BIDIRECTIONAL GATEWAY OF ELEMENTS

ENOCEAN / RS 232, RS 485 MODBUS RTU

OPERATING MANUAL

FIRVENA

Contents

Introduction

This document describes operating manual for bidirectional gateway EnOcean / RS 232, RS 485 Modbus RTU.

Type of device

Bidirectional gateway for EnOcean / RS 232, RS 485 Modbus RTU.

- Receiving, control and managing of wide EnOcean elements spectrum (e.g. temperature, humidity, motion, CO2 sensors, indication of opened doors/windows, on and off switches, actors, control modules, measuring electric current).
- It can serve up to 40 elements EnOcean.
- Standardized for frequency 868 MHz, possible option is 902 MHz.
- Supplied with EnOcean Tools application for comprehensive review of information and elements control.

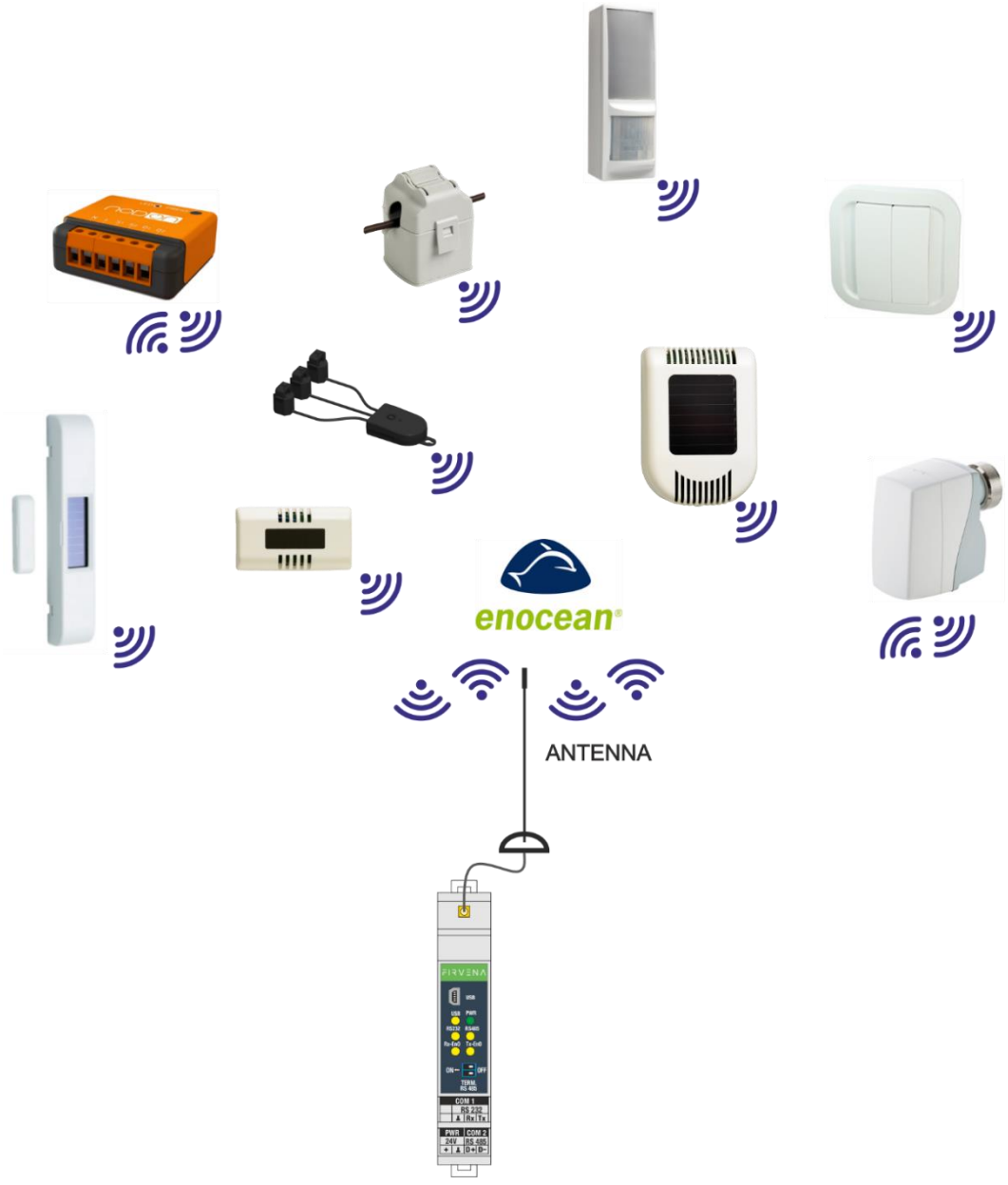

Fig. 1: *Connecting gateway with EnOcean elements*

Device name
ENOCEAN-GWY-MOD

Device manufacturer
FIRVENA s.r.o.

Address
Zamecke namesti 26
738 01 Frydek-Mistek
Czech Republic

Phone contact
+420 604 816 588

Email contact
brachacek@firvena.cz
firvena@firvena.cz

Websites
www.firvena.com

Electromagnetic compatibility EMC:

The product is in conformity with provisions of Government Regulation No. 117/2016 Coll. which are in compliance with Directive 2014/30/EU regarding electromagnetic compatibility (EMC).

Czech version of standard:	Identical with European standard:
ČSN EN 55032 ed. 2:2017	EN 55032:2015
ČSN EN 61000-6-2 ed.3:2006	EN 61000-6-2:2005
ČSN EN 61000-4-2 ed.2:2009	EN 61000-4-2:2009
ČSN EN 61000-4-3 ed.3:2006+A1:2008+A2:2011	EN 61000-4-3:2006+A1:2007+A2:2010
ČSN EN 61000-4-4 ed.3:2013	EN 61000-4-4:2012
ČSN EN 61000-4-5 ed.3:2015	EN 61000-4-5:2014
ČSN EN 61000-4-6 ed.4:2014	EN 61000-4-6:2014

Safety information and warnings

The product meets the general safety requirements according to ČSN EN 61010-1 ed. 2.
Cover IP 20 allows installation only in normal space according to ČSN 33 2000-1 ed. 2.

The gateway must be powered from safe voltage source that meets requirements of ČSN EN 61010-1 ed. 2 and must be installed in accordance with national and safety standards.

The product may be only used in accordance with this manual.

To avoid a risk of an electrical shock or fire, the maximum of gateway's operating parameters must not be exceeded.

Use only unmodified products.

It can be used types of cables with sufficient electrical strength for connection.

Storage
Store products at temperature 0-40 °C and relative humidity up to 80 %, and in spaces where condensation on products is eliminated. Products must not be exposed shocks, harmful vapors or gases.

Repairs
Products are repaired by the manufacturer. Products to be repaired are shipped in a package that ensures shock absorption and protects the products against damage during shipment.

Guarantee
The product is warranted 24 months from the date of delivery that is mentioned on the delivery note. The manufacturer guarantees technical and operational products parameters in the range of valid documentation. The warranty period runs from personal goods acceptance by the buyer or from the transport company. Claimed products and written claims for defects are claimed by the manufacturer during warranty period. The complainant shall provide products identification, number of delivery note and defects description. The manufacturer is not responsible for defects caused by improper storage, improper external connection, damages caused by external influences especially due to unacceptable size, incorrect adjustment, improper installation, incorrect operation or normal wear and tear.

Product disposal

Product does not belong to municipal waste and belongs to separate collection.

1 Product description

Front side of gateway for EnOcean / RS 232, RS 485 Modbus RTU has six LED diodes. Green LED diode marked with the symbol *PWR* is used for indication, if supply voltage is connected. For supply voltage connection, it lights green permanently. Yellow LED diodes indicate communication. Diode marked with USB indicates communication via USB interface. Diode marked with RS 232 indicates communication on the line RS 232. Diode marked with *RS 485* indicate communication on the line RS 485 with the protocol MODBUS RTU. Diodes marked with R_x-EoN (receiving) and T_x-EoN (transmitting) are used for communication indication of EnOcean elements.

The gateway has two connectors for supplying DC supply voltage and connectors for communication with serial links RS 232 and RS 485. The gateway has also mini USB connector.

The gateway contains SMA connector for antenna connection.

Double DIP switch is used to balance idle state of the line RS 485 MODBUS RTU. For more information is written the chapter 3.

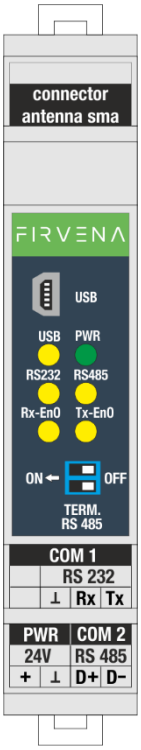

Fig. 2: *Front side of the gateway ENOCEAN-GWY-MOD*

1.1 Function description

The device ENOCEAN-GWY-MOD is gateway which wirelessly receives and controls elements through communication standard EnOcean and then communicates through communication interface RS 232 and RS 485 with the MODBUS RTU protocol. Gateway is designed for wide spectrum of elements with wireless EnOcean technology that is characterized with low consumption, frequent battery-free operation and use of alternative energy source.

Due to wireless technology, this solution finds its use in objects where the operation has been started or where new cables cannot be laid or if there is temporary rental space and the owner wants to take the device and elements with.

Gateway is able to transmit / receive all telegrams with type RPS/1BS, 4BS, VLD according to the specification EEP. Content of these telegrams is copied to registers. It is required for data in such format (RAW) knowledge of telegrams composition RORG and recalculation which burdens superior system. For this reason, there are converted values corresponding to the measured quantity for selected products. Selected products are being expanded according to actual needs of our customers.

