VMBGP1-20
VMBGP2-20
VMBGP4-20

One, two or four touch buttons module for VELBUS system

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:

- Power up message
- Channel status
- Thermostat channel status
- Module status
- Temperature sensor status
- Thermostat settings
- Current temperature
- Module type and subtype
- Bus error counter status
- First, second and third part of the channel names
- Memory data
- Memory data block (4 bytes)
- Program step info
- Real-time clock status
- Date status
- Daylight savings status
- Real-time clock status request
- Clear linked push button led
- Set linked push button led
- Slow blink linked push button led
- Fast blink linked push button led

The module can receive the following messages:

- Power up

The module can receive the following commands:

- Linked push button status
- 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
- Write memory data
- Write memory data block (4 bytes)
- Read program step info
- Write program step
- 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
- Temperature request
- Thermostat settings request
- Set thermostat heating mode
- Set thermostat cooling mode
- Set temperature sensor zone
- Set thermostat default sleep time
- Set thermostat target, safe, night, day, comfort and alarm1 to alarm 4 temperature set
- Set thermostat hysteresis
- Set thermostat temperature difference for boost output
- Set temperature sensor calibration offset and gain
- Enable/disable valve and pump unjamming
- Reset minimum and maximum temperature
- Set thermostat temperature range
- Set thermostat minimum switching time
- Switch thermostat to safe, night, day or comfort mode
- Switch the open collector output off or on
- Start a timer on the open collector output

Transmits power up message:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = 0x00
RTR = 0
DLC3...DLC0 = 2 data byte to send
DATABYTE1 = COMMAND_POWER_UP (0xAB)
DATABYTE2 = module address

Transmits real time clock status request:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = 0x00
RTR = 0
DLC3...DLC0 = 1 data byte to send
DATABYTE1 = COMMAND_REALTIME_CLOCK_STATUS_REQUEST (0xD7)

Transmits the real time clock status:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 4 data bytes to send
DATABYTE1 = COMMAND_REALTIME_CLOCK_STATUS (0xD8)
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 data bytes to send
DATABYTE1 = COMMAND_DATE_STATUS (0xB7)
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 data bytes to send
DATABYTE1 = COMMAND_DAYLIGHT_SAVING_STATUS (0xAF)
DATABYTE2 = 0 =disabled / 1 = enabled

Transmits the channel switch status:

SID10-SID9 = 00 (highest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 4 data bytes to send
DATABYTE1 = COMMAND_PUSH_BUTTON_STATUS (0x00)
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 = Sub-address
RTR = 0
DLC3...DLC0 = 4 data bytes to send
DATABYTE1 = COMMAND_OUTPUT_STATUS (0x00)
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 data bytes to send
DATABYTE1 = COMMAND_MODULE_TYPE (0xFF)
DATABYTE2 = type (0x54 = VMBGP1-20 / 0x55 = VMBGP2-20 / 0x56 = VMBGP4-20)
DATABYTE3 = High byte of serial number
DATABYTE4 = Low byte of serial number
DATABYTE5 = Memory map version
DATABYTE6 = Build year
DATABYTE7 = Build week
DATABYTE8 = Properties

Contents	Output channel
B'xxxxxxx0'	Terminator open
B'xxxxxxx1'	Terminator closed
B'xxxx000x'	Hardware version number
B'xxx0xxxx'	Velbus connection type
B'xx0xxxxx'	Only standard CAN allowed
B'xx1xxxxx'	CAN FD support

Transmits the module subtype:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 8 data bytes to send
DATABYTE1 = COMMAND_SUBTYPE (0xB0)
DATABYTE2 = type (0x54 = VMBGP1-20 / 0x55 = VMBGP2-20 / 0x56 = VMBGP4-20)
DATABYTE3 = High byte of serial number
DATABYTE4 = Low byte of serial number
DATABYTE5 = Subaddress1 (H'FF' sub-address disabled)
DATABYTE6 = Subaddress2 (H'FF' sub-address disabled)
DATABYTE7 = Subaddress3 (H'FF' sub-address disabled)
DATABYTE8 = Subaddress4 (H'FF' sub-address disabled)

Transmit: Bus error counter status

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 4 data bytes to send
DATABYTE1 = COMMAND_BUSERROR_COUNTER_STATUS (0xDA)
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 data bytes to send
DATABYTE1 = COMMAND_MEMORY_DATA (0xFE)
DATABYTE2 = High memory address
DATABYTE3 = LOW memory address
DATABYTE4 = memory data

