EnOcean Equipment Profiles

REVISION HISTORY

Ver.	Editor	Change	Date
2.6.8	NM	Last xml edition of the EEP-Specification	Dec 31, 2017

specification may be used in development of a product or service for sale without being a participant or promoter member of the EnOcean Alliance and/or joint owner of the appropriate joint IPR.

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D2-33: Intelligent, Bi-directional Heaters and Controllers

Submitter: WATTS Electronics

Description
This profile is used for all ADEO electric heaters (replacing pilot wire control) in scope of global comfort management in the home through a central processing unit. This includes temperature setpoint control based on a series of embedded sensors on the heater. Temperature management can also be tuned by an external temperature sensor input.

Data exchange
Direction: bidirectional
Addressing: addressed
Communication trigger: time-triggered (10 min +/- 3 min) and event based
Communication interval: 10 min +/- 5 min
Trigger event: defined in section 2. Typical emitter/receiver rules
Tx delay: 200 ms
Rx timeout: 1 s

Teach-in
UTE Bidirectional Teach-In / Teach-Out is used.
The device is set in pairing mode via manual on-screen set-up, then the gateway send unicast pairing message to the device with known unique ID of the heater.

Security
Encryption supported: yes
Security level format: RLC, CMAC, VAES

VLD Family Table:

Supported function	Type 00
Program (command: MID = 2)	X
Time and date (command: MID = 3)	X
Pilot wire flag	X
Window open detection	X
PIR detection	X
Reference temperature	X
Derogation	X
COV Sensor	-
CO sensor	-
CO2 sensor	-
Particles 1 sensor	-
Particles 2.5 sensor	-
Particles 10 sensor	-
Radio activity sensor	-
Sound sensor	-
Hydrometry sensor	-
Air moving sensor	-
Pressure sensor	-
Temperature scale status	X
Time notation status	X
Display content status	X

This shows the different commands and data fields which can be supported by different profiles of this VLD family. If a field is not supported, it's value shall always be transmitted as 0.

Rules for the communications

1) ACKNOWLEDGE mechanism

The gateway can request information from the heater via the "Request" message (MID = 0) but it can also send pure information to the heater based on gateway/user events without any request for status (MID = 0 to 3). Conversely, the heater can request information from the gateway via the "request and status" message (MID = 8) but also send pure information based on heater/user events (MID = 8 to 12).

The below table describes the expected ACKNOWLEDGE frames for each type of initiated message:

Message type	Initiator gateway		Target heater acknowledge	
	MID	**REQ**	**MID**	**REQ**
Request status	0	8	8	15
Request param	0	9	9	N.A.
Request sensor1	0	10	10	N.A.
Request sensor2	0	11	11	N.A.
Request sensor3	0	12	12	N.A.
Event DATA	0	13	8	15
Reserved	0	14	N.A.	N.A.
N.A.	0	15	N.A.	N.A.
Event DATA	1→3	N.A.	8	15

Message type	Initiator heater		Target gateway acknowledge	
	MID	**REQ**	**MID**	**REQ**
Request external temp	8	0	0	15
Request sensor param	8	1	1	N.A.
Request program	8	2	2	N.A.
Request time & date	8	3	3	N.A.
Event DATA	8	4	0	15
Reserved	8	5→14	N.A.	N.A.
N.A.	8	15	N.A.	N.A.
Event DATA	9→13	N.A.	0	15

2) Typical emitter/receiver rules

Emitter	Message Type	Receiver	Message sent by the receiver
Gateway	Request	Heater	Answers Request
Gateway	Data	Heater	Answer Acknowledge

Emitter	Message Type	Receiver	Message sent by the receiver
Heater	Request	Gateway	Answers Request
Heater	Data	Gateway	Answer Acknowledge

Device send Heater message when:

