DB0.7...DB0.4	Not Used (= 0)			
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	3	DB0.2...DB0.0	Not Used (= 0)			

DIRECTION-2

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Valve Set point	VSP	Valve set Point (linear)	0...100	0...100	%
8	8	DB2.7...DB2.0	Not Used (= 0)					
16	6	DB1.7...DB1.2	Not Used (= 0)					
22	1	DB1.1	Set point inverse	VSP	"Set point inverse " needs to be defined by manufacturer what zero(0) is equal to, and one(1) is equal to. Default state to be define as per product manufacturer. It can send a command to invert functionality of the unit. In some instance some equipment might need 100% to represent fully extracted, in other fully retracted.	Enum: 1: true		
23	5	DB1.0...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	20	HVAC Components
TYPE	03	Line powered Actuator (BI-DIR)

Submitter: Spartan Peripheral Devices

DIRECTION-1 = Transmit mode: Message from the actuator to the controller.
DIRECTION-2 = Receive mode: Commands from the controller to the actuator; max. reponse time 1 sec.

DIRECTION-1

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Actual valve	AV	Actual valve	0...100	0...100	%
8	8	DB2.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Temperature	TMP	Temperature (linear)	0...255	0...+40	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

DIRECTION-2

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit

0	8	DB3.7...DB3.0	Actuator or Temperature Setpoint	ATS	Actuator Setpoint: in combination with BAS/Gateway controllers. Temperature Setpoint: The actuator can be used as self-sufficient room controller (pi controller) without integration in automation systems. Wherever the user wants room conditions to be individually controlled, the actuator can work in combination with a wireless room device (RCU).	0...100 or 255	0...100 or +40	% or °C
8	8	DB2.7...DB2.0	Temperature from RCU	TMPRC	Temperature actual from RCU = 0b0 (Room controller-unit)	255...0	0...+40	°C
16	5	DB1.7...DB1.3	Not Used (= 0)					
21	1	DB1.2	Set Point Selection	SPS	Set Point Selection for DB3	Enum: 0: Actuator Setpoint (0-100%); Unit respond to controller. 1: Temperature Setpoint 0...+40°C; Unit respond to room sensor and use internal PI loop.		
22	1	DB1.1	Set Point Inverse		Valve set point can be sent to the actuator normal or inverted through BAS/Gateway controller. The selection is done by DB_1.Bit1. in the actuator with DB_3. This function is used in dependence on the type of valve.	Enum: 1: true		
23	5	DB1.0...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	20	HVAC Components
TYPE	10	Generic HVAC Interface (BI-DIR)

Submitter: Intesis Software SL

Functions: Mode, Vane Position, Fan Speed, Sensors and On/Off: With this EEP plus the already existing EEP A5-10-03 and A5-20-11 all the information of AC indoor unit can be sent and received allowing a much easier and complete control of these units.

DIRECTION-1 = Receive mode: Commands received by the HVAC interface.
DIRECTION-2 = Transmit mode: Commands sent by the HVAC interface.

DIRECTION-1

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Mode	MD	The modes are the same as in KNX and LON allowing a more transparent integration with this protocols and it has plenty of free positions for future expansion	Enum: 0: Auto 1: Heat 2: Morning Warmup 3: Cool 4: Night Purge 5: Precool 6: Off 7: Test 8: Emergency Heat		

						9: Fan only 10: Free cool 11: Ice 12: Max heat 13: Economic heat/cool 14: Dehumidification (dry) 15: Calibration 16: Emergency cool 17: Emergency steam 18: max cool 19: Hvc load 20: no load 21...30: reserved 31: Auto Heat 32: Auto Cool 33...254: reserved 255: N/A
8	4	DB2.7...DB2.4	Vane position	VPS		Enum: 0: Auto 1: Horizontal 2: Pos2 3: Pos3 4: Pos4 5: Vertical 6: Swing 7...10: Reserved 11: Vertical swing 12: Horizontal swing 13: Horizontal and vertical swing 14: Stop swing 15: N/A
12	4	DB2.3...DB2.0	Fan Speed	FANSP	fan speed value goes from 1 to 14. 1 is the lowest fan speed allowed by the AC and from there it increments with the value of this variable. Typically AC units have up to 5-6 speeds. Any speed higher than the maximum the AC allows would set it to the higher speed. 0 is auto and 15 is N/A	Enum: 0: Auto 1...14: Up to 14 fan speeds being 1 the lowest 15: N/A
16	8	DB1.7...DB1.0	Control variable	CVAR	Control variable; value 255 = auto	0...100, 255 | 0...100 | %
24	4	DB0.7...DB0.4	Not Used (= 0)			
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	2	DB0.2...DB0.1	Room occupancy	RO	The interfaces can automatically control the behaviour of the AC without integration in automation systems when linked to presence/movement sensors.	Enum: 0: Occupied 1: StandBy (waiting to perform action) 2: Unoccupied (action performed) 3: Off (no occupancy and no action)
31	1	DB0.0	On/Off	O/I	On/Off	Enum: 0: off (the unit is not running) 1: on

DIRECTION-2

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Mode	MD	The modes are the same as in KNX and LON allowing a more transparent integration with this protocols and it has plenty of free positions for future expansion	Enum: 0: Auto 1: Heat 2: Morning Warmup 3: Cool 4: Night Purge 5: Precool 6: Off 7: Test 8: Emergency Heat 9: Fan only 10: Free cool 11: Ice 12: Max heat 13: Economic heat/cool 14: Dehumidification (dry) 15: Calibration 16: Emergency cool 17: Emergency steam 18: max cool 19: Hvc load 20: no load 21...30: reserved 31: Auto Heat 32: Auto Cool 33...254: reserved 255: N/A		
8	4	DB2.7...DB2.4	Vane position	VPS		Enum: 0: Auto 1: Horizontal 2: Pos2 3: Pos3 4: Pos4 5: Vertical 6: Swing 7...10: Reserved 11: Vertical swing 12: Horizontal swing 13: Horizontal and vertical swing 14: Stop swing 15: N/A		
12	4	DB2.3...DB2.0	Fan Speed	FANSP	fan speed value goes from 1 to 14. 1 is the lowest fan speed allowed by the AC and from there it increments with the value of this variable. Typically AC units have up to 5-6 speeds. Any speed higher than the maximum the AC allows would set it to the higher speed. 0 is auto and 15 is N/A	Enum: 0: Auto 1...14: Up to 14 fan speeds being 1 the lowest 15: N/A		
16	8	DB1.7...DB1.0	Control variable	CVAR	Control variable (linear); value 255 = auto	0...100, 255	0...100	%
24	4	DB0.7...DB0.4	Not Used (= 0)					

28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	2	DB0.2...DB0.1	Room occupancy	RO	Room occupancy	Enum: 0: Occupied 1: StandBy (waiting to perform action) 2: Unoccupied (action performed) 3: Off (no occupancy and no action)
31	1	DB0.0	On/Off	O/I	On/Off	Enum: 0: off 1: on

RORG	A5	**4BS Telegram**
FUNC	20	HVAC Components
TYPE	11	Generic HVAC Interface – Error Control (BI-DIR)

Submitter: Intesis Software SL

Error Control: AC Error Code, Error States and Disablements. With this EEP plus the already existing EEP A5-10-03 and A5-20-10 all the information of AC indoor unit can be sent and received allowing a much easier and complete control of these units.

DIRECTION-1 = Receive mode: Commands received by the HVAC interface.
DIRECTION-2 = Transmit mode: Commands sent by the HVAC interface.

DIRECTION-1

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	23	DB3.7...DB1.1	Not Used (= 0)					
23	1	DB1.0	External disablement	EXDS	External disablement	Enum: 0: Not disabled 1: Disabled		
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Disable remote controller	DRC	Disable remote controller (When in receive mode it controls if the interface overwrites the remote controller commands.)	Enum: 0: Enable Remote controller 1: Disable Remote controller		
30	1	DB0.1	Window contact	WC	Window contact	Enum: 0: Windows opened 1: Windows closed		
31	1	DB0.0	Not Used (= 0)					

DIRECTION-2

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Error Code	ERR	Error Code (DB3 HI,DB2 LO); generated by A.C.	0...65535	0...65535	N/A
16	4	DB1.7...DB1.4	Reserved	RES	Reserved (0b0000)	Enum: : Reserved		

20	1	DB1.3	Other disablement	OD	Manufacturer defined. It is just to provide an extra "disablement signal" that could be used for other devices. People would not have to change anything then as this is already an established "signal"	Enum: 0: Not disabled 1: Disabled
21	1	DB1.2	Window contact disablement	WCD	Window contact disablement	Enum: 0: Not disabled 1: Disabled
22	1	DB1.1	Key card disablement	KCD	Key carddisablement	Enum: 0: Not disabled 1: Disabled
23	1	DB1.0	External disablement	ED	External disablement	Enum: 0: Not disabled 1: Disabled
24	4	DB0.7...DB0.4	Not Used (= 0)			
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	1	DB0.2	Remote controller Disablement	RCD	Remote controller Disablement (In transmit it sends the status of this parameter. If the manufacturer doesn't support this option, it will send allways 0, no matter what it receives.)	Enum: 0: Remote controller enabled 1: Remote controller disabled
30	1	DB0.1	Window contact	WC	Window contact	Enum: 0: Windows opened 1: Windows closed
31	1	DB0.0	Alarm State	AS	Alarm State	Enum: 0: Ok 1: Error

RORG	A5	**4BS Telegram**
FUNC	20	HVAC Components
TYPE	12	Temperature Controller Input

Submitter: Thermokon Sensortechnik GmbH

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Control Variable override	CV	Actual value for controller	0...255	0...100	%
8	8	DB2.7...DB2.0	FanStage override	FANOR	FanStage override	Enum: 0: Stage 0 1: Stage 1 2: Stage 2 3: Stage 3 31: auto 255: not available		
16	8	DB1.7...DB1.0	Setpoint shift	SPS	Actual set point could be shifted	0...255	-10...+10	°K
24	1	DB0.7	Fan override	FANOR		Enum: 0: Automatic 1: Override Fan DB2		
25	2	DB0.6...DB0.5	Controller mode	CTM		Enum: 0: Auto mode 1: Heating 2: Cooling 3: Off		

27	1	DB0.4	Controller state	CST	Controller state	Enum: 0: Automatic 1: Override control variable DB3
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	1	DB0.2	Energy hold-off / Dew point	ERH	Energy hold-off / Dew point	Enum: 0: Normal 1: Energy hold-off/ Dew point
30	2	DB0.1...DB0.0	Room occupancy	RO	Actual room occupancy	Enum: 0: Occupied 1: Unoccupied 2: StandBy 3: Frost

A5-30: Digital Input

RORG	A5	**4BS Telegram**
FUNC	30	Digital Input
TYPE	01	Single Input Contact, Battery Monitor

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	8	DB2.7...DB2.0	Supply voltage	SVC	Supply voltage (linear)	Enum: 0...120: Battery LOW 121...255: Battery OK		
16	8	DB1.7...DB1.0	Input State	IPS	Input State	Enum: 0...195: Contact closed 196...255: Contact open		
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	**4BS Telegram**
FUNC	30	Digital Input
TYPE	02	Single Input Contact

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	28	DB3.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	Not Used (= 0)					
31	1	DB0.0	Input State	IPS	Input State	Enum: 0: Contact closed 1: Contact open		

RORG	A5	4BS Telegram
FUNC	30	Digital Input
TYPE	03	4 Digital Inputs, Wake and Temperature

Submitter: Afriso / EnOcean

Description:
This is used for universal modules with 4 digital inputs and a room temperature. The wake input signal of the device is provided to show the telegram transmission trigger. The application meaning and exact data interpretation of the digital channels depends on the end application and is not defined in this profile documentation.

Data exchange
Direction: unidirectional
Addressing: broadcast
Communication trigger: event- & time-triggered
Trigger event: wake event – application dependent
Teach-in method: 4BS teach-in 2

Appendix:
D1.4 – The Status of Wake signalizes the status of the WAKE PIN which has a special meaning in an ultra low application. Usually, by a status change of this input the module is triggered to perform a predefined operation.

Applications using this profile:

- water sensor conductive – Wake Status = 0 (water detected)
- pressure gauge with minimum or maximum (wake signal, configurable if min or max)
- indication and individual switching points (digital channels show different areas)

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Not Used (= 0)					
8	8	DB2.7...DB2.0	Temperature	TMP	Temperature (linear)	255...0	0...40	°C
16	3	DB1.7...DB1.5	Not Used (= 0)					
19	1	DB1.4	Status of Wake	WA0	Value of wake signal	Enum: 0: Low 1: High		
20	1	DB1.3	Digital Input 3	DI3	Digital Input 3	Enum: 0: Low 1: High		
21	1	DB1.2	Digital Input 2	DI2	Digital Input 2	Enum: 0: Low 1: High		
22	1	DB1.1	Digital Input 1	DI1	Digital Input 1	Enum: 0: Low 1: High		
23	1	DB1.0	Digital Input 0	DI0	Digital Input 0	Enum: 0: Low 1: High		
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

RORG	A5	4BS Telegram
FUNC	30	Digital Input
TYPE	04	3 Digital Inputs, 1 Digital Input 8 Bits

Submitter: Afriso / EnOcean

Description:
This profile is used for universal module with 1 analog input (= 8 bits resolution digital) and 3 digital inputs. The application meaning and exact data interpretation of the input channels depends on the end application and is not defined in this profile documentation.

Data exchange
Direction: unidirectional
Addressing: broadcast
Communication trigger: event- & time-triggered
Trigger event: values have changed
Teach-in method: 4BS teach-in 2

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	DB3.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Digital value-input	DV0	Digital value 1 byte	0...255	0...255	N/A
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Digital Input 2	DI2	Measured digital Input 2	Enum: 0: Low 1: High		
30	1	DB0.1	Digital Input 1	DI1	Measured digital Input 1	Enum: 0: Low 1: High		
31	1	DB0.0	Digital Input 0	DI0	Measured digital Input 0	Enum: 0: Low 1: High		

A5-37: Energy Management

RORG	A5	4BS Telegram
FUNC	37	Energy Management
TYPE	01	Demand Response

Submitter: Echoflex Solutions Inc.

Purpose of EEP:
Demand Response is a developing standard to allow utility companies to send requests for reduction in power consumption during peak usage times. It is also used as a means to allow users to reduce overall power consumption as energy prices increase. Having an EEP for this will allow ease of integration with EnOcean products to this standard. The EEP was designed with a very flexible setting for the level (0-15) as well as a default level whereby the transmitter can specify a specific level for all controllers to use (0-100% of either maximum or current power output, depending on the load type). This EEP also includes a timeout setting to indicate how long the DR event should last if the DR transmitting device does not send heartbeats or subsequent new DR levels.

Description:
This EEP is included under a new function of Energy Management. Additional types could be added in future for power, voltage, and current data. The proposed EEP type 01 only deals with demand response activation at this point. Data Byte 3 is the default DR value for devices that implement a control algorithm that uses a set-point. It will be used for any controllers not supporting the current DR Level in the message and having an adjustable set-point.

Data Byte 2 is the default DR Level for any controllers not supporting the current DR Level in the message and having an adjustable control. It can be defined as either a percentage of the maximum power or a percentage of the current power, depending on the value of bit 7 in Data Byte 2. Bits 0 through 6 contain the percentage of power (either relative or absolute) that should be used. A value of 0 corresponds to 0% and a value of 100 corresponds to 100%. Any value higher that n100 should be interpreted as 100%. For example, if the current DR level is not supported by the controller and Data Byte 2 bit 7 is 0 and Data Byte 2 bits 0 through 6 are set to 55, then the controller should try to use 55% of its maximum power usage. In the case of a lighting load with 0-10V dimming, this would correspond to 5.5V on the dimming line. In the case of a heating controller with a maximum set back of 5 degrees C, this would correspond to a set back of 2.75 degrees C (this would most likely be rounded to 3).

Data Byte 1 is the timeout for this DR event. After this command is sent the controller will stay at the DR level for Data Byte 1 multiplied by 15 minutes. Once this time has elapsed the controller will return to normal operation. If

Data Byte 1 is 0 then the controller will remain in the DR event until the next DR command is received. This timeout allows DR devices to leave or turn off after setting controllers into a DR state, thus the DR transmitter is not needed to take the devices out of the DR state and the controllers will automatically recover. For example a DR transmitter that only sends messages when a DR event is active could be used with the timeout to create a successful DR system.

Data Byte 0, Bits 7 through 4 make up a nibble that will be used as the DR level. Levels 0 through 15 will be possible using these bits. Bit 4 will be the lowest bit in this nibble and bit 7 will be the highest. If any level is not supported by a controller then that controller should use the default settings sent in this message or map the level to one that it supports.

Data Byte 0 Bits 2 and 1 indicate whether the power adjustment at start and end of the DR event should be randomized or not. This feature is intended to minimize rapid changes on the power distribution equipment by delaying each controller's response. If random start or end is enabled, each controller will delay starting or ending the DR event by a random time that will vary uniformly over a specific time period (for example, 5 seconds, 60 seconds, or 15 minutes).. The maximum length of these random delays will depend on the implementation in the controller.

Data Byte 0, Bit 0 is the state for loads that are not adjustable for the default DR level. If a controller does not support the current DR level and does not have adjustable control then it should use this bit. The two states of this bit are defined as follows: 1 = maximum power usage by controller, 0 = minimum power usage by the controller. If for example lights are being controlled, then a setting of 1 will mean the lights should be ON, where as a setting of 0 will mean the lights should be OFF. For a thermostat application with non adjustable set back, a setting of 1 will mean that no set back should be applied, whereas a setting of 0 will mean that the full set back should be applied. This setting only applies to the maximum power usage of the controller, if for example the lights are currently off and the controller receives a DR event with this bit set, then the lights should not turn ON as the DR event has only set the maximum power usage for the device.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Temporary default	TMPD	New Temporary default DR set point Min. ... Max. (linear)	0...255	0...255	N/A
8	1	DB2.7	Absolute/relative power usage	SPWRU		Enum: 0: Absolute power usage. Interpret DB_2.BIT_6...DB_2.BIT_0 as a percentage of the maximum power use. 1: Relative power usage. Interpret DB_2.BIT_6...DB_2.BIT_0 as a percentage of the current power use.		
9	7	DB2.6...DB2.0	Power Usage	PWRU	0% to 100% power usage in 1% increments; 101...127 = interpreted as 100%	0...100	0...100	N/A
16	8	DB1.7...DB1.0	Timeout Setting	TMOS	Time in 15 min. intervals; 0 = No time specified; 1...255 = increasing 15 min. intervals. Max value: 3825 = 255*15	1...255	15...3825	min
24	4	DB0.7...DB0.4	DR Level	DRL	DR Level	0...15	0...15	N/A
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Random start delay	RSD	...	Enum: 0: False 1: True		
30	1	DB0.1	Randomized end delay	RED	...	Enum: 0: False 1: True		
31	1	DB0.0	Max/Min Power Usage for Default DR State	MPWRU		Enum: 0: Minimum Power usage 1: Maximum Power usage		

A5-38: Central Command

RORG	A5	4BS Telegram
FUNC	38	Central Command
TYPE	08	Gateway

Communication between gateway and actuator uses byte DB_3 to identify Commands. Commands 0x01 to 0x7F shall be common to all types belonging to this profile. Commands 0x80 to 0xFE can be defined individually for each device type.

0x01 Switching

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Command	COM	Command ID	Enum: 0x01:		
8	16	DB2.7...DB1.0	Time	TIM	Time in 1/10 seconds. 0 = no time specifed	1...65535	0.1...6553.5	s
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Lock/Unlock	LCK	Lock for duration time if time >0, unlimited time of no time specified. Locking may be cleared with „unlock". During lock phase no other commands will be accepted or executed	Enum: 0: Unlock 1: Lock		
30	1	DB0.1	Delay or duration	DEL	Delay or duration (if Time > 0); 0 = Duration (Execute switching command immediately and switch back after duration) 1 = Delay (Execute switching command after delay)	Enum: 0: Duration 1: Delay		
31	1	DB0.0	Switching Command	SW	Switching Command ON/OFF	Enum: 0: Off 1: On		

0x02 Dimming

REMARK:
Ramp time is the time needed to transition from minimum to maximum dimming levels.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Command	COM	Command ID	Enum: 0x02:		
8	8	DB2.7...DB2.0	Dimming value	EDIM	Dimming value (absolute [0...255] or relative [0...100])	0...255	0...100	%
16	8	DB1.7...DB1.0	Ramping time	RMP	Ramping time in seconds, 0 = no ramping, 1... 255 = seconds to 100%	0...255	0...255	s
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram		

						1: Data telegram
29	1	DB0.2	Dimming Range	EDIM R	Dimming Range	Enum: 0: Absolute value 1: Relative value
30	1	DB0.1	Store final value	STR	Store final value	Enum: 0: No 1: Yes
31	1	DB0.0	Switching Command	SW	Switching Command ON/OFF	Enum: 0: Off 1: On

0x03 Setpoint shift

Submitter: Thermokon Sensortechnik GmbH

Used for changing set point, for example summer / winter compensation

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Command	COM	Command ID	Enum: 0x03:		
8	8	DB2.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Setpoint	SP	Setpoint shift	0...255	-12.7...12.8	K
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

0x04 Basic Setpoint

Submitter: Thermokon Sensortechnik GmbH

Send a new basic set point via DDC to an actuator

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Command	COM	Command ID	Enum: 0x04:		
8	8	DB2.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	Basic Setpoint	BSP	Basic Setpoint	0...255	0...+51.2	°C
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

0x05 Control variable

Submitter: Thermokon Sensortechnik GmbH

Set occupancy, energy holdoff and control directly actuator

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Command	COM	Command ID	Enum: 0x05:		
8	8	DB2.7...DB2.0	Not Used (= 0)					

16	8	DB1.7...DB1.0	Control variable override	CVOV	Control variable override	0...255	0...100	%
24	1	DB0.7	Not Used (= 0)					
25	2	DB0.6...DB0.5	Controller mode	CM	Controller Mode	Enum: 0: Automatic mode selection 1: Heating 2: Cooling 3: Off		
27	1	DB0.4	Controller state	CS	Controller state	Enum: 0: Automatic 1: Override		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	1	DB0.2	Energy hold off	ENHO	Energy Hold Off	Enum: 0: Normal 1: Energy holdoff/ Dew point		
30	2	DB0.1...DB0.0	Room occupancy	RMOCC	Room occupancy	Enum: 0: Occupied 1: Unoccupied 2: Standby		

0x06 Fan stage

Submitter: Thermokon Sensortechnik GmbH

Set directly fan stage

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Command	COM	Command ID	Enum: 0x06:		
8	8	DB2.7...DB2.0	Not Used (= 0)					
16	8	DB1.7...DB1.0	FanStage override	FO	FanStage override	Enum: 0: Stage 0 1: Stage 1 2: Stage 2 3: Stage 3 255: Auto		
24	4	DB0.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	3	DB0.2...DB0.0	Not Used (= 0)					

0x07 Blind Central Command

Submitter: PEHA / infratec

With this central command all blinds, awnings and shutters can be manipulated.