Remark: address range: 0x0000 to 0x0703

Transmits memory data block (4 bytes):

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 7 data bytes to send
DATABYTE1 = COMMAND_MEMORY_DATA_BLOCK (0xCC)
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: 0x0000 to 0x0700

Transmits memory data block (5...60 bytes)(only allowed for CAN FD frames):

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = number of data bytes to send

Contents	*Number of data bytes*
0x09	12 data bytes
0x0A	16 data bytes
0x0B	20 data bytes
0x0C	24 data bytes
0x0D	32 data bytes
0x0E	48 data bytes
0x0F	64 data bytes

DATABYTE1 = COMMAND_MEMORY_DATA_BLOCK (0xCC)
DATABYTE2 = High start address of memory block
DATABYTE3 = LOW start address of memory block
DATABYTE4 = memory block length (5…60)
DATABYTE5 = memory data 1
…
DATABYTE12 = memory data 8 (end of data for DLC3...DLC0 = 0x09)
…
DATABYTE16 = memory data 12 (end of data for DLC3...DLC0 = 0x0A)
…
DATABYTE20 = memory data 16 (end of data for DLC3...DLC0 = 0x0B)
…
DATABYTE24 = memory data 20 (end of data for DLC3...DLC0 = 0x0C)
…
DATABYTE32 = memory data 28 (end of data for DLC3...DLC0 = 0x0D)
…
DATABYTE48 = memory data 44 (end of data for DLC3...DLC0 = 0x0E)
…
DATABYTE64 = memory data 60 (end of data for DLC3...DLC0 = 0x0F)

Remark:
Contents of unused data bytes = 0x55
Address range: 0x0000 to (0x0704 – memory block length)

Transmits the first part of channel name:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 8 data bytes to send
DATABYTE1 = COMMAND_CHANNEL_NAME_PART1 (0xF0)
DATABYTE2 = channel number 1…9 or 18 (channel 9 = temperature sensor, channel 18 = output)
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 data bytes to send
DATABYTE1 = COMMAND_CHANNEL_NAME_PART2 (0xF1)
DATABYTE2 = Channel number 1…9 or 18 (channel 9 = temperature sensor, channel 18 = output)
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 data bytes to send
DATABYTE1 = COMMAND_CHANNEL_NAME_PART3 (0xF2)
DATABYTE2 = channel number 1…9 or 18 (channel 9 = temperature sensor, channel 18 = output)
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
RTR = 0
DLC3...DLC0 = 7 data bytes to send
DATABYTE1 = COMMAND_MODULE_STATUS (0xED)
DATABYTE2 = channel 1 to 8 status (1 = pressed / 0 = released)
DATABYTE3 = enabled/disable channel status (1 = enabled / 0 = disabled)
DATABYTE4 = open collector locked & temperature sensor

Contents	***open collector & temperature sensor***
B'xxxx0xxx'	Edge color not inhibited
B'xxxx1xxx'	Edge color inhibited
B'xxx0xxxx'	Temperature sensor program enabled
B'xxx1xxxx'	Temperature sensor program disabled
B'xx0xxxxx'	Open collector output program enabled
B'xx1xxxxx'	Open collector output program disabled
B'x0xxxxxx'	Open collector output unlocked
B'x1xxxxxx'	Open collector output locked
B'0xxxxxxx'	Open collector output off
B'1xxxxxxx'	Open collector output on

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 program***
B'xxxxxx00'	None
B'xxxxxx01'	Program group 1 (Summer)
B'xxxxxx10'	Program group 2 (Winter)
B'xxxxxx11'	Program group 3 (Holiday)
B'xxxxx0xx'	Clock alarm 1 off
B'xxxxx1xx'	Clock alarm 1 on
B'xxxx0xxx'	Local clock alarm 1
B'xxxx1xxx'	Global clock alarm 1
B'xxx0xxxx'	Clock alarm 2 off
B'xxx1xxxx'	Clock alarm 2 on

B’xx0xxxxx’	Local clock alarm 2
B’xx1xxxxx’	Global clock alarm 2
B’x0xxxxxx’	Sunrise disabled
B’x1xxxxxx’	Sunrise enabled
B’0xxxxxxx’	Sunset disabled
B’1xxxxxxx’	Sunset enabled

Transmit the sensor status:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 8 data bytes to send
DATABYTE1 = COMMAND_TEMP_SENSOR_STATUS (0xEA)
DATABYTE2 = Operating mode

Contents	Operating mode
xxxxxxx1	Mode push button locked (not used)
xxxxxxx0	Mode push button unlocked (not used)
xxxxx11x	Forced to safe mode (locked)
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 = Current 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 0xFFFF, manual mode is selected.