- Heater has to respond to gateway
- Heater is entering Derogation Mode (manual entry on the device's screen)
- All 30 min +/- 10% (random value)
- Key lock user (KLU) function is activated on the device
- Any sensor is triggered:
  - Windows detection triggered
  - PIR sensor triggered
  - CO2 limit reached => 1000ppm
  - CO limit reached
  ..... => 9 ppm (CO Max prolonged exposure – ASHRAE std)
  ..... =>< 1.0 ppm = Good, or "Green"
  ..... 1.0 to 10 ppm = Marginal, or "Yellow
  ..... 10 ppm and higher = Poor, or "Red"
  - Particles Limit reached:
  ..... P1V => 10µg/m3
  ..... P2V => 25µg/m3 (EU regulation)
  ..... P10V => 40µg/m3 (EU regulation)
  - Radioactivity Limit reached => 16 mSv
  - Hygrometry Limit reached => >75%
  - Temperature Variation: significant changes thresholds for slope detection with 10% random:
  ..... 0,5°C/3min +- 10%
  ..... 0,4°C/5min +- 10%
  ..... 0,3°C/8min +- 10%
  ..... 0,2°C/15min +- 10%
  ..... 0,1°C/30min +- 10%
  - Sound level Limit reached => 20 dB
  - Pressure level Limit reached =
  ..... >< 980hPa = cyclonic weather
  ..... 1030hPa = anticyclonic weather
  - Air moving Limit reached =>
  ..... > 0,15 m/s @ 19°C
  ..... > 0,16 m/s @ 20°C
  ..... > 0,17 m/s @ 21°C
  ..... > 0,18 m/s @ 22°C
  ..... > 0,21 m/s @ 24°C
  ..... > 0,25 m/s @ 26°C
- Error flag triggered
- Pilot wire change

Gateway sends message when:

- It's needed regarding applications and functionalities. (e.g. gateway start-up)
- When Gateway receives Heater message from a device.
- In case of Program request, Gateway has to send all programs to heaters.

RORG	D2	VLD Telegram
FUNC	33	Intelligent, Bi-directional Heaters and Controllers
TYPE	00	Type 0x00

Submitter: WATTS Electronics

1) Gateway messages
There are four different messages which can be used to transmit data to heaters:

1a) Gateway request message type
Used to send external temperatures to heaters and ask for special requests.

MID 00 Gateway request message type

	DB_2							DB_1							DB_0						
DB Bit	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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	MID				REQ				EXT															

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Message Identifier	MID	Defines the type of message	Enum: 0: Gateway request message type		
4	4	Request Frame	REQ	Request information to the heater	Enum: 0...7: Reserved 8: Question: status and flags 9: Question: parameters heaters 10: Question: sensor CO/HYGRO/Sound 11: Question: sensor particle/radioactivity 12: Question: sensor air flow, hygrometry, pressure and temperature 13: Information to heater 14: Reserved 15: Acknowledge frame		
8	9	External Temperature	EXT	Recent external temperature: Temp(°C) = value / 10	1...500	0.1...50.0	°C
17	7	Not Used (= 0)					

1b) Sensor parameters

This command is transmitted by the gateway controller to enable/disable a sensor. If a sensor is disabled, no measurement will be taken and the corresponding data field will be set to 0 to indicate that the sensor is disabled. For any fields that are not supported, as indicated in the VLD family table above, 0 shall be transmitted in the corresponding field of the sensor parameters message. Only the supported fields are valid for each EEP and the rest should be ignored on the heater side.

MID 01 Sensor parameters

	DB_3							DB_2								DB_1								DB_0							
DB Bit	7	6	5	4	3	2	1	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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	MID				WOS	PIS	RTS	CVS	COS	C2S	P1S	P2S	P10S	RAS	SOS	HYS	AMS	PRS	TSS	TNS	DCS				DGS							

Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Message Identifier	MID	Defines the type of message	Enum: 1: Sensor parameters		
4	1	Window Open Detection Status	WOS	Indicates if the open window detection is active	Enum: 0: Disabled 1: Enabled		
5	1	PIR Detection Status	PIS	Indicates if the PIR function is active	Enum: 0: Disabled 1: Enabled		
6	1	Reference Temperature Status	RTS	Indicates which temperature has to be used	Enum: 0: Disabled 1: Enabled		
7	1	COV Sensor	CVS	Indicate if COV sensor is active	Enum: 0: Disabled 1: Enabled		
8	1	CO Sensor	COS	Indicate if CO sensor is active	Enum: 0: Disabled 1: Enabled		
9	1	CO2 Sensor	C2S	Indicate if CO2 sensor is active	Enum: 0: Disabled 1: Enabled		
10	1	Particles 1 Sensor	P1S	Indicate if particles 1 sensor is active	Enum: 0: Disabled 1: Enabled		
11	1	Particles 2.5 Sensor	P2S	Indicate if particles 2.5 sensor is active	Enum: 0: Disabled 1: Enabled		
12	1	Particles 10 Sensor	P10S	Indicate if particles 10 sensor is active	Enum: 0: Disabled 1: Enabled		
13	1	Radio Activity Sensor	RAS	Indicate if radio activity sensor is active	Enum: 0: Disabled 1: Enabled		
14	1	Sound Sensor	SOS	Indicate if sound sensor is active	Enum: 0: Disabled 1: Enabled		
15	1	Hygrometry Sensor	HYS	Indicate if hygrometry sensor is active	Enum: 0: Disabled 1: Enabled		
16	1	Air Moving Sensor	AMS	Indicate if air moving sensor is active	Enum: 0: Disabled 1: Enabled		

