# VMBGPOD-2

## Touch panel with Oled display for VELBUS system (ed2)

Binairy format:

<SOF-SID10...SID0-RTR-IDE-r0-DLC3...0-DATABYTE1...DATABYTEn-CRC15...CRC1-CRCDEL-ACK-ACKDEL-EOF7...EOF1-IFS3...IFS1>

| bits | Description |
|---|---|
| SOF | Start Of Frame (always 0) |
| SID10 & SID9 | Priority (00: highest … 11: lowest priority) |
| SID8…SID1 | Address |
| SID0 | Always 0 |
| RTR | Remote Transmit Request |
| IDE | Identifier Extension (always 0) |
| r0 | reserved (always 0) |
| DLC3…DLC0 | Data Length Code (0…8) |
| Databyte1 | Command |
| Databyte2 | Parameter |
| Databyte3 | Parameter |
| Databyte4 | Parameter |
| Databyte5 | Parameter |
| Databyte6 | Parameter |
| Databyte7 | Parameter |
| Databyte8 | Parameter |
| CRC15…CRC1 | Cyclic Redundancy Checksum |
| CRCDEL | CRC Delimiter (always 1) |
| ACK | Acknowledge slot (transmit 1 readback 0 if received correctly) |
| ACKDEL | Acknowledge Delimiter (always 1) |
| EOF7...EOF1 | End Of Frame (always 1111111) |
| IFS3...IFS1 | InterFrame Space (always 111) |

*The module can transmit the following messages:*
- Channel status
- Sensor output status
- Module status
- Sensor status
- Sensor temperature
- Sensor time statistics
- Sensor settings
- Module type and subtype
- Bus error counter status
- First, second and third part of the channel names
- Memory data
- Memory data block (4 bytes)
- Real-time clock status
- Date status
- Daylight savings status
- Program step
- Power up

*The module can transmit the following commands:*
- Real-time clock status request
- Set global clock alarm
- Clear linked push button led
- Set linked push button led
- Slow blink linked push button led
- Counter status request
- Remote sensor status request
- Remote sensor temperature request
- Remote sensor settings request
- Remote sensor statistics request
- Remote sensor set temperature settings
- Remote sensor set heating mode
- Remote sensor set cooling mode
- Remote sensor set comfort mode

- Remote sensor set day mode
- Remote sensor set night mode
- Remote sensor set safe mode
- Read program step
- Write program step
- Remote Analog Sensor readout request

*The module can receive the following messages:*

- Linked push button status
- Power up
- Module type request
- Module status request
- Channel name request
- Clear channel led
- Set channel led
- Slow blink channel led
- Fast blink channel led
- Very fast channel led
- Update channel leds
- Read memory data
- Read memory data block (4 bytes)
- Memory dump request
- Counter log dump request
- Counter status
- Write memory data
- Write memory data block (4 bytes)
- Bus error counter status request
- Real-time clock status request
- Set real-time clock
- Set date
- Set daylight savings
- Enable/disable global sunrise/sunset related actions
- Enable/disable local sunrise/sunset related actions
- Set local alarm clock
- Set global alarm clock
- Lock channel
- Unlock channel
- Disable channel program
- Enable channel program
- Select program
- Read program step
- Program step info
- Write program step
- Sensor temperature request
- Sensor settings request
- Set heating mode
- Set cooling mode
- Set default sleep time
- Set temperature settings
- Switch to comfort mode
- Switch to day mode
- Switch to night mode
- Switch to safe temperature mode
- Time statistics request
- Remote sensor module status
- Remote sensor status
- Remote Sensor temperature
- Remote sensor settings
- Remote sensor time statistics
- Readout of the remote analog sensor
- Memo text

*Transmits power up message:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = H'00'
    RTR = 0
    DLC3...DLC0 = 2 databyte to send
    DATABYTE1 = COMMAND_POWER_UP (H'AB')
    DATABYTE2 = module address


*Transmits real time clock status request:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = H'00'
    RTR = 0
    DLC3...DLC0 = 1 databyte to send
    DATABYTE1 = COMMAND_REALTIME_CLOCK_STATUS_REQUEST (H'D7')


*Transmits the real time clock status:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 4 databytes to send
    DATABYTE1 = COMMAND_REALTIME_CLOCK_STATUS (H'D8')
    DATABYTE2 = Day

| Contents | Day |
|----------|-----------|
| 0 | Monday |
| 1 | Tuesday |
| 2 | Wednesday |
| 3 | Thursday |
| 4 | Friday |
| 5 | Saturday |
| 6 | Sunday |

    DATABYTE3 = Hour (0…23)
    DATABYTE4 = Minute (0…59)


*Transmits the date status:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 5 databytes to send
    DATABYTE1 = COMMAND_DATE_STATUS (H'B7')
    DATABYTE2 = Day (1…31)
    DATABYTE3 = Month (1…12)
    DATABYTE4 = High byte of Year
    DATABYTE5 = Low byte of Year


*Transmits the daylight savings status:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 2 databytes to send
    DATABYTE1 = COMMAND_DAYLIGHT_SAVING_STATUS (H'AF')
    DATABYTE2 = 0 =disabled / 1 = enabled


*Transmit 'set global clock alarm':*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = H'00'
    RTR = 0
    DLC3...DLC0 = 7 databytes to send
    DATABYTE1 = COMMAND_SET_ALARM_CLOCK (H'C3')
    DATABYTE2 = Alarm number (1 or 2)
    DATABYTE3 = Wake up hour (0…23)
    DATABYTE4 = Wake up minute (0…59)
    DATABYTE5 = Go to bed hour (0…23)
    DATABYTE6 = Go to bed minute (0…59)
    DATABYTE7 = Clock alarm enable flag (0 = disabled / 1 = enabled)

*Transmits the channel switch status:*
    SID10-SID9 = 00 (highest priority)
    SID8...SID1 = Module address, subaddress1, subaddress2 or subaddress3
    RTR = 0
    DLC3...DLC0 = 4 databytes to send
    DATABYTE1 = COMMAND_PUSH_BUTTON_STATUS (H'00')
    DATABYTE2 = Channel just pressed
    DATABYTE3 = Channel just released
    DATABYTE4 = Channel long pressed


*Transmits the sensor output switch status:*
    SID10-SID9 = 00 (highest priority)
    SID8...SID1 = Subaddress 4
    RTR = 0
    DLC3...DLC0 = 4 databytes to send
    DATABYTE1 = COMMAND_OUTPUT_STATUS (H'00')
    DATABYTE2 = Output channel just activated (1 = just activated)

| Contents | Output channel |
|---|---|
| xxxxxxx1 | Heater just activated |
| xxxxxx1x | Boost heater/cooler just activated |
| xxxxx1xx | Pump just activated |
| xxxx1xxx | Cooler just activated |
| xxx1xxxx | Temperature alarm 1 just activated |
| xx1xxxxx | Temperature alarm 2  alarm activated |
| x1xxxxxx | Temperature alarm 3 just activated |
| 1xxxxxxx | Temperature alarm 4  alarm activated |

    DATABYTE3 = Outputs just deactivated (1 = just deactivated)

| Contents | Output channel |
|---|---|
| xxxxxxx1 | Heater just deactivated |
| xxxxxx1x | Boost heater/cooler just deactivated |
| xxxxx1xx | Pump just deactivated |
| xxxx1xxx | Cooler just deactivated |
| xxx1xxxx | Temperature alarm 1 just deactivated |
| xx1xxxxx | Temperature alarm 2  alarm deactivated |
| x1xxxxxx | Temperature alarm 3 just deactivated |
| 1xxxxxxx | Temperature alarm 4  alarm deactivated |

    DATABYTE4 = always zero


*Transmits the module type*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_MODULE_TYPE (H'FF')
    DATABYTE2 = VMBGPOD type (H'3D')
    DATABYTE3 = High byte of serial number
    DATABYTE4 = Low byte of serial number
    DATABYTE5 = Memorymap version
    DATABYTE6 = Build year
    DATABYTE7 = Build week
    DATABYTE8 = Version + CAN Termination

| Contents | Output channel |
|---|---|
| xxxxxxx1 | 1 = TERM closed, 0 = TERM open |
| xxxx111x | Version number. (0 = old OLED / 1 = new OLED) |


*Transmits the module subtype:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_SUBTYPE (H'B0')
    DATABYTE2 = VMBGPOD type (H'3D')
    DATABYTE3 = High byte of serial number
    DATABYTE4 = Low byte of serial number

DATABYTE5 = Subaddress1 (H'FF' subaddress disabled)
DATABYTE6 = Subaddress2 (H'FF' subaddress disabled)
DATABYTE7 = Subaddress3 (H'FF' subaddress disabled)
DATABYTE8 = Subaddress4 (H'FF' subaddress disabled)


*Transmits the module subtype:*
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 8 databytes to send
DATABYTE1 = COMMAND_SUBTYPE (H'B0')
DATABYTE2 = VMBGPOD type (H'28')
DATABYTE3 = High byte of serial number
DATABYTE4 = Low byte of serial number
DATABYTE5 = Subaddress1 (H'FF' subaddress disabled)
DATABYTE6 = Subaddress2 (H'FF' subaddress disabled)
DATABYTE7 = Subaddress3 (H'FF' subaddress disabled)
DATABYTE8 = Subaddress4 (H'FF' subaddress disabled)


*Transmit: Bus error counter status*
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 4 databytes to send
DATABYTE1 = COMMAND_BUSERROR_COUNTER_STATUS (H'DA')
DATABYTE2 = Transmit error counter
DATABYTE3 = Receive error counter
DATABYTE4 = Bus off counter


*Transmits the memory data:*
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 4 databytes to send
DATABYTE1 = COMMAND_MEMORY_DATA (H'FE')
DATABYTE2 = High memory address
DATABYTE3 = LOW memory address
DATABYTE4 = memory data

Remark:    address range: H'0000' to H'1A03'


*Transmits memory data block (4 bytes):*
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 7 databytes to send
DATABYTE1 = COMMAND_MEMORY_DATA_BLOCK (H'CC')
DATABYTE2 = High start address of memory block
DATABYTE3 = LOW start address of memory block
DATABYTE4 = memory data1
DATABYTE5 = memory data2
DATABYTE6 = memory data3
DATABYTE7 = memory data4

Remark:
address range:   H'0000' to H'1A00' = memory map
                 H'1A04' to H'2A00' = counter log data
                 H'2A04' to H'2E00' = eeprom data


*Transmits the first part of channel name:*
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 8 databytes to send

DATABYTE1 = COMMAND_CHANNEL_NAME_PART1 (H'F0')
DATABYTE2 = channel number 1…33 (channel 33 = temperature sensor name)
DATABYTE3 = Character 1 of the channel name
DATABYTE4 = Character 2 of the channel name
DATABYTE5 = Character 3 of the channel name
DATABYTE6 = Character 4 of the channel name
DATABYTE7 = Character 5 of the channel name
DATABYTE8 = Character 6 of the channel name

*Transmits the second part of the channel name:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_CHANNEL_NAME_PART2 (H'F1')
    DATABYTE2 = Channel number 1…33 (channel 33 = temperature sensor name)
    DATABYTE3 = Character 7 of the channel name
    DATABYTE4 = Character 8 of the channel name
    DATABYTE5 = Character 9 of the channel name
    DATABYTE6 = Character 10 of the channel name
    DATABYTE7 = Character 11 of the channel name
    DATABYTE8 = Character 12 of the channel name

*Transmits the third part of the channel name:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 6 databytes to send
    DATABYTE1 = COMMAND_CHANNEL_NAME_PART3 (H'F2')
    DATABYTE2 = channel number 1…33 (channel 33 = temperature sensor name)
    DATABYTE3 = Character 13 of the channel name
    DATABYTE4 = Character 14 of the channel name
    DATABYTE5 = Character 15 of the channel name
    DATABYTE6 = Character 16 of the channel name

    Remarks:
    Unused characters contain H'FF'.

*Transmits the module status*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address, sub address1, sub address2 or sub address3
    RTR = 0
    DLC3...DLC0 = 8 databytes to send for master address, 7 databytes to send for sub addresses
    DATABYTE1 = COMMAND_MODULE_STATUS (H'ED')
    DATABYTE2 = channel 1 to 8 status (1 = pressed / 0 = released)
    DATABYTE3 = enabled/disable channel status (1 = enabled / 0 = disabled)
    DATABYTE4 = normal/inverted channel status (1 = normal / 0 = inverted)
    DATABYTE5 = locked channel status (0 = unlocked / 1 = locked)
    DATABYTE6 = disabled channel program status (0 = program enabled / 1 = program disabled)
    DATABYTE7 = alarm & program selection

| Contents | Alarm /Selected program |
|---|---|
| B'xxxxxx00' | None |
| B'xxxxxx01' | Summer |
| B'xxxxxx10' | Winter |
| B'xxxxxx11' | Holiday |
| B'xxxxx0xx' | Alarm 1 off |
| B'xxxxx1xx' | Alarm 1 on |
| B'xxxx0xxx' | Local alarm 1 |
| B'xxxx1xxx' | Global alarm 1 |
| B'xxx0xxxx' | Alarm 2 off |
| B'xxx1xxxx' | Alarm 2 on |
| B'xx0xxxxx' | Local alarm 2 |
| B'xx1xxxxx' | Global alarm 2 |
| B'x0xxxxxx' | Sunrise disabled |
| B'x1xxxxxx' | Sunrise enabled |
| B'0xxxxxxx' | Sunset disabled |
| B'1xxxxxxx' | Sunset enabled |

DATABYTE8 = oled display status (only for master address

| Contents | Display status |
|---|---|
| B'xx000000' | Button page 1 |
| … | … |
| B'xx000111' | Button page 8 |
| B'xx001000' | Counter 1 page |
| … | … |
| B'xx001011' | Counter 4 page |
| B'xx001100' | Local temperature page |
| B'xx001101' | Remote temperature 1 page |
| … | … |
| B'xx011000' | Remote temperature 12 page |
| B'xx011001' | Analog sensor 1 page |
| … | … |
| B'xx011100' | Analog sensor 4 page |
| B'xx011101' | Clock  page |
| B'xx1xxxxx' | Menu pages |
| B'x0xxxxxx' | Screensaver off |
| B'x1xxxxxx' | Screensaver on |
| B'0xxxxxxx' | Display off |
| B'1xxxxxxx' | Display on |

*Transmit the sensor status:*

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 8 databytes to send
DATABYTE1 = COMMAND_TEMP_SENSOR_STATUS (H'EA')
DATABYTE2 = Operating mode

| Contents | Operating mode |
|---|---|
| xxxxxxx1 | Local control locked |
| xxxxxxx0 | Local control unlocked |
| Xxxxx11x | Disable mode |
| xxxxx01x | Manual mode |
| xxxxx10x | Sleep timer mode |
| xxxxx00x | Run mode |
| xxxx1xxx | Auto send sensor temperature enabled |
| xxxx0xxx | Auto send sensor temperature disabled |
| x100xxxx | Comfort mode |
| x010xxxx | Day mode |
| x001xxxx | Night mode |
| x000xxxx | Safe temp mode (anti frost) |
| 1xxxxxxx | Cooler mode |
| 0xxxxxxx | Heater mode |

DATABYTE3 = Program step mode

| Contents | Program step mode |
|---|---|
| xxxxx0xx | No sensor program group 1 |
| xxxxx1xx | Sensor program group 1 available |
| xxxx0xxx | No sensor program group 2 |
| xxxx1xxx | Sensor program group 2 available |
| 0xxxxxxx | No sensor program group 3 |
| 1xxxxxxx | Sensor program group 3 available |
| x100xxxx | Comfort program step received |
| x010xxxx | Day program step received |
| x001xxxx | Night program step received |
| X000xxxx | Safe temperature program step received |
| xxxxxx1x | Enable unjamming heater valve |
| xxxxxx0x | Disable unjamming heater valve |
| xxxxxxx1 | Enable unjamming pump |
| xxxxxxx0 | Disable unjamming pump |

DATABYTE4 = Output status (1 = activated)

| Contents | Output channel |
|---|---|

| | |
|---|---|
| xxxxxxx0 | Heater off |
| xxxxxxx1 | Heater on |
| xxxxxx0x | Boost heater/cooler off |
| xxxxxx1x | Boost heater/cooler on |
| xxxxx0xx | Pump off |
| xxxxx1xx | Pump on |
| xxxx0xxx | Cooler off |
| xxxx1xxx | Cooler on |
| xxx0xxxx | Temperature alarm 1 off |
| xxx1xxxx | Temperature alarm 1 on |
| xx0xxxxx | Temperature alarm 2 off |
| xx1xxxxxx | Temperature alarm 2 on |
| x0xxxxxx | Temperature alarm 3 off |
| x1xxxxxx | Temperature alarm 3 on |
| 0xxxxxxx | Temperature alarm 4 off |
| 1xxxxxxx | Temperature alarm 4 on |

DATABYTE5 = Current sensor temperature into two's complement format (resolution 0.5°)

| Contents | Current sensor temperature |
|---|---|
| 01111111 | 63.5°C |
| | |
| 00000001 | 0.5°C |
| 00000000 | 0°C |
| 11111111 | -0.5°C |
| | |
| 10010010 | -55°C |

DATABYTE6 = target temperature set (resolution 0.5°)

| Contents | Current temperature set |
|---|---|
| 01101100 | 54°C |
| | |
| 00101000 | 20°C |
| | |
| 00000010 | 1°C |
| 00000001 | 0.5°C |
| 00000000 | 0°C |
| 11111111 | -0.5°C |
| | |
| 11000000 | -32°C |

DATABYTE7 = High byte of the sleep timer
DATABYTE8 = Low byte of the sleep timer into minutes

Remark:
[DATABYTE7][DATABYTE8] contains a 16-bit sleep timer into minutes (1 to 65.279min).
If the sleep timer contains H'0000', the sleep timer is deactivated.
If the sleep timer contains a value between H'0001' and H'FEFF' (1 to 65.279min), the sleep timer is running for that time.
If the sleep timer contains H'FFFF', the sensor is in manual mode.