Transmit the sensor temperature:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 7 data bytes to send
DATABYTE1 = COMMAND_SENSOR_TEMPERATURE (0xE6)
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	111xxxxx	63.5°C
00000001	000xxxxx	0.5°C
00000000	100xxxxx	0.25°C
00000000	010xxxxx	0.125°C
00000000	001xxxxx	0.0625°C
00000000	000xxxxx	0°C
11111111	111xxxxx	-0.0625°C
11111111	110xxxxx	-0.125°C
11111111	100xxxxx	-0.25°C
11111110	000xxxxx	-0.5°C
10010010	000xxxxx	-55°C

Remark:
The 5 least significant bits of the low byte are don't care.

Transmit the first part of the sensor settings:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 8 data bytes to send
DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART1 (0xE8)
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 data bytes to send
DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART2 (0xE9)
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 data bytes to send
DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART3 (0xC6)
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 data bytes to send
DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_PART4 (0xB9)
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 data bytes to send
DATABYTE1 = COMMAND_CLEAR_LED (0xF5)
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 data bytes to send
DATABYTE1 = COMMAND_SET_LED (0xF6)
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 data bytes to send
DATABYTE1 = COMMAND_SLOW_BLINKING_LED (0xF7)
DATABYTE2 = LED bit numbers (1 = slow blink LED)

Transmit: Blinks LEDs fast on a linked push button module:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Address of the linked push button module for fast blinking LEDs
RTR = 0
DLC3...DLC0 = 2 data bytes to send
DATABYTE1 = COMMAND_FAST_BLINKING_LED (0xF8)
DATABYTE2 = LED bit numbers (1 = fast blink LED)

Transmits program step info:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 8 data bytes to send
DATABYTE1 = COMMAND_PROGRAM_STEP_INFO (0xC1)
DATABYTE2 = Program step number (1…66 / 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 (only allowed for button channels)
1	1s Pulse (only allowed for button channels)
2	2s Pulse (only allowed for button channels)
...	...
119	1min59s Pulse (only allowed for button channels)
120	2min Pulse (only allowed for button channels)
121	2min15s Pulse (only allowed for button channels)
...	...
131	4min45s Pulse (only allowed for button channels)
132	5min Pulse (only allowed for button channels)
133	5min30s Pulse (only allowed for button channels)
...	...
181	29min30s Pulse (only allowed for button channels)
182	30min Pulse (only allowed for button channels)
183	31min Pulse (only allowed for button channels)
...	...
211	59min Pulse (only allowed for button channels)
212	1h Pulse (only allowed for button channels)
213	1h15min Pulse (only allowed for button channels)
...	...
227	4h45min Pulse (only allowed for button channels)
228	5h Pulse (only allowed for button channels)
229	5h30min Pulse (only allowed for button channels)
...	...
237	9h30min Pulse (only allowed for button channels)
238	10h Pulse (only allowed for button channels)
239	11h Pulse (only allowed for button channels)
...	…
246	18h Pulse (only allowed for button channels)
247	Press (only allowed for button channels)
248	Long Press (only allowed for button channels)
249	Release (only allowed for button channels)
250	Lock
251	Unlock
252	Thermostat safe mode (only allowed for temperature sensor channel)
253	Thermostat night mode (only allowed for temperature sensor channel)
254	Thermostat day mode (only allowed for temperature sensor channel)
255	Thermostat comfort mode (only allowed for temperature sensor channel)

DATABYTE8 = Channel

Contents	Channel
1	Channel 1
2	Channel 2
...	…
7	Channel 7
8	Channel 8
9	Temperature sensor
18	Open collector output

'Linked push button status' received:

SID10-SID9 = 00 (highest priority)
SID8...SID1 = Address of the linked push button module
RTR = 0
DLC3...DLC0 = 4 data bytes received
DATABYTE1 = COMMAND_PUSH_BUTTON_STATUS (0x00)
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 = 0x00
RTR = 0
DLC3...DLC0 = 2 data byte received
DATABYTE1 = COMMAND_POWER_UP (0xAB)
DATABYTE2 = module address