17	1	Pressure Sensor	PRS	Indicate if pressure sensor is active	Enum: 0: Disabled 1: Enabled
18	2	Temperature Scale Status	TSS	Defines the used temperature scale for the room control panel display and menus	Enum: 0: No change 1: Default 2: °Celsius 3: °Fahrenheit
20	2	Time Notation Status	TNS	Defines the used time notation	Enum: 0: No change 1: Default 2: 24 h 3: 12 h
22	3	Display Content Status	DCS	Defines the main display content	Enum: 0: No change 1: Default 2: Time 3: Room temperature (internal) 4: Room temperature (external) 5: Temperature setpoint 6: Display off 7: Reserved
25	1	Derogation Status	DGS	Indicates if the derogation is allowed	Enum: 0: Derogation is not allowed 1: Derogation is allowed
26	6	Not Used (= 0)			

1c) Program
Use to define scheduling (timeslot + setpoint temperature) for all week.

To set a continuous loop over several weeks with the same setpoint temperature (Non timed mode), the gateway must send the following configuration: (as Comfort/Reduce)
- Send in One time mode
- Monday 00:00 to Monday 00:00 (Start = Stop)
- Set point: in Celcius

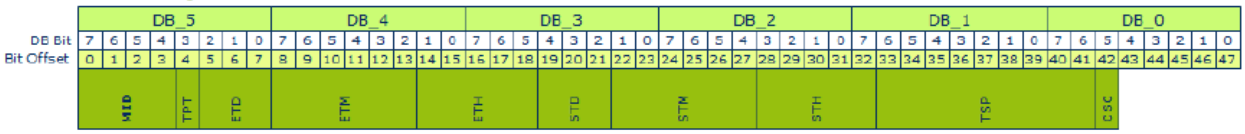
If start time = stop time, the stop time isn't taken into account and in this case the One time timeslot is a "forever" loop.

To send a full new weekly schedule, the gateway must sequentially send all timeslots with the desired setpoint temperature.

Priority: On Time information has higher priority than weekly information. In case of non-information for one time and weekly, the heater is in stop mode.

Warning: When both the CSC and TPT fields are set to 1, all scheduling programs (one time and weekly) of the heater are cleared.

MID 02 Program

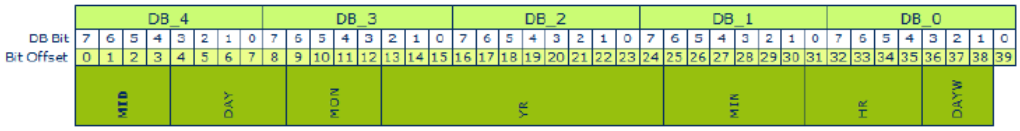


Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Message Identifier	MID	Defines the type of message	Enum: 2: Program		
4	1	Scheduled Order Type	TPT	Type of provided schedule order	Enum: 0: One time 1: Weekly		
5	3	End Time Day	ETD	The end day to apply the provided scheduled order	Enum: 0: Monday 1: Tuesday 2: Wednesday 3: Thursday 4: Friday 5: Saturday 6: Sunday 7: Reserved		
8	6	End Time Minute	ETM	The end time (minute) to apply the provided scheduled order	0...59	0...59	Min
14	5	End Time Hour	ETH	The end time (hour) to apply the provided scheduled order	0...23	0...23	Hour
19	3	Start Time Day	STD	The start day to apply the provided scheduled order	Enum: 0: Monday 1: Tuesday 2: Wednesday 3: Thursday 4: Friday 5: Saturday 6: Sunday 7: Reserved		
22	6	Start Time Minute	STM	The start time (minute) to apply the provided scheduled order	0...59	0...59	Min
28	5	Start Time Hour	STH	The start time (hour) to apply the provided scheduled order	0...23	0...23	Hour
33	9	Temperature Setpoint	TSP	The temperature setpoint to apply the provided scheduled order: Setpoint(°C) = value / 10	1...500	0.1...50.0	°C
42	1	Clear Schedule	CSC	Allow to clear Weekly or one time	Enum: 0: Set 1: Clear		
43	5	Not Used (= 0)					

1d) Time and date

Use to define Time and date for heaters.