1.2 Technical data

Tab. 1: *Technical data of gateway*

Electrical data	rated voltage	24 V DC (recommended value for power supply)
	range possibility for power supply	10 – 25 V DC
	own consumption of device	80 mA
	power consumption	1,92 W
Communication RS 232	protocol	MODBUS RTU slave
	supported functions	3, 6, 16
	baudrate	optional from 1,2 kBd to 115,2 kBd
	number of bits	8
	stopbit	1, 2
	parity	no, even, odd
	delay between received and sent message	basic + optional 0…200ms
	adjustable addresses	1…247
	max. number of device on the line	1
	indication	yes, LED yellow colour RS 232
Communication RS 485	protocol	MODBUS RTU slave
	supported functions	3, 6, 16
	baudrate	optional from 1,2 kBd to 115,2 kBd
	number of bits	8
	stopbit	1, 2
	parity	no, even, odd
	delay between received and sent message	basic + optional 0…200ms
	adjustable addresses	1...32 247
	max. number of device on the line	32
	indication	yes LED yellow colour RS 485
Communication USB	protocol	MODBUS RTU slave
	supported functions	3, 6, 16
	baudrate	115,2 kBd
	number of bits	8
	stopbit	1
	parity	no
	adjustable addresses	1
	max. number of device on the line	1
	indication	yes LED yellow colour USB
Number of EnOcean elements	Maximum number of EnOcean elements for 1 GWY	40
Supported elements of communication	RAW DATA: RPS/1BS, 4BS, VLD	
Operating valus	cover	IP 20
	operating temperature	-20 … +70^{O}C
	relative air humidity	max. 80 %

1.3 Gateway dimension

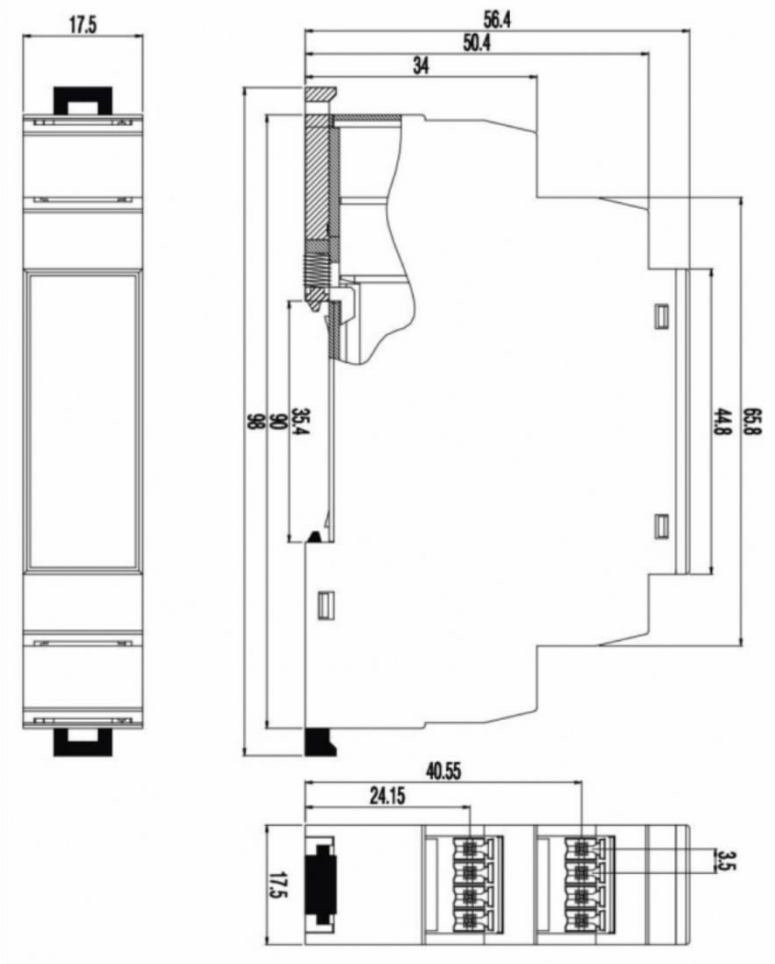

Fig. 3: *Gateway dimension*

1.4 Electrical installation

The device is intended to be used for installation into control cabinet in a DIN rail. After device installation, wires are connected to terminals.

Example for connection of stabilized DC supply voltage:

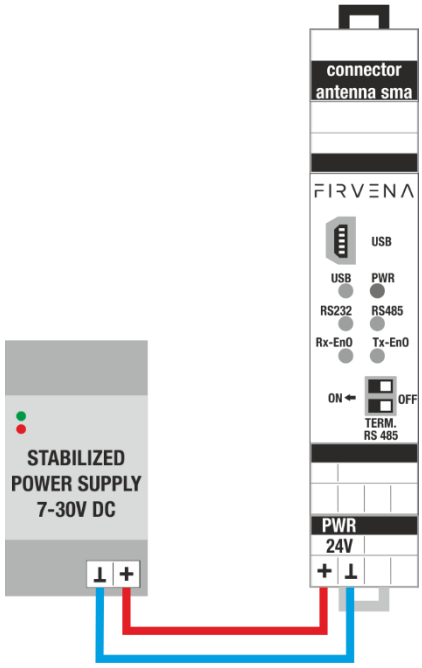

Fig. 4: *Connection of stabilized DC supply voltage*

Example for connection of communication through serial line RS 232:

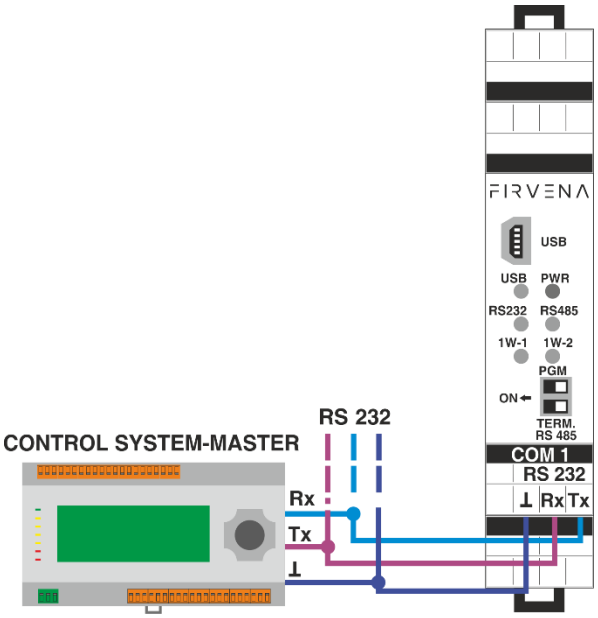

Fig. 5: *Connection of communication through serial line RS 232*

Example for connection of communication through serial line RS 485:

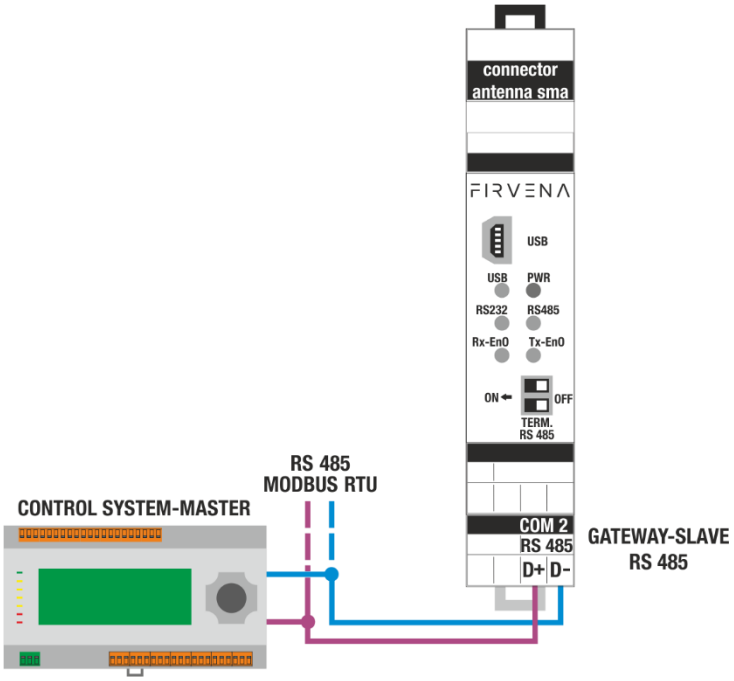

Fig. 6: *Connection of communication through serial line RS 485*

Example for connection of communication through USB interface:

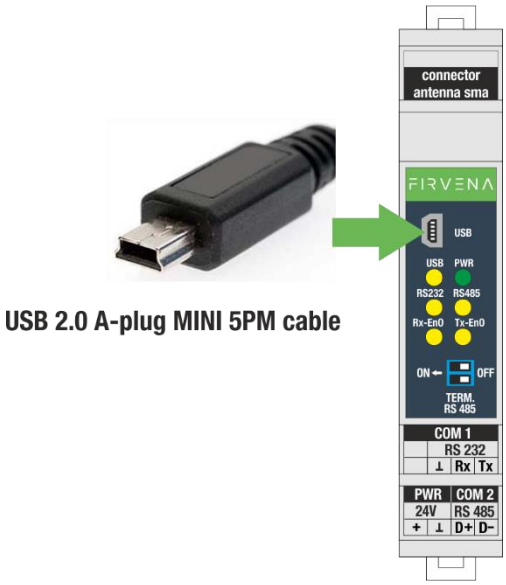

Fig. 7: *Connection of communication through USB interface*

2 RS 485 communication settings

Balance of idle state of the line RS 485 MODBUS RTU:

Communication serial line RS 485 MODBUS RTU in idle state, when no device transmits and all devices are to receive, the line is especially sensitive to induced voltage (faults) that may appear as incoming erroneous data.

For this reason, it is important to balance the idle state of the line by connection of appropriate resistors or terminators to one location on the line. It is implemented terminator in the device that is connected to the circuit with double DIP switch (see the Fig. 8). For long lines, we recommend to connect cable shield to GND.

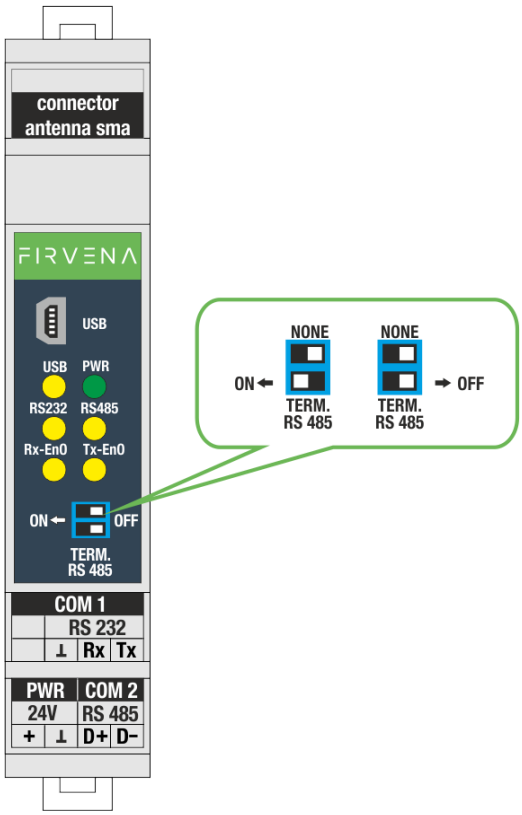

Fig. 8: *Function of double DIP switch*

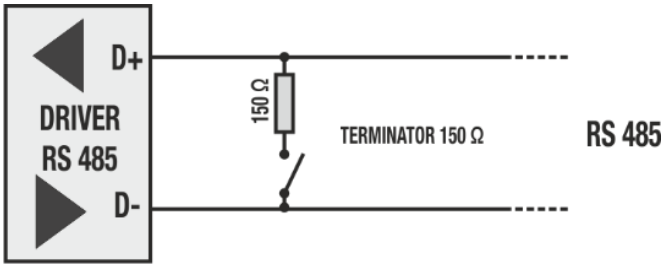

Fig. 9: *Connection of terminator 150 Ω*

3 MODBUS RTU communication description

Gateway receives data on frequency 868 MHz during its activity. It checks and process these data. Valid data are saved into prepared registers. These registers are readable by MODBUS RTU protocol.