Remarks for data table:

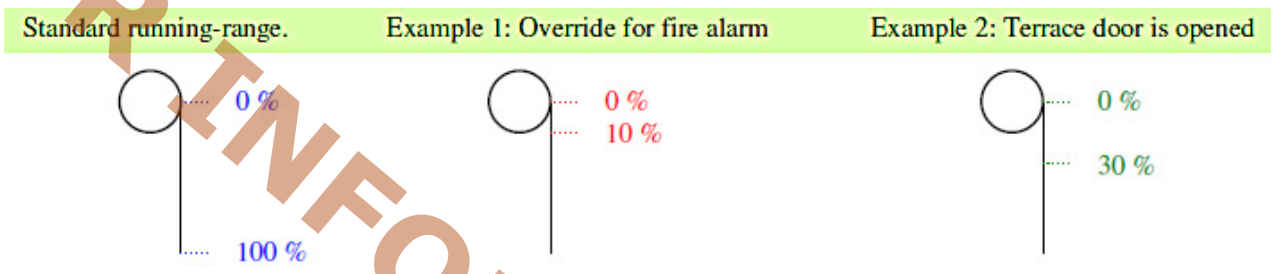
REMARK 1:
The angle is usually available in blinds and awning modules.
Normally, in shutter modules the angle value is ignored.
The angle value can be set from -180° (e.g. maximum slat angle at the fully SHUT position) to 180° (e.g. maximum

slat angle at the fully OPEN position).
The byte is set with following rule:
Bit7: Sign of the slat angle (0 = positive value, 1 = negative value)
Bit6..0: Slat angle value in 2° steps (e.g. 50 = 100°)

REMARK 2:
If this function (Blind drives to position with angle value) is not supported or not configured, use following rule:
- Position is 0 to 49% -> The blind opens
- Position is 50 to 100% -> The blind closes.

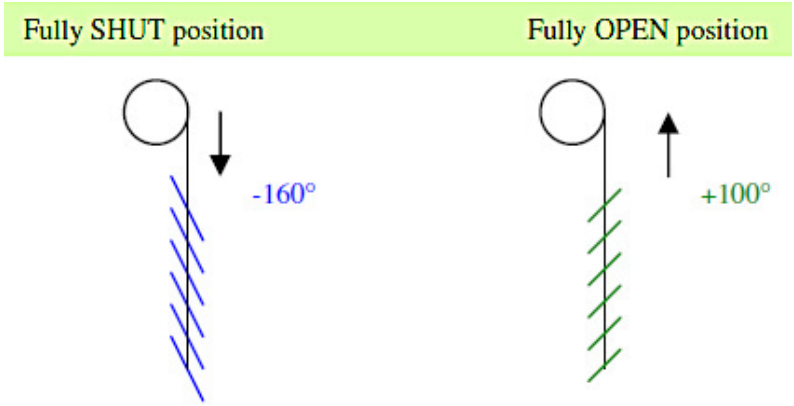
REMARK 3:
Conventional blinds and shutters can be configured with these 3 parameters to calculate the sufficiently accurate position and angle of the blind.

REMARK 4:
With this command you can adjust the minimal and maximal position of the blinds. So it's possible to override the running-range of blinds via a central control unit. Local operations are restricted and increase safety (e.g. to open blinds in case of wind or fire).
Condition: The Minimal value must be smaller or equal the maximal value.

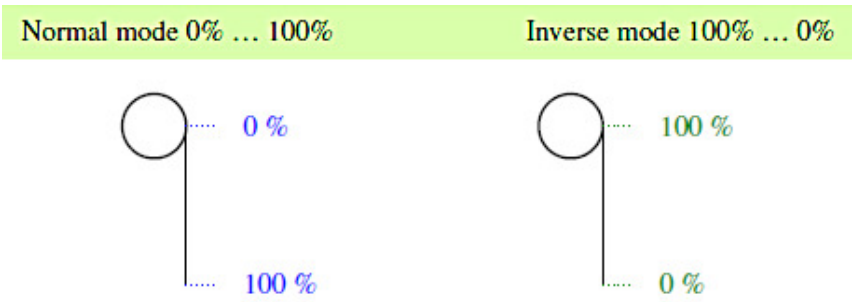


Example to lock the local functionality: Drive the shutters to a define position and set the minimal and maximal values to this position.

REMARK 5:
These to angle values describe the maximum slat angle at the fully SHUT position and the maximal slat angle at the fully OPEN position. With the time parameter, e.g.:



REMARK 6:
Set the position logic for the blind control and visualization.



Note: If the mode is changed, the minimum and maximal values (function 9) are converted as well!

REMARK 7:
For important central commands, it's not necessary to send directly the statefeedback, e.g. when many modules are activated simultaneously.
Note: Special functionality is in function "Status request (0)", the status is always sent.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Command	COM	Command ID	Enum: 0x07: Shutters / Blinds		
8	8	DB2.7...DB2.0	Parameter 1	P1	Function defined parameter value	Enum: Func. 00: -- not used -- Func. 01: -- not used -- Func. 02: -- not used -- Func. 03: -- not used -- Func. 04: 0% ... 100% e.g.: 0% = Blind fully open / 100% = Blind fully closed Func. 05: 0 ... 255 seconds Func. 06: 0 ... 255 seconds Func. 07: Runtime value to close the blind 0 ... 255 seconds Func. 08: Runtime value for the sunblind reversion time This is the time to revolve the sunblind from one slat angle end position to the other end position: 0.0 … 25.5 seconds (0.1s steps) Func. 09: Set minimal position value 0 ... 100% Func. 10: Angle at the fully SHUT position Bit7 0 = positive sign Bit7 1 = negative sign Bit6...0 0 ... 90 Angle in 2° steps (e.g. 0 = 0°, 90 = 180°) Func. 11: Position logic 0 = Highest position = 0% / Lowest position = 100% 1 = Highest position = 100% / Lowest position = 0%		

16	8	DB1.7...DB1.0	Parameter 2	P2	Function defined parameter value	Enum: Func. 00: -- not used -- Func. 01: -- not used -- Func. 02: -- not used -- Func. 03: -- not used -- Func. 04: Angel (see remark 1) Bit7 0 = positive sign Bit7 1 = negative sign Bit6...0 0 ... 90 Angle in 2° steps (e.g. 0 = 0°, 90 = 180°) Func. 05: 0.0 ... 25.5 seconds Func. 06: 0.0 ... 25.5 seconds Func. 07: Runtime value to open the blind 0 ... 255 seconds Func. 08: -- not used -- Func. 09: Set maximal position value 0 ... 100% Func. 10: Angle at the fully OPEN position Bit7 0 = positive sign Bit7 1 = negative sign Bit6...0 0 ... 90 Angle in 2° steps (e.g. 0 = 0°, 90 = 180°) Func. 11: -- not used --
24	4	DB0.7...DB0.4	Function	FUNC		Enum: 0: Do nothing, status request 1: Blind stops 2: Blind opens 3: Blind closes 4: Blind drives to position with angle value (see remark 2) 5: Blind opens for time (position value) and angle (angle value) 6: Blind closes for time (position value) and angle (angle value) 7: Set Runtime parameters (see remark 3) 8: Set angle configuration (see remark 3) 9: Set Min, Max values (see remark 4) 10: Set slat angle for SHUT and OPEN position (see remark 5) 11: Set position logic (see remark 6)
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	1	DB0.2	Send status flag	SSF	see remark 7	Enum: 0: Send new status of device 1: Send no status (e.g. Global central commands)
30	1	DB0.1	Pos. and Angle flag	PAF		Enum: 0: No Angle and position value available 1: Angle and position value available
31	1	DB0.0	Service Mode Flag	SMF		Enum: 0: Normal operation

						1: Service mode: The module disables all senders, except this sender, which has set the service mode. (For example for maintenance)

RORG	A5	4BS Telegram
FUNC	38	Central Command
TYPE	09	Extended Lighting-Control

Submitter: PEHA / infratec

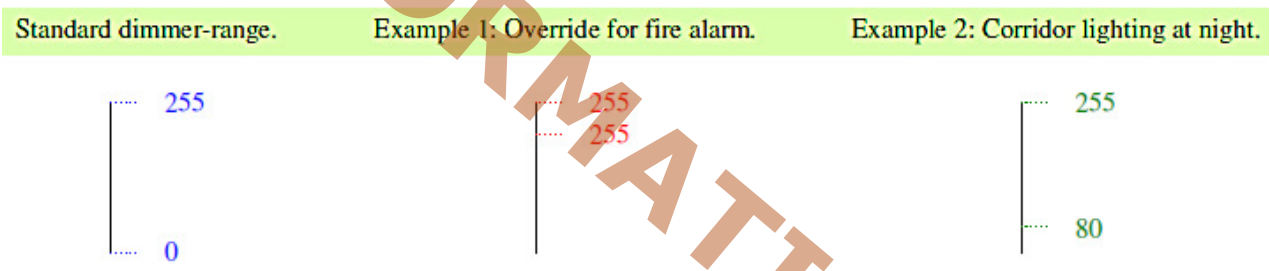
With this central command all lighting actors can be manipulated.

Remarks for data table:

REMARK 1:
Set the RGB level for corresponding lighting-control.
Devices without this feature ignore this command.

REMARK 2:
Up to 16 different scenes can be selected and configured.

REMARK 3:
Change the minimal and maximal dimmer-value. Example:



General for switchers:
The values 0 .. 127 are defined to "Off".
The values 128.. 255 are defined to "On".

REMARK 4:
Example: If the lamp was replaced, the operating hours are reset to 0.

REMARK 5:
This function blocks all other commands from the other taught-in transmitters. The transmitter, which has called this function, must delete the blocking state, before the other transmitters can use the device again.

REMARK 6:
For important central commands, it's not necessary to send directly the statefeedback, e.g. when many modules are activated simultaneously.
Note: Special functionality is in function "Status request (0)", the status is always sent.

REMARK 7:
Ramp time is the time needed to transition from minimum to maximum dimming levels.

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	DB3.7...DB3.0	Parameter 1	P1	Function defined parameter value	Enum: Func. 00: -- not used -- Func. 01: -- not used -- Func. 02: -- not used --		

						Func. 03: -- not used -- Func. 04: -- not used -- Func. 05: -- not used -- Func. 06: Dimm-Value (0 ... 255) Func. 07: R - Red (0 .. 255) Func. 08: -- not used -- Func. 09: Dimm-Value (0 ... 255) Func. 10: Lamp operating hours (MSB 15..8) Func. 11: -- not used -- Func. 12: Energy metering value (MSB 15..8)
8	8	DB2.7...DB2.0	Parameter 2	P2	Function defined parameter value	Enum: Func. 00: -- not used -- Func. 01: -- not used -- Func. 02: -- not used -- Func. 03: Ramping time (MSB 15...8) (65535 s) Func. 04: Ramping time (MSB 15...8) (65535 s) Func. 05: -- not used -- Func. 06: Ramping time (MSB 15...8) (65535 s) Func. 07: G - Green (0 ... 255) Func. 08: -- not used -- Func. 09: Dimm-Value (0 ... 255) Func. 10: Lamp operating hours (7...0 LSB) Func. 11: -- not used -- Func. 12: Energy metering value (7..0 LSB)
16	8	DB1.7...DB1.0	Parameter 3	P3	Function defined parameter value	Enum: Func. 00: -- not used -- Func. 01: -- not used -- Func. 02: -- not used -- Func. 03: Ramping time (7...0 LSB) (65535 s) Func. 04: Ramping time (7...0 LSB) (65535 s) Func. 05: -- not used -- Func. 06: Ramping time (7...0 LSB) (65535 s) Func. 07: B - Blue(0 ... 255)

						Func. 08: Bit7: 0 = Drive to scene-value Bit7: 1 = Stores actual value in the scene Bit3..0: Scene number 0 ... 15 Func. 09: -- not used -- Func. 10: -- not used -- Func. 11: Blocks the local operations Enum: 0 = Unlock local operations 1 = Locking switch on commands 2 = Locking switch off commands 3 = Locking local operations Func. 12: Unit of energy metering value Enum: 0 = mW 1 = W 2 = kW 3 = MW 4 = Wh 5 = kWh 6 = MWh 7 = GWh 8 = mA 9 = 1/10 A 10 = mV 11 = 1/10 V 12 ... 15 Not used
24	4	DB0.7...DB0.4	Function	FUNC		Enum: 0: Do nothing, status request 1: Switched off 2: Switched on (Memory value) 3: Dimming up with ramping time 4: Dimming down with ramping time 5: Dimming stops 6: Set dimmer-value and ramping time 7: Set RGB values (see remark 1) 8: Scene function (see remark 2) 9: Set minimal and maximal dimmer-value (see remark 3) 10: Set the operating hours of the lamp (see remark 4) 11: Locking local operations (see remark 5) 12: Set a new value for the energy metering (overwrite the actual value with the selected unit)
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram
29	1	DB0.2	Send status flag	SSF	see remark 6	Enum: 0: Send new status of device 1: Send no status (e.g. Global central commands)
30	1	DB0.1	Store final value	SFV		Enum: 0: No 1: Yes
31	1	DB0.0	Service Mode Flag	SMF		Enum: 0: Normal operation 1: Service mode: The module disables all senders, except this sender, which has set the service mode. (For example for maintenance)

A5-3F: Universal

RORG	A5	4BS Telegram
FUNC	3F	Universal
TYPE	00	Radio Link Test (BI-DIR)

Submitter: PROBARE

Units supporting the EEP Radio Link Test shall offer a functionality that allows for radio link testing between them (Position A to Position B, point-to-point only). Testing shall be possible without the need for prior teach-in and as an option it shall cover two way communications.

Further, testing shall be backward compatible to existing EnOcean installations that support at least 1BS (RORG=0xD5) and 4BS (RORG=0xA5) EnOcean messages.

The main area of RLT application are in-field testing of radio links between portable test equipment placed at different locations as well as between portable test equipment and fixed installation, e.g. an EnOcean Gateway.

Functional description of RLT:

When two units perform radio link testing one unit needs to act in a mode called RLT Master and the other unit needs to act in a mode called RLT Slave. On a RLT enabled unit one or both modes may be supported. The mode(s) supported shall require explicitly activation at run time.
After activation a RLT Master listens for RLT_Query messages. On reception of at least one RLT_Query message a RLT Master responds with an RLT_Response message. Following that it starts transmission of RLT_MasterTest messages within a maximum time frame of 250ms and awaits the response from the RLT Slave for each RLT_MasterTest message sent. A radio link test communication consists of a minimum of 16 and a maximum of 256 RLT_MasterTest messages. Timing distance between individual RLT_MasterTest messages shall not exceed 250ms. When the radio link test communication is completed the RLT Master gets deactivated automatically.
After activation a RLT Slave periodically transmits RLT_Query messages (1 message / 2s). It stops transmission of RLT_Query messages as soon as it has received at least one RLT_Response message. It then waits for RLT_MasterTest messages from the same EnOcean ID and replies to them within a maximum delay of 100ms thru RLT_SlaveTest messages. If it does not receive RLT_MasterTest messages from the same EnOcean ID for a time period of 5s, the RLT Slave restarts periodic transmission of RLT_Query messages. The RLT Slave requires explicit deactivation.

RLT_Query Message

This Message is a "4BS Teach-In Query" message with FUNC, Type and Manufacturer ID set properly. For details please refer to the description of the 4BS teach-in process.

RLT_Response Message

This Message is a "4BS Teach-In Response" message with FUNC, Type and Manufacturer ID set properly. For details please refer to the description of the 4BS teach-in process. As a RLT Master does accept teach-in of a RLT Slave only for the time period required by a single RLT communication it shall indicate the EEP to be supported but the EnOcean ID of the RLT Slave not to be stored permanently.

RLT_MasterTest_4BS

This is the 4BS message sent by the RLT Master during a radio link test communication
DIRECTION- 1

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	28	DB3.7...DB0.4	Not Used (= 0)					
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	MSG_ID	MSGID	Message ID	Enum: 2:		
31	1	DB0.0	MSG-Source	MSGS	Message Source	Enum: 0: RLT-Master		

RLT_SlaveTest_4BS

This is the 4BS message sent by the RLT Slave in reply to an RLT_MasterTest_4BS message.
DIRECTION- 2

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	2	DB3.7...DB3.6	Sub-Telegram Counter	STCNT	related to RLT_MasterTest_4BS message received Repeater level 2	Enum: 0: not supported 1: 1 sub telegram 2: 2 sub telegram 3: ≥ 3 sub telegram		
2	6	DB3.5...DB3.0	RSSI Level in dBm	RSLV	related to RLT_MasterTest_4BS message received Repeater level 1	Enum: 0x00: not supported 0x01: ≥-31 dBm 0x02: -32 dBm 0x3F: ≤-93 dBm		
8	8	DB2.7...DB2.0	Sub-Telegram Counter/RSSI Level in dBm	RSLV	Related to RLT_MasterTest_4BS message received Repeater level 1 (for details see DB3)	Enum: : See prev		
16	8	DB1.7...DB1.0	Sub-Telegram Counter/RSSI Level in dBm	RSLV	Related to RLT_MasterTest_4BS message received direct link	Enum: : See prev		
24	4	DB0.7...DB0.4	RSSI Level in dBm	RSLV	Non-EnOcean signal detection since last RLT_MasterTest message RSSI Level with 6dB quantization steps	Enum: 0x00: not supported 0x01: ≥ -31 dBm 0x02: -32...-37 dBm 0x03: -38...-43 dBm 0x04: -44...-49 dBm 0x05: -50...-55 dBm 0x06: -56...-61 dBm 0x07: -62...-67 dBm 0x08: -68...-73 dBm 0x09: -74...-79 dBm 0x0A: -80...-85 dBm 0x0B: ≤ -92 dBm		
28	1	DB0.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
29	2	DB0.2...DB0.1	MSG_ID	MSGID		Enum: 2:		
31	1	DB0.0	MSG-Source	MSGS		Enum: 1: RLT-Slave		

RLT_MasterTest_1BS

This is the 1BS message sent by the RLT Master during a radio link test communication.

REMARK: The column 'Bitrange' is automatically generated from the telegram type and the offset. The column Bitrange shows currently DB_3 instead of DB_0. This isn't a bug in the XML, only a weakness of the formatting. AT THIS POINT, DB_0 WOULD BE CORRECT.

DIRECTION- 1

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	DB3.7...DB3.4	RLT MSG-Counter MSB	MC-MSB	Round-trip, covering all RLT_x_1BS messages 4 bit MSB	Enum: :		
4	1	DB3.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
5	2	DB3.2...DB3.1	RLT MSG-Counter LSB	MC-LSB	Round-trip, covering all RLT_x_1BS messages 2 bit LSB	Enum: :		
7	1	DB3.0	MSG-Source	MSGS	Message Source	Enum: 0: RLT Master		

RLT_SlaveTest_1BS

This is the 1BS message sent by the RLT Slave in reply to an RLT_MasterTest_1BS message.

REMARK: The column 'Bitrange' is automatically generated from the telegram type and the offset. The column Bitrange shows currently DB_3 instead of DB_0. This isn't a bug in the XML, only a weakness of the formatting. AT THIS POINT, DB_0 WOULD BE CORRECT.

DIRECTION- 2

Offset	Size	Bitrange	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	DB3.7...DB3.4	RLT MSG-Counter MSB	MC-MSB	Round-trip, covering all RLT_x_1BS messages 4 bit MSB	Enum: :		
4	1	DB3.3	LRN Bit	LRNB	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		
5	2	DB3.2...DB3.1	RLT MSG-Counter LSB	MC-LSB	Round-trip, covering all RLT_x_1BS messages 2 bit LSB	Enum: :		
7	1	DB3.0	MSG-Source	MSGS	Message Source	Enum: 1: RLT-Slave		

D2: VLD Telegram

D2-00: Room Control Panel (RCP)

The Communication is based on the Smart Ack concept. Some basics related hereto are included in this document for convenience but for details please consult the Smart Ack specification.

A Room Control Panel (RCP) compliant to this EEP offers the following features:

- Multi symbol, multi segment LC display (or equivalent)
- 1 temperature measurement channel, remote configurable
- 1 temperature set point control (e.g. key pad based)
- 1 fan speed control (e.g. key pad based)
- 1 presence control (e.g. key pad based)

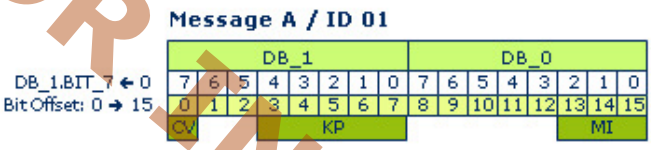
Repeater operation shall work in compliance with the Smart Ack specification.