'CAN FD enable command' received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = 0x00
RTR = 0
DLC3...DLC0 = 2 data byte received
DATABYTE1 = COMMAND_SET_CLR_LEARN_RF_CODE (0xB5)
DATABYTE2 = enable/disable (0 = disable CAN FD / 1 = enable CAN FD)

'Real time clock status request' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = 0x00
RTR = 0
DLC3...DLC0 = 1 data byte to send
DATABYTE1 = COMMAND_REALTIME_CLOCK_STATUS_REQUEST (0xD7)

'Set real time clock' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = 0x00
RTR = 0
DLC3...DLC0 = 4 data bytes received
DATABYTE1 = COMMAND_SET_REALTIME_CLOCK (0xD8)
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 = 0x00
RTR = 0
DLC3...DLC0 = 5 data bytes received
DATABYTE1 = COMMAND_SET_REALTIME_DATE (0xB7)
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 = 0x00
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_SET_DAYLIGHT_SAVING (0xAF)
DATABYTE2 = 0 =disabled / 1 = enabled

'Enable/disable global sunrise/sunset related actions' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = 0x00
RTR = 0
DLC3...DLC0 = 3 data bytes received
DATABYTE1 = COMMAND_ENA_DIS_SUNRISE_SUNSET (0xAE)
DATABYTE2 = Channel (0xFF)
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 data bytes received
DATABYTE1 = COMMAND_ENA_DIS_SUNRISE_SUNSET (0xAE)
DATABYTE2 = Channel (0xFF)
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 = 0x00
RTR = 0
DLC3...DLC0 = 7 data bytes received
DATABYTE1 = COMMAND_SET_ALARM_CLOCK (0xC3)
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 data bytes received
DATABYTE1 = COMMAND_SET_ALARM_CLOCK (0xC3)
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 data bytes received

'Module status request' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_MODULE_STATUS_REQUEST (0xFA)
DATABYTE2 = don't care

'Channel name request' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_CHANNEL_NAME_REQUEST (0xEF)
DATABYTE2 = channel number 1…9 or 18 (9 for temperature sensor name, 18 for output name)

Remark: channel = 0xFF for all 8 channel names, temperature sensor name & output channel name

'Set or Clear test mode' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_SET_CLR_LEARN_MODE (H'B5')
DATABYTE2 = Operating mode

Contents	***Operating mode***
0x00	Normal
0x01	Touch test mode

Remark:
After changing the operating mode, the module sends his status.
There is a timeout of 30 minutes for the test mode.

'Clear channel LED' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Linked module address
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_CLEAR_LED (0xF5)
DATABYTE2 = LEDs to clear (a one clears the corresponding LED of channel 1 to 8)

'Clear channel LED' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_CLEAR_LED (0xF5)
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
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_SET_LED (0xF6)
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
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_SLOW_BLINK_LED (0xF7)
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
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_FAST_BLINK_LED (0xF8)
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
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_VERY_FAST_BLINK_LED (0xF9)
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
RTR = 0
DLC3...DLC0 = 4 data bytes received
DATABYTE1 = COMMAND_UPDATE_LED_STATUS (0xF4)
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 data bytes received
DATABYTE1 = COMMAND_READ_DATA_FROM_MEMORY (0xFD)
DATABYTE2 = High memory address
DATABYTE3 = LOW memory address

Remark: address range: 0x0000 to 0x0703

'Read data block from memory' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 3 data bytes received / 4 data bytes for CAN FD response
DATABYTE1 = COMMAND_READ_MEMORY_BLOCK (0xC9)
DATABYTE2 = High memory address
DATABYTE3 = LOW memory address
DATABYTE4 = memory block length (5…60)

Remark:
address range: 0x0000 to 0x0700
address range: 0x0000 to (0x0704 – memory block length) for CAN FD response

'Memory dump request' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 1 data bytes received
DATABYTE1 = COMMAND_MEMORY_DUMP_REQUEST (0xCB)

'Write data to memory' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 4 data bytes received
DATABYTE1 = COMMAND_WRITE_DATA_TO_MEMORY (0xFC)
DATABYTE2 = High memory address
DATABYTE3 = LOW memory address
DATABYTE4 = memory data to write