*Transmit the sensor temperature:*

> SID10-SID9 = 11 (lowest priority)
> SID8...SID1 = Module address
> RTR = 0
> DLC3...DLC0 = 7 databytes to send
> DATABYTE1 = COMMAND_SENSOR_TEMPERATURE (H'E6')
> DATABYTE2 = High byte current sensor temperature
> DATABYTE3 = Low byte current sensor temperature into two's complement format (resolution 0.0625°)
> DATABYTE4 = High byte minimum sensor temperature
> DATABYTE5 = Low byte minimum sensor temperature into two's complement format (resolution 0.0625°)
> DATABYTE6 = High byte maximum sensor temperature
> DATABYTE7 = Low byte maximum sensor temperature into two's complement format (resolution 0.0625°)

| High byte | Low byte | Current sensor temperature |
|-----------|----------|----------------------------|
| 01111111 | 11100000 | 63.5°C |
| | | |
| 00000001 | 00000000 | 0.5°C |
| 00000000 | 10000000 | 0.25°C |
| 00000000 | 01000000 | 0.125°C |
| 00000000 | 00100000 | 0.0625°C |
| 00000000 | 00000000 | 0°C |
| 11111111 | 11111111 | -0.0625°C |
| 11111111 | 11011111 | -0.125°C |
| 11111111 | 10011111 | -0.25°C |
| 11111110 | 00011111 | -0.5°C |
| | | |
| 10010010 | 00011111 | -55°C |

Remark:

The 5 least significant bits of the low byte are always zero for positive temperature and one for negative temperature.
The low order bytes are not sending with the data length of 4 bytes (resolution 0.5°C)

*Transmit time statistics*

> SID10-SID9 = 11 (lowest priority)
> SID8...SID1 = Module address
> RTR = 0
> DLC3...DLC0 = 8 databytes to send
> DATABYTE1 = COMMAND_TIME_STATISTICS (H'C8')
> DATABYTE2 = statistics mode index

| Contents | Time statistics |
|----------|-----------------|
| 10000001 | Heating antifreeze mode time statistics |
| 10000010 | Heating night mode time statistics |
| 10000100 | Heating day mode time statistics |
| 10001000 | Heating comfort mode time statistics |
| 10010000 | Heating global time statistics |
| 01000001 | Cooling standby mode time statistics |
| 01000010 | Cooling night mode time statistics |
| 01000100 | Cooling day mode time statistics |
| 01001000 | Cooling comfort mode time statistics |
| 01010000 | Cooling global time statistics |

> DATABYTE3 = 'ON' time (hours bcd digits 4 & 3)
> DATABYTE4 = 'ON' time (hours bcd digits 2 & 1)
> DATABYTE5 = 'ON' time (minutes bcd digits 2 & 1)
> DATABYTE6 = Mode time (hours bcd digits 4 & 3)
> DATABYTE7 = Mode time (hours bcd digits 2 & 1)
> DATABYTE8 = Mode time (minutes bcd digits 2 & 1)

Remark:

The time is bcd formatted.
Databytes 3, 4 & 5 gives the total 'ON' time of the heater or cooler in the corresponding mode.
Databytes 6, 7 & 8 gives the total time of selected mode.

*Transmit the first part of the sensor settings:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART1 (H'E8')
    DATABYTE2 = Current temperature set (resolution 0.5°)
    DATABYTE3 = Comfort temperature set for heating mode (resolution 0.5°)
    DATABYTE4 = Day temperature set for heating mode (resolution 0.5°)
    DATABYTE5 = Night temperature set for heating mode (resolution 0.5°)
    DATABYTE6 = Anti frost temperature set for heating mode (resolution 0.5°)
    DATABYTE7 = Boost temperature difference set (resolution 0.5°)
    DATABYTE8 = Hysteresis temperature set

| Contents | Hysteresis |
|---|---|
| xxx11111 | 15.5°C |
|  |  |
| Xxx00001 | 0.5°C |
| Xxx00000 | 0°C |

*Transmit the second part of the sensor settings:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART2 (H'E9')
    DATABYTE2 = Comfort temperature set for cooling mode (resolution 0.5°)
    DATABYTE3 = Day temperature set for cooling mode (resolution 0.5°)
    DATABYTE4 = Night temperature set for cooling mode (resolution 0.5°)
    DATABYTE5 = Safe temperature set for cooling mode (resolution 0.5°)
    DATABYTE6 = High byte of the default sleep timer
    DATABYTE7 = Low byte of the default sleep timer into minutes (1 to 65.279min)
    DATABYTE8 = Default auto send temperature time interval into seconds
            (Valid range: 10…255s)
            (5…9 = auto send on temperature change with min interval 5…9s)
            (<4 = auto send disabled)

*Transmit the third part of the sensor settings:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART3 (H'C6')
    DATABYTE2 = Temperature alarm 1 setting (resolution 0.5°)
    DATABYTE3 = Temperature alarm 4 setting (resolution 0.5°)
    DATABYTE4 = Lower temperature range cool mode (resolution 0.5°)
    DATABYTE5 = Upper temperature range heat mode (resolution 0.5°)
    DATABYTE6 = Calibration offset factor (resolution 0.5°)

| Contents | Calibration factor |
|---|---|
| 00001111 | Calibration factor +7.5°C |
|  |  |
| 00000001 | Calibration factor +0.5°C |
| 00000000 | Calibration factor +0°C |
| 11111111 | Calibration factor -0.5°C |
|  |  |
| 11110000 | Calibration factor -8°C |

    DATABYTE7 = Zone number
    DATABYTE8 = Calibration gain factor

*Transmit the fourth part of the sensor settings:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART4 (H'B9')
    DATABYTE2 = Minimum switching time (0…255s)
    DATABYTE3 = Pump delayed on time (0…255s)
    DATABYTE4 = Pump delayed off time (0…255s)
    DATABYTE5 = Temperature alarm 2 setting (resolution 0.5°)
    DATABYTE6 = Temperature alarm 3 setting (resolution 0.5°)
    DATABYTE7 = Lower temperature range heat mode (resolution 0.5°)
    DATABYTE8 = Upper temperature range cool mode (resolution 0.5°)

*Transmit: Clears LEDs on a linked push button module:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Address of the linked push button module for clearing LEDs
    RTR = 0
    DLC3...DLC0 = 2 databytes to send
    DATABYTE1 = COMMAND_CLEAR_LED (H'F5')
    DATABYTE2 = LED bit numbers (1 = clear LED)

*Transmit: Sets LEDs on a linked push button module:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Address of the linked push button module for setting LEDs on
    RTR = 0
    DLC3...DLC0 = 2 databytes to send
    DATABYTE1 = COMMAND_SET_LED (H'F6')
    DATABYTE2 = LED bit numbers (1 = set LED)

*Transmit: Blinks LEDs slowly on a linked push button module:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Address of the linked push button module for slowly blinking LEDs
    RTR = 0
    DLC3...DLC0 = 2 databytes to send
    DATABYTE1 = COMMAND_SLOW_BLINKING_LED (H'F7')
    DATABYTE2 = LED bit numbers (1 = slow blink LED)

*Transmits program step info:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_PROGRAM_STEP_INFO (H'C1')
    DATABYTE2 = Program step number (1…170 / 255 step not found)
    DATABYTE3 = Program reference

| *Contents* | *Description* |
|---|---|
| 000xxxxx | Disable program step |
| 001xxxxx | Absolute time |
| 010xxxxx | Wake up time 1 + relative time |
| 011xxxxx | Go to bed time 1 + relative time |
| 100xxxxx | Wake up time 2 + relative time |
| 101xxxxx | Go to bed time 2 + relative time |
| 110xxxxx | Sunrise + relative time |
| 111xxxxx | Sunset + relative time |
| xxx01111 | Rel. time = 3h45min |
| … | |
| xxx00001 | Rel. time = 15min |
| xxx00000 | Rel. time = 0 |
| xxx11111 | Rel. time = -15min |
| … | |
| xxx10000 | Rel. time = -4h |

    DATABYTE4 = Program step month & four least significant bits of day

| Contents | Description |
|---|---|
| xxxx0000 | Weekly program |
| xxxx0001 | January |
| xxxx0010 | February |
| xxxx0011 | March |
| xxxx0100 | April |
| xxxx0101 | May |
| xxxx0110 | June |
| xxxx0111 | July |
| xxxx1000 | August |
| xxxx1001 | September |
| xxxx1010 | October |
| xxxx1011 | November |
| xxxx1100 | December |
| xxxx1101 | Monthly program |
| xxxx1110 | Monthly program |
| xxxx1111 | Monthly program |

| Contents byte6 | Contents byte4 | Description |
|---|---|---|
| 00xxxxxx | 0000xxxx | Never |
| 00xxxxxx | 0001xxxx | Day 1of the month |
| 00xxxxxx | 0010xxxx | Day 2of the month |
| … | ... | … |
| 01xxxxxx | 1111xxxx | Day 31of the month |
| 10xxxxxx | 0000xxxx | Never |
| 10xxxxxx | 0001xxxx | Every Monday |
| 10xxxxxx | 0010xxxx | Every Tuesday |
| ... | … | … |
| 10xxxxxx | 0111xxxx | Every Sunday |
| 10xxxxxx | 1000xxxx | Every weekend (sa & su) |
| 10xxxxxx | 1001xxxx | Every working day (mo…fr) |
| 10xxxxxx | 1010xxxx | Every day except Sunday |
| 10xxxxxx | 1011xxxx | Every day |
| 10xxxxxx | 1100xxxx | Never |
| … | … | … |
| 11xxxxxx | 1111xxxx | Never |

DATABYTE5 = Program step hour & group number

| Contents | Description |
|---|---|
| xxx00000 | 0h |
| xxx00001 | 1h |
| … | … |
| xxx10111 | 23h |
| xx1xxxxx | Program group 1 (Summer program) |
| x1xxxxxx | Program group 2 (Winter program) |
| 1xxxxxxx | Program group 3 (Holiday program) |

DATABYTE6 = Program step minute & every flag & msb of day

| Contents | Description |
|---|---|
| xx000000 | 0min |
| xx000001 | 1min |
| … | … |
| xx111011 | 59min |

| Contents byte6 | Contents byte4 | Description |
|---|---|---|
| 00xxxxxx | 0000xxxx | Never |
| 00xxxxxx | 0001xxxx | Day 1of the month |
| 00xxxxxx | 0010xxxx | Day 2of the month |
| … | ... | … |
| 01xxxxxx | 1111xxxx | Day 31of the month |
| 10xxxxxx | 0000xxxx | Never |

| | | |
|---|---|---|
| 10xxxxxx | 0001xxxx | Every Monday |
| 10xxxxxx | 0010xxxx | Every Tuesday |
| ... | … | … |
| 10xxxxxx | 0111xxxx | Every Sunday |
| 10xxxxxx | 1000xxxx | Every weekend (sa & su) |
| 10xxxxxx | 1001xxxx | Every working day (mo…fr) |
| 10xxxxxx | 1010xxxx | Every day except Sunday |
| 10xxxxxx | 1011xxxx | Every day |
| 10xxxxxx | 1100xxxx | Never |
| … | … | … |
| 11xxxxxx | 1111xxxx | Never |

DATABYTE7 = Program step action

| Contents | Action |
|---|---|
| 0 | 0s25 Pulse |
| 1 | 1s Pulse |
| 2 | 2s Pulse |
| ... | ... |
| 119 | 1min59s Pulse |
| 120 | 2min Pulse |
| 121 | 2min15s Pulse |
| ... | ... |
| 131 | 4min45s Pulse |
| 132 | 5min Pulse |
| 133 | 5min30s Pulse |
| ... | ... |
| 181 | 29min30s Pulse |
| 182 | 30min Pulse |
| 183 | 31min Pulse |
| ... | ... |
| 211 | 59min Pulse |
| 212 | 1h Pulse |
| 213 | 1h15min Pulse |
| ... | ... |
| 227 | 4h45min Pulse |
| 228 | 5h Pulse |
| 229 | 5h30min Pulse |
| ... | ... |
| 237 | 9h30min Pulse |
| 238 | 10h Pulse |
| 239 | 11h Pulse |
| ... | … |
| 246 | 18h Pulse |
| 247 | Press |
| 248 | Long Press |
| 249 | Release |
| 250 | Lock |
| 251 | Unlock |
| 252 | Sensor: Safe mode |
| 253 | Sensor: Night mode |
| 254 | Sensor: Day mode |
| 255 | Sensor: Comfort mode |

DATABYTE8 = Channel

| Contents | Channel |
|---|---|
| 1 | Channel 1 or temperature sensor |
| 2 | Channel 2 |
| ... | … |
| 7 | Channel 7 |
| 8 | Channel 8 |

*Transmit 'counter status request' command:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Counter address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_ENERGY_COUNTER_STATUS_RQ (H'BD')
    DATABYTE2 = energy counter channel 1 to 4

| Contents | Description |
|----------|-------------|
| B'xxxxxxx1' | Channel 1 |
| B'xxxxxx1x' | Channel 2 |
| B'xxxxx1xx' | Channel 3 |
| B'xxxx1xxx' | Channel 4 |

    DATABYTE3 = auto send interval
            10…255s fixed interval
            5…9 = auto send on change with 5s as minimum interval
            1…4 = auto send on change disabled
            0 = no change on auto send interval

    Remark: the auto send interval is common for all channels

*Transmit 'Remote Sensor status request' command:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master Address
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_MODULE_STATUS_REQUEST (H'FA')
    DATABYTE2 = don't care

*Transmit 'Remote Sensor temperature request' command:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master Address
    RTR = 0
    DLC3...DLC0 = 2 databytes to send
    DATABYTE1 = COMMAND_SENSOR_TEMP_REQUEST (H'E5')
    DATABYTE2 = Autosend time interval into seconds
            (valid range: 10…255s)
            (5…9 = auto send on temperature change)
            (1…4 = auto send disabled)
            (0 = no change on auto send interval)

*Transmit 'Remote Sensor settings request' command:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master Address
    RTR = 0
    DLC3...DLC0 = 2 databytes to send
    DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_REQUEST (H'E7')
    DATABYTE2 = don't care

*Transmit 'Remote sensor Time statistics request' command:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master Address
    RTR = 0
    DLC3...DLC0 = 2 databytes to send
    DATABYTE1 = COMMAND_TIME_STATISTICS_REQUEST (H'C7')
    DATABYTE2 = statistics mode index

| Contents | Time statistics request |
|---|---|
| 10000001 | Heating antifreeze mode time statistics |
| 10000010 | Heating night mode time statistics |
| 10000100 | Heating day mode time statistics |
| 10001000 | Heating comfort mode time statistics |
| 10010000 | Heating global time statistics |
| 01000001 | Cooling standby mode time statistics |
| 01000010 | Cooling night mode time statistics |
| 01000100 | Cooling day mode time statistics |
| 01001000 | Cooling comfort mode time statistics |
| 01010000 | Cooling global time statistics |

*Transmit 'Remote Sensor Set temperature' command:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master Address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_SET_TEMP (H'E4')
    DATABYTE2 = Pointer to temperature variable (0…20)

| Contents | Temperature variable |
|---|---|
| 0 | Target temperature set |
| 1 | Comfort temperature set for heating |
| 2 | Day temperature set for heating |
| 3 | Night temperature set for heating |
| 4 | Safe temperature set for heating |
| 5 | Temperature difference for turbo output |
| 6 | Hysteresis (0°…15.5°C) |
| 7 | Comfort temperature set for cooling |
| 8 | Day temperature set for cooling |
| 9 | Night temperature set for cooling |
| 10 | Safe temperature set for cooling |
| 11 | Calibration offset factor (-8°…+7.5°C) |
| 12 | Reset minimum/maximum temperature |
| 13 | Reset time statistics |
| 14 | enable/disable anti-block valve/pump |
| 15 | Temperature alarm 1 set |
| 16 | Temperature alarm 4 set |
| 17 | Lower temperature range cool mode |
| 18 | Upper temperature range heat mode |
| 19 | Differential sensor address (H'FF' = no diff. sensor) |
| 20 | Target temperature set for the differential sensor |
| 21 | Minimum switching time |
| 22 | Pump delayed on time |
| 23 | Pump delayed off time |
| 24 | Temperature alarm 2 set |
| 25 | Temperature alarm 3 set |
| 26 | Lower temperature range heat mode |
| 27 | Upper temperature range cool mode |
| 28 | Calibration gain factor |

DATABYTE3 = Temperature set (resolution 0.5°)

| Contents | Temperature set |
|----------|-----------------|
| 01111111 | 63.5°C |
|  |  |
| 00101000 | 20°C |
|  |  |
| 00000010 | 1°C |
| 00000001 | 0.5°C |
| 00000000 | 0°C |
| 11111111 | -0.5°C |
|  |  |
| 10010010 | -55°C |

DATABYTE3 = Reset minimum/maximum temperature

| Contents | Reset temperature |
|----------|-------------------|
| 00000001 | Reset minimum temperature |
| 00000010 | Reset maximum temperature |

DATABYTE3 = Reset time statistics mode index

| Contents | Reset time statistics |
|----------|------------------------|
| 10000001 | Reset heating antifreeze mode time statistics |
| 10000010 | Reset heating night mode time statistics |
| 10000100 | Reset heating day mode time statistics |
| 10001000 | Reset heating comfort mode time statistics |
| 10010000 | Reset heating global time statistics |
| 01000001 | Reset cooling standby mode time statistics |
| 01000010 | Reset cooling night mode time statistics |
| 01000100 | Reset cooling day mode time statistics |
| 01001000 | Reset cooling comfort mode time statistics |
| 01010000 | Reset cooling global time statistics |

DATABYTE3 = Enable/disable unjamming heater valve & pump

| Contents | Enable/disable unjamming valve and pump |
|----------|------------------------------------------|
| 00000000 | Disable unjamming heater valve & pump |
| 00000001 | Disable unjamming heater valve & enable unjamming pump |
| 00000010 | Enable unjamming heater valve & disable unjamming pump |
| 00000011 | Enable unjamming heater valve & pump |

DATABYTE3 = Minimum switching time:

| Contents | Operating mode |
|----------|----------------|
| 00000000 | No switching time protection |
| 00000001 | 1 minute switching time protection |
| 00000010 | 2 minute switching time protection |
| … | … |
| 11111110 | 254 minute switching time protection |
| 11111111 | Default 1 minute switching time protection |

Remark:
Valid hysteresis range = 0 …15.5°C
Valid calibration factor range = -8 …7.5°C
Wait at least 10ms for sending a next command on the velbus.

***Transmit 'Remote Sensor Set heating mode' command:***
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Remote Sensor Master Address
RTR = 0
DLC3...DLC0 = 2 databytes received
DATABYTE1 = COMMAND_SET_HEATING_MODE (H'E0')
DATABYTE2 = don't care

*Transmit 'Remote Sensor Set cooling mode' command:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master Address
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_SET_COOLING_MODE (H'DF')
    DATABYTE2 = don't care

*Transmit 'Switch to comfort mode' command:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master Address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_SWITCH_TO_COMFORT_MODE (H'DB')
    DATABYTE2 = High byte of the sleep time
    DATABYTE3 = Low byte of the sleep time into minutes

    Remark:
    If the sleep time contains H'FF00', the command is a program step.
    A sleep time between H'0001' and H'FEFF' (1 to 65.279min) starts the sleep timer for that time and program steps will not be executed during that time.
    A sleep time of H'FFFF' puts the sensor into manual mode. Program steps will not be executed anymore.
    A value of zero for the sleep time cancels the manual mode or sleep timer.