RORG	D2	VLD Telegram
FUNC	00	Room Control Panel (RCP)
TYPE	01	RCP with Temperature Measurement and Display (BI-DIR)

Submitter: PROBARE

Message type A / ID 01 (First User Action on RCP)

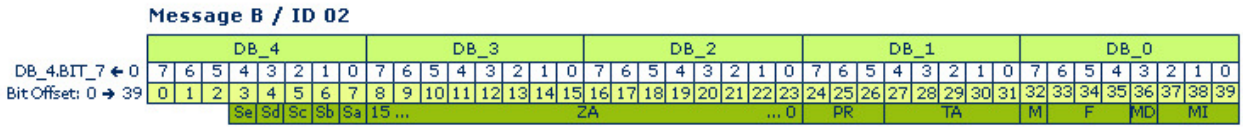
Direction: Sensor -> Gateway
Transaction Response: Message Type B or Type E
Chaining: No
Timing: T1+ = 170ms



Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	1	ConfigValid	CV		Enum: 0: Configuration data not valid (e.g. never received message of type E) 1: Configuration data valid		
1	2	Not Used (= 0)					
3	5	User Action	KP		Enum: 0: not used 1: Presence 2: Temperature Set Point "down" or "—" 3: not used 4: not used 5: Temperature Set Point "up" or "+" 6: Fan 0x07...0x1F: Not Used		
8	5	Not Used (= 0)					
13	3	MsgId	MI	Message Id; 0x01	Enum: 1: Message Id		

Message Type B / ID 02 (Display Content)

Direction: Gateway -> Sensor
Reply to Message Type A
Response: None
Chaining: Up to 2 messages per chain
Timing: T2+ = 300ms



The symbols Sa, Sb, Sc, Sd, Se are optional. One or more of those symbols are available on the display only if the manufacturer of a RCP implements them in a specific design. Thus, they are NOT mandatory for a RCP in order to comply with this EEP.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	3	Not Used (= 0)					
3	1	User Notification	Se	optional	Enum: 0x00: Off 0x01: On		
4	1	Window	Sd	optional	Enum: 0x00: Closed 0x01: Opened		
5	1	Dew-Point	Sc	optional	Enum: 0x00: Warning 0x01: No warning		
6	1	Cooling	Sb	optional	Enum: 0x00: Off 0x01: On		
7	1	Heating	Sa	optional	Enum: 0x00: Off 0x01: On		
8	16	Figure A Value	ZA	Format according to TA:	Enum: 0x01...0x07: 0 ... 4000 0x08...0x0A: Time 0000 ... 2359 0x0B...0x0C: Date 0101 ... 3112 0x0D: 0 ... 9999 0x0E...0x10: 0 ... 10000 0x0F: 0 ... 999	 0.01° lx 0.01% ppm	
24	3	Presence	PR		Enum: 0x00: Do not display 0x01: Present 0x02: Not present 0x03: Night time reduction 0x04...0x07: not used		
27	5	Figure A Type	TA		Enum: 0x00: Do not display 0x01: Room Temperature 0x02: Room Temperature 0x03: Nominal Temperature 0x04: Nominal Temperature 0x05: Delta Temperature Set Point 0x06: Delta Temperature Set Point 0x07: Delta Temperature Set Point(graphic) 0x08: Time 00:00 to 23:59 [24h] 0x09: Time 00:00 to 11:59 [AM] 0x0A: Time 00:00 to 11:59 [PM] 0x0B: Date 01.01 to 31.12 [DD.MM] 0x0C: Date 01.01 to 12.31 [MM.DD] 0x0D: Illumination (linear) 0 to 9999 0x0E: Percentage 0 to 100 0x0F: Parts per Million 0 to 9999	 °C °F °C °F °C °F lx ppm	

					0x10: Relative Humidity 0 to 100 %rH 0x11...0x1F: not used
32	1	Fan manual	M		Enum: 0: Auto 1: Fan maual
33	3	Fan	F		Enum: 0: Do not display 1: Speed Level 0 2: Speed Level 1 3: Speed Level 2 4: Speed Level 3 5...7: not used
36	1	MoreData	MD		Enum: 0: no more data 1: more data will follow after T2+
37	3	MsgId	MI	Message Id;0x02	Enum: 2: Message Id

Message Type C / ID 03 (Repeated User Action on RCP)

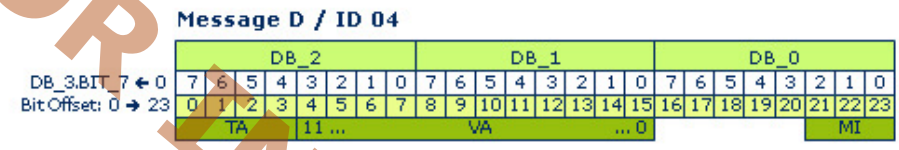
Direction: Sensor -> Gateway
Fire and Forget
Response: None
Chaining: No
Timing: may only be sent within 5s from latest receipt of a Message Type B

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	16	Set Point A Value	ZA	Format according to TA: 0x05 [0.01°]	-1270...+1270	-12.70...+12.70	°
16	3	Presence	PR		Enum: 0x00: no change 0x01: Present 0x02: Not present 0x03: Night time reduction 0x04...0x07: not used		
19	5	Set Point A Type	TA		Enum: 0x00: no change 0x01...0x04: not used 0x05: Temperature Set Point [°] 0x06...0x1F: not used		
24	1	Not Used (= 0)					
25	3	Fan	F		Enum: 0: no change 1: Speed Level 0 2: Speed Level 1 3: Speed Level 2 4: Speed Level 3		

					5: Speed Level Auto 6...7: not used
28	1	Not Used (= 0)			
29	3	MsgId	MI	Message Id; 0x03	Enum: 3: Message Id

Message Type D / ID 04 (Measurement Result)

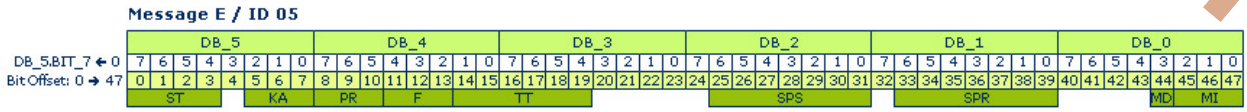
Direction: Sensor -> Gateway
Fire and Forget
Response: None
Chaining: No
Timing: None



Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Channel A Type	TA		Enum: 0x00: Temperature [°C] 0x01...0x0E: not used 0x0F: Measurement result not valid		
4	12	Channel A Value	VA	Format according to TA:	0...4000	0...40.00	°
16	5	Not Used (= 0)					
21	3	MsgId	MI	Message Id;0x04	Enum: 4: Message Id		

Message Type E / ID 05 (Sensor Configuration)

Direction: Gateway -> Sensor
Reply to Message Type A
Response: None
Chaining: Up to 2 messages per chain
Timing: T2+ = 300ms



Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Significant Temperature Difference	ST	Difference between two subsequent temperature measurements to trigger a Message Type D [0.2°]	0x0...0xF	0.0...3.0	°
4	1	Not Used (= 0)					

5	3	Keep Alive Timing	KA	Number of measurements between two subsequent "Keep Alive messages"	Enum: 0: Transmission of measurement result with each Temperature measurement 0x1...0x7: measurement *10
8	3		PR	Number of Presence Levels available to user	Enum: 0: Presence disabled 0x1...0x7: Presence avaibles
11	3	Fan	F	Number of Fan Speed Levels available to user:	Enum: 0: Fan Speed disabled 0x1...0x7: Fan Speeds
14	6	Temperature Measurement Timing	TT	Time between two subsequent Temperature measurements	Enum: 0x01...0x3C: Temperature measurement disableds s
20	5	Not Used (= 0)			
25	7	Set PointSteps	SPS	Number of Set Point Steps:	Enum: 0: Set Point disabled 0x01...0x7F: Set point
32	1	Not Used (= 0)			
33	7	Set Point Range Limit	SPR	Limit of Set Point Range, absolute value:	Enum: 0: Set Point disabled 0x01...0x7F: Set point °
40	4	Not Used (= 0)			
44	1	MoreData	MD		Enum: 0: no more data 1: more data will follow after 300ms
45	3	MsgId	MI	Message Id; 0x05	Enum: 5: Message Id

D2-01: Electronic switches and dimmers with Energy Measurement and Local Control

This EEP family shall be used for bidirectional actuators that control electric loads, e.g. for lightning purposes. Switching and dimming is controlled and high-resolution energy measurement is supported. Local Control, either thru a user interface or thru other measures shall be supported on the actuator. This may include other EnOcean enabled devices taught-in to a device belonging to the EEP family, e.g. a simple rocker switch or more sophisticated devices like occupancy sensors with timing control. The proposed EEP family serves up to 30 output channels and allows controlling them either individually or as a bulk. Extension of this EEP family is possible in different ways:

1. A new device with a different feature mix creates a new TYPE within this EEP family
-> new column in following table

2. An additional feature is added and a new device with a new TYPE is created
-> new column and new line in following table

3. Like 2, but EnOcean communication of the EEP family needs to be extended
-> new column and new line in following table
-> one or more additional messages need to be defined

For teach-in and teach-out UTE (Universal Uni- and Bidirectional Teach-In Procedure for EEP based Communication) shall be used.

Supported function	Type 0x00	Type 0x01	Type 0x02	Type 0x03	Type 0x04	Type 0x05	Type 0x06	Type 0x07	Type 0x08	Type 0x09	Type 0x0A	Type 0x10	Type 0x11
No. of output channels	1	1	1	1	1	1	1	1	1	1	1	2	2
Switching	X	X	X	X	X	X	X	X	X	X	X	X	X
Dimming	-	-	X	X	X	X	-	-	-	X	-	-	-
Dimming configurable	-	-	-	-	X	X	-	-	-	X	-	-	-
Local control	X	X	X	X	X	X	-	-	X	X	X	X	X
Local control enable/disable	-	-	-	-	X	X	-	-	X	-	X	-	-

Taught-in devices enable/disable 2)	-	-	-	-	X	X	-	-	X	X	X	-	-
User interface day/night mode	-	-	-	-	-	X	-	-	X	-	X	-	-
Over current reporting	-	-	-	-	X	X	-	-	X	X	-	-	-
Over current configurable	-	-	-	-	X	X	-	-	X	-	-	-	-
Energy measurement	X	-	X	-	X	X	X	-	X	X	-	X	-
Power measurement	-	-	-	-	X	X	-	-	X	X	-	-	-
Measurement Roll Over 1)	X	-	X	-	-	-	X	-	-	-	-	X	-
Measurement Auto Scaling 1)	-	-	-	-	X	X	-	-	X	X	-	-	-
Measurement configurable	-	-	-	-	-	X	-	-	X	X	-	-	-
Measurement report on query	X	-	X	-	X	X	X	-	X	X	-	X	-
Measurement auto reporting	-	-	-	-	X	X	-	-	X	X	-	-	-
Default state configurable	-	-	-	-	-	X	-	-	X	X	X	-	-
Error level reporting	-	-	-	-	-	X	-	-	X	X	-	-	-
Power Failure Detection	-	-	-	-	-	-	-	-	-	-	X	-	-
Power Failure Detection enable/disable	-	-	-	-	-	-	-	-	-	-	X	-	-

1) A device may either support Measurement Roll Over or Measurement Auto Scaling.

2) Enable / disable only effects devices that are taught-in to a device belonging to this EEP family;
it does not effect communication between a device belonging to this EEP family and any other entity where this device has been taught-in by itself.

RORG	D2	**VLD Telegram**
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	00	Type 0x00

Submitter: Team

CMD 0x1 - Actuator Set Output

This message is sent to an actuator. It controls switching / dimming of one or all channels of an actuator.

Command ID 01 (CMD)

	DB_2								DB_1								DB_0							
DB_2.BIT_7 ← 0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Bit Offset: 0 → 23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	CMD								dim value			I/O channel					Output Value %							

REMARK:
In case an Actuator Set Output message specifies a parameter that is not supported by the device being addresses, such device shall react as following:

- channel not supported by device -> ignore message
- dimming command to switching device -> no change of status
- dimming command with non supported speed -> dim with regular speed

RECOMMENDATION:
Dimmers should take things like phase shifting into account to provide dimming based on power consumption (results in brightness for lamps) rather than interpreting percentage values as phase angle only.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	command identifier	Enum: 0x01: ID 01		
8	3	Dim value	DV		Enum: 0x00: Switch to new output value 0x01: Dim to new output value – dim timer 1 0x02: Dim to new output value – dim timer 2 0x03: Dim to new output value – dim timer 3 0x04: Stop dimming 0x05...0x07: not used		
11	5	I/O channel	I/O		Enum: 0x00...0x1D: Output channel (to load) 0x1E: All output channels supported by the device 0x1F: Input channel (from mains supply)		
16	1	Not Used (= 0)					
17	7	Output value	OV		Enum: 0x00: Output value 0% or OFF 0x01...0x64: Output value 1% to 100% or ON 0x65...0x7E: Not used 0x7F: Output value not valid / not applicable		

CMD 0x2 - Actuator Set Local

This message is sent to an actuator. It configures one or all channels of an actuator.

Response Timing: None

RECOMMENDATION:
In case the device implements an internal order for dim timers, this order should be from "dim timer 1" (fast) to "dim timer 3" (slow). The configured time shall always be interpreted for a full range (0 to 100%) dimming.

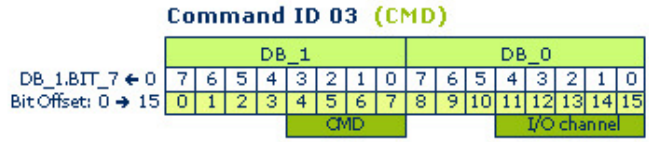
Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	1	Taught-in devices	d/e		Enum: 0b0: Disable taught-in devices (with different EEP) 0b1: Enable taught-in devices (with different EEP)		
1	3	Not Used (= 0)					

4	4	Command ID	CMD	Command identifier	Enum: 0x02: ID 02
8	1	Over current shut down	OC		Enum: 0b0: Over current shut down: static off 0b1: Over current shut down: automatic restart
9	1	reset over current shut down	RO		Enum: 0b0: Reset over current shut down: not active 0b1: Reset over current shut down: trigger signal
10	1	Local control	LC		Enum: 0b0: Disable local control 0b1: Enable local control
11	5	I/O channel	I/O		Enum: 0x00...0x1D: Output channel (to load) 0x1E: All output channels supported by the device 0x1F: Input channel (from mains supply)
16	4	Dim timer 2	DT2		Enum: 0x00: Not used 0x01...0x0F: Dim timer 2 [0,5 … 7,5s / steps 0,5s]
20	4	Dim timer 3	DT3		Enum: 0x00: Not used 0x01...0x0F: Dim timer 3 [0,5 … 7,5s / steps 0,5s]
24	1	User interface indication	d/n		Enum: 0b0: User interface indication: day operation 0b1: User interface indication: night operation
25	1	Power Failure	PF		Enum: 0b0: Disable Power Failure Detection 0b1: Enable Power Failure Detection
26	2	Default state	DS		Enum: 0b00: Default state: 0% or OFF 0b01: Default state: 100% or ON 0b10: Default state: remember previous state 0b11: Not used
28	4	Dim timer 1	DT1		Enum: 0x00: Not used 0x01...0x0F: Dim timer 1 [0,5 … 7,5s / steps 0,5s]

CMD 0x3 - Actuator Status Query

This message is sent to an actuator. It requests the status of one or all channels of an actuator.

Response Timing:
An Actuator Status Response message shall be received within a maximum of 300ms from the time of transmission of this message. In case no such response is received within this time frame the action shall be treated as completed without result.

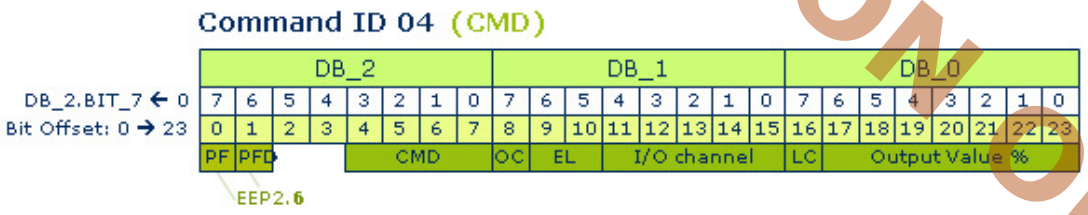


Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x03: ID 03		
8	3	Not Used (= 0)					
11	5	I/O channel	I/O		Enum: 0x00...0x1D: Output channel (to load) 0x1E: All output channels supported by the device 0x1F: Input channel (from mains supply)		

CMD 0x4 - Actuator Status Response

This message is sent by an actuator if one of the following events occurs:
- Status of one channel has been changed locally
- Message Actuator Status Query has been received

Response Timing:
This message shall be sent within a maximum of 50ms from the time of reception of the Actuator Status Query message.



REMARK 1:
In case an Actuator Status Query message specifies a parameter that is not supported by the device being addresses, such device shall ignore the message and shall not answer using the Actuator Status Response message.
REMARK 2:
In case an Actuator Status Query message queries all output channels supported by a device being addresses, such device shall answer per each output channel by using an individual Actuator Measurement Response message.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	1	Power Failure	PF		Enum: 0b0: Power Failure Detection disabled/not supported 0b1: Power Failure Detection enabled		
1	1	Power Failure Detection	PFD		Enum: 0b0: Power Failure not detected/not supported/disabled		

					0b1: Power Failure Detected
2	2	Not Used (= 0)			
4	4	Command ID	CMD	Command identifier	Enum: 0x04: ID 04
8	1	Over current switch off	OC		Enum: 0b0: Over current switch off: ready / not supported 0b1: Over current switch off: executed
9	2	Error level	EL		Enum: 0b00: Error level 0: hardware OK 0b01: Error level 1: hardware warning 0b10: Error level 2: hardware failure 0b11: Error level not supported
11	5	I/O channel	I/O		Enum: 0x00...0x1D: Output channel (to load) 0x1E: Not applicable, do not use 0x1F: Input channel (from mains supply)
16	1	Local control	LC		Enum: 0b0: Local control disabled / not supported 0b1: Local control enabled
17	7	Output value	OV		Enum: 0x00: Output value 0% or OFF 0x01...0x64: Output value 1% to 100% or ON 0x65...0x7E: Not used 0x7F: output value not valid / not set

CMD 0x5 - Actuator Set Measurement

This message is sent to an actuator. It configures the energy and power measurement of one or all channels of an actuator.

Response Timing: None

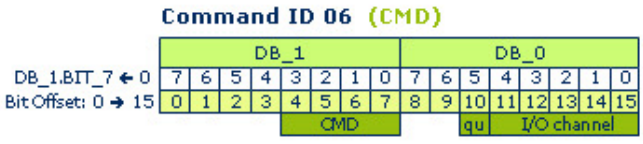
Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x05: ID 05		
8	1	Report measurement	RM		Enum: 0b0: Report measurement: query only 0b1: Report measurement: query / auto reporting		
9	1	Reset measurement	RE		Enum: 0b0: Reset measurement: not active 0b1: Reset measurement: trigger signal		

10	1	Measurement mode	e/p		Enum: 0b0: Energy measurement 0b1: Power measurement		
11	5	I/O channel	I/O		Enum: 0x00...0x1D: Output channel (to load) 0x1E: All output channels supported by the device 0x1F: Input channel (from mains supply)		
16	4	Measurement delta to be reported (LSB)	MD_LSB		0...4095	0...4095	N/A
20	1	Not Used (= 0)					
21	3	Unit	UN		Enum: 0x00: Energy [Ws] 0x01: Energy [Wh] 0x02: Energy [KWh] 0x03: Power [W] 0x04: Power [KW] 0x05...0x07: Not used		
24	8	Measurement delta to be reported (MSB)	MD_MSB		0...4095	0...4095	N/A
32	8	Maximum time between two subsequent Actuator	MAT	Measurement Response messages [10s]	0...255	10...2550	s
40	8	Minimum time between two subsequent Actuator	MIT	Measurement Response messages [s]	0...255	0...255	s

CMD 0x6 - Actuator Measurement Query

This message is sent to an actuator. The actuator replies with an Actuator Measurement Response message.

Response Timing:
An Actuator Message Response message shall be received within a maximum of 300ms from the time of transmission of this message. In case no such response is received within this time frame the action shall be treated as completed without result.

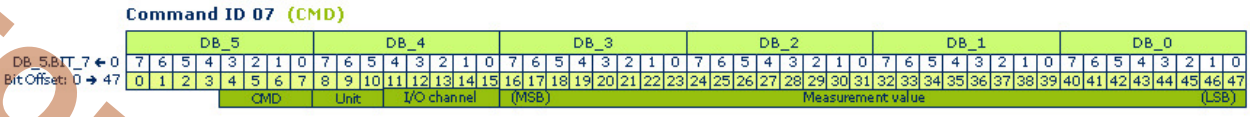


Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x06: ID 06		
8	2	Not Used (= 0)					
10	1	Query	qu		Enum: 0b0: Query energy 0b1: Query power		
11	5	I/O channel	I/O		Enum: 0x00...0x1D: Output channel (to load) 0x1E: All output channels supported by the device 0x1F: Input channel (from mains supply)		

CMD 0x7 - Actuator Measurement Response

This message is sent by an actuator if one of the following events occurs:
- Measurement results trigger an automated transmission (see Actuator Set Measurement message)
- Message Actuator Measurement Query has been received

Response Timing:
This message shall be sent within a maximum of 50ms from the time of reception of the Actuator Measurement Query message.



REMARK 1:
In case an Actuator Measurement Query message specifies a parameter that is not supported by the device addressed, such device shall ignore the message and shall not answer using the Actuator Measurement Response message.
REMARK 2:
In case an Actuator Measurement Query message queries all output channels supported by a device being addresses, such device shall answer per each output channel by using an individual Actuator Measurement Response message.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x07: ID 07		
8	3	Unit	UN		Enum: 0x00: Energy [Ws] 0x01: Energy [Wh] 0x02: Energy [KWh] 0x03: Power [W] 0x04: Power [KW] 0x05...0x07: Not used		
11	5	I/O channel	I/O		Enum: 0x00...0x1D: Output channel (to load) 0x1E: Not applicable, do not use 0x1F: Input channel (from mains supply)		
16	32	Measurement value (4 bytes)	MV	DB3 = MSB / DB0 = LSB	0...4294967295	...	N/A

RORG	D2	VLD Telegram
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	01	Type 0x01 (description: see table)

See profile: D2-01-00

RORG	D2	VLD Telegram
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control

TYPE	02	Type 0x02 (description: see table)

See profile: D2-01-00

RORG	D2	**VLD Telegram**
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	03	Type 0x03 (description: see table)

See profile: D2-01-00

RORG	D2	**VLD Telegram**
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	04	Type 0x04 (description: see table)

See profile: D2-01-00

RORG	D2	**VLD Telegram**
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	05	Type 0x05 (description: see table)

See profile: D2-01-00

RORG	D2	**VLD Telegram**
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	06	Type 0x06 (description: see table)

See profile: D2-01-00

RORG	D2	**VLD Telegram**
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	07	Type 0x07 (description: see table)

See profile: D2-01-00

RORG	D2	**VLD Telegram**
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	08	Type 0x08 (description: see table)

See profile: D2-01-00

RORG	D2	VLD Telegram
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	09	Type 0x09 (description: see table)

See profile: D2-01-00

RORG	D2	VLD Telegram
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	0A	Type 0x0A (description: see table)

See profile: D2-01-00

RORG	D2	VLD Telegram
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	10	Type 0x10 (description: see table)

See profile: D2-01-00

RORG	D2	VLD Telegram
FUNC	01	Electronic switches and dimmers with Energy Measurement and Local Control
TYPE	11	Type 0x11 (description: see table)

See profile: D2-01-00

D2-02: Sensors for Temperature, Illumination, Occupancy And Smoke

This EEP family shall be used for bidirectional sensors that measure temperature, illumination, and detect room occupancy and smoke presence.

The EEP may be used in conjunction with the Smart Acknowledge protocol.

For teach-in and teach-out the "Universal Uni- and Bidirectional Teach-In Procedure for EEP based Communication" shall be used. Alternatively the Smart Acknowledge Teach-In Procedure is used for those sensors supporting Smart Acknowledge.

Supported function	Type 0x00	Type 0x01	Type 0x02
Temperature Sensor	X	X	X
Illumination Sensor	X	X	-
Occupancy Detector	X	-	-
Smoke Detector	X	X	X

RORG	D2	VLD Telegram
FUNC	02	Sensors for Temperature, Illumination, Occupancy And Smoke
TYPE	00	Type 0x00

Submitter: MSR-Office

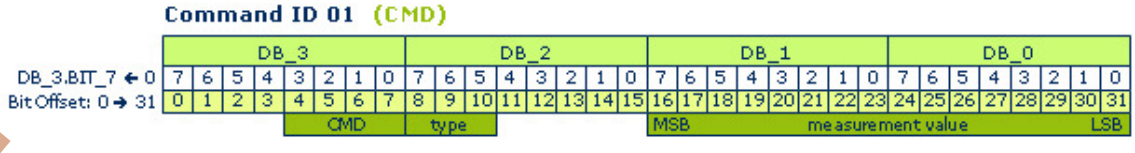
CMD 0x1 - Sensor Measurement

This message is sent by a sensor if one of the following events occurs:

- Measurement results trigger an automated transmission (see Actuator Set Measurement message)

- Message Actuator Measurement Query has been received

Response Timing: None

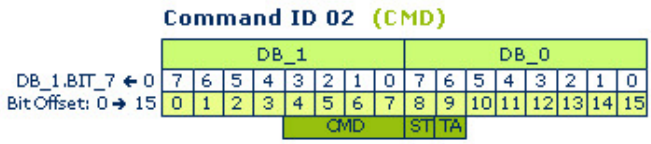


Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	command identifier	Enum: 0x01: ID 01		
8	3	Measurement type	type		Enum: 0x00: Temperature (0…65535: -40 to +120°C) 0x01: Illumination (0…65535: 0 to 2047lx) 0x02: Occupancy (0: not detected; 1: detected) 0x03: Smoke The following content applies for the value in DB_0 and DB_1: 0x00 - No smoke detected 0x01 - Smoke detected via ionization chamber 0x02 - Smoke detected via optical chamber 0x03 - Smoke detected via both chambers		
11	5	Not Used (= 0)					
16	16	Measurement value (2 bytes)	MV	DB_0 = LSB / DB_1 = MSB	0...65535	...	N/A

CMD 0x2 - Sensor Test/Trigger

This message is sent to a sensor. It causes the sensor to enter self-test mode or trigger an alarm (if supported).