3.1 Register map

There are a few registers assigned to each gateway in MODBUS RTU protocol.

Tab. 2: *Register map*

Area	No	R/W	Description
Rx data	0	R	Device 0
	10	R	Device 1
	20	R	Device 2
	…		
	399		Device 39
ID	400	R/W	Device 0
	410	R/W	Device 1
	420	R/W	Device 2
	…		
	799	R/W	Device 39
	…		
Actual data	900	R	The currently received telegram
	…		
Service data	1000 - 1054	R/W	Gateway
	…		
Rx RAW data	2000	R/W	Device 0
	2010	R/W	Device 1
	2020	R/W	Device 2
	…		
	2399	R/W	Device 39
	…		
Rx Pressac data	3000	R/W	Device 0
	3010	R/W	Device 1
	3020	R/W	Device 2
	…		
	3399	R/W	Device 39
	…		
Tx data	5000	R/W	Device 0
	5030	R/W	Device 1
	5060	R/W	Device 2
	…		
	6199	R/W	Device 39
	…		

3.1.1 Register map – data

Each device has 10 registers in which measured and converted values of supported sensors are saved, then there are saved information about signal strength, number of received telegrams, time from the last receiving, and indication of error.

Values are converted according to assigned RORG.

These include for example: measured values of temperature, humidity, CO2, state of contact, etc.

Value 1 – Value 6:
It shows measured and converted values of the sensor, size of supply voltage, permission or prohibition of sensor use, etc.

Signal strength:
The receiver measures signal strength during receiving of messages and it adds this value to the message. Then it is possible to find out how much is the signal from different transmitters damped. This value is dependent on distance, number of barriers, etc. Information about quality of received signal is very useful for change of receiver or transmitters position or for antenna selection.

Time from the last receiving:
The gateway counts time from the last received message for each position. It is possible to find out from this information for example, how outdated the temperature data are and if sensor did not stop to transmit. In case of use more receivers that receive the same transmitters, these data are decisive for selection of valid value. The value is in seconds.

Tab. 3: *Register map - data*

	No	R/W	Description
Device 0	0	R	Value 1
	1	R	Value 2
	2	R	Value 3
	3	R	Value 4
	4	R	Value 5
	5	R	Value 6
	6	R	Signal strength
	7	R	Number of received telegrams
	8	R	Time from the last receiving
	9	R	Error
Device 1	10	R	Value 1
	11	R	Value 2
	12	R	Value 3
	13	R	Value 4
	14	R	Value 5
	15	R	Value 6

	16	R	Signal strength
	17	R	Number of received telegrams
	18	R	Time from the last receiving
	19	R	Error
	…		
Device 39	390	R	Value 1
	391	R	Value 2
	392	R	Value 3
	393	R	Value 4
	394	R	Value 5
	395	R	Value 6
	396	R	Signal strength
	397	R	Number of received telegrams
	398	R	Time from the last receiving
	399	R	Error

Tab. 4: *Register map – error register*

Error register	
Value	Meaning of value
0	Message Ok
3	The type of sensor is not supported
7	Timeout (10 minutes without received data) (it hasn't worked for the time being)
255	The position is not occupied

3.1.2 Register map – ID data

The identification data determine which type of device it is. Identification data are saved in fields with ten registers for each device. These ID data start with the address 400. It is possible to edit them separately with function F-06 or collectively with function F-16.

It is possible to set RORG for values: 0xF6, 0xD5, 0xD2, 0xD1, 0xA6, 0xC6.

If different value is selected for RORG, the value doesn't display neither for FUNC nor TYPE.

ID0 – ID3:
It determines serial number of connected device.

RORG:
It determines type of supported EnOcean protocol (e.g..: RPS, 1BS, 4BS. VLD).

FUNC:
It determines function of the device (e.g.: temperature sensor, humidity sensor, gas sensor, light sensor, motion sensor, switching contacts, switches, etc.).

TYPE:

It determines type of device (e.g.: gas sensor – CO2, Radon, temperature sensor – from 0 to +40 °C, from -20 to +60 °C, etc.).

Tab. 5: *Register map – ID data*

	No	R/W	Description
Device 0	400	R	ID0
	401	R	ID1
	402	R	ID2
	403	R	ID3
	404	R	RORG
	405	R	FUNC
	406	R	TYPE
	407	R	
	408	R	
	409	R	
Device 1	410	R	ID0
	411	R	ID1
	412	R	ID2
	413	R	ID3
	414	R	RORG
	415	R	FUNC
	416	R	TYPE
	417	R	
	418	R	
	419	R	
	…		
Device 39	790	R	ID0
	791	R	ID1
	792	R	ID2
	793	R	ID3
	794	R	RORG
	795	R	FUNC
	796	R	TYPE
	797	R	
	798	R	
	799	R	

3.1.3 Register map – current changes

To monitor currently received messages quickly, data about currently received messages are reserved in register fields.

Registers with the address from 900 to 920 contain currently received message.

The stack is available for forty currently received messages.

After reading of register with the number 901 (sending a block with this address), the message is deleted and newer messages will appear at this position.

Tab. 6: *Register map – current changes*

	No	R/W	Description	
Actual rx data	900	R	Device number (0-39) (00FF – all new messages are read)	
	901	R	Value 1	Value
	902	R	Value 2	
	903	R	Value 3	
	904	R	Value 4	
	905	R	Value 5	
	906	R	Value 6	
	907	R	Signal strength	
	908	R	Number of received telegrams	
	909	R	Time from the last receiving	
	910	R	Error	
	911	R	ID0	ID
	912	R	ID1	
	913	R	ID2	
	914	R	ID3	
	915	R	RORG	
	916	R	FUNC	
	917	R	TYPE	
	918	R	Number of messages in the stack 0 - 40	State
	919	R	Time x 10 ms (time from receiving this message in tens ms – max. 600 s)	
	920	R	The stack is over-fulled (1), if not (0)	
	921	R	Message serial number	
	…			
	930	R	RAW data 0	RAW
	931	R	RAW data 1	
	932	R	RAW data 2	
	933	R	RAW data 3	
	934	R	RAW data 4	
	935	R	RAW data 5	
	936	R	RAW data 6	
	937	R	RAW data 7	
	938	R	RAW data 8	
	939	R	RAW data 9	
	…			
	…			
	945	R	Number of channel where the setting was actually changed (0xxFF-no channel)	
	…			
	…			
Data from data area	949	R	Index – during each reading it is changes by one (it refers to data field)	RxData from register 0...399
	950	R	Value 1	
	951	R	Value 2	
	952	R	Value 3	
	953	R	Value 4	
	954	R	Value 5	
	955	R	Value 6	
	956	R	Signal strength	
	957	R	Number of received telegrams	

	958	R	Time from the last receiving	
	959	R	Error	
Actual Tx data	960	R	Device number (0-39) (00FF – all new messages are read)	
	961	R	Source ID0	
	962	R	Source ID1	
	963	R	Source ID2	
	964	R	Source ID3	
	965	R	Dest. ID0	
	966	R	Dest. ID1	
	967	R	Dest. ID2	
	968	R	Dest. ID3	
	969	R	RORG	
	970	R	FUNC	
	971	R	TYPE	
	972	R	VALUE1	
	973	R	VALUE2	
	974	R	VALUE3	
	975	R	VALUE4	
	976	R	VALUE5	
	977	R	VALUE6	
	978	R	VALUE7	
	979	R	Learn	
	980	R	Number of messages in the stack 0 - 40	
	981	R	Time x 10 ms (time from transmitting this message in tens ms – max. 600 s)	
	982	R	Message serial number	

3.1.4 Register map – service data

The gateway state is indicated in service registers. The field of service registers starts at the address 1000.

Tab. 7: *Register map – service data*

	No	**R/W**	**Description**	
Service registers	1000	R	SW Version	
	1001	R	MODBUS address 1 … 247	COM0
	1002	R	Baud rate (default 9600 Bd)	RS485
	1003	R	MODBUS address 1 … 247	COM0
	1004	R	Baud rate (default 9600 Bd)	RS485
	1005	R	Stopbit 1, 2	COM1
	1006	R	Parity 0 – none, 1 – ODD, 2 - EVEN	RS232
	1007	R	Stopbit 1, 2	
	1008	R	Parity 0 – none, 1 – ODD, 2 - EVEN	
	1009	R	HW version	
	1010	**R/W**	**Command**	
	1011	**R**	**Status**	
	1012	R	(Teach-in) ID 0	
	1013	R	(Teach-in) ID 1	
	1014	R	(Teach-in) ID 2	
	1015	R	(Teach-in) ID 3	
	1016	R	(Teach-in) RORG	
	1017	R	(Teach-in) FUNC – if it is in TEACH -IN supported differently 9999	
	1018	R	(Teach-in) TYPE – if it is in TEACH -IN supported differently 9999	

	1019	R	(Teach-in) Manufacture ID	
	1020	R	(Teach-in) signal strength	
	1021	R	(Teach-in) ID counter identical with the previous one (0-65000) 0-new device, after reading this register, number 1 is set	
	1022			
	1023			
	1024	R	Transceiver ID0	
	1025	R	Transceiver ID1	
	1026	R	Transceiver ID2	
	1027	R	Transceiver ID3	
	1028	R	Transceiver version APP	
	1029	R	Transceiver version API	
	1030		Number of received messages	PORT RS485
	1031		Number of sent messages	
	1032		Number of error messages	
	1040		Number of received messages	PORT RS232
	1041		Number of sent messages	
	1042		Number of error messages	
	1050		Number of received messages	PORT USB
	1051		Number of sent messages	
	1052		Number of error messages	
	1053	R/W	Added delay between received message and reply 0 – 200ms	PORT RS485
	1054	R/W	Added delay between received message and reply 0 – 200ms	PORT RS232
	1060	R/W	Repeater: 0-OFF 1-ON for unrepeatable messages 2-ON for repeatable messages	
	1061	R/W	1 – Learning mode (60s)	
	1065	R/W	1 - CRC ON (default) 0 – CRC OFF (MODBUS messages – for tuning)	

Tab. 8: *Register map – service data – address 1010*

Address 1010 - COMMAND	
Value	Meaning of value
0x0F00	It deletes receiving channel on position 0 (0x0F01 – position 1 … 0x0F27 – position 39)
0x1F00	It deletes transmitting channel on position 0 (0x1F01 – position 1 … 0x1F3B – position 59)
0x0900	It saves new sensor on position 0 (0x0901 – position 1 … 0x0927 – position 39)
0x11AA	SW Reset of the entire device

Tab. 9: *Register map – service data – address 1011*

Address 1011 – Status	
Value	Meaning of value
0x1100	Start without programming
0x1101	Start – new program has error CRC
0x1102	Start – new program is the same as the current one
0x1103	Start reprogramming was successful
0xFFFF	Command was executed successfully

0xEEE1	Unknown position
0xEEE2	Unknown command

Repeater
It is possible to set the gateway with the register 1060 as repeater. It manages to forward values in two levels in the net.