*Transmit 'Switch to day mode' command:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master Address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_SWITCH_TO_DAY_MODE (H'DC')
    DATABYTE2 = High byte of the sleep time
    DATABYTE3 = Low byte of the sleep time into minutes

    Remark:
    If the sleep time contains H'FF00', the command is a program step.
    A sleep time between H'0001' and H'FEFF' (1 to 65.279min) starts the sleep timer for that time and program steps will not be executed during that time.
    A sleep time of H'FFFF' puts the sensor into manual mode. Program steps will not be executed anymore.
    A value of zero for the sleep time cancels the manual mode or sleep timer.

*Transmit 'Switch to night mode' command:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master Address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_SWITCH_TO_NIGHT_MODE (H'DD')
    DATABYTE2 = High byte of the sleep time
    DATABYTE3 = Low byte of the sleep time into minutes

    Remark:
    If the sleep time contains H'FF00', the command is a program step.
    A sleep time between H'0001' and H'FEFF' (1 to 65.279min) starts the sleep timer for that time and program steps will not be executed during that time.
    A sleep time of H'FFFF' puts the sensor into manual mode. Program steps will not be executed anymore.
    A value of zero for the sleep time cancels the manual mode or sleep timer.

*Transmit 'Switch to safe temperature mode' command:*

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Remote Sensor Master Address
RTR = 0
DLC3...DLC0 = 3 databytes received
DATABYTE1 = COMMAND_SWITCH_TO_SAFE_MODE (H'DE')
DATABYTE7 = High byte of the sleep time
DATABYTE8 = Low byte of the sleep time into minutes

Remark:
If the sleep time contains H'FF00', the command is a program step.
A sleep time between H'0001' and H'FEFF' (1 to 65.279min) starts the sleep timer for that time and program steps will not be executed during that time.
A sleep time of H'FFFF' puts the sensor into manual mode. Program steps will not be executed anymore.
A value of zero for the sleep time cancels the manual mode or sleep timer.

*Transmit 'Read program step' command:*

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Remote Sensor Master Address
RTR = 0
DLC3...DLC0 = 5 databytes to send
DATABYTE1 = COMMAND_READ_PROGRAM_STEP (H'C0')
DATABYTE2 = Start program step number (1…170)
DATABYTE3 = Program group number (1…3)
DATABYTE4 = Channel (1…32 for buttons or 128 for temperature channel)
DATABYTE5 = Search direction (1 = search for next matched step / 0 = search for previous matched program step)

*Transmit 'Remote Sensor Write program step' command:*

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Remote Sensor Master Address
RTR = 0
DLC3...DLC0 = 8 databytes to send
DATABYTE1 = COMMAND_WRITE_PROGRAM_STEP (H'C2')
DATABYTE2 = Program step number (1…170)
DATABYTE3 = Program reference

| Contents | Description |
|----------|-------------|
| 000xxxxx | Disable program step |
| 001xxxxx | Absolute time |
| 010xxxxx | Wake up time 1 + relative time |
| 011xxxxx | Go to bed time 1 + relative time |
| 100xxxxx | Wake up time 2 + relative time |
| 101xxxxx | Go to bed time 2 + relative time |
| 110xxxxx | Sunrise + relative time |
| 111xxxxx | Sunset + relative time |
| xxx01111 | Rel. time = 3h45min |
| … | |
| xxx00001 | Rel. time = 15min |
| xxx00000 | Rel. time = 0 |
| xxx11111 | Rel. time = -15min |
| … | |
| xxx10000 | Rel. time = -4h |

DATABYTE4 = Program step month & four least significant bits of day

| Contents | Description |
|---|---|
| xxxx0000 | Weekly program |
| xxxx0001 | January |
| xxxx0010 | February |
| xxxx0011 | March |
| xxxx0100 | April |
| xxxx0101 | May |
| xxxx0110 | June |
| xxxx0111 | July |
| xxxx1000 | August |
| xxxx1001 | September |
| xxxx1010 | October |
| xxxx1011 | November |
| xxxx1100 | December |
| xxxx1101 | Monthly program |
| xxxx1110 | Monthly program |
| xxxx1111 | Monthly program |

| Contents byte6 | Contents byte4 | Description |
|---|---|---|
| 00xxxxxx | 0000xxxx | Never |
| 00xxxxxx | 0001xxxx | Day 1of the month |
| 00xxxxxx | 0010xxxx | Day 2of the month |
| … | ... | … |
| 01xxxxxx | 1111xxxx | Day 31of the month |
| 10xxxxxx | 0000xxxx | Never |
| 10xxxxxx | 0001xxxx | Every Monday |
| 10xxxxxx | 0010xxxx | Every Tuesday |
| ... | … | … |
| 10xxxxxx | 0111xxxx | Every Sunday |
| 10xxxxxx | 1000xxxx | Every weekend (sa & su) |
| 10xxxxxx | 1001xxxx | Every working day (mo…fr) |
| 10xxxxxx | 1010xxxx | Every day except Sunday |
| 10xxxxxx | 1011xxxx | Every day |
| 10xxxxxx | 1100xxxx | Never |
| … | … | … |
| 11xxxxxx | 1111xxxx | Never |

DATABYTE5 = Program step hour & group number

| Contents | Description |
|---|---|
| xxx00000 | 0h |
| xxx00001 | 1h |
| … | … |
| xxx10111 | 23h |
| xx1xxxxx | Program group 1 (Summer program) |
| x1xxxxxx | Program group 2 (Winter program) |
| 1xxxxxxx | Program group 3 (Holiday program) |

DATABYTE6 = Program step minute & msb of day & every flag

| Contents | Description |
|---|---|
| xx000000 | 0min |
| xx000001 | 1min |
| … | … |
| xx111011 | 59min |

| Contents byte6 | Contents byte4 | Description |
|---|---|---|
| 00xxxxxx | 0000xxxx | Never |
| 00xxxxxx | 0001xxxx | Day 1of the month |
| 00xxxxxx | 0010xxxx | Day 2of the month |
| … | ... | … |
| 01xxxxxx | 1111xxxx | Day 31of the month |
| 10xxxxxx | 0000xxxx | Never |
| 10xxxxxx | 0001xxxx | Every Monday |
| 10xxxxxx | 0010xxxx | Every Tuesday |
| ... | … | … |
| 10xxxxxx | 0111xxxx | Every Sunday |
| 10xxxxxx | 1000xxxx | Every weekend (sa & su) |
| 10xxxxxx | 1001xxxx | Every working day (mo…fr) |
| 10xxxxxx | 1010xxxx | Every day except Sunday |
| 10xxxxxx | 1011xxxx | Every day |
| 10xxxxxx | 1100xxxx | Never |
| … | … | … |
| 11xxxxxx | 1111xxxx | Never |

DATABYTE7 = Program step action

| Contents | Action |
|---|---|
| 0 | 0s25 Pulse |
| 1 | 1s Pulse |
| 2 | 2s Pulse |
| ... | ... |
| 119 | 1min59s Pulse |
| 120 | 2min Pulse |
| 121 | 2min15s Pulse |
| ... | ... |
| 131 | 4min45s Pulse |
| 132 | 5min Pulse |
| 133 | 5min30s Pulse |
| ... | ... |
| 181 | 29min30s Pulse |
| 182 | 30min Pulse |
| 183 | 31min Pulse |
| ... | ... |
| 211 | 59min Pulse |
| 212 | 1h Pulse |
| 213 | 1h15min Pulse |
| ... | ... |
| 227 | 4h45min Pulse |
| 228 | 5h Pulse |
| 229 | 5h30min Pulse |
| ... | ... |
| 237 | 9h30min Pulse |
| 238 | 10h Pulse |
| 239 | 11h Pulse |
| ... | … |
| 246 | 18h Pulse |
| 247 | Press |
| 248 | Long Press |
| 249 | Release |
| 250 | Lock |
| 251 | Unlock |
| 252 | Sensor: Safe mode |
| 253 | Sensor: Night mode |
| 254 | Sensor: Day mode |
| 255 | Sensor: Comfort mode |

DATABYTE8 = Channel

| Contents | Channel |
|----------|---------|
| 1 | Channel 1 or temperature sensor |
| 2 | Channel 2 |
| ... | … |
| 7 | Channel 7 |
| 8 | Channel 8 |

*Transmit 'Remote Analog Sensor readout request' command:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Analog Sensor Address
    RTR = 0
    DLC3...DLC0 = 3 databytes to send
    DATABYTE1 = COMMAND_SENSOR_TEMP_REQUEST (H'E5')
    DATABYTE2 = Remote analog sensor channel
    DATABYTE3 = Autosend time interval into seconds
                   (valid range: 10…255s)
                   (5…9 = auto send on temperature change)
                   (1…4 = auto send disabled)
                   (0 = no change on auto send interval)

**'Linked push button status' received:**
SID10-SID9 = 00 (highest priority)
SID8...SID1 = Address of the linked push button module
RTR = 0
DLC3...DLC0 = 4 databytes received
DATABYTE1 = COMMAND_PUSH_BUTTON_STATUS (H'00')
DATABYTE2 = Linked push buttons just pressed (1 = just pressed)
DATABYTE3 = Linked push buttons just released (1 = just released)
DATABYTE4 = linked push buttons long pressed (1 = longer than 0.85s pressed)

**'Power up message' received:**
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = H'00'
RTR = 0
DLC3...DLC0 = 2 databyte to send
DATABYTE1 = COMMAND_POWER_UP (H'AB')
DATABYTE2 = module address

**'Set real time clock' command received:**
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = H'00'
RTR = 0
DLC3...DLC0 = 4 databytes to send
DATABYTE1 = COMMAND_SET_REALTIME_CLOCK (H'D8')
DATABYTE2 = Day of week

| Contents day of week' | Description |
|---|---|
| H'00' | Monday |
| H'01' | Tuesday |
| H'02' | Wednesday |
| H'03' | Thursday |
| H'04' | Friday |
| H'05' | Saterday |
| H'06' | Sunday |

DATABYTE3 = Hours (0…23)
DATABYTE4 = Minutes (0…59)

**'Set date' command received:**
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = H'00'
RTR = 0
DLC3...DLC0 = 5 databytes to send
DATABYTE1 = COMMAND_SET_REALTIME_DATE (H'B7')
DATABYTE2 = Day (1…31)
DATABYTE3 = Month (1…12)
DATABYTE4 = High byte of Year
DATABYTE5 = Low byte of Year

**'Set daylight savings' command received:**
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = H'00'
RTR = 0
DLC3...DLC0 = 2 databytes to send
DATABYTE1 = COMMAND_SET_DAYLIGHT_SAVING (H'AF')
DATABYTE2 = 0 =disabled / 1 = enabled

**'Enable/disable global sunrise/sunset related actions' command received:**
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = H'00'
    RTR = 0
    DLC3...DLC0 = 3 databytes to send
    DATABYTE1 = COMMAND_ENA_DIS_SUNRISE_SUNSET (H'AE')
    DATABYTE2 = Channel (FF)
    DATABYTE3 = enable/disable flags

| Contents | Description |
|---|---|
| B'xxxxxxx0' | Disable sunrise related actions |
| B'xxxxxxx1' | Enable sunrise related actions |
| B'xxxxxx0x' | Disable sunset related actions |
| B'xxxxxx1x' | Enable sunset related actions |

**'Enable/disable local sunrise/sunset related actions' command received:**
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 3 databytes to send
    DATABYTE1 = COMMAND_ENA_DIS_SUNRISE_SUNSET (H'AE')
    DATABYTE2 = Channel (FF)
    DATABYTE3 = enable/disable flags

| Contents | Description |
|---|---|
| B'xxxxxxx0' | Disable sunrise related actions |
| B'xxxxxxx1' | Enable sunrise related actions |
| B'xxxxxx0x' | Disable sunset related actions |
| B'xxxxxx1x' | Enable sunset related actions |

**'Set global clock alarm' command received:**
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = H'00'
    RTR = 0
    DLC3...DLC0 = 7 databytes to send
    DATABYTE1 = COMMAND_SET_ALARM_CLOCK (H'C3')
    DATABYTE2 = Alarm number (1 or 2)
    DATABYTE3 = Wake up hour (0…23)
    DATABYTE4 = Wake up minute (0…59)
    DATABYTE5 = Go to bed hour (0…23)
    DATABYTE6 = Go to bed minute (0…59)
    DATABYTE7 = Clock alarm enable flag (0 = disabled / 1 = enabled)

**'Set local clock alarm' command received:**
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 7 databytes to send
    DATABYTE1 = COMMAND_SET_ALARM_CLOCK (H'C3')
    DATABYTE2 = Alarm number (1 or 2)
    DATABYTE3 = Wake up hour (0…23)
    DATABYTE4 = Wake up minute (0…59)
    DATABYTE5 = Go to bed hour (0…23)
    DATABYTE6 = Go to bed minute (0…59)
    DATABYTE7 = Clock alarm enable flag (0 = disabled / 1 = enabled)

**'Module type request' command received:**
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 1
    DLC3...DLC0 = 0 databytes received

*'Module status request' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_MODULE_STATUS_REQUEST (H'FA')
    DATABYTE2 = don't care

*'Channel name request' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_CHANNEL_NAME_REQUEST (H'EF')
    DATABYTE2 = channel number 1…33 (channel 33 = temperature sensor name)

    Remark: channel = H'FF' for all 32 channel names & temperature sensor name

*'Clear channel LED' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address, subaddress1, subaddress2 or subaddress3
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_CLEAR_LED (H'F5')
    DATABYTE2 = LEDs to clear (a one clears the corresponding LED of channel 1 to 8)

*'Set channel LED' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address, subaddress1, subaddress2 or subaddress3
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_SET_LED (H'F6')
    DATABYTE2 = LEDs to set (a one sets the corresponding LED of channel 1 to 8)

*'Slow blink channel LED' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address, subaddress1, subaddress2 or subaddress3
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_SLOW_BLINK_LED (H'F7')
    DATABYTE2 = LEDs to blink slow (a one blinks slow the corresponding LED of channel 1 to 8)

*'Fast blink channel LED' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address, subaddress1, subaddress2 or subaddress3
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_FAST_BLINK_LED (H'F8')
    DATABYTE2 = LEDs to blink fast  (a one blinks fast the corresponding LED of channel 1 to 8)

*'Very fast blink channel LED' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address, subaddress1, subaddress2 or subaddress3
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_VERY_FAST_BLINK_LED (H'F9')
    DATABYTE2 = LEDs to blink very fast  (a one blinks very fast the corresponding LED of channel 1 to 8)

*'Update channel LEDs' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address, subaddress1, subaddress2 or subaddress3
    RTR = 0
    DLC3...DLC0 = 4 databytes received
    DATABYTE1 = COMMAND_UPDATE_LED_STATUS (H'F4')
    DATABYTE2 = LEDs to set (a one sets the corresponding LED of channel 1 to 8)
    DATABYTE3 = LEDs to blink slow (a one blinks slow the corresponding LED of channel 1 to 8)
    DATABYTE4 = LEDs to blink fast  (a one blinks very fast the corresponding LED of channel 1 to 8)

    Remark:
    The 'LEDs to set' status overrides the blinking modes.
    Very fast blinking if slow & fast blinking are set.

*'Read data from memory' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_READ_DATA_FROM_MEMORY (H'FD')
    DATABYTE2 = High memory address
    DATABYTE3 = LOW memory address

    Remark: address range: H'0000' to H'1A03'

*'Read data block from memory' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_READ_MEMORY_BLOCK (H'C9')
    DATABYTE2 = High memory address
    DATABYTE3 = LOW memory address

    Remark: address range: H'0000' to H'1A00'

*'Memory dump request' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 1 databytes received
    DATABYTE1 = COMMAND_MEMORY_DUMP_REQUEST (H'CB')

*'Counter log dump request' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_MEMORY_DUMP_REQUEST (H'CB')
    DATABYTE2 = don't care
    DATABYTE3 = don't care

*'Write data to memory' command received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 4 databytes received
    DATABYTE1 = COMMAND_WRITE_DATA_TO_MEMORY (H'FC')
    DATABYTE2 = High memory address
    DATABYTE3 = LOW memory address
    DATABYTE4 = memory data to write

    Remark:
    Wait for 'data memory byte' feedback before sending a next command on the velbus.
    Address range: H'0000' to H'1A03'
    Terminate always with a write command at the last memory location .

***'Write memory block' command received:***
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 7 databytes received
    DATABYTE1 = COMMAND_WRITE_MEMORY_BLOCK (H'CA')
    DATABYTE2 = High memory address
    DATABYTE3 = LOW memory address
    DATABYTE4 = memory databyte1 to write
    DATABYTE5 = memory databyte2 to write
    DATABYTE6 = memory databyte3 to write
    DATABYTE7 = memory databyte4 to write

    Remark:
    Wait for 'memory data block' feedback before sending a next command on the velbus.
    Address range: H'0000' to H'1A00'
    Terminate always with a write command at the last memory location .

***'Bus error counter status request' command received:***
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 1 databytes to send
    DATABYTE1 = COMMAND_BUS_ERROR_COUNTER_STATUS_REQUEST (H'D9')

***'Unlock channel' command received:***
    SID10-SID9 = 00 (highest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_CANCEL_FORCED_OFF (H'13')
    DATABYTE2 = Channel number 1…33 (33 for enable temperature sensor)

    Remark: channel number = H'FF' for all 32 channels & enable temperature sensor

***'Lock channel' command received:***
    SID10-SID9 = 00 (highest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 5 databytes received
    DATABYTE1 = COMMAND_FORCED_OFF (H'12')
    DATABYTE2 = Channel number 1…33 (33 for disable temperature sensor)
    DATABYTE3 = high byte of delay time
    DATABYTE4 = mid byte of delay time
    DATABYTE5 = low byte of delay time

    Remark:
    Channel number = H'FF' for all 32 channels & disable temperature sensor
    [DATABYTE3][DATABYTE4][DATABYTE5] contain a 24-bit time in seconds
    The command will be skipped when the time parameter contains zero.
    When the time parameter contains H'FFFFFF' then the channel will be permanently locked.

***'Enable Channel Program' command received:***
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_ENABLE_PROGRAM (H'B2')
    DATABYTE2 = Channel number (1…32)

    Remark: channel number = H'FF' for all 32 channels

**'Disable Channel Program' command received:**
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 5 databytes received
    DATABYTE1 = COMMAND_DISABLE_PROGRAM (H'B1')
    DATABYTE2 = Channel number (1…32)
    DATABYTE3 = high byte of delay time
    DATABYTE4 = mid byte of delay time
    DATABYTE5 = low byte of delay time

    Remark:
    Channel number = H'FF' for all 32 channels
    [DATABYTE3][DATABYTE4][DATABYTE5] contain a 24-bit time in seconds
    The command will be skipped when the time parameter contains zero.
    When the time parameter contains H'FFFFFF' then the channel program will be permanently disabled.