Response Timing: None

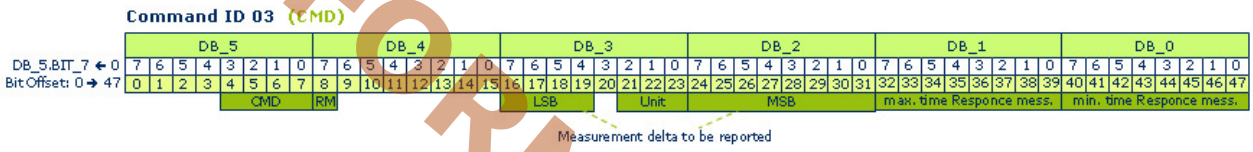


Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x02: ID 02		
8	1	Self-test	ST		Enum: 0b0: Self-test mode 0b1: Normal operation		
9	1	Trigger alarm	TA		Enum: 0b0: Trigger alarm 0b1: Normal operation		
10	6	Not Used (= 0)					

CMD 0x3 - Actuator Set Measurement

This message is sent to a sensor. It configures the measurement behaviour of the sensor.

Response Timing: None



Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x03: ID 03		
8	1	Report measurement	RM		Enum: 0b0: Report measurement: query only 0b1: Report measurement: query / auto reporting		
9	7	Not Used (= 0)					
16	4	Measurement delta to be reported (LSB)	MD_LSB		0...4095	0...4095	N/A
20	1	Not Used (= 0)					
21	3	Unit	UN		Enum: 0x00: Temperature (°C) 0x01: Illumination (lx) 0x02...0x07: Not used		
24	8	Measurement delta to be reported (MSB)	MD_MSB		0...4095	0...4095	N/A
32	8	Maximum time between two subsequent Actuator	MAT	Measurement Response messages [10s]	0...255	10...2550	s
40	8	Minimum time between two subsequent Actuator	MIT	Measurement Response messages [s]	0...255	0...255	s

CMD 0x4 - Sensor Measurement Query

This message is sent to a sensor. The sensor replies with an Sensor Measurement message.

Response Timing:
A Sensor Measurement message shall be received within a maximum of 300ms from the time of transmission of this message.
In case no such response is received within this time frame the action shall be treated as completed without result.

Command ID 04 (CMD)

	DB_1								DB_0							
DB_1.BIT_7 ← 0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Bit Offset: 0 → 15	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					CMD				qu							

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x04: ID 04		
8	3	Query	qu		Enum: 0x0: Query temperature 0x1: Query illumination 0x2: Query occupancy 0x3: Query smoke 0x4...0x7: Not used		
11	5	Not Used (= 0)					

RORG	D2	VLD Telegram
FUNC	02	Sensors for Temperature, Illumination, Occupancy And Smoke
TYPE	01	Type 0x01 (description: see table)

See profile: D2-02-00

RORG	D2	VLD Telegram
FUNC	02	Sensors for Temperature, Illumination, Occupancy And Smoke
TYPE	02	Type 0x02 (description: see table)

See profile: D2-02-00

D2-03: Light, Switching + Blind Control

The EEP family D2-03-xx provides different telegram types for switches, light and blind control. The purpose is to support secure communication and other functional aspects of applications extending the possibilities given by existing profiles (1BS, RPS, 4BS). Transmitting information in the status field of a telegram is not necessary with this EEP family.

RORG	D2	VLD Telegram
FUNC	03	Light, Switching + Blind Control
TYPE	00	Type 0x00

Submitter: EnOcean GmbH

EEP Properties:

DATA EXCHANGE
Direction: unidirectional
Addressing: broadcast
Communication trigger: event-triggered
Communication interval: N/A
Trigger event: N/A
Tx delay: N/A
Rx timeout : N/A

TEACH-IN
Teach-in method: Universal teach-in (UTE) + Secure Teach-in (for secure communication)

SECURITY
Encryption supported: yes

EEP Family Table:
(Only for VLD EEP families)

Supported function	Type 00
2 Rocker Switch	X

Each TYPE has to support every parameter that is marked in its column!

The encrypted telegram has the R-ORG 0x30. The payload (4 bits) is encrypted. That telegram can be repeated. After decryption and the authentication of the CMAC, the telegram turns into a non-encrypted EnOcean telegram with the R-ORG 0x32. The payload will be expanded to 8 bits (4 MSB set to zero) and can then be interpreted as described in the telegram definition table.

The decrypted telegram may not be repeated as the information is not secure anymore. The following table provides information about the conversion between the profiles D2-03-00 and F6-02-01:

D2-03-00 DATA	F6-02-01 DATA	F6-02-01 STATUS
0...4	-	-
5	0x17	0x30
6	0x70	0x20
7	0x37	0x30
8	0x10	0x20
9	0x15	0x30
10	0x35	0x30
11	0x50	0x30
12	0x70	0x30
13	0x10	0x30
14	0x30	0x30
15	bxxx0xxx	0x20

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Rocker Information	RI2	Information about pressed rockers (similar to RPS profiles)	Enum: 0...4: Reserved 5: Button A1 + B0 pressed, energy bow pressed 6: 3 or 4 buttons pressed, energy bow pressed 7: Button A0 + B0 pressed, energy bow pressed 8: No buttons pressed, energy bow pressed 9: Button A1 + B1 pressed, energy bow pressed 10: Button A0 + B1 pressed, energy bow pressed		

					11: Button B1 pressed, energy bow pressed
					12: Button B0 pressed, energy bow pressed
					13: Button A1 pressed, energy bow pressed
					14: Button A0 pressed, energy bow pressed
					15: Energy bow released

RORG	D2	VLD Telegram
FUNC	03	Light, Switching + Blind Control
TYPE	10	Mechanical Handle

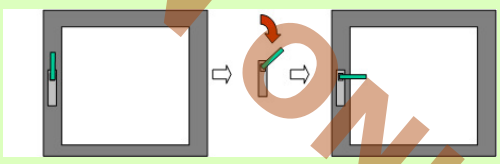
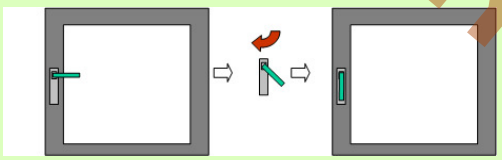
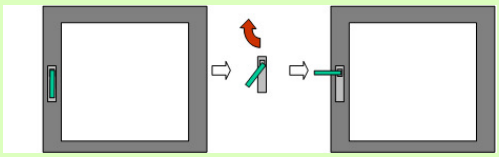
Submitter: Eltako

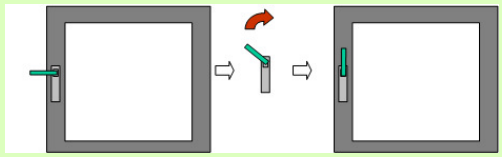
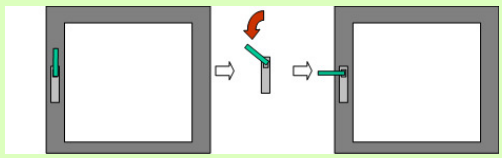
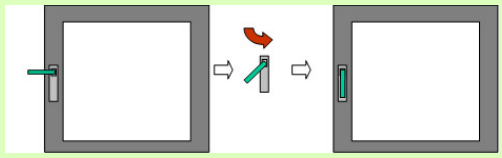
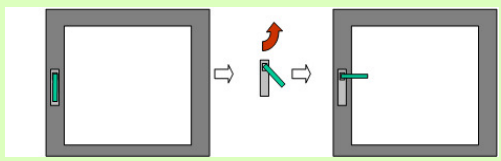
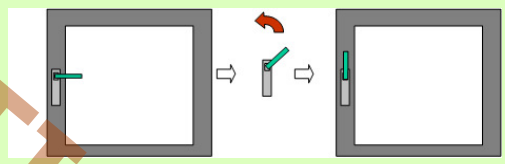
This document contains the description of decrypted mechanical handle data. The mechanical handle profile must be redefined because there is no status field in EnOcean security available.

EEP Properties:
DATA EXCHANGE
Direction: unidirectional
Addressing: broadcast
Communication trigger: event-triggered
Communication interval: N/A
Trigger event: rotate mechanical handle
Tx delay: N/A
Rx timeout: N/A

TEACH-IN
Teach-in method: Secure Teach-in, followed by special RPS teach-in sequence: Mechanical handle (closed => opened => closed within 2s)

SECURITY
Encryption supported: yes
Security level format:

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	Window handle, decrypted data	WIN	Movement of the window handle	Enum: 0b00000001:  0b00000010:  0b00000011: 		

					0b00000100: 
					0b00000011: 
					0b00000010: 
					0b00000011: 
					0b00000100: 

D2-04: CO2, Humidity, Temperature, Day/Night and Autonomy

CO2 sensor with 8 bits resolution (0 – 2000ppm or 0-5000ppm range) 8 bits temperature and relative humidity with Day / Night and battery autonomy.

Day / Night is based on illumination not on clock

Data exchange
Direction: unidirectional
Addressing: broadcast
Communication trigger: time-triggered
Communication interval: According to remaining autonomy and day or night
Trigger event: heartbeat, …
Teach-in method: Universal teach-in, Smart Ack
Encryption required: no
Security level format: 0

EEP Family Table
Each TYPE has to support every parameter that is marked in its column!

TYPE	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x10	0x1A	0x1B	0x1C	0x1D	0x1E
CO2 Sensor 0-2000 ppm range	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-
CO2 Sensor 0-5000 ppm range	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X
Humidity Sensor	X	X	-	-	-	-	-	-	X	X	-	-	-	-	-	-

Temperature Sensor	X	-	X	X	X	X	-	-	X	-	X	X	X	X	-	-
Day/Night Sensor	X	X	X	-	-	X	X	X	X	X	X	-	-	X	X	X
Battery Autonomy	X	X	X	X	-	-	-	X	X	X	X	X	-	-	-	X

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	00	Type 0x00

Submitter: NanoSense

The manufacturer will indicate emission rates versus battery autonomy and day night status.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	8	CO2	CO2	Concentration (linear), 1 LSB = 7.84 ppm Or Concentration (linear), 1 LSB = 19.6 ppm	0...255	0...2000 (or 5000)	ppm
8	8	Humidity	HUM	Rel. Humidity (linear), 1 LSB = 0.5 %	0...200	0...100	%
16	8	Temperature	TMP	Temperature (linear), 1 LSB = 0.2 °C	0...255	0...+51	°C
24	1	Day/Night	DN	...	Enum: 0: Day 1: Night		
25	3	Battery autonomy	BA	Battery autonomy	Enum: 0: 100 - 87.5 % 1: 87.5 - 75 % 2: 75 - 62.5 % 3: 62.5 - 50 % 4: 50 - 37.5 % 5: 37.5 - 25 % 6: 25 - 12.5 % 7: 12.5 - 0 %		
28	4	Not Used (= 0)					

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	01	Type 0x01 (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	02	Type 0x02 (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	03	Type 0x03 (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	04	Type 0x04 (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	05	Type 0x05 (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	06	Type 0x06 (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	07	Type 0x07 (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	08	Type 0x08 (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	09	Type 0x09 (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	10	Type 0x10 (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	1A	Type 0x1A (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	1B	Type 0x1B (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	1C	Type 0x1C (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	1D	Type 0x1D (description: see table)

See profile: D2-04-00

RORG	D2	VLD Telegram
FUNC	04	CO2, Humidity, Temperature, Day/Night and Autonomy
TYPE	1E	Type 0x1E (description: see table)

See profile: D2-04-00

D2-20: Fan Control

The EEP family D2-20-xx provides different telegram types for fan control and fan supervision messages using various parameters and variables.
Devices using this EEP family may include a master-slave function (for further description see subheading ´Master-slave function´).

EEP Properties:

DATA EXCHANGE
Direction: bidirectional
Addressing: unicast (ADT) + broadcast
Communication trigger: event-triggered

Communication interval: N/A
Trigger event: query / polling
Tx delay: N/A
Rx timeout : N/A

TEACH-IN
Teach-in method: Universal teach-in (UTE)

SECURITY
Encryption supported: no
Security level: none

EEP Family Table:
(Only for VLD EEP families)

Supported function	Type 00	Type 01	Type 02
Fan Speed	X	X	X
Fan Speed Status	X	X	X
Humidity	X	-	-
Humidity Control	X	-	-
Humidity Control Status	X	-	X
Humidity Threshold	X	-	-
Message Type	X	X	X
Operating Mode	X	-	-
Operating Mode Status	X	X	-
Room Size	X	X	X
Room Size Reference	X	X	X
Room Size Reference Status	X	X	X
Room Size Status	X	X	X
Service Information	X	-	-
Temperature Level	X	-	-

Each TYPE has to support every parameter that is marked in its column!

Master-slave function:
A device using this EEP may be able to work as a master or a slave fan. Master fans control slave fans. Slave fans are controlled by master fans. These roles are defined during the teach-in process. A slave fan will always be taught-in to a master. A master fan will accept teach-in requests from slave fans. A fan that is taught-in to another device will from now on work as a slave. A fan that accepted the teach-in of another device will go on working as a master. Combining master fans is not possible. Not every device is able to work as a master and a slave. Certain fans might only be able to be used as slaves.

RORG	D2	**VLD Telegram**
FUNC	20	Fan Control
TYPE	00	Type 0x00

Submitter: Maico Elektroapparate-Fabrik GmbH

Telegram Definition : 'Fan Control Message'

* Devices with discrete fan speed levels instead of a continuous fan speed range should divide the full range linearly and match values beside those discrete levels to the next lower fan speed level.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Operating Mode	OM	Sets the operating mode	Enum: 0: Disabled 1: Standard compliant 2...14: Reserved 15: No change		

4	1	Not Used (= 0)			
5	2	Temperature Level	TL	Status of the temperature supervision	Enum: 0: Too low 1: Normal 2: Too high 3: No change
7	1	Message Type	MT	Defines the message type	Enum: 0: Fan control
8	2	Humidity Control	HC	Activates the humidity control	Enum: 0: Disabled 1: Enabled 2: Default 3: No change
10	2	Room Size Reference	RSR	Defines if the provided room size has to be considered	Enum: 0: Used 1: Not used 2: Default 3: No change
12	4	Room Size	RS	Defines the room size	Enum: 0: < 25 m² 1: 25...50 m² 2: 50...75 m² 3: 75...100 m² 4: 100...125 m² 5: 125...150 m² 6: 150...175 m² 7: 175...200 m² 8: 200...225 m² 9: 225...250 m² 10: 250...275 m² 11: 275...300 m² 12: 300...325 m² 13: 325...350 m² 14: > 350 m² 15: No change
16	8	Humidity Threshold	HT	Sets the humidity threshold	Enum: 0...100: 0...100% 101...252: Reserved 253: Auto 254: Default 255: No change
24	8	Fan Speed *	FS	Sets the fan speed	Enum: 0...100: 0...100% 101...252: Reserved 253: Auto 254: Default 255: No change

Telegram Definition : 'Fan Status Message'

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Operating Mode Status	OMS	Provides the recent operating mode	Enum: 0: Disabled 1: Standard compliant 2...14: Reserved 15: Not supported		

4	3	Service Information	SI	Service information	Enum: 0: Nothing to report 1: Air filter error 2: Hardware error 3...6: Reserved 7: Not supported
7	1	Message Type	MT	Defines the message type	Enum: 1: Fan status
8	2	Humidity Control Status	HCS	States if the humidity control is active	Enum: 0: Disabled 1: Enabled 2: Reserved 3: Not supported
10	2	Room Size Reference	RSR	States if the provided room size has to be considered	Enum: 0: Used 1: Not used 2: Reserved 3: Not supported
12	4	Room Size Status	RSS	Room size status	Enum: 0: < 25 m² 1: 25...50 m² 2: 50...75 m² 3: 75...100 m² 4: 100...125 m² 5: 125...150 m² 6: 150...175 m² 7: 175...200 m² 8: 200...225 m² 9: 225...250 m² 10: 250...275 m² 11: 275...300 m² 12: 300...325 m² 13: 325...350 m² 14: > 350 m² 15: Not supported
16	8	Humidity	HUM	Humidity measurement	Enum: 0...100: 0...100% 101...254: Reserved 255: Not supported
24	8	Fan Speed Status	FSS	Fan speed	Enum: 0...100: 0...100% 101...254: Reserved 255: Not supported

RORG	D2	**VLD Telegram**
FUNC	20	Fan Control
TYPE	01	Type 0x01

Submitter: Maico Elektroapparate-Fabrik GmbH

Telegram Definition : 'Fan Control Message'

* Devices with discrete fan speed levels instead of a continuous fan speed range should divide the full range linearly and match values beside those discrete levels to the next lower fan speed level.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	7	Not Used (= 0)					
7	1	Message Type	MT	Defines the message type	Enum: 0: Fan control		
8	2	Not Used (= 0)					
10	2	Room Size Reference	RSR	Defines if the provided room size has to be considered	Enum: 0: Used 1: Not used 2: Default 3: No change		
12	4	Room Size	RS	Defines the room size	Enum: 0: < 25 m² 1: 25...50 m² 2: 50...75 m² 3: 75...100 m² 4: 100...125 m² 5: 125...150 m² 6: 150...175 m² 7: 175...200 m² 8: 200...225 m² 9: 225...250 m² 10: 250...275 m² 11: 275...300 m² 12: 300...325 m² 13: 325...350 m² 14: > 350 m² 15: No change		
16	8	Not Used (= 0)					
24	8	Fan Speed *	FS	Sets the fan speed	Enum: 0...100: 0...100% 101...252: Reserved 253: Auto 254: Default 255: No change		

Telegram Definition : 'Fan Status Message'

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Operating Mode Status	OMS	Provides the recent operating mode	Enum: 0: Disabled 1: Standard compliant 2...14: Reserved 15: Not supported		
4	3	Not Used (= 0)					
7	1	Message Type	MT	Defines the message type	Enum: 1: Fan status		
8	2	Not Used (= 0)					
10	2	Room Size Reference	RSR	States if the provided room size has to be considered	Enum: 0: Used 1: Not used 2: Reserved 3: Not supported		

12	4	Room Size Status	RSS	Room size status	Enum: 0: < 25 m² 1: 25...50 m² 2: 50...75 m² 3: 75...100 m² 4: 100...125 m² 5: 125...150 m² 6: 150...175 m² 7: 175...200 m² 8: 200...225 m² 9: 225...250 m² 10: 250...275 m² 11: 275...300 m² 12: 300...325 m² 13: 325...350 m² 14: > 350 m² 15: Not supported
16	8	Not Used (= 0)			
24	8	Fan Speed Status	FSS	Fan speed	Enum: 0...100: 0...100% 101...254: Reserved 255: Not supported

RORG	D2	**VLD Telegram**
FUNC	20	Fan Control
TYPE	02	Type 0x02

Submitter: Maico Elektroapparate-Fabrik GmbH

Telegram Definition : 'Fan Control Message'

* Devices with discrete fan speed levels instead of a continuous fan speed range should divide the full range linearly and match values beside those discrete levels to the next lower fan speed level.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	7	Not Used (= 0)					
7	1	Message Type	MT	Defines the message type	Enum: 0: Fan control		
8	2	Not Used (= 0)					
10	2	Room Size Reference	RSR	Defines if the provided room size has to be considered	Enum: 0: Used 1: Not used 2: Default 3: No change		
12	4	Room Size	RS	Defines the room size	Enum: 0: < 25 m² 1: 25...50 m² 2: 50...75 m² 3: 75...100 m² 4: 100...125 m² 5: 125...150 m² 6: 150...175 m² 7: 175...200 m² 8: 200...225 m² 9: 225...250 m² 10: 250...275 m²		

					11: 275...300 m² 12: 300...325 m² 13: 325...350 m² 14: > 350 m² 15: No change
16	8	Not Used (= 0)			
24	8	Fan Speed *	FS	Sets the fan speed	Enum: 0...100: 0...100% 101...252: Reserved 253: Auto 254: Default 255: No change

Telegram Definition : 'Fan Status Message'

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	7	Not Used (= 0)					
7	1	Message Type	MT	Defines the message type	Enum: 1: Fan status		
8	2	Humidity Control Status	HCS	States if the humidity control is active	Enum: 0: Disabled 1: Enabled 2: Reserved 3: Not supported		
10	2	Room Size Reference	RSR	States if the provided room size has to be considered	Enum: 0: Used 1: Not used 2: Reserved 3: Not supported		
12	4	Room Size Status	RSS	Room size status	Enum: 0: < 25 m² 1: 25...50 m² 2: 50...75 m² 3: 75...100 m² 4: 100...125 m² 5: 125...150 m² 6: 150...175 m² 7: 175...200 m² 8: 200...225 m² 9: 225...250 m² 10: 250...275 m² 11: 275...300 m² 12: 300...325 m² 13: 325...350 m² 14: > 350 m² 15: Not supported		
16	8	Not Used (= 0)					
24	8	Fan Speed Status	FSS	Fan speed	Enum: 0...100: 0...100% 101...254: Reserved 255: Not supported		

D2-30: Floor Heating Controls and Automated Meter Reading

Floor heating controls and automated meter reading gateway may appear combined in one device, but the metering functionality can also be absent.

The floor heating control unit controls a number of valves for separate heating circuits (e.g. for separate heating of single rooms). It measures the common hot water supply temperature as well as the return water temperatures of each single circuit.

The automated meter reading gateway is a device that connects to various counters such as heating, water, gas or electrical energy meters. The meters may be connected to the gateway by one or several of these interface types: M-Bus, D0, S0 (see appendix). The gateway reports the continuous energy or flow volume meter reading of each of the connected metering devices. Typically the measured variables consist of a momentary value and an accumulated value. The transmission of separated consumption import and export values is supported, too.