Remark:
Wait at least 10ms for sending a next command on the velbus.
Address range: 0x0000 to 0x0703
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 data bytes received
DATABYTE1 = COMMAND_WRITE_MEMORY_BLOCK (0xCA)
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

Or

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Address of the module
RTR = 0
DLC3...DLC0 = number of data bytes to send

Contents	*Number of data bytes*
0x09	12 data bytes
0x0A	16 data bytes
0x0B	20 data bytes
0x0C	24 data bytes
0x0D	32 data bytes
0x0E	48 data bytes
0x0F	64 data bytes

DATABYTE1 = COMMAND_WRITE_MEMORY_BLOCK (0xCA)
DATABYTE2 = High memory address
DATABYTE3 = LOW memory address

DATABYTE4 = memory block length (5…60)
DATABYTE5 = memory data 1 to write
…
DATABYTE12 = memory data 8 to write (end of data for DLC3...DLC0 = 0x09)
…
DATABYTE16 = memory data 12 to write (end of data for DLC3...DLC0 = 0x0A)
…
DATABYTE20 = memory data 16 to write (end of data for DLC3...DLC0 = 0x0B)
…
DATABYTE24 = memory data 20 to write (end of data for DLC3...DLC0 = 0x0C)
…
DATABYTE32 = memory data 28 to write (end of data for DLC3...DLC0 = 0x0D)
…
DATABYTE48 = memory data 44 to write (end of data for DLC3...DLC0 = 0x0E)
…
DATABYTE64 = memory data 60 to write (end of data for DLC3...DLC0 = 0x0F)

Remark:
Wait for 'memory data block' feedback before sending a next command on the velbus.
address range: 0x0000 to 0x0700 for standard CAN response
address range: 0x0000 to (0x0704 – memory block length) for CAN FD response
Contents of unused data bytes = 0x55
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 data byte received
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 data bytes received
DATABYTE1 = COMMAND_CANCEL_FORCED_OFF (0x13)
DATABYTE2 = Channel number 1…8, 9 or 18 (9 for temperature sensor, 18 for open collector output)

Remark: channel number = 0xFF for all channels

'Lock channel' command received:
SID10-SID9 = 00 (highest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 5 data bytes received
DATABYTE1 = COMMAND_FORCED_OFF (0x12)
DATABYTE2 = Channel number 1…8, 9 or 18 (9 for temperature sensor, 18 for open collector output)
DATABYTE3 = high byte of delay time
DATABYTE4 = mid byte of delay time
DATABYTE5 = low byte of delay time

Remark:
Channel number = 0xFF for all 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 0xFFFFFF 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 data bytes received
DATABYTE1 = COMMAND_ENABLE_PROGRAM (0xB2)
DATABYTE2 = Channel number 1…8, 9 or 18 (9 for temperature sensor name, 18 for open collector output)

Remark: channel number = 0xFF for all channels

'Disable Channel Program' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 5 data bytes received
DATABYTE1 = COMMAND_DISABLE_PROGRAM (0xB1)
DATABYTE2 = Channel number1…8, 9 or 18 (9 for temperature sensor name, 18 for open collector output)
DATABYTE3 = high byte of delay time
DATABYTE4 = mid byte of delay time
DATABYTE5 = low byte of delay time

Remark:
Channel number = 0xFF for all 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 0xFFFFFF 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 data bytes received
DATABYTE1 = COMMAND_SELECT_PROGRAM (0xB3)
DATABYTE2 = Program mode

Contents	*Selected program*
0	None
1	Program group 1 (Summer)
2	Program group 2 (Winter)
3	Program group 3 (Holiday)

'Sensor temperature request' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_SENSOR_TEMP_REQUEST (0xE5)
DATABYTE2 = Auto send time interval into seconds
(Valid range: 10…255s)
(5…9 = auto send on temperature change >= 0.5°)
(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 data bytes received
DATABYTE1 = COMMAND_TEMP_SENSOR_SETTINGS_REQUEST (0xE7)
DATABYTE2 = don't care

'Set heating mode' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_SET_HEATING_MODE (0xE0)
DATABYTE2 = don't care

'Set cooling mode' command received:

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

'Set sensor zone number' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_SET_SENSOR_ZONE_NUMBER (0xC5)
DATABYTE2 = Zone number (0= no zone / 1…7 = valid zone)