MID 03 Time and date



Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Message Identifier	MID	Defines the type of message	Enum: 3: Time and date		
4	5	Day	DAY	Date format: YYYY/MM/DD	1...31	1...31	Day
9	4	Month	MON	Date format: YYYY/MM/DD	1...12	1...12	Mon
13	12	Year	YR	Date format: YYYY/MM/DD	0...4095	0...4095	Year
25	6	Minute	MIN	Time format: hh:mm	0...59	0...59	Min
31	5	Hour	HR	Time format: hh:mm	0...23	0...23	Hour
36	3	Day Week	DAYW	Day of week	Enum: 0: Monday 1: Tuesday 2: Wednesday 3: Thursday 4: Friday 5: Saturday 6: Sunday 7: Reserved		
39	1	Not Used (= 0)					

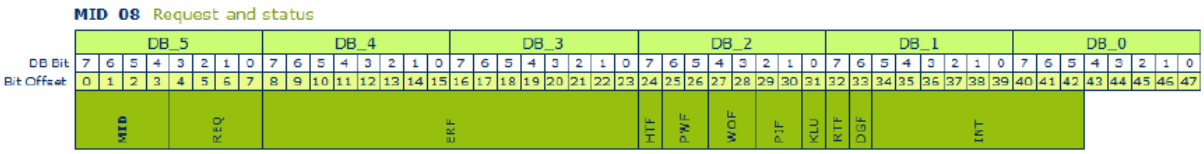
2) Heater message

5 different messages to communicate data to Gateway:

2a) Request and status

Ask for special data from gateway and send actual status of product.

MID 08 Request and status



Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Message Identifier	MID	Defines the type of message	Enum: 8: Request and status		
4	4	Request Frame	REQ	Ask information from heater	Enum: 0: Question External Temp. 1: Question Sensor parameters 2: Question Program 3: Question Time and date 4: Information to gateway 5...7: Reserved 8...14: Reserved for gateway frame 15: Acknowledge frame		

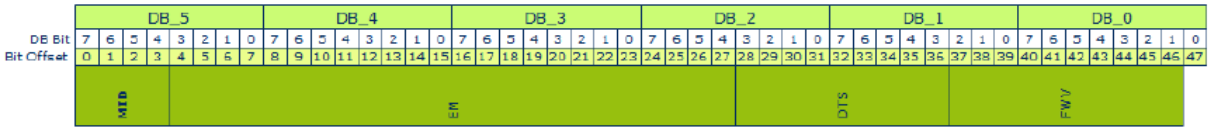
8	16	Error Flag	ERF	Indicates the errors occurred	Enum: 0: Temperature sensor is open 1: Temperature sensor is Short circuit 2: Temperature measured is greater than 50°C 3: Error between internal temp and external temp is greater than 4°C 4: Reserved 5: Reserved 6: Reserved 7: Reserved 8: Reserved 9: Reserved 10: Reserved 11: Reserved 12: Reserved 13: Reserved 14: Reserved 15: Reserved
24	1	Heating Flag	HTF	Indicates if the heater is heating the room	Enum: 0: No heating up 1: Heating up
25	2	Pilot Wire Flag	PWF	Indicates the status of the pilot wire	Enum: 0: No pilot wire 1: Pilot wire active 2: Pilot wire -1 3: Pilot wire -2
27	2	Window Open Detection Flag	WOF	Indicates if an open window is detected	Enum: 0: Disabled 1: Close 2: Open 3: Reserved
29	2	PIR Flag	PIF	Indicates if the PIR detected a movement	Enum: 0: Disabled 1: No movement detected 2: Movement detected 3: Reserved
31	1	Key Lock User Status	KLU	Indicates if the children protection is active or not	Enum: 0: Key Lock is disabled 1: Key Lock is enabled

32	1	Reference Temperature Flag	RTF	Indicates which temperature is used	Enum: 0: Internal 1: External		
33	1	Derogation Flag	DGF	Indicates the status of the derogation	Enum: 0: No derogation 1: Derogation active		
34	9	Internal Temperature	INT	Recent internal temperature: Temp(°C) = value / 10	1...500	+0.1...+50.0	°C
43	5	Not Used (= 0)					

2b) Heater parameters

Use by gateway to know Energy, Setpoint in derogation mode and firmware version.