Option to activate one and two-level repeater for EnOcean radio telegrams:

Level 1 – If a received telegram is valid and original (not yet repeated), the telegram is repeated with a random delay. This delay will be chosen such a way, that the maximum TX validity time (as standardized in ISO 14543-3-10) will not exceed 40 ms.

Level 2 – If a received telegram is valid and original or repeated once, the telegram is repeated with a random delay. The limit is only in message validation, because each telegram can be resent only three times. This delay is chosen in such a way, that the maximum validity time (as standardized in ISO 14543-3-10) will not exceed 40 ms.

3.1.5 Register map – RAW data

At the address 2000 received data are displayed in raw state, how they were received.

The user converts the values then according to his needs.
Copies of received data are stored in registers with addresses from 2000 to 2399. Ten registers are prepared for each entry. First four registers contain ID number for easier orientation. Then there are types of telegrams and received data.

Tab. 10: *Register map – RAW data*

	No	R/W	Description
Device 0 (4BS)	2000	R	ID 0
	2001	R	ID 1
	2002	R	ID 2
	2003	R	ID 3
	2004	R	RORG =0xA5
	2005	R	DB 0
	2006	R	DB 1
	2007	R	DB 2
	2008	R	DB 3
	2009	R	Status
Device 1 (RPS, 1BS)	2010	R	ID 0
	2011	R	ID 1
	2012	R	ID 2
	2013	R	ID 3
	2014	R	RORG =0xF6 (0xD5)
	2015	R	DB 0
	2016	R	DB 1

	2017	R	DB 2
	2018	R	DB 3
	2019	R	Status
	…		
Device 39 (VLD)	2390	R	Hi byte ID 1, Lo Byte ID 0
	2391	R	Hi byte ID 3, Lo Byte ID 2
	2392	R	RORG = 0xD2 (0xD4)
	2393	R	Hi DB1; Lo DB0
	2394	R	Hi DB3; Lo DB2
	2395	R	Hi DB5; Lo DB4
	2396	R	Hi DB7; Lo DB6
	2397	R	Hi DB9; Lo DB8
	2398	R	Hi DB11; Lo DB10
	2399	R	Hi DB13; Lo DB12

3.1.6 Register map – Pressac

User registers for the company Pressac Communications Ltd.

User registers for measuring electric current with CT clamp are ready at the address 3000.

Tab. 11: *Register map – Pressac*

	No	R/W	Description
Device 0	3000	R	ID 3 Hi , ID2 Lo
	3001	R	ID 1 Hi , ID0 Lo
	3002	R	Telegram type (0,1,2)
	3003	R	Power fail (1,0)
	3004	R	Divisor (1,0)
	3005	R	0 (reserved)
	3006	R	Value 1 (Type 0, Type 1, Type 2)
	3007	R	Value 2 (Type 1, Type 2) (0xFFFF for Type 0)
	3008	R	Value 3 (Type 2) (0xFFFF for Type 0, Type1)
	3009	R	Reserved (0xFFFF for Type 0, Type1) (0 for Type 2)
Device 1	3010	R	ID 3 Hi , ID2 Lo
	3011	R	ID 1 Hi , ID0 Lo
	3012	R	Telegram type (0,1,2)
	3013	R	Power fail (1,0)
	3014	R	Divisor (1,0)
	3015	R	0 (reserved)
	3016	R	Value 1 (Type 0, Type 1, Type 2)
	3017	R	Value 2 (Type 1, Type 2) (0xFFFF for Type 0)
	3018	R	Value 3 (Type 2) (0xFFFF for Type 0, Type1)
	3019	R	Reserved (0xFFFF for Type 0, Type1) (0 for Type 2)
	…		
Device 39	3390	R	ID 3 Hi , ID2 Lo
	3391	R	ID 1 Hi , ID0 Lo
	3392	R	Telegram type (0,1,2)
	3393	R	Power fail (1,0)
	3394	R	Divisor (1,0)
	3395	R	0 (reserved)
	3396	R	Value 1 (Type 0, Type 1, Type 2)
	3397	R	Value 2 (Type 1, Type 2) (0xFFFF for Type 0)
	3398	R	Value 3 (Type 2) (0xFFFF for Type 0, Type1)
	3399	R	Reserved (0xFFFF for Type 0, Type1) (0 for Type 2)

3.1.7 Register map – TX

- Register map for transmitting preselected telegrams start at address 5000.
- It is possible to transmit up to 40 preset telegrams.
- 20 registers are reserved for each command.
- As Source ID it is possible to use ID of transmitter (registers 1022 – 1026)
- As Source ID it is possible to use BASE ID (0xFF, 0x01…0x28)

The transmitting is available on 40 channels. It is not about frequency, the frequency is always the same, it is about virtual transmitters with different ID number. ID numbers of transmitters are in the range FF-FF-FF-(01H … 28H). The EnOcean transmitter supports such a format of ID numbers. Virtual ID number are not completely unique and it is necessary to pay attention not to cover in case of use of more transmitters.

ID3 = 255, ID2 = 255 dec, ID1 = 255 dec, ID0 = 1..40 dec

If value 0xFF is added to transmitting register source ID0, the gateway will add default ID, that was added from the production to transmitting module, automatically during approximately half a minute.

Tab. 12: *Register map – Tx*

	No	R/W	Description
Transmitting telegram 0	5000	R/W	Source ID0
	5001	R/W	Source ID1
	5002	R/W	Source ID2
	5003	R/W	Source ID3
	5004	R/W	Dest. ID0
	5005	R/W	Dest. ID1
	5006	R/W	Dest. ID2
	5007	R/W	Dest. ID3
	5008	R/W	RORG
	5009	R/W	FUNC
	5010	R/W	TYPE
	5011	R/W	VALUE1
	5012	R/W	VALUE2
	5013	R/W	VALUE3
	5014	R/W	VALUE4
	5015	R/W	VALUE5
	5016	R/W	VALUE6
	5017	R/W	VALUE7
	5018	R/W	Learn button
	5019	W	Sending 1 - Immediately 2 – For receiving message 1x (must be filled in Destination ID) 3 – For receiving message always (must be filled in Destination ID) 101 – This immediately and next message in sequence in 100ms 102 – This immediately and next message in sequence in 150ms 103 – This immediately and next message in sequence in 200ms 104 – This immediately and next message in sequence in 250ms 105 – This immediately and next message in sequence in 300ms 106 – This immediately and next message in sequence in 350ms 107 – This immediately and next message in sequence in 400ms

			108 – This immediately and next message in sequence in 450ms 109 – This immediately and next message in sequence in 500ms 110 – This immediately and next message in sequence in 550ms 111 – This immediately and next message in sequence in 600ms
Transmitting telegram 1	5020	R/W	Source ID0
	5021	R/W	Source ID1
	5022	R/W	Source ID2
	5023	R/W	Source ID3
	5024	R/W	Dest. ID0
	5025	R/W	Dest. ID1
	5026	R/W	Dest. ID2
	5027	R/W	Dest. ID3
	5028	R/W	RORG
	5029	R/W	FUNC
	5030	R/W	TYPE
	5031	R/W	VALUE1
	5032	R/W	VALUE2
	5033	R/W	VALUE3
	5034	R/W	VALUE4
	5035	R/W	VALUE5
	5036	R/W	VALUE6
	5037	R/W	VALUE7
	5038	R/W	Learn button
	5039	W	Sending 1 - Immediately 2 – For receiving message 1x (must be filled in Destination ID) 3 – For receiving message always (must be filled in Destination ID) 101 – This immediately and next message in sequence in 100ms 102 – This immediately and next message in sequence in 150ms 103 – This immediately and next message in sequence in 200ms 104 – This immediately and next message in sequence in 250ms 105 – This immediately and next message in sequence in 300ms 106 – This immediately and next message in sequence in 350ms 107 – This immediately and next message in sequence in 400ms 108 – This immediately and next message in sequence in 450ms 109 – This immediately and next message in sequence in 500ms 110 – This immediately and next message in sequence in 550ms 111 – This immediately and next message in sequence in 600ms

4 Supported functions

It is possible to communicate with gateway in the net MODBUS RTU with following functions:

- Function 3 enables to read any registers in its memory range. Available registers return zero.
- Function 6 sets values in (adjustable) registers. It is used to set transmitted message and for its sending.
- Function 16 is used only for writing new ID number into gateway's memory.

5 Software tool EnOcean Tools

The tool is prepared for simple administration of all elements serviced with gateway through you can connect or disconnect EnOcean elements to and from gateway, monitor their states, values, communication intervals and signal strength. Another useful function is the possibility to control EnOcean elements from the gateway side. When there are installed more gateways, the tool enables to monitor and compare on which gateway each element has better signal and to assign the element with better signal to its gateway. You can assign the elements on position with use of ID number manually or automatically. The type of communication (RS 232, RS 485, USB) and baud rate can be set with this software. The baud rate for USB is default 115,2 kBd.