Data exchange

Direction: bidirectional
Addressing: ADT inbound, broadcast outbound
Communication trigger: event- & time-triggered
Communication interval: minimum 1-1000 s, maximum 1000 s
Trigger event: heartbeat 1000 s, value change in "Position", "Return Temperature", "Status/Error", "Supply Temperature", "Meter Reading" while respecting the minimum reporting interval
Tx delay: 500 ms (maximum response time, first telegram)
Rx timeout: 0 ms (minimum time between two received messages)
Teach-in method: Universal teach-in (outbound)
Encryption required : no
Security level format : 0

EEP Family Table
(Only for VLD EEP families)

Each TYPE has to support every parameter that is marked in its column!

Supported function	Type 0x00	Type 0x01	Type 0x02	Type 0x03	Type 0x04
Number of heating channels/valves	4	8	8	8	8
Number of supported MBUS meters	0	0	8	10	10
Number of supported S0 meters	0	0	0	0	1
Number of supported D0 meters	0	0	0	0	0

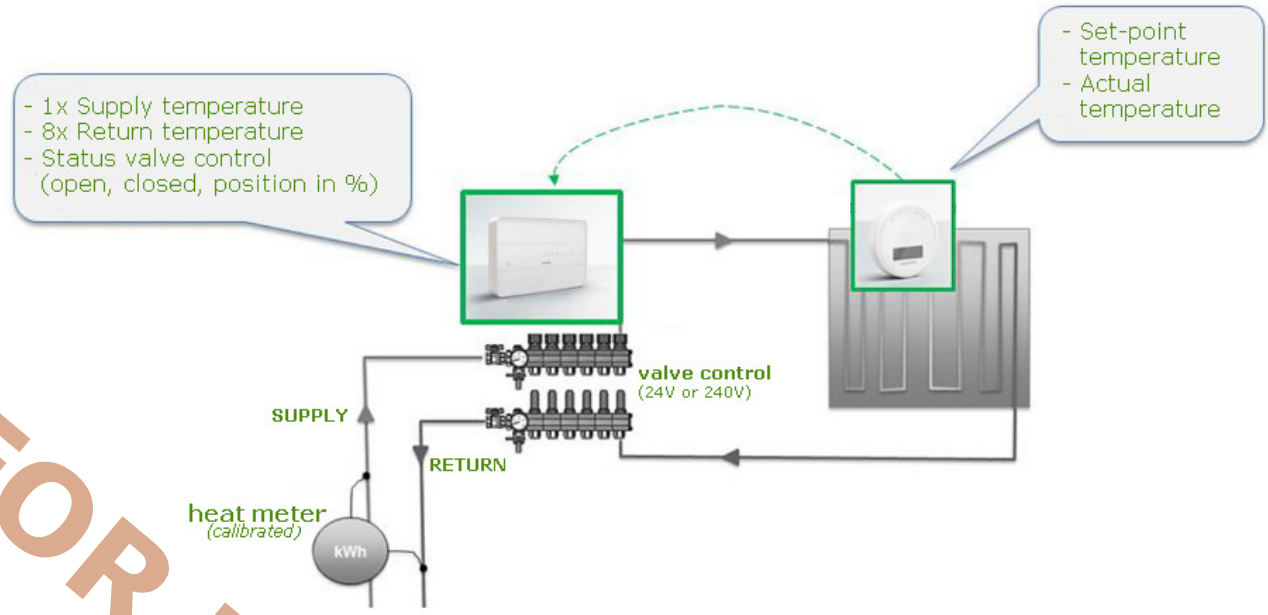
Description of the meter interfaces

S0-Interface:
The S0-Interface is a two-wire connection designed for the transmission of monotonously rising measurement data. The standard is defined in EN 62053-31. The meter device transmits a fixed number of pulses per physical meter unit. The number of pulses per unit is defined by the meter manufacturer and depends on the necessary precision of the meter system. The pulses are output as currency variations, where a value lower than 3 mA corresponds to a logical 0. The sender output is mostly realized by a transistor or an opto-coupler, which needs to be supplied by a voltage of 27-30 V. Polarity must be respected.

D0-Interface:
The D0-interface is an optical metering interface defined in EN62056-61. It allows the unidirectional readout of metering data at a rate of 9600 Baud, using telegrams with start bit, 7 data bits, parity and a stop bit. One of the protocols SML (Smart Message Language) or DLMS (Device Language Message Specification, EN62056-21) can be used for coding the data. A D0-Meter can deliver consumption data as well as various system data. The source and type of a data point is indicated by the standardized OBIS-codes.

MBUS-Interface:
The M-Bus (Meter-Bus) is a bidirectional field bus for the communication with consumption meters. It is described in standard EN13757. Typically there can be connected up to 250 devices in one M-Bus network. There is a common master in the network, who periodically collects the meter data from its slaves. The network may be implemented either as two-wire cable network allowing remote powering of the slaves or as wireless network. The protocol operates at 300 to 9600 Baud and codes the data bytes with start bit, 8 data bits, parity and a stop bit. The data records sent by a metering slave deliver in their header field the coding information of the following data field (value size, measurement medium, unit, multiplier). The master can address a single slave by its primary address (1…250), which must be assigned during network configuration, or by its secondary address, which is a unique device identification number assigned by the device manufacturer.

Application example for floor heating controls



References:
M-Bus documentation: www.m-bus.com
SML specification: www.vde.com/de/fnn/arbeitsgebiete/messwesen/Sym2/Seiten/default.aspx
DLMS User Association: www.dlms.com

RORG	D2	**VLD Telegram**
FUNC	30	Floor Heating Controls and Automated Meter Reading
TYPE	00	Type 0x00

Submitter: MSR-Solutions

CMD 0x1 - Set heating controls output

This message is sent to a floor heating actuator. It controls the valve position of one channel or of all channels of the floor heating controls.

Sender: controller; send type: broadcast or addressed; expected response: CMD 0x3

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Valve control period / PWM signal interval	PERIOD	Total on-off time for two-position valve controller (T valve open + T valve closed)	Enum:		
					0: Local default / no change		
					1: 1 s		
					2: 2 s		
					3: 5 s		
					4: 10 s		
					5: 20 s		
					6: 50 s		
					7: 100 s		
					8: 200 s		
					9: 500 s		
					10: 1000 s		
					11...15: Reserved		
4	4	Command ID	CMD	Command identifier	Enum:		
					0x01: ID 01		

8	2	Not Used (= 0)					
10	1	Valve type	VTYP	Type of connected valve	Enum: 0: Valve normally closed (N.C.) 1: Valve normally open (N.O.)		
11	5	Heating channel	HCH	The heating channel that should be set	Enum: 0...15: A valid channel number 16...30: Reserved 31: All valid channels		
16	1	Run init sequence	RIN	Measure and store the valve zero point	Enum: 0: No action 1: Run init sequence		
17	7	Valve position set point	POS	Valve set point 0…100% (0=closed, 100=open)	0...100	0...100	%

CMD 0x2 - Heating controls status query

This message is sent to a floor heating actuator. It requests the status of one channel or the status of the global control unit of an actuator.

Sender: controller; send type: broadcast or addressed; expected response: CMD 0x3

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x02: ID 02		
8	3	Not Used (= 0)					
11	5	Heating channel	HCH	The heating channel that should be reported	Enum: 0...15: A valid channel number 16...28: Reserved 29: All valid channels 30: All valid channels and global device status 31: Global device status only		

CMD 0x3 - Heating controls status response / CH = 0...15

This message is sent by a floor heating controls if one of the following events occurs:
- Message "status query" has been received (CMD 0x2).
- Status of one channel or temperature has changed.

Sender: actuator; send type: broadcast; maximum send delay 1 s.

If the response is for single channel data (CH = 0…15):

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x03: ID 03		
8	3	Status / Error	STATUS	Status / Error indication of given channel	Enum: 0: No fault 1: General error 2: Init sequence running 3: Channel not available 4: Temperature sensor error		

					5: Valve error 6: Temperature sensor and valve error 7: Reserved		
11	5	Heating channel	HCH	The heating channel that is reported	Enum: 0...15: A valid channel number 16...31: Reserved		
16	1	Not Used (= 0)					
17	7	Valve position	POS	Actual valve position 0…100% (0=closed, 100=open)	0...100	0...100	%
24	8	Return temperature	TEMPRET	The current return temperature of the channel	0...180	0...90	°C

CMD 0x3 - Heating controls status response / CH = 31

If the response is for global floor heating controls unit data (CH = 31):

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x03: ID 03		
8	3	Status / Error	STATUS	Global unit status	Enum: 0: No fault 1: General error 2: Supply temperature error 3: Return temperature error 4: Error on both sensors 5...7: Reserved		
11	5	Heating channel	HCH	The heating channel that is reported (=global unit)	Enum: 31: Unit status only		
16	8	Supply temperature	TSUP	The current supply temperature of the unit	0...180	0...90	°C
24	8	Return temperature	TRET	The current common return temperature	0...180	0...90	°C

CMD 0x6 - Set meter configuration / MBUS (BUS = 1)

This message is sent to a metering device gateway to configure the meter settings for one channel.

Sender: controller; send type: broadcast or addressed.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Report measurement	RM	Minimum auto reporting interval	Enum: 0: No auto reporting 1: Min. 1 s interval 2: Min. 3 s interval 3: Min. 10 s interval 4: Min. 30 s interval 5: Min. 100 s interval 6: Min. 300 s interval 7: Min. 1000 s interval 8...15: Reserved		
4	4	Command ID	CMD	Command identifier	Enum: 0x06: ID 06		
8	1	Not Used (= 0)					

9	2	Meter bus type	BUS	The meter bus that should be configured	Enum: 0: Reserved 1: MBUS 2: S0 3: D0		
11	5	Meter channel index	MCH	The meter bus that should be configured	0...30	0...30	1
16	2	Not Used (= 0)					
18	3	Meter 1 units	UNIT1	Physical units of first measured quantity (imported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter		
21	3	Meter 2 units	UNIT2	Physical units of second measured quantity (exported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter		
24	8	Primary Address	ADDR	The primary MBUS address of the meter	1...250	1...250	1
32	40	Not Used (= 0)					

CMD 0x6 - Set meter configuration / S0 (BUS = 2)

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Report measurement	RM	Minimum auto reporting interval	Enum: 0: No auto reporting 1: Min. 1 s interval 2: Min. 3 s interval 3: Min. 10 s interval 4: Min. 30 s interval 5: Min. 100 s interval 6: Min. 300 s interval 7: Min. 1000 s interval 8...15: Reserved		
4	4	Command ID	CMD	Command identifier	Enum: 0x06: ID 06		
8	1	Not Used (= 0)					
9	2	Meter bus type	BUS	The meter bus that should be configured	Enum: 0: Reserved 1: MBUS 2: S0 3: D0		

11	5	Meter channel index	MCH	The meter number of given bus that should be configured	0...30	0...30	1
16	2	Not Used (= 0)					
18	3	Meter 1 units	UNIT1	Physical units of first measured quantity (imported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter		
21	3	Meter 2 units	UNIT2	Physical units of second measured quantity (exported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter		
24	2	Factor of number of pulses	FACP	The factor for the number of pulses per value in UNIT1	Enum: 0: 1 1: 0.1 2: 0.01 3: 0.001		
26	14	Number of pulses	NOP	The number of pulses per value in UNIT1* FACP	Enum: 0: Do not change the current setting of NOP 1...65535: Number of pulses per unit		
40	32	Preset value	RST	Preset the accumulated value to this value	Enum: 0...4294967294: New preset value 0xFFFFFFFF: Do not change the current value		

CMD 0x6 - Set meter configuration / D0 (BUS = 3)

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Report measurement	RM	Minimum auto reporting interval	Enum: 0: No auto reporting 1: Min. 1 s interval 2: Min. 3 s interval 3: Min. 10 s interval 4: Min. 30 s interval 5: Min. 100 s interval 6: Min. 300 s interval 7: Min. 1000 s interval 8...15: Reserved		
4	4	Command ID	CMD	Command identifier	Enum: 0x06: ID 06		

8	1	Not Used (= 0)					
9	2	Meter bus type	BUS	The meter bus that should be configured	Enum: 0: Reserved 1: MBUS 2: S0 3: D0		
11	5	Meter channel index	MCH	The meter number of given bus that should be configured	0...30	0...30	1
16	2	Not Used (= 0)					
18	3	Meter 1 units	UNIT1	Physical units of first measured quantity (imported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter		
21	3	Meter 2 units	UNIT2	Physical units of second measured quantity (exported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter		
24	8	D0 Protocol	PROT	The D0 protocol that should be used for that meter	Enum: 0: Auto detect 1: SML (Smart Message Language) 2: DLMS (Device Language Message Specification) 3...255: Reserved		
32	40	Not Used (= 0)					

CMD 0x7 - Meter Status Query

This message is sent to a metering device gateway to query the status of a meter.
Sender: controller; send type: broadcast or addressed; expected response: CMD 0x8.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x07: ID 07		
8	1	Not Used (= 0)					
9	2	Meter bus type	BUS	The meter bus type that is queried	Enum: 0: Reserved 1: MBUS 2: S0 3: D0		

11	5	Meter channel index	MCH	The meter channel of given bus that status is queried	Enum: 0...30: Meter channel 31: All valid channels

CMD 0x8 - Meter reading report / status response

This message is sent by a metering device gateway to report the meter values for each configured channel. It is sent if one of the following events occurs:
- Message "meter status query" has been received (CMD 0x7)
- Status or meter reading of one channel has changed and auto reporting was configured by signal RM.

Sender: sensor; send type: broadcast; maximum send delay 1 s.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	1	Not Used (= 0)					
1	3	Meter status / error	MSTAT	Meter channel status	Enum: 0: No fault 1: General error 2: Bus unconfigured 3: Bus unconnected 4: Bus shortcut 5: Communication timeout 6: Unknown protocol or configuration mismatch 7: Bus initialization running		
4	4	Command ID	CMD	Command identifier	Enum: 0x08: ID 08		
8	1	Not Used (= 0)					
9	2	Meter bus type	BUS	The used bus of the meter status response	Enum: 0: Reserved 1: MBUS 2: S0 3: D0		
11	5	Meter channel index	MCH	The meter number of given bus that status is reported	0...30	0...30	1
16	3	Not Used (= 0)					
19	2	Value selection	VSEL	The selection of the reported value	Enum: 0: Meter 1 Current value 1: Meter 1 Accumulated value 2: Meter 2 Current value 3: Meter 2 Accumulated value		
21	3	Value unit	VUNIT	The unit of the reported value	Enum: 0: W 1: Wh 2: kWh 3: m3/h 4: dm3/h 5: m3 6: dm3 7: 1 (digital counter)		
24	32	Meter reading value	VAL	The reported value	0...4294967295	0...4294967295	According to VUNIT

RORG	D2	VLD Telegram
FUNC	30	Floor Heating Controls and Automated Meter Reading
TYPE	01	Type 0x01 (description: see table)

See profile: D2-30-00

RORG	D2	VLD Telegram
FUNC	30	Floor Heating Controls and Automated Meter Reading
TYPE	02	Type 0x02 (description: see table)

See profile: D2-30-00

RORG	D2	VLD Telegram
FUNC	30	Floor Heating Controls and Automated Meter Reading
TYPE	03	Type 0x03 (description: see table)

See profile: D2-30-00

RORG	D2	VLD Telegram
FUNC	30	Floor Heating Controls and Automated Meter Reading
TYPE	04	Type 0x04 (description: see table)

See profile: D2-30-00

D2-31: Automated Meter Reading Gateway

The automated meter reading gateway is a device that connects to various counters such as heating, water, gas or electrical energy meters. The meters may be connected to the gateway by one or several of these interface types: M-Bus, D0, S0 (see appendix). The gateway reports the continuous energy or flow volume meter reading of each of the connected metering devices. Typically the measured variables consist of a momentary value and an accumulated value. The transmission of separated consumption import and export values is supported, too.

Data exchange

Direction: bidirectional
Addressing: ADT inbound, broadcast outbound
Communication trigger: event- & time-triggered
Communication interval: minimum 1-1000 s (configuration item), maximum 1000 s
Trigger event: heartbeat 1000 s, value change in “Status/Error”, “Meter Reading” while respecting the minimum reporting interval
Tx delay: 500 ms (maximum response time, first telegram)
Rx timeout: 0 ms (minimum time between two received messages)
Teach-in method: Universal teach-in (outbound)
Encryption required : no
Security level format : 0

Telegram Definition
The telegram definition is inherited from profile D2-30-xx and thus identical to the definition there.

EEP Family Table
(Only for VLD EEP families)

Each TYPE has to support every parameter that is marked in its column!

Supported function	Type 0x00	Type 0x01
Number of supported MBUS meters	10	16
Number of supported S0 meters	2	0
Number of supported D0 meters	2	0

Description of the meter interfaces

S0-Interface:
The S0-Interface is a two-wire connection designed for the transmission of monotonously rising measurement data. The standard is defined in EN 62053-31. The meter device transmits a fixed number of pulses per physical meter unit. The number of pulses per unit is defined by the meter manufacturer and depends on the necessary precision of the meter system. The pulses are output as currency variations, where a value lower than 3 mA corresponds to a logical 0. The sender output is mostly realized by a transistor or an opto-coupler, which needs to be supplied by a voltage of 27-30 V. Polarity must be respected.

D0-Interface:
The D0-interface is an optical metering interface defined in EN62056-61. It allows the unidirectional readout of metering data at a rate of 9600 Baud, using telegrams with start bit, 7 data bits, parity and a stop bit. One of the protocols SML (Smart Message Language) or DLMS (Device Language Message Specification, EN62056-21) can be used for coding the data. A D0-Meter can deliver consumption data as well as various system data. The source and type of a data point is indicated by the standardized OBIS-codes.

MBUS-Interface:
The M-Bus (Meter-Bus) is a bidirectional field bus for the communication with consumption meters. It is described in standard EN13757. Typically there can be connected up to 250 devices in one M-Bus network. There is a common master in the network, who periodically collects the meter data from its slaves. The network may be implemented either as two-wire cable network allowing remote powering of the slaves or as wireless network. The protocol operates at 300 to 9600 Baud and codes the data bytes with start bit, 8 data bits, parity and a stop bit. The data records sent by a metering slave deliver in their header field the coding information of the following data field (value size, measurement medium, unit, multiplier). The master can address a single slave by its primary address (1…250), which must be assigned during network configuration, or by its secondary address, which is a unique device identification number assigned by the device manufacturer.

References:
M-Bus documentation: www.m-bus.com
SML specification: www.vde.com/de/fnn/arbeitsgebiete/messwesen/Sym2/Seiten/default.aspx
DLMS User Association: www.dlms.com

RORG	D2	**VLD Telegram**
FUNC	31	Automated Meter Reading Gateway
TYPE	00	Type 0x00

Submitter: MSR-Solutions

CMD 0x6 - Set meter configuration / MBUS (BUS = 1)

This message is sent to a metering device gateway to configure the meter settings for one channel.

Sender: controller; send type: broadcast or addressed.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Report measurement	RM	Minimum auto reporting interval	Enum: 0: No auto reporting 1: Min. 1 s interval 2: Min. 3 s interval 3: Min. 10 s interval 4: Min. 30 s interval 5: Min. 100 s interval 6: Min. 300 s interval 7: Min. 1000 s interval 8...15: Reserved		
4	4	Command ID	CMD	Command identifier	Enum: 0x06: ID 06		
8	1	Not Used (= 0)					
9	2	Meter bus type	BUS	The meter bus that should be configured	Enum: 0: Reserved 1: MBUS		

					2: S0 3: D0		
11	5	Meter channel index	MCH	The meter number of given bus that should be configured	0...30	0...30	1
16	2	Not Used (= 0)					
18	3	Meter 1 units	UNIT1	Physical units of first measured quantity (imported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter		
21	3	Meter 2 units	UNIT2	Physical units of second measured quantity (exported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter		
24	8	Primary Address	ADDR	The primary MBUS address of the meter	1...250	1...250	1
32	40	Not Used (= 0)					

CMD 0x6 - Set meter configuration / S0 (BUS = 2)

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Report measurement	RM	Minimum auto reporting interval	Enum: 0: No auto reporting 1: Min. 1 s interval 2: Min. 3 s interval 3: Min. 10 s interval 4: Min. 30 s interval 5: Min. 100 s interval 6: Min. 300 s interval 7: Min. 1000 s interval 8...15: Reserved		
4	4	Command ID	CMD	Command identifier	Enum: 0x06: ID 06		
8	1	Not Used (= 0)					
9	2	Meter bus type	BUS	The meter bus that should be configured	Enum: 0: Reserved 1: MBUS 2: S0 3: D0		
11	5	Meter channel index	MCH	The meter number of given bus that should be configured	0...30	0...30	1
16	2	Not Used (= 0)					

18	3	Meter 1 units	UNIT1	Physical units of first measured quantity (imported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter
21	3	Meter 2 units	UNIT2	Physical units of second measured quantity (exported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter
24	2	Factor of number of pulses	FACP	The factor for the number of pulses per value in UNIT1	Enum: 0: 1 1: 0.1 2: 0.01 3: 0.001
26	14	Number of pulses	NOP	The number of pulses per value in UNIT1* FACP	Enum: 0: Do not change the current setting of NOP 1...65535: Number of pulses per unit
40	32	Preset value	RST	Preset the accumulated value to this value	Enum: 0...4294967294: New preset value 0xFFFFFFFF: Do not change the current value

CMD 0x6 - Set meter configuration / D0 (BUS = 3)

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Report measurement	RM	Minimum auto reporting interval	Enum: 0: No auto reporting 1: Min. 1 s interval 2: Min. 3 s interval 3: Min. 10 s interval 4: Min. 30 s interval 5: Min. 100 s interval 6: Min. 300 s interval 7: Min. 1000 s interval 8...15: Reserved		
4	4	Command ID	CMD	Command identifier	Enum: 0x06: ID 06		
8	1	Not Used (= 0)					

9	2	Meter bus type	BUS	The meter bus that should be configured	Enum: 0: Reserved 1: MBUS 2: S0 3: D0		
11	5	Meter channel index	MCH	The meter number of given bus that should be configured	0...30	0...30	1
16	2	Not Used (= 0)					
18	3	Meter 1 units	UNIT1	Physical units of first measured quantity (imported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter		
21	3	Meter 2 units	UNIT2	Physical units of second measured quantity (exported value)	Enum: 0: No reading (unconfigured) 1: Current value W, accumulated value kWh 2: Current value W, accumulated value Wh 3: Accumulated value kWh only 4: Current value m3/h, accumulated value m3 5: Current value dm3/h, accumulated value dm3 6: Accumulated value m3 only 7: Digital counter		
24	8	D0 Protocol	PROT	The D0 protocol that should be used for that meter	Enum: 0: Auto detect 1: SML (Smart Message Language) 2: DLMS (Device Language Message Specification) 3...255: Reserved		
32	40	Not Used (= 0)					

CMD 0x7 - Meter Status Query

This message is sent to a metering device gateway to query the status of a meter.
Sender: controller; send type: broadcast or addressed; expected response: CMD 0x8.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Not Used (= 0)					
4	4	Command ID	CMD	Command identifier	Enum: 0x07: ID 07		
8	1	Not Used (= 0)					
9	2	Meter bus type	BUS	The meter bus type that is queried	Enum: 0: Reserved 1: MBUS 2: S0 3: D0		

11	5	Meter channel index	MCH	The meter channel of given bus that status is queried	Enum: 0...30: Meter channel 31: All valid channels

CMD 0x8 - Meter reading report / status response

This message is sent by a metering device gateway to report the meter values for each configured channel. It is sent if one of the following events occurs:
- Message "meter status query" has been received (CMD 0x7)
- Status or meter reading of one channel has changed and auto reporting was configured by signal RM.