'Set default sleep time' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 3 data bytes received
DATABYTE1 = COMMAND_SET_DEFAULT_SLEEP_TIME (0xE3)
DATABYTE2 = High byte of the default sleep time
DATABYTE3 = Low byte of the default sleep time into minutes
(Valid range 0x0001 to 0xFEFF 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 data bytes received
DATABYTE1 = COMMAND_SET_TEMP (0xE4)
DATABYTE2 = Pointer to temperature variable (0…20)

Contents	Temperature variable
0	Current 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
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
21	Minimum switching time
22	Pump delayed on time (0…255 s)

23	Pump delayed off time (0…255 s)
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
xxxxxxx1	Reset minimum temperature
xxxxxx1x	Reset maximum temperature

DATABYTE3 = Enable/disable unjamming heater valve & pump

Contents	Enable/disable unjamming valve and pump
xxxxxx00	Disable unjamming heater valve & pump
xxxxxx01	Disable unjamming heater valve & enable unjamming pump
xxxxxx10	Enable unjamming heater valve & disable unjamming pump
xxxxxx11	Enable unjamming heater valve & pump

DATABYTE3 = Minimum switching or pump delayed on/off time:

Contents	Operating mode
00000000	No switching time protection
00000001	1 seconds switching time protection
00000010	2 seconds switching time protection
…	…
11111110	254 seconds switching time protection
11111111	255 seconds 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 data bytes received
DATABYTE1 = COMMAND_SWITCH_TO_COMFORT_MODE (0xDB)
DATABYTE2 = High byte of the sleep time
DATABYTE3 = Low byte of the sleep time into minutes

Remark:
If the sleep time contains 0xFF00, the command is a program step.
A sleep time between 0x0001 and 0xFEFF (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 0xFFFF puts the sensor into manual mode. Program steps will not be executed anymore and local control is disabled.
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 data bytes received
DATABYTE1 = COMMAND_SWITCH_TO_DAY_MODE (0xDC)
DATABYTE2 = High byte of the sleep time
DATABYTE3 = Low byte of the sleep time into minutes

Remark:
If the sleep time contains 0xFF00, the command is a program step.
A sleep time between 0x0001 and 0xFEFF (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 0xFFFF puts the sensor into manual mode. Program steps will not be executed anymore and local control is disabled.
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 data bytes received
DATABYTE1 = COMMAND_SWITCH_TO_NIGHT_MODE (0xDD)
DATABYTE2 = High byte of the sleep time
DATABYTE3 = Low byte of the sleep time into minutes

Remark:
If the sleep time contains 0xFF00, the command is a program step.
A sleep time between 0x0001 and 0xFEFF (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 0xFFFF puts the sensor into manual mode. Program steps will not be executed anymore and local control is disabled.
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 data bytes received
DATABYTE1 = COMMAND_SWITCH_TO_SAFE_MODE (0xDE)
DATABYTE7 = High byte of the sleep time
DATABYTE8 = Low byte of the sleep time into minutes

Remark:
If the sleep time contains 0xFF00, the command is a program step.
A sleep time between 0x0001 and 0xFEFF (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 0xFFFF puts the sensor into manual mode. Program steps will not be executed anymore and local control is disabled.
A value of zero for the sleep time cancels the manual mode or sleep timer.

'Switch open collector output off' command received:

SID10-SID9 = 00 (highest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_SWITCH_RELAY_OFF (0x01)
DATABYTE2 = channel bit = don't care

'Switch open collector output on' command received:

SID10-SID9 = 00 (highest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 data bytes received
DATABYTE1 = COMMAND_SWITCH_RELAY_ON (0x02)
DATABYTE2 = channel bit = don't care

'Start open collector timer' command received:

SID10-SID9 = 00 (highest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 5 data bytes received
DATABYTE1 = COMMAND_START_RELAY_TIMER (0x03)
DATABYTE2 = channel bit = don't care
DATABYTE3 = high byte of delay time
DATABYTE4 = mid byte of delay time
DATABYTE5 = low byte of delay time

Remark:
[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 0xFFFFFF then the open collector output are permanently switched on.