6 Supported profiles of device (EEP) for receiving data

6.1 Supported 4BS telegrams

A5-02-xx Temperature sensors		
EEP	**Registers**	**Description**
A5-02-01	Value1	Tempereature -40 … 0 °C (x10)
A5-02-02	Value1	Temperature -30 … +10 °C (x10)
A5-02-03	Value1	Temperature -20 … +20 °C (x10)
A5-02-04	Value1	Temperature -10 … +30 °C (x10)
A5-02-05	Value1	Temperature 0 … +40 °C (x10)
A5-02-06	Value1	Temperature +10 ...+50 °C (x10)
A5-02-07	Value1	Temperature +20 ... +60 °C (x10)
A5-02-08	Value1	Temperature +30 ... +70 °C (x10)
A5-02-09	Value1	Temperature +40 ... +80 °C (x10)
A5-02-0A	Value1	Temperature +50 ... +90 °C (x10)
A5-02-0B	Value1	Temperature +60 ... +100 °C (x10)
A5-02-10	Value1	Temperature -60 … +20 °C (x10)
A5-02-11	Value1	Temperature -50 … +30 °C (x10)
A5-02-12	Value1	Temperature -40 … +40 °C (x10)
A5-02-13	Value1	Temperature -30 … +50 °C (x10)
A5-02-14	Value1	Temperature -20 … +60 °C (x10)
A5-02-15	Value1	Temperature -10 … +70 °C (x10)
A5-02-16	Value1	Temperature 0 … +80 °C (x10)
A5-02-17	Value1	Temperature +10 … +90 °C (x10)
A5-02-18	Value1	Temperature +20 … +100 °C (x10)
A5-02-19	Value1	Temperature +30 … +110 °C (x10)
A5-02-1A	Value1	Temperature +40 … +120 °C (x10)
A5-02-1B	Value1	Temperature +50 … +130 °C (x10)
A5-02-20	Value1	Temperature -10 … +41,2 °C (x10)
A5-02-30	Value1	Temperature -40 … +62,3 °C (x10)

A5-04-xx Temperature and humidity sensors		
EEP	**Registers**	**Description**
A5-04-01	Value1	Temperature 0 … +40 °C (x10)
	Value2	Relative humidity 0 … 100 % (x10)
	Value3	Temperature sensor: 1 - available 0 - not available
A5-04-02	Value1	Temperature -20 … +60 °C (x10)
	Value2	Relative humidity 0 … 100 % (x10)
	Value3	Temperature sensor: 1 - available 0 - not available
A5-04-03	Value1	Temperature -20 … +60 °C (x10) - resolution 10bit
	Value2	Relative humidity 0 … 100 % (x10)
	Value3	Telegram type: 1 – Event triggered 0 - heartbeat

A5-05-xx Pressure sensors		
EEP	**Registers**	**Description**
A5-05-01	Value1	Pressure 500 … 1150 hPa
	Value2	Telegram type: 1 – Event triggered 0 - heartbeat
	Value3	Temperature sensor: 1 - available 0 - not available

A5-06-xx Light sensors		
EEP	**Registers**	**Description**
A5-06-01	Value1	Supply voltage 0… 5.0V (x100)
	Value2	Illumination 300-60000lx (/10) value 300-6000
	Value3	Range
A5-06-02	Value1	Supply voltage 0… 5.0V (x100)
	Value2	Illumination 0-1020lx
	Value3	Range
A5-06-03	Value1	Supply voltage 0… 5.0V (x100)
	Value2	Illumination 0-1000lx
A5-06-04	Value1	Temperature -20°C … 60°C
	Value2	Illumination 0-65535lx (/10) value 0-6553
	Value3	Energy storage 0…100%
	Value4	Valid temperature data 0 … 1
	Value5	Valid storage data 0 … 1

A5-07-xx PIR sensors		
EEP	**Registers**	**Description**
A5-07-01	Value1	0 - PIR off … 1 – PIR on
	Value2	Supply voltage 0… 5.0V (x10)
	Value3	Supply voltage availability : 0 – Supply voltage is not supported 1- Supply voltage is supported
A5-07-02	Value1	0 – Uncertain of occupancy status … 1 – Motion detect
	Value2	Supply voltage 0… 5.0 V (x10)
A5-07-03	Value1	0 - PIR off … 1 – PIR on
	Value2	Supply voltage 0… 5.0 V (x10)
	Value3	Illumination 0…1000 lx
A5-08-01	Value1	0 - PIR off … 1 – PIR on
	Value2	Supply voltage 0… 5.1 V (x10)
	Value3	Button occupancy 1 – preset 0- released
	Value4	Illumination 0 … 510 lx
	Value5	Temperature 0 … 51 °C (x10)
A5-08-02	Value1	0 - PIR off … 1 – PIR on
	Value2	Supply voltage 0… 5.1 V (x10)
	Value3	Button occupancy 1 – preset 0- released
	Value4	Illumination 0 … 1020 lx
	Value5	Temperature 0 … 51 °C (x10)
A5-08-03	Value1	0 - PIR off … 1 – PIR on
	Value2	Supply voltage 0… 5.1 V (x10)
	Value3	Button occupancy 1 – preset 0- released
	Value4	Illumination 0 … 1530 lx
	Value5	Temperature -30 … 50 °C (x10)
A5-09-02	Value1	CO conc. 0…1020ppm
	Value2	Supply voltage 0… 5.1 V (x10)
	Value3	Temperature 1…51°C (x10)
	Value6	0 - Temper. Sensor not available 1 – Temperature sensor available
A5-09-04	Value1	CO_2 conc. 0…2550ppm increment = 10ppm
	Value2	Relative Humidity 0…100% (x10) res. 0,5%
	Value3	Temperature 1…51°C (x10)
	Value4	
	Value5	0 - Humidity Sensor not available 1 – Humidity sensor available
	Value6	0 - Temper. Sensor not available 1 – Temperature sensor available

A5-09-xx Environmental sensors VOC, CO, CO_2, dust, radon		
EEP	**Registers**	**Description**
A5-09-02	Value1	CO conc. 0…1020ppm
	Value2	Supply voltage 0… 5.1 V (x10)
	Value3	Temperature 1…51°C (x10)
	Value6	0 - Temper. Sensor not available 1 – Temperature sensor available
A5-09-04	Value1	CO_2 conc. 0…2550ppm increment = 10ppm
	Value2	Relative Humidity 0…100% (x10) res. 0,5%
	Value3	Temperature 1…51°C (x10)
	Value4	0
	Value5	0 - Humidity Sensor not available 1 – Humidity sensor available
	Value6	0 - Temper. Sensor not available 1 – Temperature sensor available
A5-09-05	Value1	VOC con. 0 …65535 ppb
	Value2	VOC ID 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
	Value3	Scale Multiplier 0: 0.01 1: 0.1 2: 1 3: 10
A5-09-06	Value1	Radon aktivity 0 …1023 Bq/m^3
A5-09-07	Value 1	Dust less than 10 µm (PM10) 0...511 0...511 $\mu g/m^3$
	Value 2	Dust less than 2.5 µm (PM2.5) 0...511 0...511 $\mu g/m^3$
	Value 3	Dust less than 1 µm (PM1) 0...511 0...511 $\mu g/m^3$
	Value 4	0: PM10 not active 1: PM10 active

	Value 5	0: PM2.5 not active 1: PM2.5 active	
	Value 6	0: PM1 not active 1: PM1 active	
A5-09-08	Value 1	CO_2 0 – 2000 ppm (Pure sensor)	
A5-10-xx Room Operating Panel			
EEP	**Registers**	**Description**	
A5-10-01	Value1	Actual temperature 0…+40°C (x10)	
	Value2	Setpoint 0-255	
	Value3	Button occupancy 1 – preset 0- released	
	Value4	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
	Value5	Stage 0,1,2,3, (255=AUTO)	
	Value6	Reserved	
A5-10-02	Value1	Actual temperature 0…+40°C (x10)	
	Value2	Setpoint 0-255	
	Value3	Slide switch or Slide switch Day/Night 1 – day(sw1) 0- night(sw0)	
	Value4	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
	Value5	Stage 0,1,2,3, (255=AUTO)	
	Value6	reserved	
A5-10-03	Value1	Actual temperature 0…+40°C (x10)	
	Value2	Setpoint 0-255	
	Value3	reserved	
	Value4	reserved	
	Value5	reserved	
	Value6	reserved	
A5-10-04	Value1	Actual temperature 0…+40°C (x10)	
	Value2	Setpoint 0-255	
	Value3	reserved	
	Value4	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
	Value5	Stage 0,1,2,3, (255=AUTO)	
	Value6	reserved	
A5-10-05	Value1	Actual temperature 0…+40°C (x10)	
	Value2	Setpoint 0-255	
	Value3	Button occupancy 1 – preset 0- released	
	Value4	reserved	
	Value5	reserved	
	Value6	reserved	
A5-10-06	Value1	Actual temperature 0…+40°C (x10)	
	Value2	Setpoint 0-255	
	Value3	slide switch or Slide switch Day/Night	0: Position I / Night /Off 1: Position O / Day /On
	Value4	reserved	
	Value5	reserved	

	Value6	reserved

A5-10-xx Room Operating Panel			
EEP	**Registers**	**Description**	
A5-10-07	Value1	Actual tempetature 0…+40°C (x10)	
	Value2	reserved	
	Value3	reserved	
	Value4	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
	Value5	Stage 0,1,2,3, (255=AUTO)	
	Value6	reserved	
A5-10-08	Value1	Actual tempetature 0…+40°C (x10)	
	Value2	reserved	
	Value3	Button occupancy 1 – preset 0- released	
	Value4	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
	Value5	Stage 0,1,2,3, (255=AUTO)	
	Value6	reserved	
A5-10-09	Value1	Actual tempetature 0…+40°C (x10)	
	Value2	reserved	
	Value3	Slide switch or Slide switch Day/Night 1 – day(sw1) 0- night(sw0)	
	Value4	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
	Value5	Stage 0,1,2,3, (255=AUTO)	
	Value6	reserved	
A5-10-0A	Value1	Actual tempetature 0…+40°C (x10)	
	Value2	Setpoint 0-255	
	Value3	Contact state 0 – Close; 1- Open	
	Value4	Reserved	
	Value5	Reserved	
	Value6	Reserved	
A5-10-0B	Value1	Actual tempetature 0…+40°C (x10)	
	Value2	Reserve	
	Value3	Button occupancy 1 – preset 0- released	
	Value4	reserved	
	Value5	reserved	
	Value6	reserved	
A5-10-0C	Value1	Actual tempetature 0…+40°C (x10)	
	Value2	Setpoint 0-255	
	Value3	slide switch or Slide switch Day/Night	0: Position I / Night /Off 1: Position O / Day /On
	Value4	reserved	
	Value5	reserved	
	Value6	reserved	

A5-10-xx Room Operating Panel		
EEP	**Registers**	**Description**
A5-10-10	Value1	Actual temperature 0…+40°C (x10)
	Value2	Setpoint 0-255
	Value3	Button occupancy 1 – preset 0- released
	Value4	Humidity 0…100%
	Value5	Reserved
	Value6	Reserved
A5-10-11	Value1	Actual temperature 0…+40°C (x10)
	Value2	Setpoint 0-255
	Value3	Slide switch or Slide switch Day/Night 1 – day(sw1) 0- night(sw0)
	Value4	Humidity 0…100%
	Value5	Reserved
	Value6	Reserved
A5-10-12	Value1	Actual temperature 0…+40°C (x10)
	Value2	Setpoint 0-255
	Value3	Reserved
	Value4	Humidity 0…100%
	Value5	Reserved
	Value6	Reserved
A5-10-13	Value1	Actual temperature 0…+40°C (x10)
	Value2	Reserved
	Value3	Button occupancy 1 – preset 0- released
	Value4	Humidity 0…100%
	Value5	Reserved
	Value6	Reserved
A5-10-14	Value1	Actual temperature 0…+40°C (x10)
	Value2	Reserved
	Value3	Button occupancy 1 – preset 0- released
	Value4	Humidity 0…100%
	Value5	Reserved
	Value6	Reserved
A5-10-20	Value1	Actual temperature 0…+40°C (x10)
	Value2	Setpoint 0…255
	Value3	Heating mode 0 , 1, 2, 3 Reserved
	Value4	Battery change needed 1: battery low 0 :battery ok
	Value5	Reserved
	Value6	Reserved