Sender: sensor; send type: broadcast; maximum send delay 1 s.

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	1	Not Used (= 0)					
1	3	Meter status / error	MSTAT	Meter channel status	Enum: 0: No fault 1: General error 2: Bus unconfigured 3: Bus unconnected 4: Bus shortcut 5: Communication timeout 6: Unknown protocol or configuration mismatch 7: Bus initialization running		
4	4	Command ID	CMD	Command identifier	Enum: 0x08: ID 08		
8	1	Not Used (= 0)					
9	2	Meter bus type	BUS	The used bus of the meter status response	Enum: 0: Reserved 1: MBUS 2: S0 3: D0		
11	5	Meter channel index	MCH	The meter number of given bus that status is reported	0...30	0...30	1
16	3	Not Used (= 0)					
19	2	Value selection	VSEL	The selection of the reported value	Enum: 0: Meter 1 Current value 1: Meter 1 Accumulated value 2: Meter 2 Current value 3: Meter 2 Accumulated value		
21	3	Value unit	VUNIT	The unit of the reported value	Enum: 0: W 1: Wh 2: kWh 3: m3/h 4: dm3/h 5: m3 6: dm3 7: 1 (digital counter)		
24	32	Meter reading value	VAL	The reported value	0...4294967295	0...4294967295	According to VUNIT

RORG	D2	VLD Telegram
FUNC	31	Automated Meter Reading Gateway
TYPE	01	Type 0x01 (description: see table)

See profile: D2-31-00

D2-A0: Standard Valve

RORG	D2	**VLD Telegram**
FUNC	A0	Standard Valve
TYPE	01	Valve Control (BI-DIR)

Submitter: Afriso / EnOcean

Description:
Radio operated valve control with feedback message. Valve is controlled through the air interface to be opened or closed. The valve reports the actual status after finishing the determined operation.

Data exchange
Direction: bidirectional
Addressing: addressed (inbound) and broadcast (outbound)
Communication trigger: event- & time-triggered
Trigger event: position of valve has changed
Teach-in method: UTE

DIRECTION-1 = Outbound (water valve to the controller)
Description: Valve reports its status. Report is sent after operation was executed or as a heartbeat.

DIRECTION-2 = Inbound (controller to the water valve)
Description: Operational command to the valve. After this request a feedback response will be transmitted, once the operation is finished.
A "no change"-command will also be followed by a feedback response. Therefore, it can be used as a status request.

DIRECTION-1

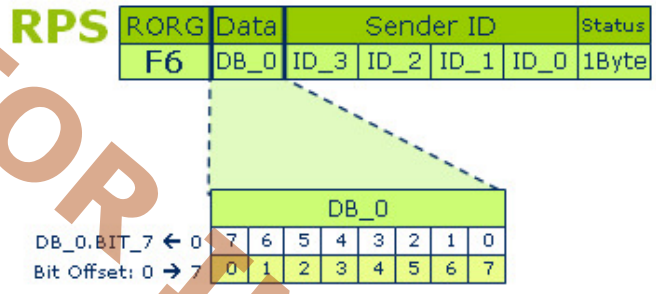
Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	6	Not Used (= 0)					
6	2	Feedback	FDB	Return	Enum: 0b00: Not defined 0b01: Closed 0b10: Opened 0b11: Not defined		

DIRECTION-2

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	6	Not Used (= 0)					
6	2	Request	REQ	Request to operate the valve	Enum: 0b00: No change (request of feedback) 0b01: Request to close valve 0b10: Request to open valve 0b11: Request to close valve		

3) Appendix

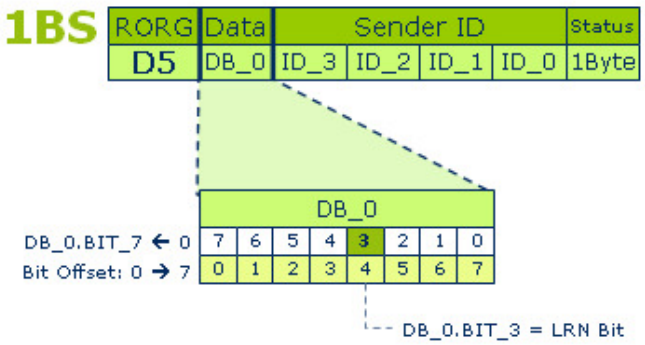
3.1) RPS Teach-in



The RPS telegram can only send data and has no special telegram modification to teach-in the device. Therefore, the teach-in procedure takes place manually on the actuator/controller through a normal data telegram. The EEP profile must be manually supplied to the controller per sender ID.

In learn mode, the receiving actuator reduces the input sensitivity in order to fade out weakly received data telegrams. This helps avoid inadvertently teaching-in sensors.

3.2) 1BS Teach-in



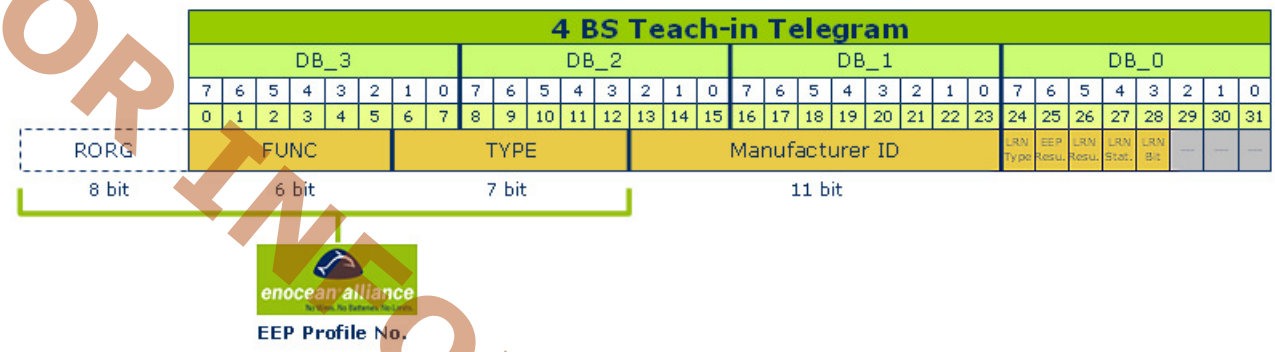
The 1BS telegram has its own teach-in telegram, which can signal the teach-in command through the DB_0.BIT_3 data bit.

Offset	Size	Bitrange	Data	Valid Range	Scale	Unit

4	1	DB0.3	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram

Here, an EEP profile must also be manually allocated per sender ID.

3.3) 4BS Teach-in



The 4BS telegram also has its own teach-in telegram, however with more teach-in variations:

Variation 1

The profile-less unidirectional teach-in procedure functions according to the same principle as the 1BS telegram: if the data bit is DB_0.BIT_3 = 0, then a teach-in telegram is sent. This includes the 'LRN TYPE' DB_0.BIT_7 = 0 data bit. Then no EEP profile identifier and no manufacturer ID are transferred.

Offset	Size	Bitrange	Data	Valid Range	Scale	Unit
24	1	DB0.7	LRN Type	Enum: 0: telegram without EEP and Manufacturer ID		
28	1	DB0.3	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		

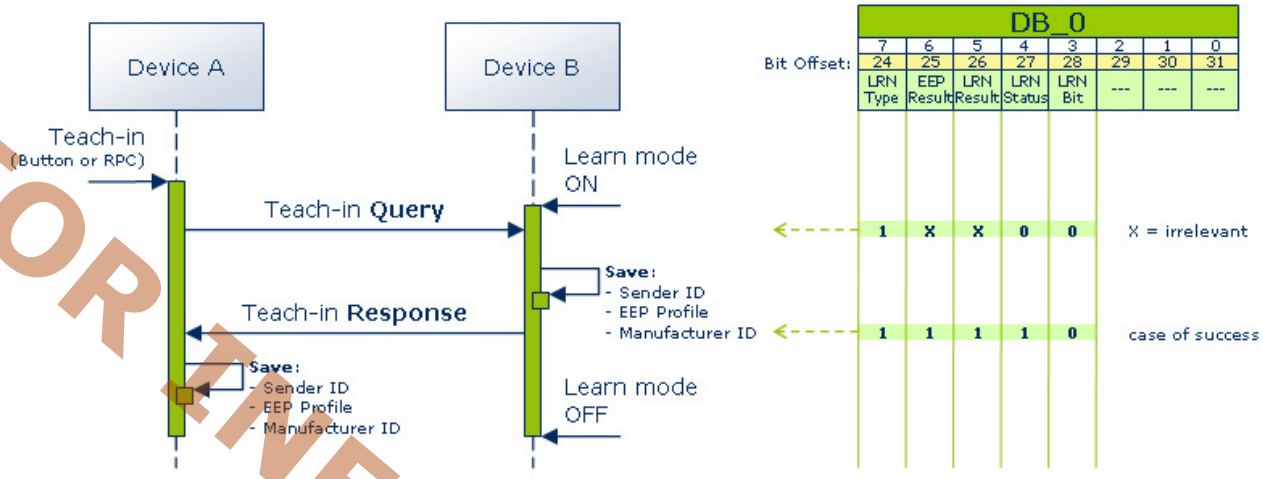
Variation 2

For the unidirectional profile teach-in procedure, it is preferred in opposite to variation 1), as the teach-in telegram contains both the complete EEP number and the manufacturer ID. The device is therefore clearly identifiable as ready-to-use and can be securely executed in a complex system environment or by foreign systems. In this case, the 'LRN TYPE' data bit is DB_0.BIT_7 = 1.

Offset	Size	Bitrange	Data	Valid Range	Scale	Unit
24	1	DB0.7	LRN Type	Enum: 1: telegram with EEP number and Manufacturer ID		
28	1	DB0.3	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		

Variation 3

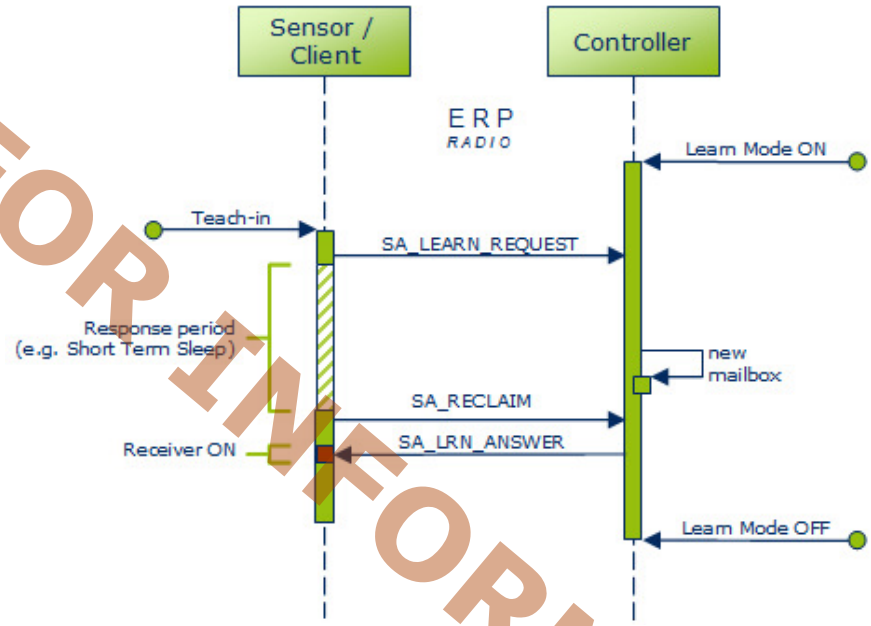
During the bidirectional teach-in procedure, further bits are required from the DB_0, in order to develop the mutual teach-in between two communication partners. For this, the procedure is made up of 2 teach-in telegrams, which are exchanged on both sides. The following UML diagram is used to illustrate this:



Offset	Size	Bitrange	Data	Valid Range	Scale	Unit
24	1	DB0.7	LRN Type	Enum: 0: telegram without EEP and Manufacturer ID 1: telegram with EEP number and Manufacturer ID		
25	1	DB0.6	EEP Result	Enum: 0: EEP not supported 1: EEP supported		
26	1	DB0.5	LRN Result	Enum: 0: Sender ID deleted/not stored 1: Sender ID stored		
27	1	DB0.4	LRN Status	Enum: 0: Query 1: Response		
28	1	DB0.3	LRN Bit	Enum: 0: Teach-in telegram 1: Data telegram		

3.4) Smart Ack Teach-in (without repeater)

Under Smart Ack (SA), the teach-in procedure is more complex as, alongside the SA client and SA controller, a Postmaster must also be established to prepare a mailbox for each taught-in SA client. The Postmaster is normally found in the controller. If a repeater is installed, then a postmaster is set up there.

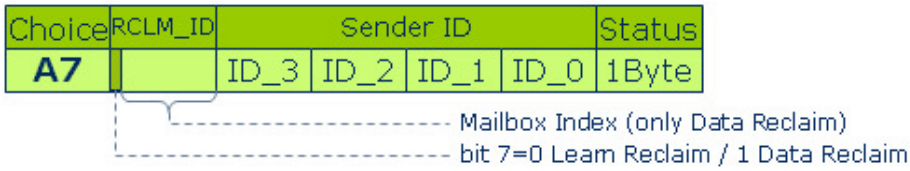


After the learn mode is activated on the controller, the teach-in procedure can be started on the client. The client sends an SA_LEARN_REQUEST telegram:

RORG	Req.	Manuf.ID	EEP (3 byte)			RSSI	Repeater ID				Sender ID				Status	CHCK
C6	5 bit	11 bit	RORG	FUNC	TYPE	dBm	ID_3	ID_2	ID_1	ID_0	ID_3	ID_2	ID_1	ID_0	1 Byte	1 Byte
	Request Code															

Data	Value	Description
Request Code	0b11111	Default value – send by sensor
Manufacturer ID	0bnnnnnnnnnnn	Corresponding to the teach-in sensor
EEP No.	0xnnnnnn	RORG, FUNC, TYPE
RSSI	0x00	0 = Without repeater
Repeater ID	0x00000000	0 = Without repeater
Sender ID	0xnnnnnnnn	Chip ID of sensor for teach-in
Status	0x0F	0F = no repeating permitted
CHCK	0xnn	Checksum

During the 'response period' in the SA client, which is always 550 ms during the teach-in, the controller creates a new mailbox in its postmaster and leaves its first message there with an OK receipt. This entry is requested from the postmaster by the SA client with an SA_RECLAIM 'Learn' telegram:



Data	Value	Description
Message Index	0b0	Bit 7: 0 = Learn Reclaim
Sender ID	0xnnnnnnnn	Chip ID of sensor for teach-in
Status	0x0F	0F = no repeating desired
CHCK	0xnn	Checksum

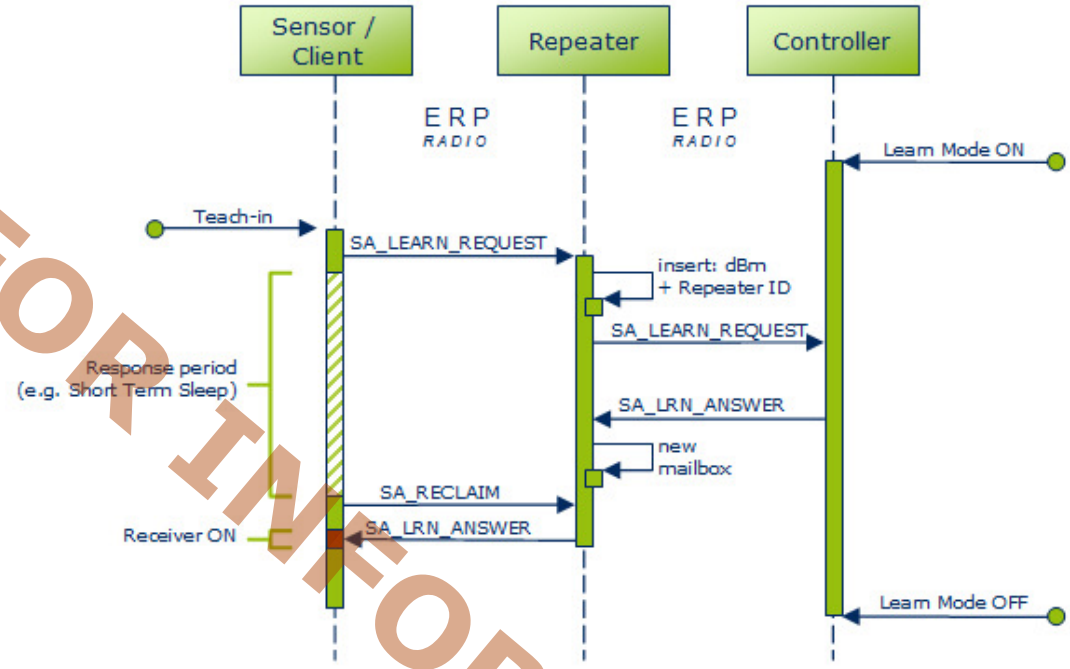
The final telegram sent to the SA client, SA_LRN_ANSWER, contains the 'Learn Acknowledge' message from the mailbox that the teach-in procedure has been carried out successfully:

Smart Ack Learn Answer (Learn Acknowledge)

RORG	RORG-EN	Index	Response time		Ack C.	Mailbox	not used			Postmaster ID				Controller ID				Status	CHCK
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A6	C7	02					-	-	-	ID_3	ID_2	ID_1	ID_0	ID_3	ID_2	ID_1	ID_0		

Data	Value	Description
RORG	0xA6	A6 = ADR Telegram
RORG-EN	0xC7	RORG encapsulated / C7 = SA_LRN_ANSWER
Index	0x02	Message Index; 02 = Learn Acknowledge
Response time	0xnnnn	Response time for Smart Ack Client in ms in which the controller can prepare the data and send it to the postmaster (max. value 550 ms = 0x0226)
Acknowledge code	0x00	First Learn In successful
Mailbox index	0xnn	Index no. of the assigned mailbox
Postmaster ID	0xnnnnnnnn	Device ID of the Post master candidate
Controller ID	0xnnnnnnnn	Device ID of the assigned controller
Status	0x0F	0F = no repeating permitted
CHCK	0xnn	Checksum

3.5) Smart Ack Teach-in (with repeater)



If a repeater comes into operation, the SA_LEARN_REQUEST telegram sent by the SA client (with an EEP No., Manufacturer ID, Sender ID) is completed on the repeater with the RSSI value (in dBm) and the Repeater ID, and sent to the controller.

RORG	Req.	Manuf.ID	EEP (3 byte)			RSSI	Repeater ID				Sender ID				Status	CHCK
C6	5 bit	11 bit	RORG	FUNC	TYPE	dBm	ID_3	ID_2	ID_1	ID_0	ID_3	ID_2	ID_1	ID_0	1 Byte	1 Byte
	Request Code															

Data	Value	Description
Request Code	0b11111	Default value – send by sensor
Manufacturer ID	0bnnnnnnnnnnn	Corresponding to the teach-in sensor
EEP No.	0xnnnnnn	RORG, FUNC, TYPE
RSSI	0xnn	Value added from repeater
Repeater ID	0xnnnnnnnn	Device ID repeater
Sender ID	0xnnnnnnnn	Chip ID of sensor for teach-in
Status	0x0F	0F = no repeating permitted
CHCK	0xnn	Checksum

From the reception strength of the RSSI, the controller can recognise which repeater is best for the task of postmaster. In the meantime, the SA client will be in its 'response period'.
The sent addressed telegram **SA_LRN_ANSWER** with the message 'Learn Reply' by the controller to the repeater ensures that the postmaster is activated and a mailbox is created.

RORG	Req.	Manuf.ID	EEP (3 byte)			RSSI	Repeater ID				Sender ID				Status	CHCK
C6	5 bit	11 bit	RORG	FUNC	TYPE	dBm	ID_3	ID_2	ID_1	ID_0	ID_3	ID_2	ID_1	ID_0	1 Byte	1 Byte
	Request Code															

Data	Value	Description
RORG	0xA6	A6 = ADR Telegram
RORG-EN	0xC7	RORG encapsulated / C7 = SA_LRN_ANSWER
Index	0x01	Message Index; 01 = Learn Reply
Response time	0xnnnn	Response time for Smart Ack Client in ms in which the controller can prepare the data and send it to the postmaster (max. value 550 ms = 0x0226)
Acknowledge code	0x00	First Learn In successful
Sender ID	0xnnnnnnnn	Chip ID of sensor to be teach-in
Postmaster ID	0xnnnnnnnn	Device ID of the Post master candidate
Controller ID	0xnnnnnnnn	Device ID of the assigned controller
Status	0x0F	0F = no repeating permitted
CHCK	0xnn	Checksum

Also, a mailbox is created for the SA client, where an initial entry with an OK message is left. This information is requested by the SA client from the repeater's postmaster with the SA_RECLAIM 'Learn' telegram.

Choice	RCLM_ID	Sender ID				Status
A7		ID_3	ID_2	ID_1	ID_0	1Byte

Mailbox Index (only Data Reclaim)
bit 7=0 Learn Reclaim / 1 Data Reclaim

Data	Value	Description
Message Index	0b0	Bit 7: 0 = Learn Reclaim
Sender ID	0xnnnnnnnn	Chip ID of sensor for teach-in
Status	0x0F	0F = no repeating desired
CHCK	0xnn	Checksum

The final telegram sent to the SA client, SA_LRN_ANSWER, contains the 'Learn Acknowledge' message from the mailbox that the teach-in procedure has been carried out successfully:

Smart Ack Learn Answer (Learn Acknowledge)

RORG	RORG-EN	Index	Response time		Ack C.	Mailbox	not used			Postmaster ID				Controller ID				Status	CHCK
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A6	C7	02					-	-	-	ID_3	ID_2	ID_1	ID_0	ID_3	ID_2	ID_1	ID_0		

Data	Value	Description
RORG	0xA6	A6 = ADR Telegram
RORG-EN	0xC7	RORG encapsulated / C7 = SA_LRN_ANSWER
Index	0x02	Message Index; 02 = Learn Acknowledge
Response time	0xnnnn	Response time for Smart Ack Client in ms in which the controller can prepare the data and send it to the postmaster (max. value 550 ms = 0x0226)
Acknowledge code	0x00	First Learn In successful
Mailbox index	0xnn	Index no. of the assigned mailbox
Postmaster ID	0xnnnnnnnn	Device ID of the Post master candidate
Controller ID	0xnnnnnnnn	Device ID of the assigned controller
Status	0x0F	0F = no repeating permitted

CHCK	0xnn	Checksum

3.6) UTE – Universal Uni- and Bidirectional Teach-in

General

Up to now there are teach-in procedures available for:

- RPS communication (EnOcean ID + rocker/channel information, unidirectional)
- 1BS communication (LRN telegram, w/o EEP and MID, unidirectional)
- 4BS communication (LRN telegram, w FUNC+TYPE and MID, unidirectional)
- 4BS communication (LRN telegram, w FUNC+TYPE and MID, bidirectional)
- SmartACK communication (self powered devices, bidirectional)

For uni- and bidirectional EEP communication that does not fit into SmartACK communication principles but is based on e.g. MSC and VLD messages no teach-in procedure is defined so far.