**'Select Program' command received:**
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_SELECT_PROGRAM (H'B3')
    DATABYTE2 = Program mode

| Contents | Selected program |
|----------|------------------|
| 0 | None |
| 1 | Group 1 (Summer) |
| 2 | Group 2 (Winter) |
| 3 | Group 3 (Holiday) |

**'Sensor temperature request' command received:**
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 2 databytes to send
    DATABYTE1 = COMMAND_SENSOR_TEMP_REQUEST (H'E5')
    DATABYTE2 = Autosend time interval into seconds
                  (valid range: 10…255s)
                  (5…9 = auto send on temperature change)
                  (1…4 = auto send disabled)
                  (0 = no change on auto send interval)

**'Sensor settings request' command received:**
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 2 databytes to send
    DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_REQUEST (H'E7')
    DATABYTE2 = don't care

**'Set heating mode' command received:**
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_SET_HEATING_MODE (H'E0')
    DATABYTE2 = don't care

**'Set cooling mode' command received:**

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 2 databytes received
    DATABYTE1 = COMMAND_SET_COOLING_MODE (H'DF')
    DATABYTE2 = don't care

**'Set default sleep time' command received:**

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_SET_DEFAULT_SLEEP_TIME (H'E3')
    DATABYTE2 = High byte of the default sleep time
    DATABYTE3 = Low byte of the default sleep time into minutes
                (valid range H'0001' to H'FEFF' or 1min to 65.279min)

Remark: Wait at least 20ms for sending a next command on the velbus

**'Set temperature' command received:**

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_SET_TEMP (H'E4')
    DATABYTE2 = Pointer to temperature variable (0…20)

| Contents | Temperature variable |
|---|---|
| 0 | Target temperature set |
| 1 | Comfort temperature set for heating |
| 2 | Day temperature set for heating |
| 3 | Night temperature set for heating |
| 4 | Safe temperature set for heating |
| 5 | Temperature difference for turbo output |
| 6 | Hysteresis (0°…15.5°C) |
| 7 | Comfort temperature set for cooling |
| 8 | Day temperature set for cooling |
| 9 | Night temperature set for cooling |
| 10 | Safe temperature set for cooling |
| 11 | Calibration offset factor (-8°…+7.5°C) |
| 12 | Reset minimum/maximum temperature |
| 13 | Reset time statistics |
| 14 | enable/disable anti-block valve/pump |
| 15 | Temperature alarm 1 set |
| 16 | Temperature alarm 4 set |
| 17 | Lower temperature range cool mode |
| 18 | Upper temperature range heat mode |
| 19 | Differential sensor address (H'FF' = no diff. sensor) |
| 20 | Target temperature set for the differential sensor |
| 21 | Minimum switching time |
| 22 | Pump delayed on time |
| 23 | Pump delayed off time |
| 24 | Temperature alarm 2 set |
| 25 | Temperature alarm 3 set |
| 26 | Lower temperature range heat mode |
| 27 | Upper temperature range cool mode |
| 28 | Calibration gain factor |

DATABYTE3 = Temperature set (resolution 0.5°)

| Contents | Temperature set |
|----------|-----------------|
| 01111111 | 63.5°C |
|          |        |
| 00101000 | 20°C |
|          |      |
| 00000010 | 1°C |
| 00000001 | 0.5°C |
| 00000000 | 0°C |
| 11111111 | -0.5°C |
|          |        |
| 10010010 | -55°C |

DATABYTE3 = Reset minimum/maximum temperature

| Contents | Reset temperature |
|----------|-------------------|
| 00000001 | Reset minimum temperature |
| 00000010 | Reset maximum temperature |

DATABYTE3 = Reset time statistics mode index

| Contents | Reset time statistics |
|----------|-----------------------|
| 10000001 | Reset heating antifreeze mode time statistics |
| 10000010 | Reset heating night mode time statistics |
| 10000100 | Reset heating day mode time statistics |
| 10001000 | Reset heating comfort mode time statistics |
| 10010000 | Reset heating global time statistics |
| 01000001 | Reset cooling standby mode time statistics |
| 01000010 | Reset cooling night mode time statistics |
| 01000100 | Reset cooling day mode time statistics |
| 01001000 | Reset cooling comfort mode time statistics |
| 01010000 | Reset cooling global time statistics |

DATABYTE3 = Enable/disable unjamming heater valve & pump

| Contents | Enable/disable unjamming valve and pump |
|----------|------------------------------------------|
| 00000000 | Disable unjamming heater valve & pump |
| 00000001 | Disable unjamming heater valve & enable unjamming pump |
| 00000010 | Enable unjamming heater valve & disable unjamming pump |
| 00000011 | Enable unjamming heater valve & pump |

DATABYTE3 = Minimum switching time:

| Contents | Operating mode |
|----------|----------------|
| 00000000 | No switching time protection |
| 00000001 | 1 minute switching time protection |
| 00000010 | 2 minute switching time protection |
| … | … |
| 11111110 | 254 minute switching time protection |
| 11111111 | Default 1 minute switching time protection |

Remark:
Valid hysteresis range = 0 …15.5°C
Valid calibration factor range = -8 …7.5°C
Wait at least 10ms for sending a next command on the velbus.

**'Switch to comfort mode' command received:**

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_SWITCH_TO_COMFORT_MODE (H'DB')
    DATABYTE2 = High byte of the sleep time
    DATABYTE3 = Low byte of the sleep time into minutes

    Remark:
    If the sleep time contains H'FF00', the command is a program step.
    A sleep time between H'0001' and H'FEFF' (1 to 65.279min) starts the sleep timer for that time and program steps will not be executed during that time.
    A sleep time of H'FFFF' puts the sensor into manual mode. Program steps will not be executed anymore.
    A value of zero for the sleep time cancels the manual mode or sleep timer.

**'Switch to day mode' command received:**

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_SWITCH_TO_DAY_MODE (H'DC')
    DATABYTE2 = High byte of the sleep time
    DATABYTE3 = Low byte of the sleep time into minutes

    Remark:
    If the sleep time contains H'FF00', the command is a program step.
    A sleep time between H'0001' and H'FEFF' (1 to 65.279min) starts the sleep timer for that time and program steps will not be executed during that time.
    A sleep time of H'FFFF' puts the sensor into manual mode. Program steps will not be executed anymore.
    A value of zero for the sleep time cancels the manual mode or sleep timer.

**'Switch to night mode' command received:**

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_SWITCH_TO_NIGHT_MODE (H'DD')
    DATABYTE2 = High byte of the sleep time
    DATABYTE3 = Low byte of the sleep time into minutes

    Remark:
    If the sleep time contains H'FF00', the command is a program step.
    A sleep time between H'0001' and H'FEFF' (1 to 65.279min) starts the sleep timer for that time and program steps will not be executed during that time.
    A sleep time of H'FFFF' puts the sensor into manual mode. Program steps will not be executed anymore.
    A value of zero for the sleep time cancels the manual mode or sleep timer.

**'Switch to safe temperature mode' command received:**

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Module address
    RTR = 0
    DLC3...DLC0 = 3 databytes received
    DATABYTE1 = COMMAND_SWITCH_TO_SAFE_MODE (H'DE')
    DATABYTE7 = High byte of the sleep time
    DATABYTE8 = Low byte of the sleep time into minutes

    Remark:
    If the sleep time contains H'FF00', the command is a program step.
    A sleep time between H'0001' and H'FEFF' (1 to 65.279min) starts the sleep timer for that time and program steps will not be executed during that time.
    A sleep time of H'FFFF' puts the sensor into manual mode. Program steps will not be executed anymore.
    A value of zero for the sleep time cancels the manual mode or sleep timer.

*'Time statistics request' command received:*

    SID10-SID9 = 11 (lowest priority)

    SID8...SID1 = Module address

    RTR = 0

    DLC3...DLC0 = 2 databytes to send

    DATABYTE1 = COMMAND_TIME_STATISTICS_REQUEST (H'C7')

    DATABYTE2 = statistics mode index

| Contents | Time statistics request |
|---|---|
| 10000001 | Heating antifreeze mode time statistics |
| 10000010 | Heating night mode time statistics |
| 10000100 | Heating day mode time statistics |
| 10001000 | Heating comfort mode time statistics |
| 10010000 | Heating global time statistics |
| 01000001 | Cooling standby mode time statistics |
| 01000010 | Cooling night mode time statistics |
| 01000100 | Cooling day mode time statistics |
| 01001000 | Cooling comfort mode time statistics |
| 01010000 | Cooling global time statistics |

*'Read program step' command received:*

    SID10-SID9 = 11 (lowest priority)

    SID8...SID1 = Module address

    RTR = 0

    DLC3...DLC0 = 5 databytes to send

    DATABYTE1 = COMMAND_READ_PROGRAM_STEP (H'C0')

    DATABYTE2 = Start program step number (1…170)

    DATABYTE3 = Program group number (1…3)

    DATABYTE4 = Channel (1…32 for buttons or 128 for temperature channel)

    DATABYTE5 = Search direction (1 = search for next matched step / 0 = search for previous matched program step)

*'Program step info' command received:*

    SID10-SID9 = 11 (lowest priority)

    SID8...SID1 = Module address

    RTR = 0

    DLC3...DLC0 = 8 databytes to send

    DATABYTE1 = COMMAND_PROGRAM_STEP_INFO (H'C1')

    DATABYTE2 = Program step number (1…170 / 255 step not found)

    DATABYTE3 = Program reference

| *Contents* | *Description* |
|---|---|
| 000xxxxx | Disable program step |
| 001xxxxx | Absolute time |
| 010xxxxx | Wake up time 1 + relative time |
| 011xxxxx | Go to bed time 1 + relative time |
| 100xxxxx | Wake up time 2 + relative time |
| 101xxxxx | Go to bed time 2 + relative time |
| 110xxxxx | Sunrise + relative time |
| 111xxxxx | Sunset + relative time |
| xxx01111 | Rel. time = 3h45min |
| … | |
| xxx00001 | Rel. time = 15min |
| xxx00000 | Rel. time = 0 |
| xxx11111 | Rel. time = -15min |
| … | |
| xxx10000 | Rel. time = -4h |

DATABYTE4 = Program step month & four least significant bits of day

| Contents | Description |
|---|---|
| xxxx0000 | Weekly program |
| xxxx0001 | January |
| xxxx0010 | February |
| xxxx0011 | March |
| xxxx0100 | April |
| xxxx0101 | May |
| xxxx0110 | June |
| xxxx0111 | July |
| xxxx1000 | August |
| xxxx1001 | September |
| xxxx1010 | October |
| xxxx1011 | November |
| xxxx1100 | December |
| xxxx1101 | Monthly program |
| xxxx1110 | Monthly program |
| xxxx1111 | Monthly program |

| Contents byte6 | Contents byte4 | Description |
|---|---|---|
| 00xxxxxx | 0000xxxx | Never |
| 00xxxxxx | 0001xxxx | Day 1of the month |
| 00xxxxxx | 0010xxxx | Day 2of the month |
| … | ... | … |
| 01xxxxxx | 1111xxxx | Day 31of the month |
| 10xxxxxx | 0000xxxx | Never |
| 10xxxxxx | 0001xxxx | Every Monday |
| 10xxxxxx | 0010xxxx | Every Tuesday |
| ... | … | … |
| 10xxxxxx | 0111xxxx | Every Sunday |
| 10xxxxxx | 1000xxxx | Every weekend (sa & su) |
| 10xxxxxx | 1001xxxx | Every working day (mo…fr) |
| 10xxxxxx | 1010xxxx | Every day except Sunday |
| 10xxxxxx | 1011xxxx | Every day |
| 10xxxxxx | 1100xxxx | Never |
| … | … | … |
| 11xxxxxx | 1111xxxx | Never |

DATABYTE5 = Program step hour & group number

| Contents | Description |
|---|---|
| xxx00000 | 0h |
| xxx00001 | 1h |
| … | … |
| xxx10111 | 23h |
| xx1xxxxx | Program group 1 (Summer program) |
| x1xxxxxx | Program group 2 (Winter program) |
| 1xxxxxxx | Program group 3 (Holiday program) |

DATABYTE6 = Program step minute & every flag & msb of day

| Contents | Description |
|---|---|
| xx000000 | 0min |
| xx000001 | 1min |
| … | … |
| xx111011 | 59min |

| Contents byte6 | Contents byte4 | Description |
|---|---|---|
| 00xxxxxx | 0000xxxx | Never |
| 00xxxxxx | 0001xxxx | Day 1of the month |
| 00xxxxxx | 0010xxxx | Day 2of the month |
| … | ... | … |
| 01xxxxxx | 1111xxxx | Day 31of the month |
| 10xxxxxx | 0000xxxx | Never |
| 10xxxxxx | 0001xxxx | Every Monday |
| 10xxxxxx | 0010xxxx | Every Tuesday |
| ... | … | … |
| 10xxxxxx | 0111xxxx | Every Sunday |
| 10xxxxxx | 1000xxxx | Every weekend (sa & su) |
| 10xxxxxx | 1001xxxx | Every working day (mo…fr) |
| 10xxxxxx | 1010xxxx | Every day except Sunday |
| 10xxxxxx | 1011xxxx | Every day |
| 10xxxxxx | 1100xxxx | Never |
| … | … | … |
| 11xxxxxx | 1111xxxx | Never |

DATABYTE7 = Program step action

| Contents | Action |
|---|---|
| 0 | 0s25 Pulse |
| 1 | 1s Pulse |
| 2 | 2s Pulse |
| ... | ... |
| 119 | 1min59s Pulse |
| 120 | 2min Pulse |
| 121 | 2min15s Pulse |
| ... | ... |
| 131 | 4min45s Pulse |
| 132 | 5min Pulse |
| 133 | 5min30s Pulse |
| ... | ... |
| 181 | 29min30s Pulse |
| 182 | 30min Pulse |
| 183 | 31min Pulse |
| ... | ... |
| 211 | 59min Pulse |
| 212 | 1h Pulse |
| 213 | 1h15min Pulse |
| ... | ... |
| 227 | 4h45min Pulse |
| 228 | 5h Pulse |
| 229 | 5h30min Pulse |
| ... | ... |
| 237 | 9h30min Pulse |
| 238 | 10h Pulse |
| 239 | 11h Pulse |
| ... | … |
| 246 | 18h Pulse |
| 247 | Press |
| 248 | Long Press |
| 249 | Release |
| 250 | Lock |
| 251 | Unlock |
| 252 | Sensor: Safe mode |
| 253 | Sensor: Night mode |
| 254 | Sensor: Day mode |
| 255 | Sensor: Comfort mode |

DATABYTE8 = Channel

| Contents | Channel |
|---|---|
| 1 | Channel 1 or temperature sensor |
| 2 | Channel 2 |
| ... | … |
| 7 | Channel 7 |
| 8 | Channel 8 |

**'Write program step' command received:**

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 8 databytes to send
DATABYTE1 = COMMAND_WRITE_PROGRAM_STEP (H'C2')
DATABYTE2 = Program step number (1…170)
DATABYTE3 = Program reference

| Contents | Description |
|---|---|
| 000xxxxx | Disable program step |
| 001xxxxx | Absolute time |
| 010xxxxx | Wake up time 1 + relative time |
| 011xxxxx | Go to bed time 1 + relative time |
| 100xxxxx | Wake up time 2 + relative time |
| 101xxxxx | Go to bed time 2 + relative time |
| 110xxxxx | Sunrise + relative time |
| 111xxxxx | Sunset + relative time |
| xxx01111 | Rel. time = 3h45min |
| … | |
| xxx00001 | Rel. time = 15min |
| xxx00000 | Rel. time = 0 |
| xxx11111 | Rel. time = -15min |
| … | |
| xxx10000 | Rel. time = -4h |

DATABYTE4 = Program step month & four least significant bits of day

| Contents | Description |
|---|---|
| xxxx0000 | Weekly program |
| xxxx0001 | January |
| xxxx0010 | February |
| xxxx0011 | March |
| xxxx0100 | April |
| xxxx0101 | May |
| xxxx0110 | June |
| xxxx0111 | July |
| xxxx1000 | August |
| xxxx1001 | September |
| xxxx1010 | October |
| xxxx1011 | November |
| xxxx1100 | December |
| xxxx1101 | Monthly program |
| xxxx1110 | Monthly program |
| xxxx1111 | Monthly program |

| Contents byte6 | Contents byte4 | Description |
|---|---|---|
| 00xxxxxx | 0000xxxx | Never |
| 00xxxxxx | 0001xxxx | Day 1of the month |
| 00xxxxxx | 0010xxxx | Day 2of the month |
| … | ... | … |
| 01xxxxxx | 1111xxxx | Day 31of the month |
| 10xxxxxx | 0000xxxx | Never |
| 10xxxxxx | 0001xxxx | Every Monday |
| 10xxxxxx | 0010xxxx | Every Tuesday |
| ... | … | … |
| 10xxxxxx | 0111xxxx | Every Sunday |
| 10xxxxxx | 1000xxxx | Every weekend (sa & su) |
| 10xxxxxx | 1001xxxx | Every working day (mo…fr) |
| 10xxxxxx | 1010xxxx | Every day except Sunday |
| 10xxxxxx | 1011xxxx | Every day |
| 10xxxxxx | 1100xxxx | Never |
| … | … | … |
| 11xxxxxx | 1111xxxx | Never |

DATABYTE5 = Program step hour & group number

| Contents | Description |
|---|---|
| xxx00000 | 0h |
| xxx00001 | 1h |
| … | … |
| xxx10111 | 23h |
| xx1xxxxx | Program group 1 (Summer program) |
| x1xxxxxx | Program group 2 (Winter program) |
| 1xxxxxxx | Program group 3 (Holiday program) |

DATABYTE6 = Program step minute & msb of day & every flag

| Contents | Description |
|---|---|
| xx000000 | 0min |
| xx000001 | 1min |
| … | … |
| xx111011 | 59min |

| Contents byte6 | Contents byte4 | Description |
|---|---|---|
| 00xxxxxx | 0000xxxx | Never |
| 00xxxxxx | 0001xxxx | Day 1of the month |
| 00xxxxxx | 0010xxxx | Day 2of the month |
| … | ... | … |
| 01xxxxxx | 1111xxxx | Day 31of the month |
| 10xxxxxx | 0000xxxx | Never |
| 10xxxxxx | 0001xxxx | Every Monday |
| 10xxxxxx | 0010xxxx | Every Tuesday |
| ... | … | … |
| 10xxxxxx | 0111xxxx | Every Sunday |
| 10xxxxxx | 1000xxxx | Every weekend (sa & su) |
| 10xxxxxx | 1001xxxx | Every working day (mo…fr) |
| 10xxxxxx | 1010xxxx | Every day except Sunday |
| 10xxxxxx | 1011xxxx | Every day |
| 10xxxxxx | 1100xxxx | Never |
| … | … | … |
| 11xxxxxx | 1111xxxx | Never |