MID 09 Heater parameters

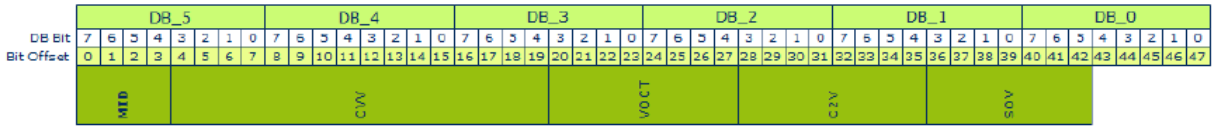


Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Message Identifier	MID	Defines the type of message	Enum: 9: Heater parameters		
4	24	Energy Measurement	EM	Total amount of energy consumed Energy(KWh) = value / 10	0...16777215	0...1677721	kWh
28	9	Derogation Temperature Setpoint	DTS	The temperature setpoint set with the derogation: Setpoint(°C) = value / 10	1...500	+0.1...+50.0	°C
37	10	Firmware Version	FWV	Give the version of the firmware	0...1024	0...1024	-
47	1	Not Used (= 0)					

2c) Value of CO, COV, CO2 and sound level

Use by gateway to know value of CO, COV, CO2 and sound level.

MID 10 Value of CO, COV, CO2 and sound level

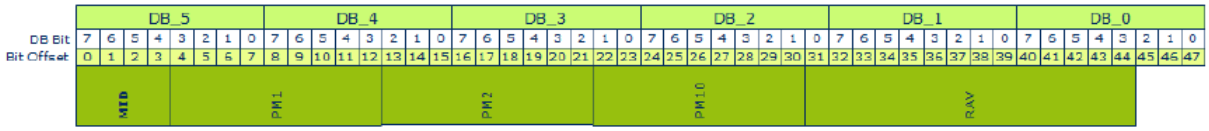


Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Message Identifier	MID	Defines the type of message	Enum: 10: Value of CO, COV, CO2 and sound level		
4	16	COV Value	CVV	COV value in ppb	1...65535	1...65535	ppb
20	8	CO Value	VOCT	CO value in ppm	1...255	1...255	ppm
28	8	CO2 Value	C2V	CO2 value in ppm	1...255	10...2550	ppm
36	7	Sound Value	SOV	Sound value in dB	1...127	1...127	dB
43	5	Not Used (= 0)					

2d) Value of particles and radioactivity sensors

Use by gateway to know value of particle and radioactivity.

MID 11 Value of of particle and radioactivity

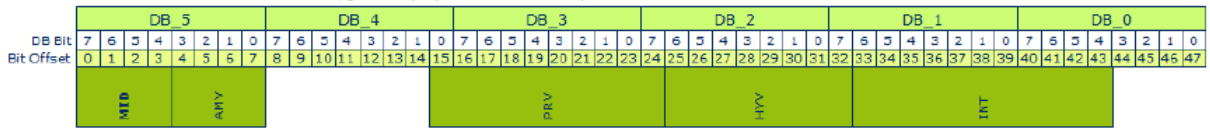


Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Message Identifier	MID	Defines the type of message	Enum: 11: Value of particles and radioactivity sensors		
4	9	Particle 1 Value	PM1	Particle 1 value in µg/m3	1...511	1...511	µg/m3
13	9	Particle 2 Value	PM2	Particle 2 value in µg/m3	1...511	1...511	µg/m3
22	9	Particle 10 Value	PM10	Particle 10 value in µg/m3	1...511	1...511	µg/m3
31	14	Radioactivity Value	RAV	Radioactivity value In µSv/h	1...16383	0.01...163.83	µSv/h
45	3	Not Used (= 0)					

2e) Value of air flow, hygrometry, pressure and temperature

Use by gateway to know value of air flow, hygrometry, pressure and temperature.

MID 12 Value of of air flow, hygrometry, pressure and temperature



Offset	Size	Data	ShortCut	Description	Valid Range	Scale	Unit
0	4	Message Identifier	MID	Defines the type of message	Enum: 12: Value of air, hygro., pressure and temp.		
4	4	Air Moving	AMV	Air moving value in m/s	1...15	1...15	m/s
8	7	Not Used (= 0)					
15	10	Pressure Value	PRV	Pressure value in hPa	1...1023	500...1150	hPa
25	8	Hygrometry Value	HYV	Hygrometry value in %	1...200	1...100	%
33	11	Internal Temperature	INT	Recent internal temperature: Temp(°C) = value / 10	1...500	+0.1...+50.0	°C
44	4	Not Used (= 0)					