Therefore, this document proposes a universal teach-in procedure that allows handling of teach-in and teach-out requirements for EEP based communication of all different RORG. This proposal shall be understood as an alternative to SmartACK teach-in for devices where SmartACK is not applicable.

RORG to be used: **0xD4** Universal Teach-in, EEP based (UTE)

FUNC and TYPE shall be represented as 8bit parameters, both with a value range from 0x00 … 0xFF. This aligns UTE with the EEP representation defined for SmartACK teach-in.

REMARK 1:
Even though the proposed Universal Tech-In Procedure is able to cover EEPs based on RPS, 1BS and 4BS messages as well, it is not intended to replace the existing RPS, 1BS and 4BS teach-in / teach-out procedures for unidirectional and the existing 4BS teach-in / teach-out procedures for bidirectional communication.
However, it is recommended that with the acceptance of the proposed Universal Tech-In Procedure all new bidirectional 4BS applications shall use it for teach-in and teach-out as well.

REMARK 2:
The proposed Universal Tech-In Procedure is dedicated to EEP based EnOcean communication. It does neither compete with nor shall it interfere with the tech-in process of the Generic EnOcean Communication.

Communication – Principles and Definitions

BIDIRECTIONAL EEP-BASED COMMUNICATION

Bidirectional EnOcean communication means a point-to-point communication relationship between two enabled EnOcean devices. It requires all parties involved to know the unique EnOcean ID of their partners.
Such point-to-point communication relationship is established with the completion of a successful teach-in process and it is deleted with the completion of a successful teach-out process.

To get a maximum reliable teach-in process with a minimum consumption of energy and resources, a simple query - response mechanism is used: the device that is intended to be taught-in broadcasts a query message and gets back an addresses response message, containing its own EnOcean ID as the transmission target address.

In case there is more than one device ready to accept teach-in query messages at the same time and within the same radio range, the device with the quickest response time will be accepted by the device to be taught-in. Second and further devices will respond as well but they will not be accepted by the device to be taught-in. This will result in a configuration situation that is common to today's EEP based unidirectional teach-in processes.

UNIDIRECTIONAL EEP-BASED COMMUNICATION

Unidirectional EnOcean communication means a point-to-multipoint communication relationship between enabled EnOcean devices. In this case of broadcasting the device to be taught-in to other devices does not know the unique EnOcean ID of those communication partners.

The proposed Universal Teach-In Procedure supports unidirectional EnOcean communication thru related configuration bits in the query message.

However, for specific applications – e.g. configuration feedback - it is also possible to combine a bidirectional teach-in process with a unidirectional EEP based communication during the regular operation of a device.

EEP Teach-In Query - UTE Message (Broadcast / CMD: 0x0)

This message is sent by the EEP based EnOcean device that is intended to be taught-in to another device (which has been set into LRN-mode before either manually or thru a ReMan command).

Response Timing:
If a response is expected it shall be received within a maximum of 700ms from the time of transmission of this message. In case no such response is received within this time frame the query action shall be treated as completed with negative result. If no response is expected, each query action has to be treated as completed with positive result.

TABLE OF 7 BYTE PAYLOAD:

Data	Value	Description
DB_0	RORG	RORG of EEP [0x00 … 0xFF]
DB_1	FUNC	FUNC of EEP [0x00 … 0xFF]
DB_2	TYPE	TYPE of EEP [0x00 … 0xFF]
DB_3.BIT_7…3	-	Do not use
DB_3.BIT_2…0	MID (3MSB)	Manufacturer-ID (3MSB)
DB_4	MID (8LSB)	Manufacturer-ID (8LSB)
DB_5	0x00 … 0xFE	Number of individual channel to be taught in
"	0xFF	Teach-in of all channels supported by the device
DB_6.BIT_7	0b0	Unidirectional communication (EEP operation)
"	0b1	Bidirectional communication (EEP operation)
DB_6.BIT_6	0b0	EEP Teach-In-Response message expected
"	0b1	No EEP Teach-In-Response message expected
DB_6.BIT_5…4	0b00	Teach-in request
"	0b01	Teach-in deletion request
"	0b10	Teach-in or deletion of teach-in, not specified
"	0b11	Not used
DB_6.BIT_3…0	0x0	Command identifier (CMD): EEP Teach-In Query

EEP Teach-In Response - UTE Message (Addressed / CMD: 0x1)

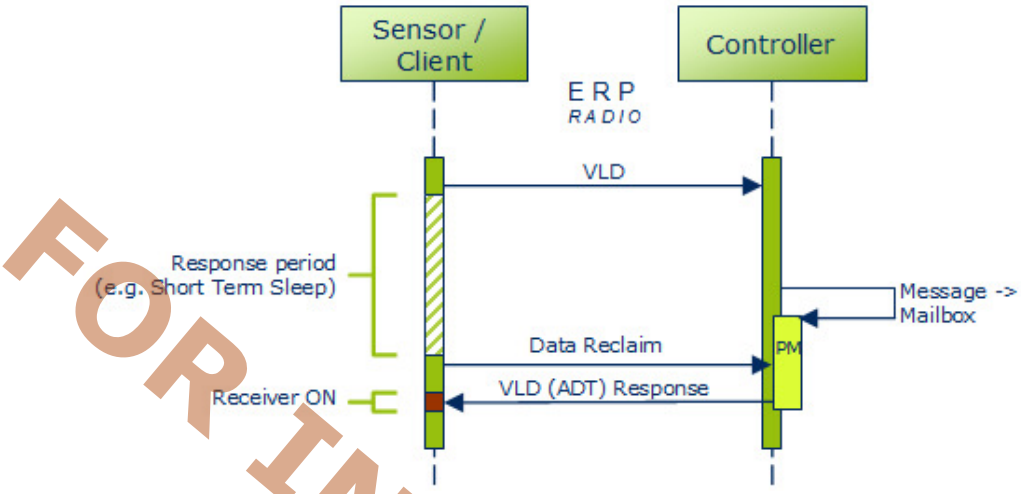
This message is the reply to an EEP Teach-In Query message. It is sent by the EEP based EnOcean device that has been set into LRN-mode before (either manually by HMI or thru a ReMan command).

Response Timing:
If a response is requested this message shall be sent within a maximum of 500ms from the time of reception of the EEP Teach-In Query message. This limit shall give sufficient time to decide on the teach-in request and answer accordingly (e.g. when requests need to be processes by data base systems connected asynchronously).

TABLE OF 7 BYTE PAYLOAD:

Data	Value	Description
DB_0…DB_5	...	Same structure as Teach-In Query message (EEP, MID and channel of requesting device is echoed back)
DB_6.BIT_7	0b0	Unidirectional communication (EEP operation)
"	0b1	Bidirectional communication (EEP operation)
DB_6.BIT_6	-	Not used
DB_6.BIT_5…4	0b00	Request not accepted, general reason
"	0b01	Request accepted, teach-in successful
"	0b10	Request accepted, deletion of teach-in successful
"	0b11	Request not accepted, EEP not supported
DB_6.BIT_3…0	0x1	Command identifier (CMD): EEP Teach-In Response

3.7) Smart Ack: functional principle (without repeater)



Smart Ack is a bidirectional communication protocol between a self-powered device and a line-powered controller. Data transmission in both directions is controlled by the sensor/client, as the limited energy budget requires an exact synchronization of the sent and the received messages. This pre-defined time interval allows a very short activation of the energy-intensive receiver electronics on the client.

If the teach-in procedure has already taken place as in Chapter 'Smart Ack Teach-in procedure' and the two devices already ‘know each other’, communication always takes place as following under Smart Ack:

The client sends its message over a VLD telegram to the controller (Manufacturer ID = optional).

VLD

RORG	Manufacturer ID	Variable data	Sender ID				Status	CRC8
D2	1,5 byte	1 ... 12,5 bytes	ID_3	ID_2	ID_1	ID_0	1 byte	1 byte

Finally, the message is processed in the controller, or forwarded to an external micro-controller over the serial interface for each use case. During the intervening period, the client is in the 'response period', which is frequently connected to an energy saving measure (like ‘Short Term Sleep’). The length of this time period is agreed during the teach-in procedure between the devices as ‘response time’. The feedback defined for the client is deposited in the mailbox of the postmaster (PM). When the client is active again, it requests this message containing the Smart Ack telegram DATA_RECLAIM from the responsible postmaster.

RORG		Sender ID				Status	CHCK
A7		ID_3	ID_2	ID_1	ID_0	1Byte	1 Byte

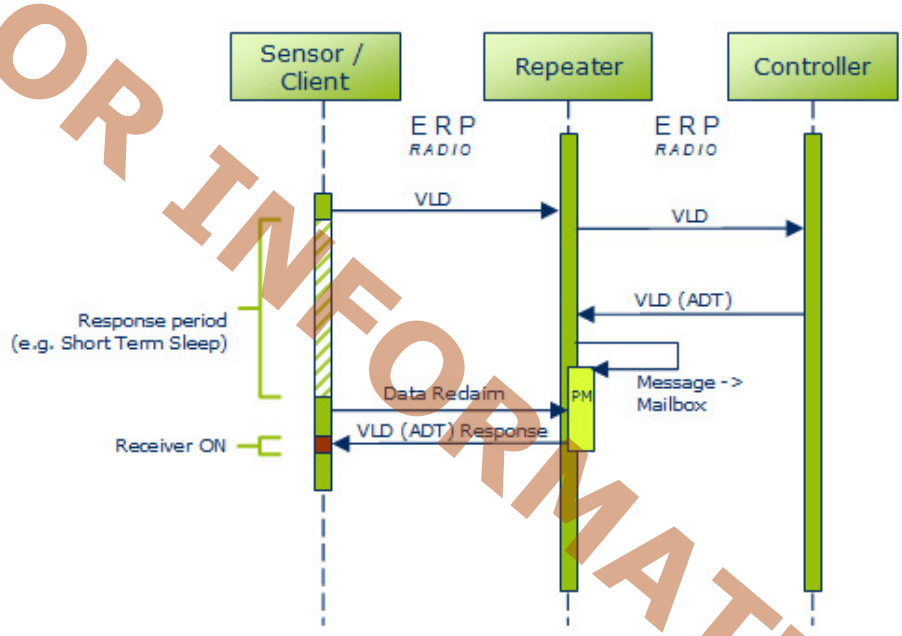
bit 0 ... 6: Mailbox Index
bit 7: 1 = Message index 'Data Reclaim'

Finally, the receiver part of the client is activated and the message sent by the postmaster is accepted. In this case the VLD telegram is sent encapsulated as ADT telegram (= addressed).

ADT / VLD

RORG	RORG-EN	Manufacturer ID	Variable data	Destination ID				Sender ID				Status	CRC8
A6	D2	1,5 byte	1 ... 7,5 bytes	ID_3	ID_2	ID_1	ID_0	ID_3	ID_2	ID_1	ID_0	1 byte	1 byte

3.8) Smart Ack: functional principle (with repeater)



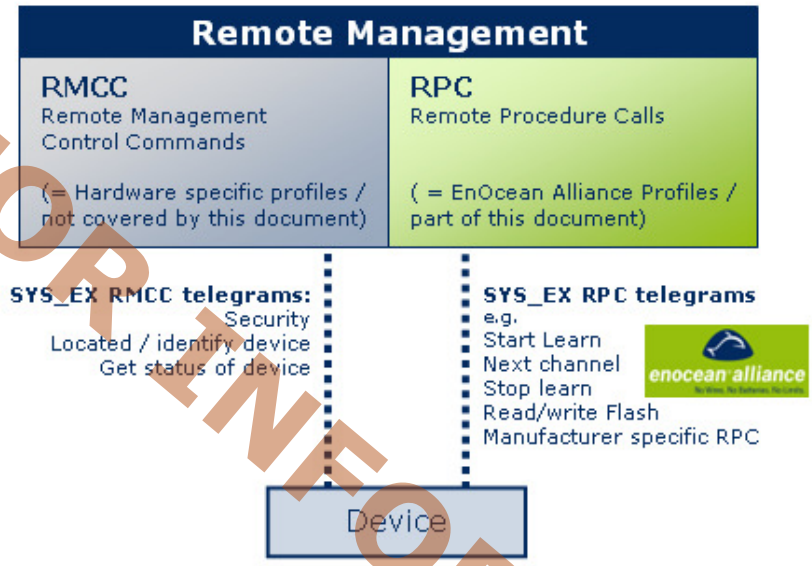
If a repeater is used, it takes over the task of the postmaster after the teach-in procedure. Hence, the client cannot view under operating conditions whether it is communicating directly with a controller or with a repeater.

The VLD telegram of the client is forwarded by the repeater 1:1 in the direction of the controller. The feedback is transferred in the form of an addressed telegram (containing Repeater ID) to the postmaster of the repeater and stored in the mailbox.

The client then turns to the repeater with its 'Data Reclaim', instead of turning to the controller, and requests the response message from the postmaster.

3.9) Remote Management / RPC

Remote Management allows EnOcean devices to be configured and maintained over the air or via a serial interface. For instance sensor or switch IDs can be stored or deleted from already installed actuators or gateways that are hard to access. There is a remote management library available for Dolphin based products.



Remote management is divided into two function groups:

RMCCs are mandatory features; they are permanently defined and they have overlapping tasks. They cannot be modified devicespecifically and are therefore, not an integral part of this description.

RPCs cover optional and manufacturer-specific features, and they have a flexible number of functionalities that can be used for numerous devices. If new device properties are mapped, RPCs can be extended correspondingly. To keep the RPCs interoperable, it is in the interest of the EnOcean Alliance to standardize these procedures.

The RPCs available today with their SYS_EX structures do not have any data-technical commonalities with EEP, but are to be handled the same way in future within the framework of coordination measures.

Structure of SYS_EX for RPC

SYS_EX telegrams for RPCs are generally encapsulated in an ADT telegram (RORG = A6) and are sent addressed as such.

ADT / SYS_EX / RPC

RORG	RORG-EN	SYS-EX data	Destination ID				Sender ID				Status	CRC8
A6	C5	x bytes	ID_3	ID_2	ID_1	ID_0	ID_3	ID_2	ID_1	ID_0	1 byte	1 byte

In the following section the SYS_EX data is described in detail. Note that Remote Management RPC commands are composed of several telegrams. That means SYS_EX data is than merged in one data block. The next section describes this datablock in detail.

For further details refer to the specification Remote Management, V1.7, Dec 16, 2010, released by EnOcean GmbH www.enocean.com/fileadmin/redaktion/pdf/tec_docs/RemoteManagement.pdf , please.

Title	RPC - Remote learn

Function code	0x201
Manufacturerid	0x7FF
Datalength	0x04
Broadcast	YES
Addressable	YES
Answer	NO

Offset	Size	Data	Description	Valid Range	Scale	Unit
0	24	EEP (ORG-FUNC-TYPE)	Determines the device type to learn in, all other devices learn telegrams are ignored. To ignore EEP controll the mask bits has to be set to 0)	...	...	
24	8	Flag	learn flag, determines different behaviour of the learn procedure	Enum: 0x00: RESERVED 0x01: Start learn 0x02: Next channel 0x03: Stop learn 0x04: SmartACK - Start simple learn mode 0x05: SmartACK - Start advanced learn mode 0x06: SmartACK - Stop learn		

Title	RPC - Remote flash write
Function code	0x203
Manufacturerid	0x7FF
Datalength	0x04 + N
Broadcast	YES
Addressable	YES
Answer	NO

Using this command the flash of a device can be written.

Offset	Size	Data	Description
0	16	Flash Memory Address	Destination where the data should be stored
16	16	Number of Bytes	Number of bytes to be transfered and written to the flash
32	N*8	Data	data to be transfered and written to the flash

Title	RPC - Remote flash read
Function code	0x204
Manufacturerid	0x7FF
Datalength	0x04
Broadcast	NO
Addressable	YES
Answer	YES

Using this command the flash can be read from the application. The data requested data area transmitted in RPC telegrams.

Offset	Size	Data	Description
16	16	Number of Bytes	Number of bytes to be transfered and written to the flash

Title	RPC - Remote flash read answer
Function code	0x804
Manufacturerid	0x7FF
Datalength	N
Broadcast	NO
Addressable	YES
Answer	NO

Offset	Size	Data	Description
0	N*8	Data	data read from flash

Title	RPC - SmartACK read settings
Function code	0x205
Manufacturerid	0x7FF
Datalength	1
Broadcast	NO
Addressable	YES
Answer	YES

Using this command the SmartACK settings and learn tables can be read from the device. The Setting type filled determines what type of data is requested. The data requested data area transmitted in RPC telegrams.

Offset	Size	Data	Description	Valid Range	Scale	Unit
0	8	>Setting type	type of settings to read	Enum: 0x00: RESERVED 0x01: Mailbox settings 0x02: Learned sensor - read the ID table of sensors in the Controller		

Title	RPC - SmartACK read settings - Mailbox settings answer
Function code	0x805
Manufacturerid	0x7FF
Datalength	4
Broadcast	NO
Addressable	YES
Answer	NO

Offset	Size	Data	Description
0	16	SmartACK flash address	Address where the SmartACK settings are stored
16	16	SmartACK mailbox count	number of mailboxes stored in flash

Title	RPC - SmartACK read settings - Learned sensor answer
Function code	0x806
Manufacturerid	0x7FF
Datalength	N*9
Broadcast	NO
Addressable	YES
Answer	NO

N - is the number of entries: SensorID, ControllerID, LearnCount

Offset	Size	Data
N*0	32	SensorID
N*32	32	ControllerID
N*64	8	Learned Count

Title	RPC - SmartACK write settings
Function code	0x206
Manufacturerid	0x7FF
Datalength	10
Broadcast	NO
Addressable	YES
Answer	YES

Using this command different type of data can be transmitted to the SmartACK devices. This command is useful when the SmartACK device has to be configured remotely. The structure of the data transmitted is depends on the Operation Type field.

Operation Type = 0x01: Add mailbox (only controller)

Offset	Size	Data	Value	Description
0	8	Operatian Type	0x01	Add mailbox (only controller)
8	8	Mailbox Index		
16	32	SensorID		
48	32	PostmasterID		

Operation Type = 0x02: Delete mailbox

Offset	Size	Data	Value	Description
0	8	Operation Type	0x02	Delete mailbox
8	8	Mailbox Index		
16	64	Not Used (= 0)		

Operation Type = 0x03: LearnIn - only controller

Offset	Size	Data	Value	Description
0	8	Operation Type	0x03	LearnIn - only controller
8	8	Learn Count		
16	32	SensorID		
48	32	ControllerID		

Operation Type = 0x04: LearnOut - only controller

Offset	Size	Data	Value	Description
0	8	Operation Type	0x04	LearnOut - only controller

8	8	Learn Count		
16	32	SensorID		
48	32	ControllerID		

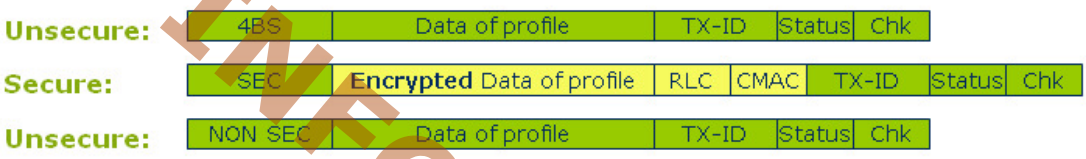
3.10) Interoperability with Security of EnOcean Networks

The Specification "Security of EnOcean Networks" defines two new telegram types for secure EnOcean telegrams in operational mode:

- R-ORG = 0x30 = SEC *Secure telegram*
- R-ORG = 0x31 = SEC_ENCAPS *Secure telegram with R-ORG encapsulation*

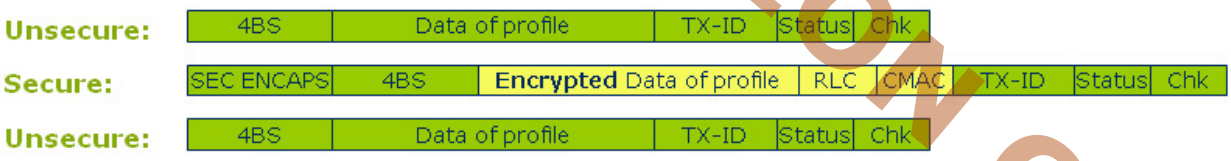
To make sure that interoperability is warranted, both telegrams may used for telegram transmission with existing EEP's. Because the profile of the device is known, the data of the SEC or SEC_ENCAPS telegram contains the same information as described in the profile, but it may be encrypted defined by the SLF (Security level format) of the device. When the device uses more than one R-ORG's in operational mode, the SEC_ENCAPS telegram has to be applied to ensure the correct original R-ORG after converting from secure to unsecure telegram. At present, 3 different communication variants having the existing XML structure can be mapped, which approximate the principles of a bi-directional data transfer. The teach-in procedure required for this is described in the same chapter.

Example for converting a telegram from unsecure to secure and back:



The data of the known profile will be applied in the unsecure telegram after the conversion from secure to unsecure telegram.

Example for converting a telegram from unsecure to secure and back with encapsulated R-ORG:



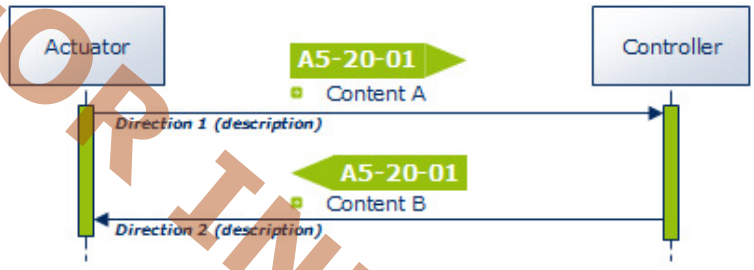
After conversion from secure to unsecure telegram, the encapsulated R-ORG will be applied in the telegram. The data of the profile of the encapsulated R-ORG will be applied.

3.11) Existing 'bidirectional' profile structures

At present, 3 different communication variants having the existing XML structure can be mapped, which approximate the principles of a bi-directional data transfer. The teach-in procedure required for this is described in the same chapter.