DATABYTE7 = Program step action

| Contents | **Action** |
|---|---|
| 0 | 0s25 Pulse |
| 1 | 1s Pulse |
| 2 | 2s Pulse |
| ... | ... |
| 119 | 1min59s Pulse |
| 120 | 2min Pulse |
| 121 | 2min15s Pulse |
| ... | ... |
| 131 | 4min45s Pulse |
| 132 | 5min Pulse |
| 133 | 5min30s Pulse |
| ... | ... |
| 181 | 29min30s Pulse |
| 182 | 30min Pulse |
| 183 | 31min Pulse |
| ... | ... |
| 211 | 59min Pulse |
| 212 | 1h Pulse |
| 213 | 1h15min Pulse |
| ... | ... |
| 227 | 4h45min Pulse |
| 228 | 5h Pulse |
| 229 | 5h30min Pulse |
| ... | ... |
| 237 | 9h30min Pulse |
| 238 | 10h Pulse |
| 239 | 11h Pulse |
| ... | … |
| 246 | 18h Pulse |
| 247 | Press |
| 248 | Long Press |
| 249 | Release |
| 250 | Lock |
| 251 | Unlock |
| 252 | Sensor: Safe mode |
| 253 | Sensor: Night mode |
| 254 | Sensor: Day mode |
| 255 | Sensor: Comfort mode |

DATABYTE8 = Channel

| Contents | Channel |
|---|---|
| 1 | Channel 1 or temperature sensor |
| 2 | Channel 2 |
| ... | … |
| 7 | Channel 7 |
| 8 | Channel 8 |

*'Counter status' command received:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Counter Module address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_ENERGY_COUNTER_STATUS (H'BE')
    DATABYTE2 = counter channel 1 to 4 & number of pulses/Unit (kWh-l-m$^3$) divide by 100

| Contents | Description |
|---|---|
| B'xxxxxx00' | Channel 1 |
| B'xxxxxx01' | Channel 2 |
| B'xxxxxx10' | Channel 3 |
| B'xxxxxx11' | Channel 4 |
| B'000001xx' | 100 pulses/Unit |
| B'000010xx' | 200 pulses/Unit |
| … | … |
| B'001000xx' | 800 pulses/Unit |
| … | … |
| B'001010xx' | 1000 pulses/Unit |
| … | … |
| B'010100xx' | 2000 pulses/Unit |
| … | … |

    DATABYTE3 = most significant byte of pulse counter
    DATABYTE4 = upper byte of pulse counter
    DATABYTE5 = high byte of pulse counter
    DATABYTE6 = low byte of pulse counter
    DATABYTE7 = high byte of period in ms between 2 pulses
    DATABYTE8 = low byte of period in ms between 2 pulses

    Remark:  a period counter contents of 0xFFFF means overflow
               Counter pulses in Units (kWh-l-m$^3$) = DATABYTE[3…6] / (DATABYTE2[pulses/Unit factor] * Multiplier)
               Power in W = 1000 * 1000 * 3600 / (DATABYTE[7..8] * DATABYTE2[pulses/Unit factor] * Multiplier)
               Flow in Units/h = 1000 * 3600 / (DATABYTE[7..8] * DATABYTE2[pulses/Unit factor] * Multiplier)

*Remote sensor module status received:*

    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master address
    RTR = 0
    DLC3...DLC0 = 7 databytes to send
    DATABYTE1 = COMMAND_MODULE_STATUS (H'ED')
    DATABYTE2 = channel 1 to 8 status (1 = pressed / 0 = released)
    DATABYTE3 = enabled/disable channel status (1 = enabled / 0 = disabled)
    DATABYTE4 = normal/inverted channel status (1 = normal / 0 = inverted)
    DATABYTE5 = locked channel status (0 = unlocked / 1 = locked)
    DATABYTE6 = disabled channel program status (0 = program enabled / 1 = program disabled)
    DATABYTE7 = alarm & program selection

| Contents | Selected programl |
|---|---|
| B'xxxxxx00' | None |
| B'xxxxxx01' | Summer |
| B'xxxxxx10' | Winter |
| B'xxxxxx11' | Holiday |
| B'xxxxx0xx' | Alarm 1 off |
| B'xxxxx1xx' | Alarm 1 on |
| B'xxxx0xxx' | Local alarm 1 |
| B'xxxx1xxx' | Global alarm 1 |
| B'xxx0xxxx' | Alarm 2 off |
| B'xxx1xxxx' | Alarm 2 on |
| B'xx0xxxxx' | Local alarm 2 |
| B'xx1xxxxx' | Global alarm 2 |
| B'x0xxxxxx' | Sunrise disabled |
| B'x1xxxxxx' | Sunrise enabled |
| B'0xxxxxxx' | Sunset disabled |
| B'1xxxxxxx' | Sunset enabled |

*Remote Sensor status received:*

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Remote Sensor Master address
RTR = 0
DLC3...DLC0 = 8 databytes to send
DATABYTE1 = COMMAND_TEMP_SENSOR_STATUS (H'EA')
DATABYTE2 = Operating mode

| Contents | Operating mode |
|----------|----------------|
| xxxxxxx1 | Mode push button locked |
| xxxxxxx0 | Mode push button unlocked |
| Xxxxx11x | Disable mode |
| xxxxx01x | Manual mode |
| xxxxx10x | Sleep timer mode |
| xxxxx00x | Run mode |
| xxxx1xxx | Auto send sensor temperature enabled |
| xxxx0xxx | Auto send sensor temperature disabled |
| x100xxxx | Comfort mode |
| x010xxxx | Day mode |
| x001xxxx | Night mode |
| x000xxxx | Safe temp mode (anti frost) |
| 1xxxxxxx | Cooler mode |
| 0xxxxxxx | Heater mode |

DATABYTE3 = Program step mode

| Contents | Program step mode |
|----------|-------------------|
| xxxxx0xx | No sensor program |
| xxxxx1xx | Sensor program available |
| xxxx0xxx | No zone program |
| xxxx1xxx | Zone program available |
| 0xxxxxxx | No all rooms program |
| 1xxxxxxx | All rooms program available |
| x100xxxx | Comfort program step received |
| x010xxxx | Day program step received |
| x001xxxx | Night program step received |
| X000xxxx | Safe temperature program step received |
| xxxxxx1x | Enable unjamming heater valve |
| xxxxxx0x | Disable unjamming heater valve |
| xxxxxxx1 | Enable unjamming pump |
| xxxxxxx0 | Disable unjamming pump |

DATABYTE4 = Output status (1 = activated)

| Contents | Output channel |
|----------|----------------|
| xxxxxxx0 | Heater off |
| xxxxxxx1 | Heater on |
| xxxxxx0x | Boost heater/cooler off |
| xxxxxx1x | Boost heater/cooler on |
| xxxxx0xx | Pump off |
| xxxxx1xx | Pump on |
| xxxx0xxx | Cooler off |
| xxxx1xxx | Cooler on |
| xxx0xxxx | Temperature alarm 1 off |
| xxx1xxxx | Temperature alarm 1 on |
| xx0xxxxx | Temperature alarm 2 off |
| xx1xxxxx | Temperature alarm 2 on |
| x0xxxxxx | Temperature alarm 3 off |
| x1xxxxxx | Temperature alarm 3 on |
| 0xxxxxxx | Temperature alarm 4 off |
| 1xxxxxxx | Temperature alarm 4 on |

DATABYTE5 = Current sensor temperature into two's complement format (resolution 0.5°)

| Contents | Current sensor temperature |
|----------|---------------------------|
| 01111111 | 63.5°C |
| | |
| 00000001 | 0.5°C |
| 00000000 | 0°C |
| 11111111 | -0.5°C |
| | |
| 10010010 | -55°C |

DATABYTE6 = target temperature set (resolution 0.5°)

| Contents | Current temperature set |
|----------|------------------------|
| 01101100 | 54°C |
| | |
| 00101000 | 20°C |
| | |
| 00000010 | 1°C |
| 00000001 | 0.5°C |
| 00000000 | 0°C |
| 11111111 | -0.5°C |
| | |
| 11000000 | -32°C |

DATABYTE7 = High byte of the sleep timer
DATABYTE8 = Low byte of the sleep timer into minutes

Remark:
[DATABYTE7][DATABYTE8] contains a 16-bit sleep timer into minutes (1 to 65.279min).
If the sleep timer contains H'0000', the sleep timer is deactivated.
If the sleep timer contains a value between H'0001' and H'FEFF' (1 to 65.279min), the sleep timer is running for that time.
If the sleep timer contains H'FFFF', the sensor is in manual mode.

*Remote Sensor temperature received:*
SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Remote Sensor Master address
RTR = 0
DLC3...DLC0 = 7 databytes to send
DATABYTE1 = COMMAND_SENSOR_TEMPERATURE (H'E6')
DATABYTE2 = High byte current sensor temperature
DATABYTE3 = Low byte current sensor temperature into two's complement format (resolution 0.0625°)
DATABYTE4 = High byte minimum sensor temperature
DATABYTE5 = Low byte minimum sensor temperature into two's complement format (resolution 0.0625°)
DATABYTE6 = High byte maximum sensor temperature
DATABYTE7 = Low byte maximum sensor temperature into two's complement format (resolution 0.0625°)

| High byte | Low byte | Current sensor temperature |
|-----------|----------|---------------------------|
| 01111111 | 11100000 | 63.5°C |
| | | |
| 00000001 | 00000000 | 0.5°C |
| 00000000 | 10000000 | 0.25°C |
| 00000000 | 01000000 | 0.125°C |
| 00000000 | 00100000 | 0.0625°C |
| 00000000 | 00000000 | 0°C |
| 11111111 | 11111111 | -0.0625°C |
| 11111111 | 11011111 | -0.125°C |
| 11111111 | 10011111 | -0.25°C |
| 11111110 | 00011111 | -0.5°C |
| | | |
| 10010010 | 00011111 | -55°C |

Remark:
The 5 least significant bits of the low byte are always zero for positive temperature and one for negative temperature.
The low order bytes are not sending with the data length of 4 bytes (resolution 0.5°C)

*First part of the remote sensor settings received:*

    SID10-SID9 = 11 (lowest priority)

    SID8...SID1 = Remote Sensor Master address

    RTR = 0

    DLC3...DLC0 = 8 databytes to send

    DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART1 (H'E8')

    DATABYTE2 = Current temperature set (resolution 0.5°)

    DATABYTE3 = Comfort temperature set for heating mode (resolution 0.5°)

    DATABYTE4 = Day temperature set for heating mode (resolution 0.5°)

    DATABYTE5 = Night temperature set for heating mode (resolution 0.5°)

    DATABYTE6 = Anti frost temperature set for heating mode (resolution 0.5°)

    DATABYTE7 = Boost temperature difference set (resolution 0.5°)

    DATABYTE8 = Hysteresis temperature set

| Contents | Hysteresis |
|----------|------------|
| xxx11111 | 15.5°C |
|  |  |
| Xxx00001 | 0.5°C |
| Xxx00000 | 0°C |

*Second part of the remote sensor settings received:*

    SID10-SID9 = 11 (lowest priority)

    SID8...SID1 = Remote Sensor Master address

    RTR = 0

    DLC3...DLC0 = 8 databytes to send

    DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART2 (H'E9')

    DATABYTE2 = Comfort temperature set for cooling mode (resolution 0.5°)

    DATABYTE3 = Day temperature set for cooling mode (resolution 0.5°)

    DATABYTE4 = Night temperature set for cooling mode (resolution 0.5°)

    DATABYTE5 = Safe temperature set for cooling mode (resolution 0.5°)

    DATABYTE6 = High byte of the default sleep timer

    DATABYTE7 = Low byte of the default sleep timer into minutes (1 to 65.279min)

    DATABYTE8 = Default auto send temperature time interval into seconds

            (Valid range: 10…255s)

            (5…9 = auto send on temperature change with min interval 5…9s)

            (<4 = auto send disabled)

*Third part of the remote sensor settings received:*

    SID10-SID9 = 11 (lowest priority)

    SID8...SID1 = Remote Sensor Master address

    RTR = 0

    DLC3...DLC0 = 8 databytes to send

    DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART3 (H'C6')

    DATABYTE2 = Temperature alarm 1 setting (resolution 0.5°)

    DATABYTE3 = Temperature alarm 4 setting (resolution 0.5°)

    DATABYTE4 = Lower temperature range cool mode (resolution 0.5°)

    DATABYTE5 = Upper temperature range heat mode (resolution 0.5°)

    DATABYTE6 = Calibration offset factor (resolution 0.5°)

| Contents | Calibration factor |
|----------|---------------------|
| 00001111 | Calibration factor +7.5°C |
|  |  |
| 00000001 | Calibration factor +0.5°C |
| 00000000 | Calibration factor +0°C |
| 11111111 | Calibration factor -0.5°C |
|  |  |
| 11110000 | Calibration factor -8°C |

    DATABYTE7 = Zone number

    DATABYTE8 = Calibration gain factor

*Fourth part of the remote sensor settings received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART4 (H'B9')
    DATABYTE2 = Minimum switching time (0…255s)
    DATABYTE3 = Pump delayed on time (0…255s)
    DATABYTE4 = Pump delayed off time (0…255s)
    DATABYTE5 = Temperature alarm 2 setting (resolution 0.5°)
    DATABYTE6 = Temperature alarm 3 setting (resolution 0.5°)
    DATABYTE7 = Lower temperature range heat mode (resolution 0.5°)
    DATABYTE8 = Upper temperature range cool mode (resolution 0.5°)

*Time statistics of the remote sensor received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Sensor Master address
    RTR = 0
    DLC3...DLC0 = 8 databytes to send
    DATABYTE1 = COMMAND_TIME_STATISTICS (H'C8')
    DATABYTE2 = statistics mode index

| Contents | Time statistics |
| --- | --- |
| 10000001 | Heating antifreeze mode time statistics |
| 10000010 | Heating night mode time statistics |
| 10000100 | Heating day mode time statistics |
| 10001000 | Heating comfort mode time statistics |
| 10010000 | Heating global time statistics |
| 01000001 | Cooling standby mode time statistics |
| 01000010 | Cooling night mode time statistics |
| 01000100 | Cooling day mode time statistics |
| 01001000 | Cooling comfort mode time statistics |
| 01010000 | Cooling global time statistics |

    DATABYTE3 = 'ON' time (hours bcd digits 4 & 3)
    DATABYTE4 = 'ON' time (hours bcd digits 2 & 1)
    DATABYTE5 = 'ON' time (minutes bcd digits 2 & 1)
    DATABYTE6 = Mode time (hours bcd digits 4 & 3)
    DATABYTE7 = Mode time (hours bcd digits 2 & 1)
    DATABYTE8 = Mode time (minutes bcd digits 2 & 1)

    Remark:
    The time is bcd formatted.
    Databytes 3, 4 & 5 gives the total 'ON' time of the heater or cooler in the corresponding mode.
    Databytes 6, 7 & 8 gives the total time of selected mode.

*Readout of the remote analog sensor received:*
    SID10-SID9 = 11 (lowest priority)
    SID8...SID1 = Remote Analog Sensor address
    RTR = 0
    DLC3...DLC0 = number of databytes to send
    DATABYTE1 = COMMAND_TEXT (H'AC')
    DATABYTE2 = remote analog sensor channel
    DATABYTE3 = text start position
    DATABYTE4 = character 1
    DATABYTE5 = character 2
    DATABYTE6 = character 3
    DATABYTE7 = character 4
    DATABYTE8 = character 5

    Remark:
    valid text start position: 0…15
    maximum 15 characters are allowed
    shorter text stings must be ended with a zero value

*Memo text received:*

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = number of databytes to send
DATABYTE1 = COMMAND_TEXT (H'AC')
DATABYTE2 = don't care
DATABYTE3 = text start position
DATABYTE4 = character 1
DATABYTE5 = character 2
DATABYTE6 = character 3
DATABYTE7 = character 4
DATABYTE8 = character 5

Remark:
valid text start position: 0…63
maximum 64 characters are allowed
The last character must be zero