A5-20-xx Actuators		
EEP	**Registers**	**Description**
A5-20-01	Value1	Actuator position 0…100 %
	Value2	Actual temperature from actuator 0…+40°C (x10)
	Value3	1-Service on
	Value4	1-Detection Window open
	Value5	1 Energy input enabled (MVA004 Active energy harvesting (valve is hot)) 10 Energy storage (MVA004 - Energy storage sufficiently filled)
	Value6	1 Failure temperature sensor 10 Actuator obstructed (MVA004 motor failure) 100 Cover open 1000 Batery – change battery next day

		1111 + Batery – change battery next day + Cover open + Actuator obstructed + Failure temperature sensor		
A5-20-04	Value1	Actuator position 0…100 %		
	Value2	Room Temperature 10…30 °C		
	Value3	Feed Temperature 20 .. 80°C		
	Value4	Temperature Set Point 10 .. 30°C		
	Value5	Status byte 0000 … 1111	Failure Code Button Lock Status Measurement Status Status Request	0xxx No failure 1xxx failure x0xx Unlocked x1xx Locked xx0x Inactive xx1x Active xxx0 No change xxx1 Status requested
	Value6	Failure Code 0…255	0...16: Reserved 17: Measurement error 18: Battery empty 19: Reserved 20: Frost protection 21 ...32: Reserved 33: Blocked valve 34 ...35: Reserved 36: End point detection error 37 ...39: Reserved 40: No valve 41 ...48: Reserved 49: Not taught in 50 ... 52: Reserved 53: No response from controller 54: Teach-in error 55 ... 255: Reserved	

A5-20-06 Harvesting-powered Actuator with Local Setpoint Control **DIRECTION-1: Data received from actuator**			
Registers	**Description**		
Value1	Actual Position 0…100 %		
Value2	Local Offset (absolute) 0…40 °C (x10) Local Offset (relative) -5…5 °C (x10)		1)
Value3	Temperature (ambient) 0…40 °C (x10)		2)
Value4	Temperature (feed) 0…80 °C (x10)		
Value5	Reserved		
Value6	Flags (single-bit values occurring in EEP telegram)		
Flags (16 bits)			3)
8 bits [15:8]	Reserved		
bit7 (MSB)	Local Offset Mode	0:Relative; 1:Absolute	
bit6	Temperature Selection	0:Ambient; 1:Feed	
bit5	Harvesting Status	0:Not harvesting; 1:Harvesting active	
bit4	Charge Level	0:Low; 1:Sufficient	
bit3	Window Open	0:False; 1:True	
bit2	Radio Error	0:False; 1:True (>= 6 consecutive errors)	
bit1	Signal Strength	0:Strong; 1:Weak	
bit0 (LSB)	Actuator Obstructed	0:False; 1:True	
Note			

1) The meaning of Value2 is defined by Local Offset Mode (Value6.bit7).
2) Temperature Selection (Value6.bit6) defines if Value3 or 4 was updated by the last telegram, the second value stays unchanged.
3) Bits are numbered from LSB to MSB, e.g. Flags = 128 (0x80) => bit7 = 1 (Local Offset Mode = 1:Absolute)

6.2 Supported RPS telegrams

F6-01-xx Switch		
EEP	**Registers**	**Desription**
F6-01-01	Value1	0: Button released 1: Button pressed
	Value2	Last value
	Value3	Previous value
	Value4	Previous value
	Value5	Energy Bow: 0 – released; 1- pressed; 2-long push
	Value6	Number of incoming messages from the last reading of the value 1 (max. 3)

F6-02-xx Switch		
EEP	**Registers**	**Description**
F6-02-01	Value1	Rocker 1st action 1: Button AI: "Switch light on" or "Dim light down" or "Move blind closed" 3: Button A0: "Switch light off" or "Dim light up" or "Move blind open" 5: Button BI: “Switch light on” or "Dim light down” or "Move blind closed” 7: Button B0: “Switch light off” or “Dim light up” or "Move blind open”
	Value2	Last value
	Value3	Previous value
	Value4	2nd action
	Value5	Energy Bow: 0 – released; 1- pressed; 2-long push
	Value6	Number of incoming messages from the last reading of the value 1 (max. 3))
F6-02-02	Value1	Rocker 1st action 1: Button AI: "Switch light on" or "Dim light up" or "Move blind open" 3: Button A0: "switch light off" or "Dim light down" or "Move blind closed" 5: Button BI: “Switch light on” or "Dim light up” or "Move blind open” 7: Button B0: “Switch light off” or “Dim light down” or "Move blind closed”
	Value2	Last value
	Value3	Previous value
	Value4	2nd action
	Value5	Energy Bow: 0 – released; 1- pressed; 2-long push
	Value6	Number of incoming messages from the last reading of the value 1 (max. 3)
F6-02-03	Value1	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
	Value2	Last value
	Value3	Previous value
	Value4	2Previous value
	Value5	Energy Bow: 0 – released; 1- pressed; 2-long push
	Value6	Number of incoming messages from the last reading of the value 1 (max. 5)
F6-02-04	Value1	1: Button A0 pressed 2:
	Value2	Last value
	Value3	Previous value
	Value4	2Previous value
	Value5	3Previous value
	Value6	Number of incoming messages from the last reading of the value 1 (max. 5)

F6-04-xx Position switch, Home and office Application		
EEP	**Registers**	**Description**
F6-02-01	Value1	1 = Card Inserted 0 = take out
	Value2	Last value
	Value3-6	0
F6-02-02	Value1	1 = Card Inserted 0 = take out
	Value2	Last value
	Value3	Energy bow (1 = Card Inserted 0 = take out)
	Value4	0
	Value5	Button coding 0: button
	Value6	0

6.3 Supported 1BS telegrams

D5-00-xx Switch		
EEP	**Registers**	Description
D5-00-01	Value1	0: OPEN (without battey door/window kontact) 1: CLOSE
	Value2	Last value
	Value3	Previous value
	Value4	2Previous value
	Value5	3Previous value
	Value6	Number of incoming messages from the last reading of the value 1 (max. 5)

6.4 Supported VLD telegrams

D2-01-XX Actuators, Dimmers		
EEP	**Registers**	**Description**
CMD = 0x01	**Value1**	**CMD index = 1**
	Value 2	Output value: 0: Output value 0% or OFF 1...100: Output value 1% to 100% or ON 101...126: Not used 127: Output value not valid / not applicable
	Value3	Dim value: 0: Switch to new output value 1: Dim to new output value – dim timer 1 2: Dim to new output value – dim timer 2 3: Dim to new output value – dim timer 3 4: Stop dimming 5...7: not used
	Value4	I/O channel 0...29: Output channel (to load) 30: All output channels supported by the device 31: Input channel (from mains supply)
CMD = 0x04	**Value1**	**CMD index = 4 Actuator status response**
	Value2	Output value: 0: Output value 0% or OFF 1...100: Output value 1% to 100% or ON 101...126: Not used 127: Output value not valid / not applicable
	Value3	I/O channel 0...29: Output channel (to load) 30: All output channels supported by the device 31: Input channel (from mains supply)
	Value4	0: Local control disabled / not supported 1: Local control enabled
	Value5	100 Power Failure Detection enabled 10 Power Failure Detected 1 Over current switch off: executed
	Value6	Error level 0: Error level 0: hardware OK 1: Error level 1: hardware warning 2: Error level 2: hardware failure 3: Error level not supported
CMD = 0x07	**Value1**	**CMD index = 7 Actuator measurement response**
	Value2	Value – low 16 bytes
	Value3	Value – high 16 bytes
	Value4	I/O channel 0...29: Output channel (to load) 30: All output channels supported by the device 31: Input channel (from mains supply)
	Value5	Unit 0: Energy [Ws] 1: Energy [Wh] 2: Energy [KWh] 3: Power [W] 4: Power [KW]

		5… 7: Not used

D2-03-XX		
	Registers	**Description**
D2-03-00	Value1	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
D2-03-0A	Value1	Button Action 1 ... Simple Press 2 ... Double Press 3 ... Long Press 4 ... Long Press released
	Value2	Battery Autonomy 0 … 100%
D2-03-10	Value1	Movement of the window handle 1 … 0b00000001 2 … 0b00000010 4 … 0b00000011 5 … 0b00000100

D2-05-XX Blinds Control for Position and Angle		
EEP	**Registers**	**Description**
D2-05-00		
CMD = 0x04	**Value1**	**CMD index = 4 Reply Position and Angle**
	Value2	Channel address Channel 1
	Value3	Current vertical position 0...100: 0...100 % 127: Position unknown, will be known after the next goto cmd
	Value4	Current rotation angle 0...100: 0...100 % 127: Angle unknown, will be known after the next goto cmd
	Value5	Current locking mode 0: Normal (no lock) 1: Blockage mode 2: Alarm mode 3 ... 7:Reserved
	Value6	0
Note		
1) The same mapping is valid for D2-05-00, D2-05-01, D2-05-02 and D2-05-03. 2) D2-05-03 partial support, only CMD1 to 4.		