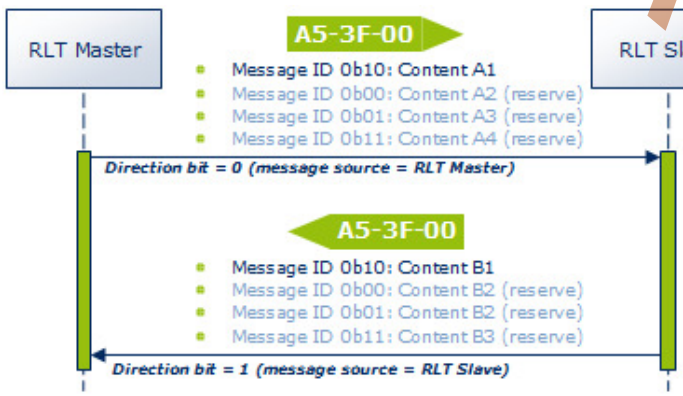
The original terminology 'transmit mode / receive mode' was not taken over, as no unique assignment to device type and hence to transmission direction can be derived there from. A neutral number (Direction 1 / 2) or the state of a bit should allow the required free space to the individual application.

Variant 1:



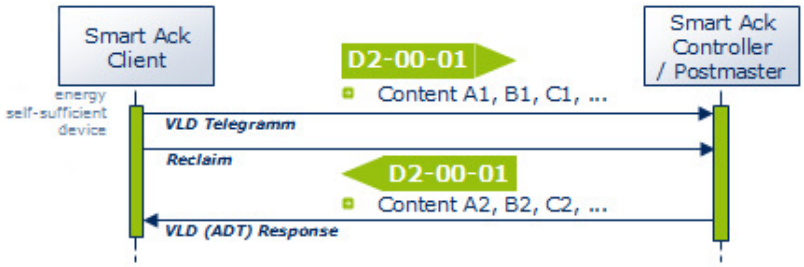
In Variant 1, there is no data-technical differentiation option in the 4BS telegram between Direction 1 and Direction 2, but only a documentation-related direction specification. No transmission direction can be detected if the telegrams are monitored on the radio stretch.

Variant 2:



In Variant 2, 3 bits are provided in the 4BS telegram, which allow up to 8 different data interpretations of the same EEP Profile No. through bit combination. 1 bit is used for direction (with the instruction text 'message source') and 2 bits for the Message ID.

Variant 3:



In Variant 3, the Smart Ack technology normally offers multiple use options of bidirectional data transmission. Smart Ack clients can therefore be energy self-sufficient devices. The used VLD telegrams allow a payload of up to 14 bytes (12.5 bytes with Manufacturer ID). Contents can thus be structured more individually.

3.12) MSC telegram - Manufacturer Specific Communication

Communication over MSC telegrams can always be used when bigger data volumes are to be transmitted, and at the same time, a closed system structure is to be created. This can be the case if e.g., the controller system backbone is expanded to include radio components, or if safety-related controls require proprietary data structures.

Such communication must not affect any interoperable EEP-based communication and should be identifiable as MSC by any Dolphin-based hardware.

Interoperability Conditions:

A device using MSC in addition to other EEPs may be marked with the EnOcean ingredient logo, as long as it complies with the rules defined by the EnOcean alliance for such markings. A device using MSC may be marked with the EnOcean ingredient logo even though the manufacturer does not disclose any or all information regarding the MSC payload. However, all other functionality of such a device shall comply with the latest EEP specification and such a device shall support at least one additional EEP. The manufacturer must clearly state which EEP(s) the device complies with. To safeguard interoperability, if there is sufficient justified doubt within the EnOcean Alliance TWG, a specific unit using MSC can be assessed by the TWG and if found to breach the interoperability intentions, the TWG may then decide (majority vote) to adapt the rules for the usage of the interoperability logo.

The MSC telegram has the same structure as a VLD telegram. The only difference is that the RORG Number is different and the payload specification is missing.

MSC

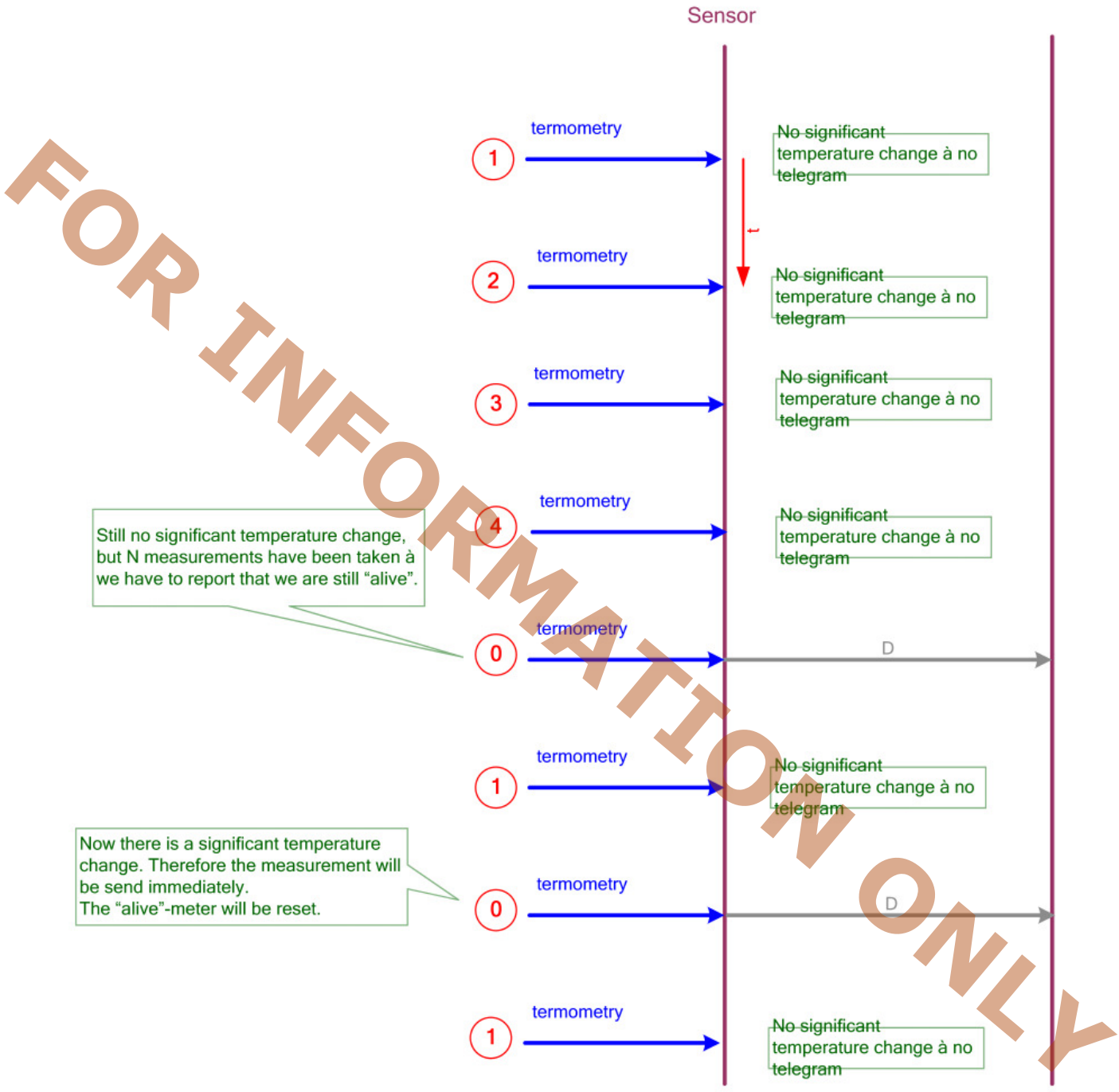
RORG	Manufacturer ID	Variable data	Sender ID				Status	CRC8
D1	1,5 byte	1 ... 12,5 bytes	ID_3	ID_2	ID_1	ID_0	1 byte	1 byte

The following points are to be noted:

1. The usage of the Multi User Manufacturer ID (0x7FF) shall not be allowed.
2. Each user may send MSC telegrams under his own Manufacturer ID. The Manufacturer ID should not be left out.

3.13) Use Cases for profile 2D-00-01 (self powered RCP for 2way operation)

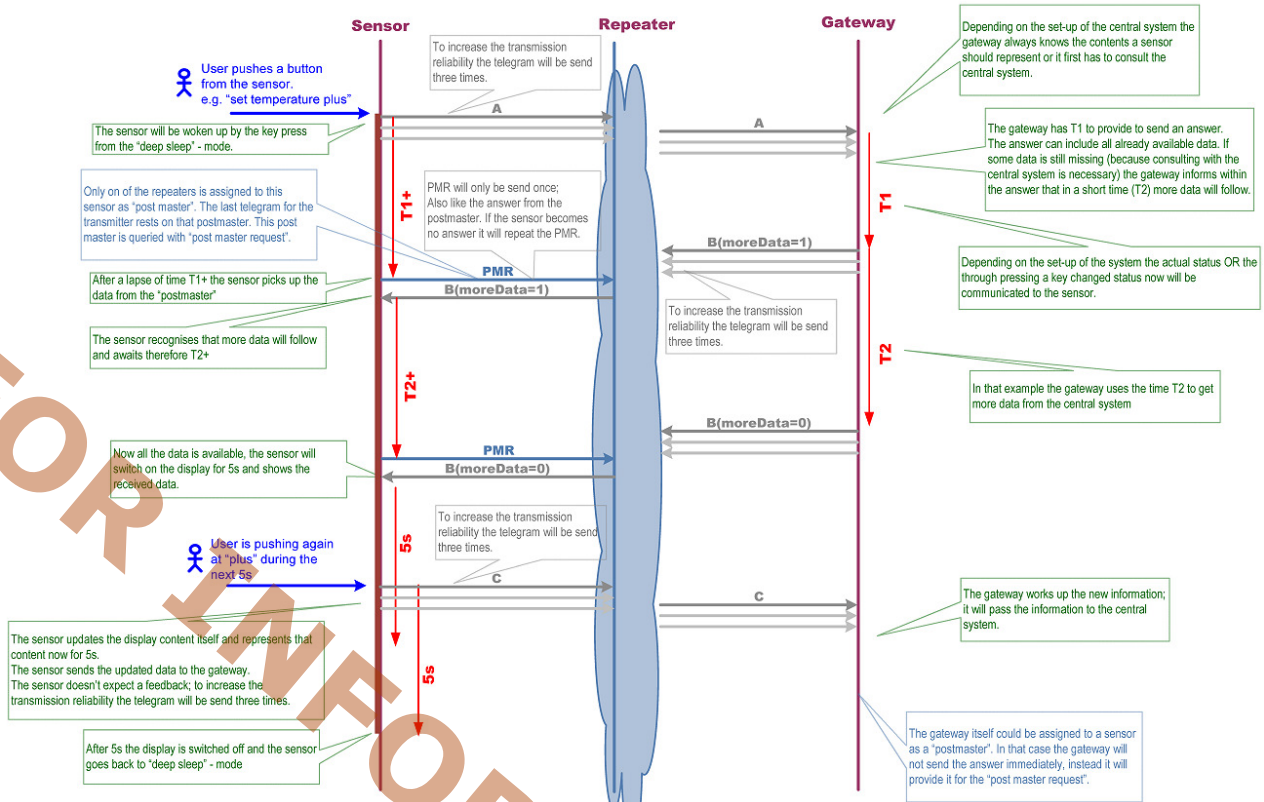
Use Case: Temperature Measurement



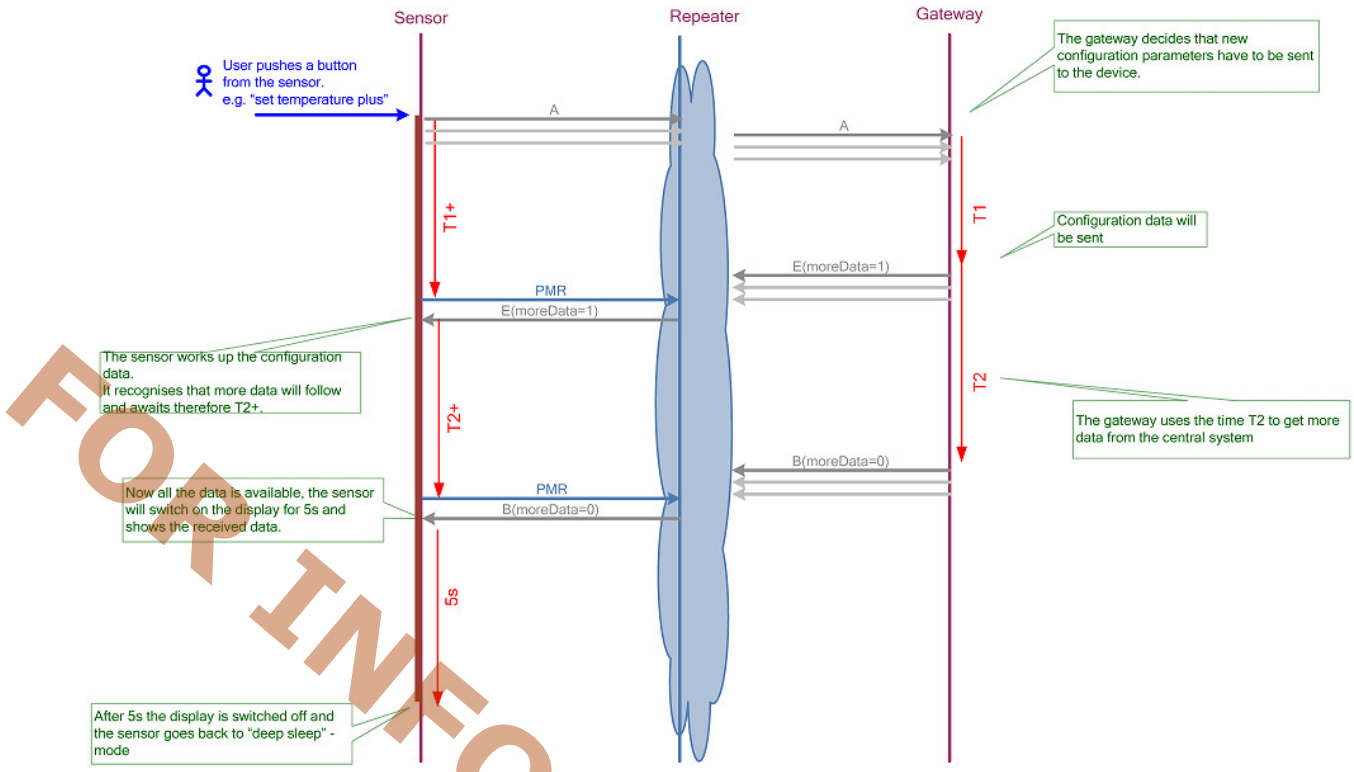
REMARK:

Temperature measurement may be configured by the Gateway, see chapter "Message Type E – RCP Configuration".

Use Case: User Interaction



Use Case: User Interaction including transfer of configuration data



3.14) Manufacturer ID's

This chapter was transferred into a separate document entitled **EnOcean Manufacturer Identification (ManID)**. This document will be updated as soon as a new ManID will be allocated to a member of the EnOcean Alliance. The document **EnOcean Manufacturer Identification (ManID)** is stored in the webspace of the TWG on http://portal.enocean-alliance.org/MyWorkGroups/Documents.aspx
(access only for registered members of the TWG).

3.15) XML + DOC Maintenance process

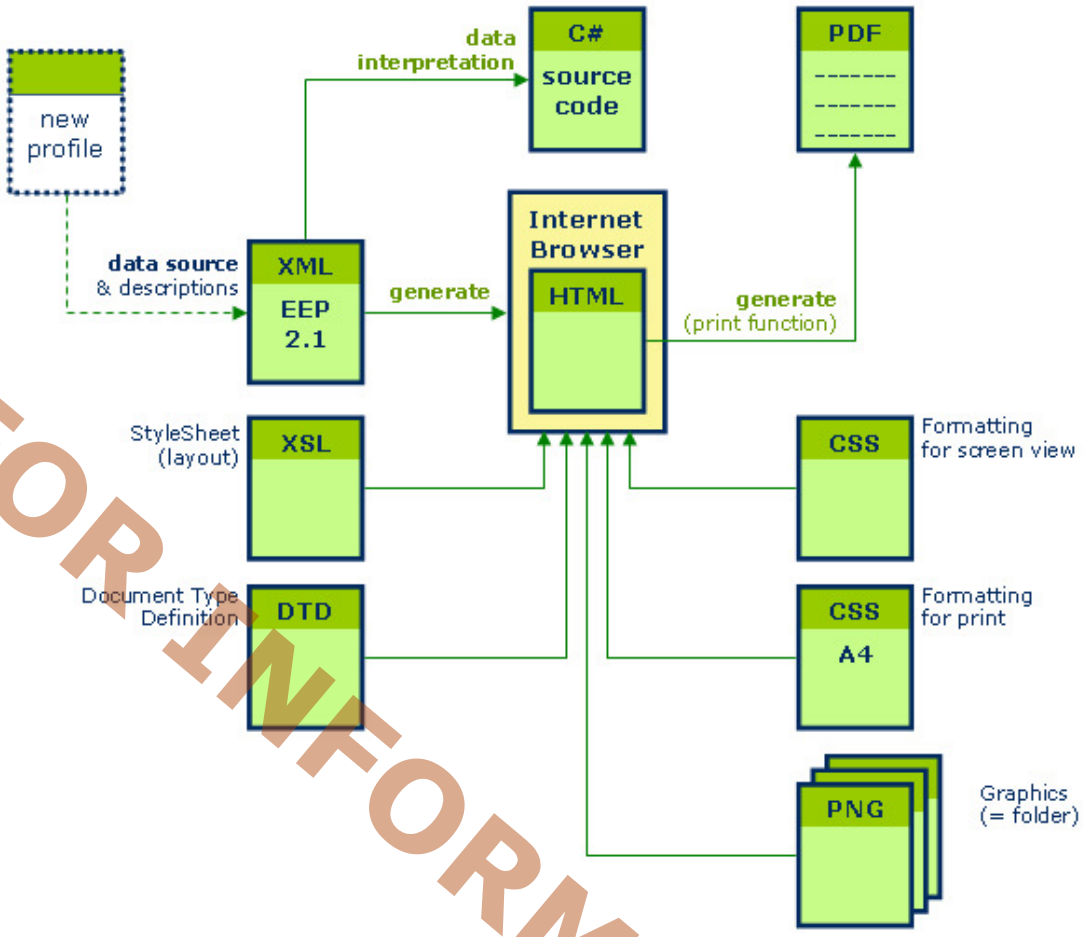
3.15.1) General

The maintenance process is descripted separately in the document: EEP2x_Maintenance_Process.pdf.

3.15.2) XML file

With EEP 2.1, a new type of documentation is introduced, which can also display logical structures next to the described contents. These can be adapted by developers into their programming environment.

XML is fully compatible with applications like C# or JAVA, and it can be combined with any application which is capable of processing XML irrespective of the platform it is being used on. If the application can work alongside XML, then XML can work on any platform and has no boundaries. It is also vendor independent and system independent.



Only the XML data is edited and released in defined time intervals as a total release under a new version. A styles sheet file (XSL) and formatting specifications (CSS) ensure that an attractive HTML representation is possible in an internet browser. The author of the new version also creates a final PDF file.
This method ensures that the document view, as well as the software environment, remain synchronized. Errors are strongly reduced and data maintenance is optimized.

3.16) Revision

Rev.	Date	Editor	Major Changes
0.10		GT	Initial EnOcean Alliance Version created, based on the EnOcean GmbH document "Standardization EnOcean Communication Profiles_v1.04"
0.90		TR	EEP for ORG = 0x05 added EEP for ORG = 0x06 added Headlines and Text formatted
0.91		TR	FUNC = 11 "Controller Status" added Proposals added: EEP 07-11-01 "Lightning Controller" (EchoFlex) EEP 07-02-0C "Temp.Sensor, Window Contact" (EchoFlex) EEP 07-10-0A "Temp. Sensor, Set-Point Adj., Window Contact" (EchoFlex) EEP 07-30-02 "Window Contact, Single Input" (EchoFlex)
0.92		TR	Manufacturer ID: Guidelines added. Definitions updated Revision History moved to a separate document chapter INPUT document for Berlin Meeting April 2009
2.0R		TR	EEP 07-02-0C shifted to Room Operating Panels -> EEP 07-10-0B EEP 06-00-00 renamed to 06-00-01 EEP 05-xx-xx (PRS telegram / PTM200) updated with results of latest discussions EEP 05-04-01 (Key Card Activated Switch) updated Proposals Added: EEP 07-10-0C "Temp. Sensor, Occupancy Control" (Termokon) EEP 07-10-0D "Temp. Sensor, Day/Night Control" (Termokon) Ratification info and period added
2.0	July 2009		Creation of final Version V2.0 EEP 05-03-02 added EEP 05-04-01 corrected EEP 06-00-01 renamed Single Input Contact EEP 07-10-0A and EEP 07-10-0B updated Single Input Contact EEP 07-30-01 and EEP 07-30-02 updated Single Input Contact 4BS teach in Telegram updated FUNC /TYPE Editorial corrections
2.1 R1	Nov 12, 2010	Op	The EEP 2.0 document as well as all 2.1 single documents were transferred to an XML data structure and standardized. The following chapters were re-written: Introduction, Teach-in, Bi-directional profiles, Smart Ack, RPC and MSC. Profiles that are still being coordinated were also accepted. These are characterized as 'Not approved' in the document. Bidirectional profiles are labeled with 'BI-DIR'. RPS ORG 05 = RORG F6; 1BS ORG 06 = RORG D5; 4BS ORG 07 = RORG A5
2.1 R2	Dec 31, 2010	Op	2th review
2.1	Jan 20, 2011	Op	Final Version V2.1
2.5 R1	May 20, 2012	Op	Review version 1 Added profiles: - 1 RPS: F6-02-03 - 16 4BS: A5-07-02, A5-09-02, A5-09-05, A5-09-06, A5-09-07, A5-10-1F, A5-11-03, A5-11-04, A5-14-01, A5-14-02, A5-14-03, A5-14-04, A5-14-05, A5-14-06, A5-38-08 CMD 0x07, A5-38-09 - 15 VLD: D2-01-00 ... -11, D2-01-00 ...-02 Updated profiles: A5-07-01, A5-09-01, A5-09-04 Further: - Description: UTE – Universal Uni- and Bidirectional Teach-in - RPC function no. added - Manufacturer ID's added
2.5 R2	Nov 08, 2012	Op	Review version 2 Significant changes: - Chapter 1.3 - Add new profiles: A5-06-03, A5-07-03, A5-13-07 - Update of profiles: A5-10-15, A5-10-16, A5-10-17, A5-13-01, A5-13-05
2.5 R3	Feb 03, 2013	Op	Significant changes: - Add new profiles: D2-03-00, D2-20-00, D2-20-01, D2-20-02 - Update of profiles: A5-07-02, A5-13-02, D2-01-00 - Deleted Chapter ´Manufacturer ID's´

2.5	March 04, 2013	Op	Final Version V2.5 - Add chapter 3.14 "Manufacturer ID's" with a cross reference only - Add chapter 3.10 "Interoperability with Security ..." - Update profiles: A5-13-02 (name), A5-20-01 (first phrase), A5-38-08 / 0x02 Dimming (remark / ramp time), A5-38-09 (remark 7 / ramp time)
2.6 R1	Nov 26, 2013	Op	Review version - Add 15 new profiles
2.6	Dec 17, 2013	Op	Final Version V2.6