## Memory map 2 build 1803 or higher: (PCB With New Touch Controller CAP1188)

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'0000' | Channel 1 name character 1 | H'0001' | Channel 1 name character 2 |
| ... | ... | ... | ... |
| H'000E' | Channel 1 name character 15 | H'000F' | Channel 1 name character 16 |
| H'0010' | Channel 1 reaction time | H'0011' | Channel 1 start function |
| H'0012' | Channel 1 end function | H'0013' | Channel 1 mode |
| H'0014' | Channel 2 name character 1 | H'0015' | Channel 2 name character 2 |
| ... | ... | ... | ... |
| H'0022' | Channel 2 name character 15 | H'0023' | Channel 2 name character 16 |
| H'0024' | Channel 2 reaction time | H'0025' | Channel 2 start function |
| H'0026' | Channel 2 end function | H'0027' | Channel 2 mode |
| ... | ... | ... | ... |
| H'026C' | Channel 32 name character 1 | H'026D' | Channel 32 name character 2 |
| ... | ... | ... | ... |
| H'027A' | Channel 32 name character 15 | H'027B' | Channel 32 name character 16 |
| H'027C' | Channel 32 reaction time | H'027D' | Channel 32 start function |
| H'027E' | Channel 32 end function | H'027F' | Channel 32 mode |
| H'0280' | Long pressed delay | H'0281' | Dual function long pressed time |
| H'0282' | Led backlight intensity | H'0283' | Led intensity |
| H'0284' | Alarm clock configuration | H'0285' | Wake up 1 hour (0…23) |
| H'0286' | Wake up 1 minutes (0…59) | H'0287' | Go to bed 1 hour (0…23) |
| H'0288' | Go to bed 1 minutes (0…59) | H'0289' | Wake up 2 hour (0…23) |
| H'028A' | Wake up 2 minutes (0…59) | H'028B' | Go to bed 2 hour (0…23) |
| H'028C' | Go to bed 2 minutes (0…59) | H'028D' | Sunrise hour at 21 December (0…23) |
| H'028E' | Sunrise minutes at 21 December (0…59) | H'028F' | Sunrise 21 January – sunrise 5 January (-128'..127') |
| H'0290' | Sunrise 5 February – sunrise 21 January (-128'..127') | H'0291' | Sunrise 21 February – sunrise 5 February (-128'..127') |
| H'0292' | Sunrise 5 March – sunrise 21 February (-128'..127') | H'0293' | Sunrise 21 March – sunrise 5 March (-128'..127') |
| H'0294' | Sunrise 5 April – sunrise 21 March (-128'..127') | H'0295' | Sunrise 21 April – sunrise 5 April (-128'..127') |
| H'0296' | Sunrise 5 May – sunrise 21 April (-128'..127') | H'0297' | Sunrise 21 May – sunrise 5 May (-128'..127') |
| H'0298' | Sunrise 5 June – sunrise 21 May (-128'..127') | H'0299' | Sunrise 21 June – sunrise 5 June (-128'..127') |
| H'029A' | Sunrise 5 July – sunrise 21 June (-128'..127') | H'029B' | Sunrise 21 July – sunrise 5 July (-128'..127') |
| H'029C' | Sunrise 5 August – sunrise 21 July (-128'..127') | H'029D' | Sunrise 21 August – sunrise 5 August (-128'..127') |
| H'029E' | Sunrise 5 September – sunrise 21 August (-128'..127') | H'029F' | Sunrise 21 September – sunrise 5 September (-128..127') |
| H'02A0' | Sunrise 5 October – sunrise 21 September (-128'..127') | H'02A1' | Sunrise 21 October – sunrise 5 October (-128'..127') |
| H'02A2' | Sunrise 5 November – sunrise 21 October (-128'..127') | H'02A3' | Sunrise 21 November – sunrise 5 November (-128'..127') |
| H'02A4' | Sunrise 5 December – sunrise 21 November (-128'..127') | H'02A5' | Sunrise 21 December – sunrise 5 December (-128'..127') |
| H'02A6' | Sunrise 5 January – sunrise 21 December (-128'..127') | H'02A7' | Sunset hour at 21 December (0…23) |
| H'02A8' | Sunset minutes at 21 December (0…59) | H'02A9' | Sunset 21 January – sunset 5 January (-128'..127') |
| H'02AA' | Sunset 5 February – sunset 21 January (-128'..127') | H'02AB' | Sunset 21 February – sunset 5 February (-128'..127') |
| H'02AC' | Sunset 5 March – sunset 21 February (-128'..127') | H'02AD' | Sunset 21 March – sunset 5 March (-128'..127') |
| H'02AE' | Sunset 5 April – sunset 21 March (-128'..127') | H'02AF' | Sunset 21 April – sunset 5 April (-128'..127') |
| H'02B0' | Sunset 5 May – sunset 21 April (-128'..127') | H'02B1' | Sunset 21 May – sunset 5 May (-128'..127') |
| H'02B2' | Sunset 5 June – sunset 21 May (-128'..127') | H'02B3' | Sunset 21 June – sunset 5 June (-128'..127') |
| H'02B4' | Sunset 5 July – sunset 21 June (-128'..127') | H'02B5' | Sunset 21 July – sunset 5 July (-128'..127') |
| H'02B6' | Sunset 5 August – sunset 21 July (-128'..127') | H'02B7' | Sunset 21 August – sunset 5 August (-128'..127') |
| H'02B8' | Sunset 5 September – sunset 21 August (-128'..127') | H'02B9' | Sunset 21 September – sunset 5 September (-128'..127') |
| H'02BA' | Sunset 5 October – sunset 21 September (-128'..127') | H'02BB' | Sunset 21 October – sunset 5 October (-128'..127') |
| H'02BC' | Sunset 5 November – sunset 21 October (-128'..127') | H'02BD' | Sunset 21 November – sunset 5 November (-128'..127') |
| H'02BE' | Sunset 5 December – sunset 21 November (-128'..127') | H'02BF' | Sunset 21 December – sunset 5 December (-128'..127') |
| H'02C0' | Sunset 5 January – sunset 21 December (-128'..127') | H'02C1' | Sensor name character 1 |
| H'02C2' | Sensor name character 2 | H'02C3' | Sensor name character 3 |
| ... | ... | ... | ... |
| H'02D0' | Sensor name character 16 | H'02D1' | Temp. sensor: zone |
| H'02D2' | Temp. sensor: flags | H'02D3' | Temp. sensor: calibration offset |
| H'02D4' | Temp. sensor: calibration gain | H'02D5' | Temp. sensor: hysteresis |
| H'02D6' | Temp. sensor: boost difference | H'02D7' | Temp. sensor: Pump delayed on |
| H'02D8' | Temp. sensor: pump delayed off | H'02D9' | Temp. sensor: min switching time |
| H'02DA' | Temp. sensor: default sleep time low byte | H'02DB' | Temp. sensor: default sleep time high byte |
| H'02DC' | Temp. sensor: heater lower temperature range | H'02DD' | Temp. sensor: heater upper temperature range |
| H'02DE' | Temp. sensor: heater safe temperature set | H'02DF' | Temp. sensor: heater night temperature set |
| H'02E0' | Temp. sensor: heater day temperature set | H'02E1' | Temp. sensor: heater comfort temperature set |
| H'02E2' | Temp. sensor: cooler lower temperature range | H'02E3' | Temp. sensor: cooler upper temperature range |
| H'02E4' | Temp. sensor: cooler safe temperature set | H'02E5' | Temp. sensor: cooler night temperature set |

| | | | |
|---|---|---|---|
| H'02E6' | Temp. sensor: cooler day temperature set | H'02E7' | Temp. sensor: cooler comfort temperature set |
| H'02E8' | Temp. sensor: alarm 1 temperature set | H'02E9' | Temp. sensor: alarm 2 temperature set |
| H'02EA' | Temp. sensor: alarm 3 temperature set | H'02EB' | Temp. sensor: alarm 4 temperature set |
| H'02EC' | Temp. sensor alarm1 & 2 modes | H'02ED' | Temp. sensor alarm3 & 4 modes |
| H'02EE' | unused | H'02EF' | Memo Display Pages |
| H'02F0' | Module settings | H'02F1' | Oled intensisty |
| H'02F2' | Language | H'02F3' | Display Pages |
| H'02F4' | Display counters, clock & sensors | H'02F5' | Number of remote temperature sensors (0…12) |
| H'02F6' | Counter 1 Address | H'02F7' | Counter 1 channel |
| H'02F8' | Counter 1 name character 1 | H'02F9' | Counter 1 name character 2 |
| ... | ... | ... | ... |
| H'0306' | Counter 1 name character 15 | H'0307' | Counter 1 name character 16 |
| ... | ... | ... | … |
| H'032C' | Counter 4 Address | H'032D' | Counter 1 channel |
| H'032E' | Counter 4 name character 1 | H'032F' | Counter 4 name character 2 |
| ... | ... | ... | ... |
| H'033C' | Counter 4 name character 15 | H'033D' | Counter 4 name character 16 |
| H'033E' | Counters 1…4 multiply factors (x1-x2.5-x0.05-x0.01) | H'033F' | Counters 1...4 units (l-m3-kWh) |
| H'0340' | Remote Temperature sensor 1 master address | H'0341' | Remote Temperature sensor 1 sub address |
| H'0342' | Remote Temperature sensor 1 name character 1 | H'0343' | Remote Temperature sensor 1 name character 2 |
| ... | ... | ... | ... |
| H'0350' | Remote Temperature sensor 1 name character 15 | H'0351' | Remote Temperature sensor 1 name character 16 |
| ... | ... | ... | … |
| H'0406' | Remote Temperature sensor 12 master address | H'0407' | Remote Temperature sensor 12 sub address |
| H'0408' | Remote Temperature sensor 12 name character 1 | H'0409' | Remote Temperature sensor 12 name character 2 |
| ... | ... | ... | ... |
| H'0416' | Remote Temperature sensor 12 name character 15 | H'0417' | Remote Temperature sensor 12 name character 16 |
| H'0418' | Remote Analog sensor 1 address | H'0419' | Remote Analog sensor 1 channel |
| H'041A' | Remote Analog sensor 1 name character 1 | H'041B' | Remote Analog sensor 1 name character 2 |
| ... | ... | ... | ... |
| H'0428' | Remote Analog sensor 1 name character 15 | H'0429' | Remote Analog sensor 1 name character 16 |
| ... | ... | ... | … |
| H'044E' | Remote Analog sensor 4 address | H'044F' | Remote Analog sensor 4 channel |
| H'0450' | Remote Analog sensor 4 name character 1 | H'0451' | Remote Analog sensor 4 name character 2 |
| ... | ... | ... | ... |
| H'045E' | Remote Analog sensor 4 name character 15 | H'045F' | Remote Analog sensor 4 name character 16 |

**Remark:**

Unused locations contain H'FF'

For VMB1TS: Remote temperature sensor master address and sub address must be equal

*Valid reaction times*

| Contents | Reaction time |
|---|---|
| H'01' | immediatly (default) |
| H'26' | 0.5s |
| H'4C' | 1s |
| H'99' | 2s |
| H'E0' | 3s |
| H'FF' | Channel disabled |

*Channel x start/end function*

| Contents | Function |
|---|---|
| 1 | Channel 1 (default & write protected) |
| 2 | Channel 2 (default & write protected) |
| ... | ... |
| 31 | Channel 31 (default & write protected) |
| 32 | Channel 32 (default & write protected) |

**Remark:**

For a normal one function button, the start and end function channel are the same.

For a multi function button, the start function channel must be less than the end function. At every press the next channel will be send. When the end function channel is reached, the start channel will be send again at the next press.

For a dual function button, the start function channel will be send at a short press or the end function will be send at a long press.

*Channels mode*

| Contents | Description |
|---|---|
| B'xxxxxx0' | Dual function disabled (default & write protected) |
| B'xxxxxxx1' | Dual function enabled |
| B'xxxxxx0x' | Multi-function auto reset disabled (default & write protected) |
| B'xxxxxx1x' | Multi-function auto reset enabled |
| B'xxxxx0xx' | Led backlight off (default) |
| B'xxxxx1xx' | Led backlight on |
| B'xxxx0xxx' | Led feedback off |
| B'xxxx1xxx' | Led feedback on (default) |
| B'xxx0xxxx' | Slow blinking led feedback off |
| B'xxx1xxxx' | Slow blinking led feedback on (default) |
| B'xx0xxxxx' | Fast blinking led feedback off |
| B'xx1xxxxx' | Fast blinking led feedback on (default) |
| B'x0xxxxxx' | Very fast blinking led feedback off |
| B'x1xxxxxx' | Very fast blinking led feedback on (default) |

**Remark:**

When auto reset is enabled, the start function will be loaded again after 3 seconds inactivity of the channel.
For a dual function button, the start function channel will be send at a short press or the end function will be send at a long press.
The dual function overwrites the multi-function mode.

*Valid long pressed delay*

| Contents | Reaction time |
|---|---|
| H'40' | 0.8s (default) |
| H'80' | 1.6s |

*Valid dual function long pressed times*

| Contents | Long pressed time |
|---|---|
| H'4C' | 1s |
| H'99' | 2s (default & write protect) |
| H'E0' | 3s |

*Led backlight intensity*

| Contents | Led backlight intensity |
|---|---|
| H'01' | Minimum |
| ... | ... |
| H'05' | default |
| ... | ... |
| H'0F' | Maximum |

*Led intensity*

| Contents | Led intensity |
|---|---|
| H'01' | Minimum |
| ... | ... |
| H'29' | Maximum (default) |

*Oled intensity*

| Contents | Led intensity |
|---|---|
| H'0F' | Minimum |
| H'1F' | ... |
| H'3F' | Mid (default) |
| H'7F' | ... |
| H'FF' | Maximum |

*Alarm clock configuration*

| Contents | Channel locked/unlocked |
|---|---|
| B'xxxxxxx0' | Alarm 1 disabled (default) |
| B'xxxxxxx1' | Alarm 1 enabled |
| B'0xxxxx0x' | Local alarm 1 (default) |
| B'1xxxxx1x' | Global alarm 1 |
| B'xxxxx0xx' | Alarm 2 disabled (default) |
| B'xxxxx1xx' | Alarm 2 enabled |
| B'xxxx0xxx' | Local alarm 2 (default) |
| B'xxxx1xxx' | Global alarm 2 |
| B'xxx0xxxx' | Sunrise disabled |
| B'xxx1xxxx' | Sunrise enabled (default) |
| B'xx0xxxxx' | Sunset disabled |
| B'xx1xxxxx' | Sunset enabled (default) |
| B'x0xxxxxx' | Day light savings disabled |
| B'x1xxxxxx' | Day light savings enabled (default) |

*Memo Display pages*

| Contents | Description |
|---|---|
| B'xxxxxxx0' | Memo text not displayed into page 1 (default) |
| B'xxxxxxx1' | Memo text displayed into page 1 |
| B'xxxxxx0x' | Memo text not displayed into page 2 (default) |
| B'0xxxxx1x' | Memo text displayed into page 2 |
| B'1xxxx0xx' | Memo text not displayed into page 3 (default) |
| B'xxxxx1xx' | Memo text displayed into page 3 |
| B'xxxx0xxx' | Memo text not displayed into page 4 (default) |
| B'xxxx1xxx' | Memo text displayed into page 4 |
| B'xxx0xxxx' | Memo text not displayed into page 5 (default) |
| B'xxx1xxxx' | Memo text displayed into page 5 |
| B'xx0xxxxx' | Memo text not displayed into page 6 (default) |
| B'xx1xxxxx' | Memo text displayed into page 6 |
| B'x0xxxxxx' | Memo text not displayed into page 7 (default) |
| B'x1xxxxxx' | Memo text displayed into page 7 |
| B'0xxxxxxx' | Memo text not displayed into page 8 (default) |
| B'1xxxxxxx' | Memo text displayed into page 8 |

*Module settings*

| Contents | Description |
|---|---|
| B'xxxxxxx0' | Page 1 not as start-up page (default) |
| B'xxxxxxx1' | Page 1 as start-up page |
| B'0xxxxx0x' | Counter 1 not as start-up page (default) |
| B'1xxxxx1x' | Counter 1 as start-up page |
| B'xxxxx0xx' | Temperature sensor not as start-up page (default) |
| B'xxxxx1xx' | Temperature sensor as start-up page |
| B'xxxx0xxx' | Menu button do not switch between buttons, counters, sensors or clock pages (default) |
| B'xxxx1xxx' | Menu button switch between buttons, counters, sensors or clock pages |
| B'xxx0xxxx' | Wake-up display with no direct actions on the buttons |
| B'xxx1xxxx' | Wake-up with direct actions on buttons  (default) |
| B'xx0xxxxx' | Infrared receiver disabled (default) |
| B'xx1xxxxx' | Infrared receiver enabled |
| B'x0xxxxxx' | Keybeep off |
| B'x1xxxxxx' | Keybeep enabled (default) |
| B'0xxxxxxx' | Screensaver off |
| B'1xxxxxxx' | Screensaver on (default) |

*Language*

| Contents | Description |
|---|---|
| 0 | English (default) |
| 1 | Français |
| 2 | Nederlands |
| 3 | Espanõl |
| 4 | Deutsch |
| 5 | Italiano |

*Display pages*

| Contents | Description |
|---|---|
| B'xxxxxxx1' | Display page 1 always  allowed (default) |
| B'xxxxxx01' | Display page 2 not  allowed (default) |
| B'0xxxxx11' | Display page 2 allowed |
| B'1xxxx0x1' | Display page 3 not  allowed  (default) |
| B'xxxxx1x1' | Display page 3 allowed |
| B'xxxx0xx1' | Display page 4 not  allowed  (default) |
| B'xxxx1xx1' | Display page 4 allowed |
| B'xxx0xxx1' | Display page 5 not  allowed  (default) |
| B'xxx1xxx1' | Display page 5 allowed |
| B'xx0xxxx1' | Display page 6 not  allowed  (default) |
| B'xx1xxxx1' | Display page 6 allowed |
| B'x0xxxxx1' | Display page 7 not  allowed  (default) |
| B'x1xxxxx1' | Display page 7 allowed |
| B'0xxxxxx1' | Display page 8 not  allowed  (default) |
| B'1xxxxxx1' | Display page 8 allowed |

*Display counters, clock & temperature sensors*

| Contents | Description |
|---|---|
| B'xxxxxxx1' | Counter 1 disabled (default) |
| B'xxxxxxx1' | Counter 1 enabled |
| B'xxxxxx0x' | Counter 2 disabled (default) |
| B'xxxxxx1x' | Counter 2 enabled |
| B'xxxxx0xx' | Counter 3 disabled (default) |
| B'xxxxx1xx' | Counter 3 enabled |
| B'xxxx0xxx' | Counter 4 disabled (default) |
| B'xxxx1xxx' | Counter 4 enabled |
| B'xxx0xxxx' | Do not display the clock page (default) |
| B'xxx1xxxx' | Display the clock page |
| B'xx0xxxxx' | Do not display the temperature sensor pages (default) |
| B'xx1xxxxx' | Display the temperature pages |
| B'x0xxxxxx' | Show local temperature  if temperature pages are enabled (default) |
| B'x1xxxxxx' | Hide local temperature page |
| B'0xxxxxxx' | Do not display the analog sensor pages (default) |
| B'1xxxxxxx' | Display the analog sensor pages |

*Counter channel*

| Contents | Description |
|---|---|
| B'00000001' | Counter channel 1 |
| B'00000010' | Counter channel 2 |
| B'00000100' | Counter channel 3 |
| B'00001000' | Counter channel 4 |

*Counter multiply factor*

| Contents | Counter multiply factor |
|---|---|
| B'xxxxxx00' | Counter 1: x 1 (default) |
| B'xxxxxx01' | Counter 1: x 2.5 |
| B'xxxxxx10' | Counter 1: x 0.05 |
| B'xxxxxx11' | Counter 1: x 0.01 |
| B'xxxx00xx' | Counter 2: x 1 (default) |
| B'xxxx01xx' | Counter 2: x 2.5 |
| B'xxxx10xx' | Counter 2: x 0.05 |
| B'xxxx11xx' | Counter 2: x 0.01 |
| B'xx00xxxx' | Counter 3: x 1 (default) |
| B'xx01xxxx' | Counter 3: x 2.5 |
| B'xx10xxxx' | Counter 3: x 0.05 |
| B'xx11xxxx' | Counter 3: x 0.01 |
| B'00xxxxxx' | Counter 4: x 1 (default) |
| B'01xxxxxx' | Counter 4: x 2.5 |
| B'10xxxxxx' | Counter 4: x 0.05 |
| B'11xxxxxx' | Counter 4: x 0.01 |

*Counter units*

| Contents | Counter unit |
|---|---|
| B'xxxxxx00' | Counter 1: reserved |
| B'xxxxxx01' | Counter 1: liter |
| B'xxxxxx10' | Counter 1: $m^3$ |
| B'xxxxxx11' | Counter 1: kWh (default) |
| B'xxxx00xx' | Counter 2: reserved |
| B'xxxx01xx' | Counter 2: liter |
| B'xxxx10xx' | Counter 2: $m^3$ |
| B'xxxx11xx' | Counter 2: kWh (default) |
| B'xx00xxxx' | Counter 3: reserved |
| B'xx01xxxx' | Counter 3: liter |
| B'xx10xxxx' | Counter 3: $m^3$ |
| B'xx11xxxx' | Counter 3: kWh (default) |
| B'00xxxxxx' | Counter 4: reserved |
| B'01xxxxxx' | Counter 4: liter |
| B'10xxxxxx' | Counter 4: $m^3$ |
| B'11xxxxxx' | Counter 4: kWh (default) |