D2-14-40 Multisensor: Temperature, Humidity, XYZ Acceleration, Illumination D2-14-41 Multisensor: Temperature, Humidity, XYZ Acceleration, Illumination, Window Contact	
Registers	**Description**
Value1	Temperature -40…60 °C (x10)
Value2	Humidity 0…100 % (x10)
Value3	Illumination 0…65535 lx
Value4	Contact (0: Open, 1: Closed)
Value5	Accelerometer data (HI)
Value6	Accelerometer data (LO)
Accelerometer data (32 bits)	
2 bits [31:30]	Telegram type (0: Periodic, 1: Threshold 1 exceeded, 2: Threshold 2 exceeded
10 bits [29:20]	Acceleration X 0…1000
10 bits [19:10]	Acceleration Y 0…1000
10 bits [9:0]	Acceleration Z 0…1000
Note	
1) Value4 is valid for D2-14-41 only. 2) Value5 and 6 contains compressed accelerometer data as it is transferred in the telegram. Acceleration conversion (0…1000 -> −2500…2500 mG): g = raw * 5 − 2500 [mG] 3) Encryption is not supported	

D2-32-XX Current sensors		
EEP	**Registers**	Description
D2-32-00	Value1	Input 1 0 … 4095 0 … 409,5 A (without battery current sensor - clamp)
	Value2	0
	Value3	0
	Value4	0
	Value5	0 …1 Divisor
	Value6	0 … 1 Power Fail
D2-32-01	Value1	Input 1 0 … 4095 0 … 409,5 A (without battery current sensor - clamp)
	Value2	Input 2 0 … 4095 0 … 409,5 A (without battery current sensor - clamp)
	Value3	0
	Value4	0
	Value5	0 …1 Divisor
	Value6	0 … 1 Power Fail
D2-32-02	Value1	Input 1 0 … 4095 0 … 409,5 A (without battery current sensor - clamp)
	Value2	Input 2 0 … 4095 0 … 409,5 A (without battery current sensor - clamp)
	Value3	Input 3 0 … 4095 0 … 409,5 A (without battery current sensor - clamp)
	Value4	0
	Value5	0 …1 Divisor
	Value6	0 … 1 Power Fail
D2-20-12		

6.5 Supported MSC telegrams

D1-xx-xx MSC telegramy		
EEP	**Registers**	**Description**
D1-03-C1	Value1	Temperature 1 (the most updated) -20… 100 °C (x10)
	Value2	Temperature 2 (the most updated) -20… 100 °C (x10)
	Value3	Temperature 3 (the most updated) -20… 100 °C (x10)
	Value4	1 range -20 … 100 °C

	Value5	Indoor temperature -20… 100 °C (x10)
	Value6	Repeating the sending 30, 60, 120 a 300s Solar cell (+1) battery (+0) e.g. 31 repeating the sending after 30s, solar power supply
D1-03-C2	Value1	Temperature 1 (the most updated) 0… 85 °C (x10)
	Value2	Temperature 2 (the most updated) 0… 85 °C (x10)
	Value3	Temperature 3 (the most updated) 0… 85 °C (x10)
	Value4	2 range 0 … 85 °C
	Value5	Indoor temperature 0… 85 °C (x10)
	Value6	Repeating the sending 30, 60, 120 a 300s Solar cell (+1) battery (+0) e.g. 31 repeating the sending after 30s, solar power supply

7 Supported profiles of device (EEP) for transmitting data

Selected RORG protocols are supported for transmitting. Numbers according to EEP are entered to transmitting registers RORG, FUNC and TYPE. Values from registers VALUE 1…7 are converted to format of selected protocol.

7.1 Supported 1BS telegrams

D5-00-xx Contacts		
EEP	**Registers**	**Description**
D5-00-01	Value1	0: OPEN (without battery door/window contact) 1: CLOSE
	Learn	0: Data telegram 1: Learn mode

7.2 Supported RPS telegrams

F6-02-xx		
EEP	**Registers**	**Description**
F6-02-02	Value1	Rocker 1st action 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”
	Value2	2nd action
	Value3	Energy Bow: 0 – released; 1 – pressed
	Value7	It is copied directly to STATUS byte

7.3 Supported 4BS telegrams

A5-02-xx		
EEP	**Registers**	**Description**
A5-02-01	Value1	X 10 Temperature -40…0 °C
A5-02-02	Value1	X 10 Temperature -30…10 °C
A5-02-03	Value1	X 10 Temperature -20…20 °C
A5-02-04	Value1	X 10 Temperature -10…30 °C
A5-02-05	Value1	X 10 Temperature 0…40 °C
A5-02-06	Value1	X 10 Temperature 10…50 °C
A5-02-07	Value1	X 10 Temperature 20…60 °C
A5-02-08	Value1	X 10 Temperature 30…70 °C
A5-02-09	Value1	X 10 Temperature 40…80 °C
A5-02-0A	Value1	X 10 Temperature 50…90 °C
A5-02-0B	Value1	X 10 Temperature 60…100 °C
A5-02-10	Value1	X 10 Temperature -60…20 °C
A5-02-11	Value1	X 10 Temperature -50…30 °C
A5-02-12	Value1	X 10 Temperature -40…40 °C
A5-02-13	Value1	X 10 Temperature -30…50 °C
A5-02-14	Value1	X 10 Temperature -20…60 °C
A5-02-15	Value1	X 10 Temperature -10…70 °C
A5-02-16	Value1	X 10 Temperature 0…80 °C

A5-02-17	Value1	X 10 Temperature 10…90 °C
A5-02-18	Value1	X 10 Temperature 20…100 °C
A5-02-19	Value1	X 10 Temperature 30…110 °C
A5-02-1A	Value1	X 10 Temperature 40…120 °C
A5-02-1B	Value1	X 10 Temperature 50…130 °C

A5-04-xx		
EEP	**Registers**	**Description**
A5-04-01	Value1	x 10 Temperature 0…40 °C (0…400)
	Value2	x 10 Humidity 0…100% (0…1000)
	Value3	Temperature sensor available (1) not available (0)
	Value 4,5,6,7	Not used
A5-04-02	Value1	x 10 Temperature -20…60 °C (-200…600)
	Value2	x 10 Humidity 0…100% (0…1000)
	Value 3,4,5,6,7	Not used
A5-04-03	Value1	x 10 Temperature -20…60 °C (-200…600)
	Value2	x 10 Humidity 0…100% (0…1000)
	Value3	Type of telegram 0: Heartbeat 1: Even Triggered
	Value 4,5,6,7	Not used

A5-05-xx		
EEP	**Registers**	**Description**
A5-05-01	Value1	Air pressure 500-1150hPa
	Value2	Type of telegram 0: Heartbeat 1: Even Triggered
	Value 3,4,5,6,7	Not used

A5-20-xx		
EEP	**Registers**	**Description**
A5-20-01	Value1	Actuator position 0…100 or temperature 0…400 (0…40°C)
	Value2	Actual room temperature from GWY to actuator
	Value3	Meaning of value 1 0 – Actuator position 1 – Temperature
	Value4	1 – run unit sequence 2 – lift set 3 – run unit sequence+left set
	Value5	1 – valve open maintenance 2 – valve closed 10 – set point inverse 11 – valve open maintenance + set point inverse 12 – valve closed + set point inverse
	Value6	0 – nothing 1 – summer mode
	Value7	0 – RCU 1 – Service on
	Teach-in	0: Data telegram 1: Learning mode
A5-20-04	Value1	Actuator position 0…100% (Valve Position)
	Value2	Temperature Set Point 10…30°C

	Value3	Wake-up Cycle	0: 10 sec 1: 60 sec 2: 90 sec 3: 120 sec 4: 150 sec 5: 180 sec 6: 210 sec 7: 240 sec 8: 270 sec 9: 300 sec (5min) 10: 330 sec 11: 360 sec 12: 390 sec 13: 420 sec 14: 450 sec 15: 480 sec 16: 510 sec 17: 540 sec 18: 570 sec 19: 600 sec (10min) 20: 630 sec 21: 660 sec 22: 690 sec 23: 720 sec 24: 750 sec	25: 780 sec 26: 810 sec 27: 840 sec 28: 870 sec 29: 900 sec (15min) 30: 930 sec 31: 960 sec 32: 990 sec 33: 1020 sec 34: 1050 sec 35: 1080 sec 36: 1110 sec 37: 1140 sec 38: 1170 sec 39: 1200 sec (20min) 40: 1230 sec 41: 1260 sec 42: 1290 sec 43: 1320 sec 44: 1350 sec 45: 1380 sec 46: 1410 sec 47: 1440 sec 48: 1470 sec	49: 1500 sec (25min) 50: 3 hrs 51: 6 hrs 52: 9 hrs 53: 12 hrs 54: 15 hrs 55: 18 hrs 56: 21 hrs 57: 24 hrs 58: 27 hrs 59: 30 hrs 60: 33 hrs 61: 36 hrs 62: 39 hrs 63: 42 hrs (max)
	Value4	Measurement Control 0: Disable 1:Enable Control the temperature measurement (feed temperature + room temperature)			
	Value5	Button Lock Control 0: Unlocked 1: Locked			
	Value6	Display Orientation	0: 0° 1: 90° 2: 180° 3: 270°		
	Value7	Reserved			
	Teach-in	0: Data telegram 1: Learning mode			

Learning mode Variation 3

The learning mode for MD15-FTL-HE is in the form query – answer. The gateway makes this process automatically. It is necessary to follow the procedure.

1. Fill in actuator ID to registers for transmitting channels.
2. Fill in RORG, TYPE, FUNC.
3. Set register Teach-in on 1.
4. Set Value 2 for transmitting to the register (send once after receiving).
5. Press button on actuator, the process „teach-in“ will start.

A5-20-06 Harvesting-powered Actuator with Local Setpoint Control DIRECTION-2: Data and commands sent to actuator				
Registers	**Description**			
Value1	Valve Position 0…100 %			1)
Value2	Temperature Setpoint 0…40 °C (x10)			
Value3	Temperature from RCU 0…40 °C (x10)			
Value4	Reserved			
Value5	Reserved			
Value6	Radio Interval	0:Auto; 1:2 min; 2:5 min;	3:10 min; 4:20 min; 5:30 min;	6:60 min; 7:120 min
Value7	Flags (single-bit values occurring in EEP telegram)			
Flags (16 bits)				2)
8 bits [15:8]	Reserved			
3 bits [7:5]	Reserved			
bit4 (MSB)	Reference Run	0:False; 1:True		
bit3	Summer Mode	0:False; 1:True		
bit2	Setpoint Selection	0:Valve position; 1:Temperature		
bit1	Temperature Selection	0:Ambient; 1:Feed		
bit0 (LSB)	Standby Mode	0:False; 1:True		
Note				
1) Setpoint Selection (Value7.bit2) defines if Value1 or 2 is used, the second value has no effect. 2) Bits are numbered from LSB to MSB, e.g. Flags = 4 (0x04) => bit2 = 1 (Setpoint Selection = 1:Temperature)				

A5-38-08		
EEP	**Registers**	**Description**
COM ID 1	Value1	Command ID = 1 Switching
	Value2	SW Switching Command ON/OFF Enum: 0: Off 1: On
	Value3	Time (in 1/10 second) 0= no time specifed 1…65535: 0,1 … 6553,5s
	Value4	Duration (Execute switching command immediately and switch back after duration) 1 = Delay (Execute switching command after delay) 0: Duration 1: Delay
	Value5	0: Unlock 1: Lock 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
	Teach-in	0: Data telegram 1: Learning mode
COM ID 2	Value1	Command ID = 2 Dimming
	Value2	SW Switching Command ON/OFF Enum: 0: Off 1: On
	Value3	Dimming value (absolute [0...255] or relative [0...100]) 0...255 0...100 %
	Value4	Dimming Range EDIM R Dimming Range