*Temp. sensor zone*

| Contents | Zone |
|---|---|
| 0' | No zone |
| 1. | Zone 1... |
| ... | ... |
| 7 | Zone 7 |

*Temp. sensor flags*

| Contents | Description |
|---|---|
| B'xxxxxxx0' | Pump unjamming disabled (default) |
| B'xxxxxxx1' | Pump unjamming enabled |
| B'xxxxxx0x' | Heater valve unjamming disabled (default) |
| B'xxxxxx1x' | Heater valve unjamming enabled |
| B'xxxxx0xx' | Not used (default) |
| B'xxxxx1xx' | Not used |
| B'xxxx0xxx' | Not used  (default) |
| B'xxxx1xxx' | Not used |
| B'xxx0xxxx' | Local control thermostat do not starts sleep timer (default) |
| B'xxx1xxxx' | Local control thermostat control starts sleep timer |
| B'xx0xxxxx' | Independent temperature alarms (default) |
| B'xx1xxxxx' | Dependent temperature alarms |
| B'x0xxxxxx' | Local control of thermostat unlocked (default) |
| B'x1xxxxxx' | Local control of thermostat locked |
| B'0xxxxxxx' | Local control thermostat at short key press (default) |
| B'1xxxxxxx' | Local control thermostat at long key press |

*Temp. sensor Alarm1 & 2 modes*

| Contents | Description |
|---|---|
| B'xxxxx000' | Low temperature alarm 1 |
| B'xxxxx001' | High temperature alarm 1 (default) |
| B'xxxxx010' | Anti-frost mode alarm 1 |
| B'xxxxx011' | Night mode alarm 1 |
| B'xxxxx100' | Day mode alarm 1 |
| B'xxxxx101' | Comfort mode alarm 1 |
| B'xxxxx110' | Night, Day or Comfort mode alarm 1 |
| B'xxxxx111' | Day or Comfort mode alarm 1 |
| B'xxxx0xxx' | Temperature alarms 1 absolute (default) |
| B'xxxx1xxx' | Temperature alarms 1 relative |
| B'x000xxxx' | Low temperature alarm 2 |
| B'x001xxxx' | High temperature alarm 2 (default) |
| B'x010xxxx' | Anti-frost mode alarm 2 |
| B'x011xxxx' | Night mode alarm 2 |
| B'x100xxxx' | Day mode alarm 2 |
| B'x101xxxx' | Comfort mode alarm 2 |
| B'x110xxxx' | Night, Day or Comfort mode alarm 2 |
| B'x111xxxx' | Day or Comfort mode alarm 2 |
| B'0xxxxxxx' | Temperature alarms 2 absolute (default) |
| B'1xxxxxxx' | Temperature alarms 2 relative |

**Temp. sensor Alarm3 & 4 modes**

| Contents | Description |
|---|---|
| B'xxxxx000' | Low temperature alarm 3 |
| B'xxxxx001' | High temperature alarm 3 (default) |
| B'xxxxx010' | Anti-frost mode alarm 3 |
| B'xxxxx011' | Night mode alarm 3 |
| B'xxxxx100' | Day mode alarm 3 |
| B'xxxxx101' | Comfort mode alarm 3 |
| B'xxxxx110' | Night, Day or Comfort mode alarm 3 |
| B'xxxxx111' | Day or Comfort mode alarm 3 |
| B'xxxx0xxx' | Temperature alarms 3 absolute (default) |
| B'xxxx1xxx' | Temperature alarms 3 relative |
| B'x000xxxx' | Low temperature alarm 4 |
| B'x001xxxx' | High temperature alarm 4 (default) |
| B'x010xxxx' | Anti-frost mode alarm 4 |
| B'x011xxxx' | Night mode alarm 4 |
| B'x100xxxx' | Day mode alarm 4 |
| B'x101xxxx' | Comfort mode alarm 4 |
| B'x110xxxx' | Night, Day or Comfort mode alarm 4 |
| B'x111xxxx' | Day or Comfort mode alarm 4 |
| B'0xxxxxxx' | Temperature alarms 4 absolute (default) |
| B'1xxxxxxx' | Temperature alarms 4 relative |

**Temp. sensor calibration offset (resolution 0.5°):**

| Contents | Calibration offset |
|---|---|
| 00001111 | Calibration offset +7.5°C |
| … | … |
| 00000001 | Calibration offset +0.5°C |
| 00000000 | Calibration offset +0°C (default) |
| 11111111 | Calibration offset -0.5°C |
| … | … |
| 11110000 | Calibration offset -8°C |

**Temp. sensor calibration gain:**

| Contents | Calibration gain |
|---|---|
| 0 | Calibration gain |
| … | … |
| 128 | Calibration gain (default) |
| … | … |
| 255 | Calibration gain |

Calibrated Temperature = (gain/128) * sensortemperature + offset

**Temp. sensor hysteresis (resolution 0.5°):**

| Contents | Hysteresis |
|---|---|
| 00011111 | 15.5°C |
|  |  |
| 00000001 | 0.5°C |
| 00000000 | 0°C |

**Temp. sensor boost difference (resolution 0.5°):**

| Contents | Temperature difference |
|---|---|
| 00010100 | +10°C |
|  |  |
| 00000001 | +0.5°C |
| 00000000 | 0°C |
| 11111111 | -0.5°C |
|  |  |
| 11101100 | -10°C |

*Temp. sensor pump delayed on, pump delayed off & valve minimum switching time:*

| Contents | Time |
|----------|------|
| 00000000 | 0 |
| 00000001 | 1 sec |
| 00000010 | 2 sec |
| … | … |
| 11111110 | 254 sec |
| 11111111 | 255 sec |

*Temp. sensor default sleep time into minutes*
   valid range H'0001' to H'FEFF' or 1min to 65.279min

*Temp. sensor lower, upper, safe, night, day, comfort or alarm set (resolution 0.5°):*

| Contents | Temperature set |
|----------|-----------------|
| 01111000 | 60°C |
|          |      |
| 00101000 | 20°C |
|          |      |
| 00000010 | 1°C |
| 00000001 | 0.5°C |
| 00000000 | 0°C |
| 11111111 | -0.5°C |
|          |      |
| 11000000 | -32°C |

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'0460' | Linked Push button 1 module address | H'0461' | Linked Push button 1 bit number |
| H'0462' | Linked Push button 1 action | H'0463' | Linked Push button 1 time parameter |
| H'0464' | Linked Push button 1 channel parameter | H'0465' | Linked Push button 2 module address |
| H'0466' | Linked Push button 2 bit number | H'0467' | Linked Push button 2 action |
| H'0468' | Linked Push button 2 time parameter | H'0469' | Linked Push button 2 channel parameter |
| H'046A' | … | H'046B' | … |
| ... | ... | ... | ... |
| H'05EA' | … | H'05EB' | Linked Push button 80 module address |
| H'05EC' | Linked Push button 80 bit number | H'05ED' | Linked Push button 80 action |
| H'05EE' | Linked Push button 80 time parameter | H'05EF' | Linked Push button 80 channel parameter |
| H'05F0' | Linked Push button 81 module address | H'05F1' | Linked Push button 81 bit number |
| H'05F2' | Linked Push button 81 action | H'05F3' | Linked Push button 81 time parameter |
| H'05F4' | Linked Push button 81 channel parameter | H'05FF' | Not used (0xFF) |

What has changed? Max limit Linked Push Buttons reduced to 81 (Previous 83)

**Remark:** Unused locations contain H'FF'

Action

| Action number | Action | Time parameter | Channel parameter |
|---------------|--------|----------------|-------------------|
| 0 | Switch status led indication | - | Channel number (1...32) |
| 1 | Lock channel at closed switch | - | Channel number (1...32) |
| 2 | Lock channel at opened switch | - | Channel number (1...32) |
| 3 | Lock channel | Timeout | Channel number (1...32) |
| 4 | Lock/unlock channel | Timeout | Channel number (1...32) |
| 5 | Unlock channel | - | Channel number (1...32) |
| 6 | Disable channel program at closed switch | - | Channel number (1...32) |
| 7 | Disable channel program at opened switch | - | Channel number (1...32) |
| 8 | Disable channel program channel | Timeout | Channel number (1...32) |
| 9 | Disable/enable channel program | Timeout | Channel number (1...32) |
| 10 | Enable channel program | - | Channel number (1...32) |
| 11 | Select no programs | - | - |
| 12 | Select program group 1 (eg. summer programs) | - | - |
| 13 | Select program group 2 (eg. winter programs) | - | - |
| 14 | Select program group 3 (eg. holiday programs) | - | - |
| 15 | Enable Alarm 1 at closed switch | - | - |
| 16 | Enable Alarm 1 at open switch | - | - |
| 17 | Disable Alarm 1 at closed switch | - | - |
| 18 | Disable Alarm 1 at open switch | - | - |
| 19 | Enable Alarm 1 | - | - |
| 20 | Enable/Disable Alarm 1 | - | - |
| 21 | Disable Alarm 1 | - | - |
| 22 | Enable Alarm 2 at closed switch | - | - |
| 23 | Enable Alarm 2 at open switch | - | - |
| 24 | Disable Alarm 2 at closed switch | - | - |
| 25 | Disable Alarm 2 at open switch | - | - |
| 26 | Enable Alarm 2 | - | - |
| 27 | Enable/Disable Alarm 2 | - | - |
| 28 | Disable Alarm 2 | - | - |
| 29 | Enable Sunrise at closed switch | - | - |
| 30 | Enable Sunrise at open switch | - | - |
| 31 | Disable Sunrise at closed switch | - | - |
| 32 | Disable Sunrise at open switch | - | - |
| 33 | Enable Sunrise | - | - |
| 34 | Enable/Disable Sunrise | - | - |
| 35 | Disable Sunrise | - | - |
| 36 | Enable Sunset at closed switch | - | - |
| 37 | Enable Sunset at open switch | - | - |
| 38 | Disable Sunset at closed switch | - | - |
| 39 | Disable Sunset at open switch | - | - |
| 40 | Enable Sunset | - | - |
| 41 | Enable/Disable Sunset | - | - |
| 42 | Disable Sunset | - | - |
| 43 | Sensor: Comfort mode | Short press sleep time | Long press sleep time |
| 44 | Sensor: Day mode | Short press sleep time | Short press sleep time |
| 45 | Sensor: Night mode | Short press sleep time | Short press sleep time |

| 46 | Sensor: Safe mode | Short press sleep time | Short press sleep time |
|---|---|---|---|
| 47 | Sensor: Heating mode | - | - |
| 48 | Sensor: Cooling mode | - | - |
| 49 | Sensor: Forced Safe mode at open switch | - | 0xFF |
| 50 | Sensor: Forced Safe mode at closed switch | - | 0xFF |
| 51 | Sensor: Forced Safe mode | Timeout | - |
| 52 | Sensor: Forced or Cancel Forced Safe mode | Timeout | - |
| 53 | Sensor: Cancel Forced Safe mode | - | - |
| 54 | Toggle program group 1 (eg. summer programs) | - | - |
| 55 | Toggle program group 2 (eg. winter programs) | - | - |
| 56 | Toggle program group 3 (eg. holiday programs) | - | - |
| 57 | Screensaver off | - | - |
| 58 | Screensaver on (if active) | - | - |

Time parameter

| Time parameter | Timeout |
|---|---|
| 0 | 0s (no timer) |
| 1 | 1s |
| 2 | 2s |
| 3 | 3s |
| ... | |
| 119 | 1min59s |
| 120 | 2min |
| 121 | 2min15s |
| ... | |
| 131 | 4min45s |
| 132 | 5min |
| 133 | 5min30s |
| ... | |
| 181 | 29min30s |
| 182 | 30min |
| 183 | 31min |
| ... | |
| 211 | 59min |
| 212 | 1h |
| 213 | 1h15min |
| ... | |
| 227 | 4h45min |
| 228 | 5h |
| 229 | 5h30min |
| ... | ... |
| 237 | 9h30min |
| 238 | 10h |
| 239 | 11h |
| ... | |
| 251 | 23h |
| 252 | 1d |
| 253 | 2d |
| 254 | 3d |
| 255 | Infinite |

| Sleep time parameter | action |
|---|---|
| 0 | No action |
| 1 | Select until next program step execution |
| 2 | Select for default sleep time (see sensor config.) |
| 3 | Select for 15 min (auto return to program) |
| 4 | Select for 30 min (auto return to program) |
| ... | ... |
| 17 | Select for 3h45 min (auto return to program) |
| 18 | Select for 4h min (auto return to program) |
| 19 | Select for 4h30 min (auto return to program) |
| ... | ... |
| 33 | Select for 11h30 min (auto return to program) |
| 34 | Select for 12h (auto return to program) |
| 35 | Select for 13h (auto return to program) |
| ... | ... |
| 45 | Select for 23h (auto return to program) |
| 46 | Select for 1 day (auto return to program) |
| 47 | Select for 1 day 12h (auto return to program) |
| ... | ... |
| 57 | Select for 6 days 12h (auto return to program) |
| 58 | Select for 7 days (auto return to program) |
| 59 | Select for 8 days (auto return to program) |
| ... | ... |
| 96 | Select for 45 days (auto return to program) |
| 97 | Select and ignore all program steps |

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'05F5' | Button Treshold TP1 | H'05F6' | Button Treshold TP2 |
| H'05F7' | Button Treshold TP3 | H'05F8' | Button Treshold TP4 |
| H'05F9' | Button Treshold TP5 | H'05FA' | Button Treshold TP6 |
| H'05FB' | Button Treshold TP7 | H'05FC' | Touch Controller Param 1 |
| H'05FD' | Touch Controller Param 2 | H'05FE' | Touch Controller Param 3 |

**Remark:** A lot of these parameters can be found -with extra information- in the CAP1188 datasheet.

Button Treshold TP1 – TP7
Writes a byte that adjusts the threshold when a touch is detected. (7bit number!)

```
#ifdef VMBGP4          #ifdef VMBGP1          #ifdef VMBGP2
/*                     /*                     /*
 4 button glass panel   1 button glass panel  2 button glass panel ed3
 ----------------       ----------------      ----------------
|    |     |           | 6    5      4|      |     |      |
| 6  |  4  |           |                |     |     |      |
|    |     |           |     2          |     | 1   | 2    |
--------+-------        |                |     |     |      |
|    |     |           | 3    1      7|      |     |      |
| 3  |  1  |                                  |     |      |
|    |     |                                  |     |      |
TP-------------        TP-------------        TP-------------
 */                     */                     */

#ifdef VMBGP4PIR       #ifdef VMBGP2_PCB_ED4  #ifdef VMBGPO(PTC/D)
/*                     /*                     /*
 4 button glass panel   2 button glass panel ed4  7 button glass panel (with flat OLED)
 ----------------       ----------------      ----------------
|    |     |           | 6   | 1   |         | 1          2|
| 6  |  4  |           |     |     |         |             |
|    |     |           | 3   | 2   |         | 6 |||||||||| 7|
--------0--------      |     |     |          |             |
|    |     |           | 5   | 7   |         | 4    5     3|
| 3  |  1  |           |     |     |          |             |
|    |     |                                  |             |
TP-------------        TP-------------        TP-------------
 */                     */                     */
```

Touch Controller Param1/2/3
Writes a byte that contains settings for detecting touches on the glass panel.

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | length |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Param 1 | GAIN | | DELTA SENS | | | DIS_DIG_NOISE | DIS_ANA_NOISE | MAX_DUR_EN | = 8bit |
| Param 2 | DIS_RF_NOISE | | MAX_DUR | | | CS_BN_TH | | unused | = 8bit |
| Param 3 | MULT_BLK_EN | | AVERAGE | | | SAMP_TIME | | CYCLE_TIME | = 8bit |

a) GAIN:

**Table 5.3  GAIN Bit Decode**

| GAIN[1:0] | | CAPACITIVE TOUCH SENSOR GAIN |
|-----------|---|------------------------------|
| 1 | 0 | |
| 0 | 0 | 1 |
| 0 | 1 | 2 |
| 1 | 0 | 4 |
| 1 | 1 | 8 |

b) DELTA_SENS:

**Table 5.8  DELTA_SENSE Bit Decode**

| DELTA_SENSE[2:0] | | | SENSITIVITY MULTIPLIER |
|------------------|---|---|------------------------|
| 2 | 1 | 0 | |
| 0 | 0 | 0 | 128x (most sensitive) |
| 0 | 0 | 1 | 64x |
| 0 | 1 | 0 | 32x (default) |
| 0 | 1 | 1 | 16x |
| 1 | 0 | 0 | 8x |
| 1 | 0 | 1 | 4x |
| 1 | 1 | 0 | 2x |
| 1 | 1 | 1 | 1x - (least sensitive) |

## c) DIS_DIG_NOISE

DIS_DIG_NOISE - Determines whether the digital noise threshold (see Section 5.19, "Sensor Input Noise Threshold Register") is used by the device. Setting this bit disables the feature.

- '0' - The digital noise threshold is used. If a delta count value exceeds the noise threshold but does not exceed the touch threshold, the sample is discarded and not used for the automatic re-calibration routine.
- '1' (default) - The noise threshold is disabled. Any delta count that is less than the touch threshold is used for the automatic re-calibration routine.

## d) DIS_ANA_NOISE

DIS_ANA_NOISE - Determines whether the analog noise filter is enabled. Setting this bit disables the feature.

- '0' (default) - If low frequency noise is detected by the analog block, the delta count on the corresponding channel is set to 0. Note that this does not require that Noise Status bits be set.
- '1' - A touch is not blocked even if low frequency noise is detected.

## e) MAX_DUR_EN

MAX_DUR_EN - Determines whether the maximum duration recalibration is enabled.

- '0' (default) - The maximum duration recalibration functionality is disabled. A touch may be held indefinitely and no re-calibration will be performed on any sensor input.
- '1' - The maximum duration recalibration functionality is enabled. If a touch is held for longer than the MAX_DUR bit settings, then the re-calibration routine will be restarted (see Section 5.8).

## f) DIS_RF_NOISE

DIS_RF_NOISE - Determines whether the RF noise filter is enabled. Setting this bit disables the feature.

- '0' (default) - If RF noise is detected by the analog block, the delta count on the corresponding channel is set to 0. Note that this does not require that Noise Status bits be set.
- '1' - A touch is not blocked even if RF noise is detected.

## g) MAX_DUR

MAX_DUR[3:0] - (default 1010b) - Determines the maximum time that a sensor pad is allowed to be touched until the capacitive touch sensor input is recalibrated, as shown in Table 5.13.

Table 5.13 MAX_DUR Bit Decode

| MAX_DUR[3:0] | | | | TIME BEFORE RECALIBRATION |
|---|---|---|---|---|
| 3 | 2 | 1 | 0 | |
| 0 | 0 | 0 | 0 | 560ms |
| 0 | 0 | 0 | 1 | 840ms |
| 0 | 0 | 1 | 0 | 1120ms |
| 0 | 0 | 1 | 1 | 1400ms |
| 0 | 1 | 0 | 0 | 1680ms |
| 0 | 1 | 0 | 1 | 2240ms |
| 0 | 1 | 1 | 0 | 2800ms |
| | 1 | 1 | 1 | 3360ms |
| 1 | 0 | 0 | 0 | 3920ms |
| 1 | 0 | 0 | 1 | 4480ms |
| 1 | 0 | 1 | 0 | 5600ms (default) |
| 1 | 0 | 1 | 1 | 6720ms |
| 1 | 1 | 0 | 0 | 7840ms |
| 1 | 1 | 0 | 1 | 8906ms |
| 1 | 1 | 1 | 0 | 10080ms |
| 1 | 1 | 1 | 1 | 11200ms |

## h) CS_BN_TH

CS1_BN_TH[1:0] - Controls the noise threshold for all capacitive touch sensor inputs, as shown in Table 5.34. The threshold is proportional to the threshold setting.

Table 5.34 CSx_BN_TH Bit Decode

| CS_BN_TH[1:0] | | PERCENT THRESHOLD SETTING |
|---|---|---|
| 1 | 0 | |
| 0 | 0 | 25% |
| 0 | 1 | 37.5% (default) |
| 1 | 0 | 50% |
| 1 | 1 | 62.5% |

### i) MULT_BLK_EN

MULT_BLK_EN - Enables the multiple button blocking circuitry.

- '0' - The multiple touch circuitry is disabled. The device will not block multiple touches.
- '1' (default) - The multiple touch circuitry is enabled. The device will flag the number of touches equal to programmed multiple touch threshold and block all others. It will remember which sensor inputs are valid and block all others until that sensor pad has been released. Once a sensor pad has been released, the N detected touches (determined via the cycle order of CS1 - CS8) will be flagged and all others blocked.

### h) AVERAGE

Determines the number of samples that are taken for all active channels during the sensor cycle as shown in Table 5.18. All samples are taken consecutively on the same channel before the next channel is sampled and the result is averaged over the number of samples measured before updating the measured results.

**Table 5.18  AVG Bit Decode**

| AVG[2:0] | | | NUMBER OF SAMPLES TAKEN PER MEASUREMENT |
|---|---|---|---|
| 2 | 1 | 0 | |
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 2 |
| 0 | 1 | 0 | 4 |
| 0 | 1 | 1 | 8 (default) |
| 1 | 0 | 0 | 16 |
| 1 | 0 | 1 | 32 |
| 1 | 1 | 0 | 64 |
| 1 | 1 | 1 | 128 |

### h) SAMP_TIME

SAMP_TIME[1:0] - Determines the time to take a single sample as shown in Table 5.19.

**Table 5.19  SAMP_TIME Bit Decode**

| SAMP_TIME[1:0] | | SAMPLE TIME |
|---|---|---|
| 1 | 0 | |
| 0 | 0 | 320us |
| 0 | 1 | 640us |
| 1 | 0 | 1.28ms (default) |
| 1 | 1 | 2.56ms |

### h) CYCLE_TIME

CYCLE_TIME[1:0] - Determines the overall cycle time for all measured channels during normal operation as shown in Table 5.20. All measured channels are sampled at the beginning of the cycle time. If additional time is remaining, then the device is placed into a lower power state for the remaining duration of the cycle.

**Table 5.20  CYCLE_TIME Bit Decode**

| CYCLE_TIME[1:0] | | OVERALL CYCLE TIME |
|---|---|---|
| 1 | 0 | |
| 0 | 0 | 35ms |
| 0 | 1 | 70ms (default) |
| 1 | 0 | 105ms |
| 1 | 1 | 140ms |

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'0600' | Program step 1 byte1 | H'0601' | Program step 1 byte2 |
| H'0602' | Program step 1 byte3 | H'0603' | Program step 1 byte4 |
| H'0604' | Program step 1 byte5 | H'0605' | Program step 1 byte6 |
| … | .. | .. | .. |
| H'09B4' | Program step 159 byte1 | H'09B5' | Program step 159 byte2 |
| H'09B6' | Program step 159 byte3 | H'09B7' | Program step 159 byte4 |
| H'09B8' | Program step 159 byte5 | H'09B9' | Program step 159 byte6 |

| Contents program byte1 | Description |
|------------------------|-------------|
| B'000xxxxx' | Disable program step |
| B'001xxxxx' | Absolute time |
| B'010xxxxx' | Wake up time 1 + relative time |
| B'011xxxxx' | Go to bed time 1 + relative time |
| B'100xxxxx' | Wake up time 2 + relative time |
| B'101xxxxx' | Go to bed time 2 + relative time |
| B'110xxxxx' | Sunrise + relative time |
| B'111xxxxx' | Sunset + relative time |
| B'xxx01111' | Rel. time = 3h45min |
| … | |
| B'xxx00001' | Rel. time = 15min |
| B'xxx00000' | Rel. time = 0 |
| B'xxx11111' | Rel. time = -15min |
| … | |
| B'xxx10000' | Rel. time = -4h |

**Remark:** Wake up, Go to bed, sunrise & sunset time are only allowed for weekly programs

| Contents program byte2 | Description |
|------------------------|-------------|
| B'xxxx0000' | Weekly program |
| B'xxxx0001' | January |
| B'xxxx0010' | February |
| B'xxxx0011' | March |
| B'xxxx0100' | April |
| B'xxxx0101' | May |
| B'xxxx0110' | June |
| B'xxxx0111' | July |
| B'xxxx1000' | August |
| B'xxxx1001' | September |
| B'xxxx1010' | October |
| B'xxxx1011' | November |
| B'xxxx1100' | December |
| B'xxxx1101' | Monthly program |
| B'xxxx1110' | Monthly program |
| B'xxxx1111' | Monthly program |

| Contents program byte3 | Description |
|------------------------|-------------|
| B'xxx00000' | 0h |
| B'xxx00001' | 1h |
| … | … |
| B'xxx10111' | 23h |
| B'xx1xxxxx' | Program group 1 (Summer program) |
| B'x1xxxxxx' | Program group 2 (Winter program) |
| B'1xxxxxxx' | Program group 3 (Holiday program) |

| Contents program byte4 | Description |
|------------------------|-------------|
| B'xx000000' | 0min |
| B'xx000001' | 1min |
| … | … |
| B'xx111011' | 59min |

| Contents program byte4 | Contents program byte2 | Description |
|---|---|---|
| B'00xxxxxx' | B'0000xxxx' | Never |
| B'00xxxxxx' | B'0001xxxx' | Day 1of the month |
| B'00xxxxxx' | B'0010xxxx' | Day 2of the month |
| … | … | … |
| B'01xxxxxx' | B'1111xxxx' | Day 31of the month |
| B'10xxxxxx' | B'0000xxxx' | Never |
| B'10xxxxxx' | B'0001xxxx' | Every Monday |
| B'10xxxxxx' | B'0010xxxx' | Every Tuesday |
| … | … | … |
| B'10xxxxxx' | B'0111xxxx' | Every Sunday |
| B'10xxxxxx' | B'1000xxxx' | Every weekend (sa & su) |
| B'10xxxxxx' | B'1001xxxx' | Every working day (mo…fr) |
| B'10xxxxxx' | B'1010xxxx' | Every day except Sunday |
| B'10xxxxxx' | B'1011xxxx' | Every day |
| B'10xxxxxx' | B'1100xxxx' | Never |
| … | … | … |
| B'11xxxxxx' | B'1111xxxx' | Never |

| Contents program byte5 | Action |
|---|---|
| 0 | 0s25 Pulse |
| 1 | 1s Pulse |
| 2 | 2s Pulse |
| ... | ... |
| 119 | 1min59s Pulse |
| 120 | 2min Pulse |
| 121 | 2min15s Pulse |
| ... | ... |
| 131 | 4min45s Pulse |
| 132 | 5min Pulse |
| 133 | 5min30s Pulse |
| ... | ... |
| 181 | 29min30s Pulse |
| 182 | 30min Pulse |
| 183 | 31min Pulse |
| ... | ... |
| 211 | 59min Pulse |
| 212 | 1h Pulse |
| 213 | 1h15min Pulse |
| ... | ... |
| 227 | 4h45min Pulse |
| 228 | 5h Pulse |
| 229 | 5h30min Pulse |
| ... | ... |
| 237 | 9h30min Pulse |
| 238 | 10h Pulse |
| 239 | 11h Pulse |
| ... | … |
| 246 | 18h Pulse |
| 247 | Press |
| 248 | Long Press |
| 249 | Release |
| 250 | Lock |
| 251 | Unlock |
| 252 | Sensor : Safe mode |
| 253 | Sensor : Night mode |
| 254 | Sensor : Day mode |
| 255 | Sensor : Comfort mode |

| Contents program byte6 | Channel |
| --- | --- |
| 1 | Channel 1 |
| 2 | Channel 2 |
| .. | … |
| 31 | Channel 31 |
| 32 | Channel 32 |
| 128 | Temperature sensor |

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'09BA' | Location id low byte | H'09BB' | Location id high byte |
| H'09BC' | Group id low byte | H'09BD' | Group id high byte |
| H'09BE' | Module name character 1 | H'09BF' | Module name character 2 |
| … | .. | .. | .. |
| H'09FC' | Module name character 63 | H'09FD' | Module name character 64 |
| H'09FE' | Not used | H'09FF' | Not used |

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'0A00' | Page 1 bitmap data row 1 / x-pos 0 | H'0A01' | Page 1 bitmap data row 1 / x-pos 1 |
| | … | | … |
| H'0A7E' | Page 1 bitmap data row 1 / x-pos 126 | H'0A7F' | Page 1 bitmap data row 1 / x-pos 127 |
| H'0A80' | Page 1 bitmap data row 2 / x-pos 0 | H'0A81' | Page 1 bitmap data row 2 / x-pos 1 |
| | … | | … |
| H'0AFE' | Page 1 bitmap data row 2 / x-pos 126 | H'0AFF' | Page 1 bitmap data row 2 / x-pos 127 |
| H'0B00' | Page 1 bitmap data row 3 / x-pos 0 | H'0B01' | Page 1 bitmap data row 3 / x-pos 1 |
| | … | | … |
| H'0B7E' | Page 1 bitmap data row 3 / x-pos 126 | H'0B7F' | Page 1 bitmap data row 3 / x-pos 127 |
| H'0B80' | Page 1 bitmap data row 4 / x-pos 0 | H'0B81' | Page 1 bitmap data row 4 / x-pos 1 |
| | … | | … |
| H'0BFE' | Page 1 bitmap data row 4 / x-pos 126 | H'0BFF' | Page 1 bitmap data row 4 / x-pos 127 |

…

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'1800' | Page 8 bitmap data row 1 / x-pos 0 | H'1801' | Page 8 bitmap data row 1 / x-pos 1 |
| | … | | … |
| H'187E' | Page 8 bitmap data row 1 / x-pos 126 | H'187F' | Page 8 bitmap data row 1 / x-pos 127 |
| H'1880' | Page 8 bitmap data row 2 / x-pos 0 | H'1881' | Page 8 bitmap data row 2 / x-pos 1 |
| | … | | … |
| H'18FE' | Page 8 bitmap data row 2 / x-pos 126 | H'18FF' | Page 8 bitmap data row 2 / x-pos 127 |
| H'1900' | Page 8 bitmap data row 3 / x-pos 0 | H'1901' | Page 8 bitmap data row 3 / x-pos 1 |
| | … | | … |
| H'197E' | Page 8 bitmap data row 3 / x-pos 126 | H'197F' | Page 8 bitmap data row 3 / x-pos 127 |
| H'1980' | Page 8 bitmap data row 4 / x-pos 0 | H'1981' | Page 8 bitmap data row 4 / x-pos 1 |
| | … | | … |
| H'19FE' | Page 8 bitmap data row 4 / x-pos 126 | H'19FF' | Page 8 bitmap data row 4 / x-pos 127 |
| H'1A00' | Not used | H'1A01' | Not used |
| H'1A02' | Not used | H'1A03' | Not used |

**Counter 1 log memory map:**

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'1A04' | Day | H'1A05' | Month |
| H'1A06' | Year low byte | H'1A07' | Year high byte |
| H'1A08' | Counter 1 low byte | H'1A09' | Counter 1 high byte |
| H'1A0A' | Counter 1 upper byte | H'1A0B' | Counter 1 most significant byte |
| | … | | … |
| H'1DFC' | Day | H'1DFD | Month |
| H'1DFE' | Year low byte | H'1DFF' | Year high byte |
| H'1E00' | Counter 1 low byte | H'1E01' | Counter 1 high byte |
| H'1E02' | Counter 1 upper byte | H'1E03' | Counter 1 most significant byte |

**Counter 2 log memory map:**

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'1E04' | Day | H'1E05' | Month |
| H'1E06' | Year low byte | H'1E07' | Year high byte |
| H'1E08' | Counter 2 low byte | H'1E09' | Counter 2 high byte |
| H'1E0A' | Counter 2 upper byte | H'1E0B' | Counter 2 most significant byte |
| | … | | … |
| H'21FC' | Day | H'21FD' | Month |
| H'21FE' | Year low byte | H'21FF' | Year high byte |
| H'2200' | Counter 2  low byte | H'2201' | Counter 2 high byte |
| H'2202' | Counter 2 upper byte | H'2203' | Counter 2 most significant byte |

**Counter 3 log memory map:**

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'2204' | Day | H'2205' | Month |
| H'2206' | Year low byte | H'2207' | Year high byte |
| H'2208' | Counter 3 low byte | H'2209' | Counter 3 high byte |
| H'220A' | Counter 3 upper byte | H'220B' | Counter 3 most significant byte |
| | … | | … |
| H'25FC' | Day | H'25FD' | Month |
| H'25FE' | Year low byte | H'25FF' | Year high byte |
| H'2600' | Counter 3 low byte | H'2601' | Counter 3 high byte |
| H'2602' | Counter 3 upper byte | H'2603' | Counter 3 most significant byte |

**Counter 4 log memory map:**

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'2604' | Day | H'2605' | Month |
| H'2606' | Year low byte | H'2607' | Year high byte |
| H'2608' | Counter 4 low byte | H'2609' | Counter 4 high byte |
| H'260A' | Counter 4 upper byte | H'260B' | Counter 4 most significant byte |
| | … | | … |
| H'29FC' | Day | H'29FD' | Month |
| H'29FE' | Year low byte | H'29FF' | Year high byte |
| H'2A00' | Counter 4 low byte | H'2A01' | Counter 4 high byte |
| H'2A02' | Counter 4 upper byte | H'2A03' | Counter 4 most significant byte |

**EEprom memory map:**

| Address | Contents | Address | Contents |
|---------|----------|---------|----------|
| H'2A04' | Bank 1: Day of week | H'2A05' | Bank 1: Day of month |
| H'2A06' | Bank 1: Month | H'2A07' | Bank 1: Year low byte |
| H'2A08' | Bank 1: Year high byte | H'2A09' | Bank 1: Program group number |
| H'2A0A' | Bank 1: Locked flags ch1…8 | H'2A0B' | Bank 1: Locked flags ch9…16 |
| H'2A0C' | Bank 1: Locked flags ch17…24 | H'2A0D' | Bank 1: Locked flags ch25…32 |
| H'2A0E' | Bank 1: Program disabled flags ch1…8 | H'2A0F' | Bank 1: Program disabled flags ch9…16 |
| H'2A10' | Bank 1: Program disabled flags ch17…24 | H'2A11' | Bank 1: Program disabled flags ch25…32 |
| H'2A12' | Bank 1: Sensor current mode low byte | H'2A13' | Bank 1: Sensor current mode high byte |
| H'2A14' | Bank 1: Sensor current program mode | H'2A15' | Bank 1: Sensor target temperature low byte |
| H'2A16' | Bank 1: Sensor target temperature high byte | H'2A17' | Bank 1: Auto send sensor temperature |
| H'2A18' | Bank 1: reserved | H'2A19' | Bank 1: reserved |
| H'2A1A' | Bank 1: reserved | H'2A1B' | Bank 1: reserved |
| H'2A1C' | Bank 1: reserved | H'2A1D' | Bank 1: reserved |
| H'2A1E' | Bank 1: reserved | H'2A1F' | Bank 1: reserved |
| H'2A20' | Bank 1: reserved | H'2A21' | Bank 1: reserved |
| H'2A22' | Bank 1: reserved | H'2A23' | Bank 1: current bank number |
|  | … |  | … |
| H'2DE4' | Bank 32: Day of week | H'2DE5' | Bank 32: Day of month |
| H'2DE6' | Bank 32: Month | H'2DE7' | Bank 32: Year low byte |
| H'2DE8' | Bank 32: Year high byte | H'2DE9' | Bank 32: Program group number |
| H'2DEA' | Bank 32: Locked flags ch1…8 | H'2DEB' | Bank 32: Locked flags ch9…16 |
| H'2DEC' | Bank 32: Locked flags ch17…24 | H'2DED' | Bank 32: Locked flags ch25…32 |
| H'2DEE' | Bank 32: Program disabled flags ch1…8 | H'2DEF' | Bank 32: Program disabled flags ch9…16 |
| H'2DF0' | Bank 32: Program disabled flags ch17…24 | H'2DF1' | Bank 32: Program disabled flags ch25…32 |
| H'2DF2' | Bank 32: Sensor current mode low byte | H'2DF3' | Bank 32: Sensor current mode high byte |
| H'2DF4' | Bank 32: Sensor current program mode | H'2DF5' | Bank 32: Sensor target temperature low byte |
| H'2DF6' | Bank 32: Sensor target temperature low byte | H'2DF7' | Bank 32: Auto send sensor temperature |
| H'2DF8' | Bank 32: reserved | H'2DF9' | Bank 32: reserved |
| H'2DFA' | Bank 32: reserved | H'2DFB' | Bank 32: reserved |
| H'2DFC' | Bank 32: reserved | H'2DFD' | Bank 32: reserved |
| H'2DFE' | Bank 32: reserved | H'2DFF' | Bank 32: reserved |
| H'2E00' | Bank 32: reserved | H'2E01' | Bank 32: reserved |
| H'2E02' | Bank 32: reserved | H'2E03' | Bank 32: current bank number |