		0: Absolute value 1: Relative value
	Value5	Ramping time RMP Ramping time in seconds, 0 = no ramping, 1... 255 = seconds to 100% 0...255 0...255 s
	Value6	Store final value STR Store final value 0: No 1: Yes
	Teach-in	0: Data telegram 1: Learning mode

7.4 Supported VLD telegrams

D2-01-XX		
EEP	**Registers**	**Description**
CMD – 0x01	Value1	CMD = 1 Actuator Set Output
	Value2	Output value: 0 – 100% (0=OFF; 100=ON)
	Value3	I/O Channel 0 – 29 30 = All channels 31 = Input channel (from mains supply)
	Value4	Diming 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
	Value5..7	Not Used
	Teach-in	0
CMD – 0x02	Value1	CMD = 2 Actuator Set Local
	Value 2	I/O channel 0...29: Output channel (to load) 30: All output channels supported by the device 31: Input channel (from mains supply)
	Value 3	Dim timer 1 - fast 0: Not used 1…15: Dim timer 1 [0,5 … 7,5s / steps 0,5s]
	Value4	Dim timer 2 - medium 0: Not used 1…15: Dim timer 1 [0,5 … 7,5s / steps 0,5s]
	Value5	Dim timer 3 - slow 0: Not used 1…15: Dim timer 1 [0,5 … 7,5s / steps 0,5s]
	Value6	0: Disable taught-in devices (with different EEP) 1: Enable taught-in devices (with different EEP) 0: Over current shut down: static off 10: Over current shut down: automatic restart 0: Reset over current shut down: not active 100: Reset over current shut down: trigger signal 0: Disable local control 1000: Enable local control Sample: 1011 Enable local control; Reset over current shut down: not active; Over current shut down: automatic restart; Enable taught-in devices (with different EEP)
	Value7	Default state DS 0: Default state: 0% or OFF 1: Default state: 100% or ON 2: Default state: remember previous state

		3: Not used 0: Disable Power Failure Detection 10: Enable Power Failure Detection 0: User interface indication: day operation 100: User interface indication: night operation Sample: 103 User interface indication: night operation; Disable Power Failure Detection; Default state: Not used
	Teach-in	0

D2-01-XX		
EEP	**Registers**	**Description**
CMD – 0x03	Value1	CMD = 3 Actuator Status Query
	Value 2	I/O channel 0...29: Output channel (to load) 30: All output channels supported by the device 31: Input channel (from mains supply)
	Value3..7	Not Used
	Teach-in	0
CMD – 0x05	Value1	CMD = 5 Actuator Set Measurement
	Value2	I/O channel 0...29: Output channel (to load) 30: All output channels supported by the device 31: Input channel (from mains supply)
	Value3	Unit UN 0: Energy [Ws] 1: Energy [Wh] 2: Energy [KWh] 3: Power [W] 4: Power [KW]
	Value4	Measurement delta to be reported 0...4095: 0...4095
	Value5	Maximum time between two subsequent actuator messages MAT Measurement Response messages [10s] 1...255: 10...2550s
	Value6	Minimum time between two subsequent actuator messages MIT Measurement Response messages[s] 1...255: 1...255s
	Value7	0: Report measurement: query only 1: Report measurement: query /auto reporting 0: Reset measurement: not active 10: Reset measurement: trigger signal 0: Energy measurement 100: Power measurement
	Teach-in	0
CMD – 0x06	Value1	CMD = 6 Actuator Measurement Query
	Value2	I/O channel 0...29: Output channel (to load) 30: All output channels supported by the device 31: Input channel (from mains supply)
	Value3	0: Query energy 1: Query power

	Value4..7	Not Used
	Teach-in	0
CMD – 0x08	Value1	CMD = 8 Actuator Set Pilot Wire Mode
	Value2	Pilotwire mode 0: Off 1: Comfort 2: Eco 3: Anti-freeze 4: Comfort-1 5: Comfort-2
	Value3..7	Not Used
	Teach-in	0

D2-01-XX		
EEP	**Registers**	**Description**
CMD – 0x09	Value1	CMD = 9 Actuator Pilot Wire Mode Query
	Value2..7	Not Used
	Teach-in	0
CMD – 0x0A	Value1	CMD = 11 Actuator Set External Interface Settings
	Value2	I/O channel 0...29: Output channel (to load) 30: All output channels supported by the device 31: Input channel (from mains supply)
	Value3	Auto OFF Timer 0: Timer deactivated 1...65534: 0.1...6553.4 s 65535: Does not modify saved value
	Value4	Delay OFF Timer 0: Timer deactivated 1...65534: 0.1...6553.4 s 65535: Does not modify saved value
	Value5	External Switch/Push Button (External interface mode) 0: Not applicable 1: External Switch 2: External Push Button 3: Auto detect
	Value6	2 – state switch - Switching state 0: Change of key state sets ON or OFF 1: Specific ON/OFF positions. ON when contacts are closed. OFF when contacts are open.
	Value7	Not Used
	Teach-in	0
CMD – 0x0C	Value1	CMD = 12 Actuator External Interface Settings Query
	Value2	I/O channel 0...29: Output channel (to load) 30: All output channels supported by the device 31: Input channel (from mains supply)
CMD – 0x0F	Value1	CMD = 15 Actuator Set Dimming Limits
	Value2	ECID – Extended Command ID = 0 Setting min, max ID=1 Actuator dimming limits query
	Value3	Output channel 0...29: Output channel (to load) 30: All output channels supported by the device

		31: Reserved
	Value4	(only ECID = 0) MAXV Set dimming maximum value (Maximum value is set to 100%)
	Value5	(only ECID = 0) MINV Set dimming minimum value (Minimum value is set 0%)

D2-05-XX Blinds Control for Position and Angle		
EEP	**Registers**	**Description**
D2-05-00		
CMD – 0x01	Value1	CMD = 1 Goto command
	Value2	Channel address Channel (1)
	Value3	Vertical position 0…100: 0…100 % 127: Do not change
	Value4	Rotation angle Enum: 0…100: 0…100 % 127: Do not change
	Value5	How to adjust the internal positioning tracker before going to the new position 0: Go directly to POS/ANG 1: Go up (0%), then to POS/ANG 2: Go down (100%), then to POS/ANG 3 … 7:Reserved
	Value6	LOCK Set/reset locking modes 0: Do not change 1: Set blockage mode 2: Set alarm mode 3 … 6:Reserved 7: Deblockage
	Value7	Not used
	Teach-in	0
CMD – 0x02	Value1	CMD = 2 Stop
	Value 2	Channel address Channel (1)
	Value3…7	Not used
	Teach-in	0
CMD – 0x03	Value1	CMD = 3 Query Position and Angle
	Value 2	Channel address Channel (1)
	Value3…7	Not used
	Teach-in	0
CMD – 0x05	Value1	CMD = 5 Set parameters
	Value 2	Channel address Channel (1)
	Value3	Measured duration of a vertical run 0 … 499: Reserved 500...30 000: 5000...300000 ms (500 = 5s… 30 000 = 300s) 32767 (0x7FFF): -> No change
	Value4	Measured duration of rotation 1...254: 10...2540 ms (1 = 0,01s … 254 = 2,54s) 0: No rotation 255: -> No change
	Value5	Set alarm action Besides locking all other commands entering the alarm mode results in 0: No action 1: Immediate stop 2: Go up (0%)

		3: Go down (100%) 4 ... 6:Reserved 7: -> No change
	Value6…7	Not used
	Teach-in	0
Note		
1) The same mapping is valid for D2-05-00, D2-05-01, D2-05-02 and D2-05-03. 2) D2-05-03 partial support, only CMD1 to 4.		

VLD Teach-in process

For learning process VLD, the command UTE is used.

D4-XX-XX		
EEP	**Registers**	**Description**
	Value1	DB6.7 0b0 Unidirectional communication (EEP operation) 0b1 Bidirectional communication (EEP operation) DB6.6 0b0 EEP Teach-In-Response message expected 0b1 No EEP Teach-In-Response message expected DB6.5 ... DB6.4 0b00 Teach-in request 0b01 Teach-in deletion request 0b10 Teach-in or deletion of teach-in, not specified 0b11 Not used
	Value 2	DB_5 Number of individual channel to be taught in
	Value3	DB_4 MID (8LSB) Manufacturer-ID (8LSB)
	Value4	DB_3 MID (3MSB) Manufacturer-ID (3MSB)
	Value5	DB_2 TYPE
	Value6	DB_1 FUNC
	Value7	DB_0 RORG

8 Saving characters for channels descriptions

Short description with lenght 40 characters can be connected to each transmitting (60) and receiving (40) channel. These characters are saved in registers with the address 10000-20000.

	No	R/W	Description
Device Rx 0	10000	R	0
	10001	R	12 (Length)
	10002	R/W	„T“ (First ascii char 0x54)
	10003	R/W	„e“ (0x65)
	…	R/W	„mperatu“
	10011	R/W	„r“ (0x72)
	10012	R/W	„e“ (0x65)
	10013	R/W	„1“ (0x31)
	…	R/W	0
	10099	R	0
Device Rx 1	10100	R	0
	10101	R	12 (Length)
	10102	R/W	„T“ (First ascii char 0x54))
	10103	R/W	„e“ (0x65)
	…	R/W	„mperatu“
	10111	R/W	„r“ (0x72)
	10112	R/W	„e“ (0x65)
	10113	R/W	„2“ (0x32)
	…	R/W	0
	10199	R	0
Device Tx 59	19900	R	0
	19901	R	9 (Length)
	19902	R/W	„A“ (First ascii char 0x41))
	19903	R/W	„c“ (0x63)
	…	R/W	„tuat“
	19911	R/W	„o“ (0x6F)
	19912	R/W	„r“ (0x72)
	19913	R/W	„2“ (0x32)
	…	R/W	0
	19999	R	0

9 Revision history

Tab. Document revision history

Date	Version	Modifications made
2nd March 2018	1.3	Supported 4BS telegrarams (chapter 7.1) Supported 4BS telegrarams (chapter 8.3)
10th October 2018	1.4	Repair connection RS 232, text corrections
25th October 2018	1.5	Enlargement of supported MSC telegrams for PRESSAC 3 channel temperature
17th December 2018	1.6	Repair of technical information
22nd February 2019	1.7	The protocol D2-01-0C added
4th March 2019	1.8	The protocol D2-01-0F (page….) added
10th May 2019	1.9	EEP protocols and desription of saving channel descriptions added
13th August 2019	1.10	Transmitting protocols A5-04-(01,02,03) a A5-05-01 added
21st May 2020	1.11	D2-03-0A added
30th January 2023	1.12	Text corrections
9th June 2023	1.13	Added description of D2-14-40,41
1st August 2023	1.14	Added description of A5-20-06
14th September 2023	1.15	Text corrections