'Read program step' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 5 data bytes received
DATABYTE1 = COMMAND_READ_PROGRAM_STEP (0xC0)
DATABYTE2 = Start program step number (1…66)
DATABYTE3 = Program group number (1…3)
DATABYTE4 = Channel number1…8, 9 or 18 (9 for temperature sensor name, 18 for open collector output)
DATABYTE5 = Search direction (1 = search for next matched step / 0 = search for previous matched program step)

'Write program step' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 8 data bytes received

DATABYTE1 = COMMAND_WRITE_PROGRAM_STEP (0xC2)
DATABYTE2 = Program step number (1…66)
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 (only allowed for button channels)
1	1s Pulse (only allowed for button channels)
2	2s Pulse (only allowed for button channels)
...	...
119	1min59s Pulse (only allowed for button channels)
120	2min Pulse (only allowed for button channels)
121	2min15s Pulse (only allowed for button channels)
...	...
131	4min45s Pulse (only allowed for button channels)
132	5min Pulse (only allowed for button channels)
133	5min30s Pulse (only allowed for button channels)
...	...
181	29min30s Pulse (only allowed for button channels)
182	30min Pulse (only allowed for button channels)
183	31min Pulse (only allowed for button channels)
...	...
211	59min Pulse (only allowed for button channels)
212	1h Pulse (only allowed for button channels)
213	1h15min Pulse (only allowed for button channels)
...	...
227	4h45min Pulse (only allowed for button channels)
228	5h Pulse (only allowed for button channels)
229	5h30min Pulse (only allowed for button channels)
...	...
237	9h30min Pulse (only allowed for button channels)
238	10h Pulse (only allowed for button channels)
239	11h Pulse (only allowed for button channels)

...	…
246	18h Pulse (only allowed for button channels)
247	Press (only allowed for button channels)
248	Long Press (only allowed for button channels)
249	Release (only allowed for button channels)
250	Lock
251	Unlock
252	Thermostat safe mode (only allowed for temperature sensor channel)
253	Thermostat night mode (only allowed for temperature sensor channel)
254	Thermostat day mode (only allowed for temperature sensor channel)
255	Thermostat comfort mode (only allowed for temperature sensor channel)

DATABYTE8 = Channel

Contents	Channel
1	Channel 1
2	Channel 2
...	…
7	Channel 7
8	Channel 8
9	Temperature sensor
18	Open collector output

Remark:
Erase program step if channel parameter is equal with zero.

Memory map version 4:

Address	*Contents*	*Address*	*Contents*
0x0000	Touch init: main control	0x0001	Touch init: sensistivity
0x0002	Touch init: config 1	0x0003	Touch init: sensor enable
0x0004	Touch init: sensor config 1	0x0005	Touch init: sensor config 2
0x0006	Touch init: average sampling	0x0007	Touch init: interrupt enable
0x0008	Touch init: repeat enable	0x0009	Touch init: mtp config
0x000A	Touch init: mtp pattern config	0x000B	Touch init: mtp pattern
0x000C	Touch init: recal config	0x000D	Touch init: sensor 1 threshold
0x000E	Touch init: sensor 2 threshold	0x000F	Touch init: sensor 3 threshold
0x0010	Touch init: sensor 4 threshold	0x0011	Touch init: sensor 5 threshold
0x0012	Touch init: sensor 6 threshold	0x0013	Touch init: sensor 7 threshold
0x0014	Touch init: sensor 8 threshold	0x0015	Touch init: noise threshold
0x0016	Touch init: standby channel	0x0017	Touch init: standby config
0x0018	Touch init: standby sensitivity	0x0019	Touch init: standby threshold
0x001A	Touch init: config 2	0x001B	Touch init: not used
0x001C	Channel 1 name character 1	0x001D	Channel 1 name character 2
...	...	...	...
0x002A	Channel 1 name character 15	0x002B	Channel 1 name character 16
0x002C	Channel 1 reaction time	0x002D	Channel 1 start function
0x002E	Channel 1 end function	0x002F	Channel 1 mode
0x0030	Channel 2 name character 1	0x0031	Channel 2 name character 2
...	...	...	...
0x003E	Channel 2 name character 15	0x003F	Channel 2 name character 16
0x0040	Channel 2 reaction time	0x0041	Channel 2 start function
0x0042	Channel 2 end function	0x0043	Channel 2 mode
...	...	...	...
0x00A8	Channel 8 name character 1	0x00A9	Channel 8 name character 2
...	...	...	...
0x00B6	Channel 8 name character 15	0x00B7	Channel 8 name character 16
0x00B8	Channel 8 reaction time	0x00B9	Channel 8 start function
0x00BA	Channel 8 end function	0x00BB	Channel 8 mode
0x00BC	Long pressed delay	0x00BD	Dual function long pressed time
0x00BE	Key beep (1 = enabled)	0x00BF	Feedback led brightness for GPx series
0x00C0	reserved	0x00C1	reserved
...	…	…	…
0x0352	reserved	0x0353	reserved
0x0354	Not used	0x0355	Not used
0x0356	Not used	0x0357	Alarm clock configuration
0x0358	Wake up 1 hour (0…23)	0x0359	Wake up 1 minutes (0…59)
0x035A	Go to bed 1 hour (0…23)	0x035B	Go to bed 1 minutes (0…59)
0x035C	Wake up 2 hour (0…23)	0x035D	Wake up 2 minutes (0…59)
0x035E	Go to bed 2 hour (0…23)	0x035F	Go to bed 2 minutes (0…59)
0x0360	Sunrise hour at 21 December (0…23)	0x0361	Sunrise minutes at 21 December (0…59)
0x0362	Sunrise 21 January – sunrise 5 January (-128'...127')	0x0363	Sunrise 5 February – sunrise 21 January (-128'...127')
0x0364	Sunrise 21 February – sunrise 5 February (-128'...127')	0x0365	Sunrise 5 March – sunrise 21 February (-128'...127')
0x0366	Sunrise 21 March – sunrise 5 March (-128'…127')	0x0367	Sunrise 5 April – sunrise 21 March (-128'...127')
0x0368	Sunrise 21 April – sunrise 5 April (-128'…127')	0x0369	Sunrise 5 May – sunrise 21 April (-128'...127')
0x036A	Sunrise 21 May – sunrise 5 May (-128'…127')	0x036B	Sunrise 5 June – sunrise 21 May (-128'...127')
0x036C	Sunrise 21 June – sunrise 5 June (-128'…127')	0x036D	Sunrise 5 July – sunrise 21 June (-128'...127')
0x036E	Sunrise 21 July – sunrise 5 July (-128'…127')	0x036F	Sunrise 5 August – sunrise 21 July (-128'...127')
0x0370	Sunrise 21 August – sunrise 5 August (-128'...127')	0x0371	Sunrise 5 September – sunrise 21 August (-128'...127')
0x0372	Sunrise 21 September – sunrise 5 September (-128...127')	0x0373	Sunrise 5 October – sunrise 21 Sept. (-128'...127')
0x0374	Sunrise 21 October – sunrise 5 October (-128'…127')	0x0375	Sunrise 5 November – sunrise 21 Oct. (-128'...127')
0x0376	Sunrise 21 November – sunrise 5 November (-128'...127')	0x0377	Sunrise 5 December – sunrise 21 Nov. (-128'...127')
0x0378	Sunrise 21 December – sunrise 5 December (-128'...127')	0x0379	Sunrise 5 January – sunrise 21 December (-128'...127')
0x037A	Not used	0x037B	Not used
0x037C	Sunset hour at 21 December (0…23)	0x037D	Sunset minutes at 21 December (0…59)
0x037E	Sunset 21 January – sunset 5 January (-128'...127')	0x037F	Sunset 5 February – sunset 21 January (-128'...127')
0x0380	Sunset 21 February – sunset 5 February (-128'...127')	0x0381	Sunset 5 March – sunset 21 February (-128'...127')
0x0382	Sunset 21 March – sunset 5 March (-128'...127')	0x0383	Sunset 5 April – sunset 21 March (-128'...127')
0x0384	Sunset 21 April – sunset 5 April (-128'...127')	0x0385	Sunset 5 May – sunset 21 April (-128'...127')
0x0386	Sunset 21 May – sunset 5 May (-128'...127')	0x0387	Sunset 5 June – sunset 21 May (-128'...127')
0x0388	Sunset 21 June – sunset 5 June (-128'...127')	0x0389	Sunset 5 July – sunset 21 June (-128'...127')
0x038A	Sunset 21 July – sunset 5 July (-128'...127')	0x038B	Sunset 5 August – sunset 21 July (-128'...127')
0x038C	Sunset 21 August – sunset 5 August (-128'...127')	0x038D	Sunset 5 September – sunset 21 August (-128'...127')

0x038E	Sunset 21 September – sunset 5 September (-128'...127')	0x038F	Sunset 5 October – sunset 21 September (-128'...127')
0x0390	Sunset 21 October – sunset 5 October (-128'...127')	0x0391	Sunset 5 November - sunset 21 October (-128'...127')
0x0392	Sunset 21 November – sunset 5 November (-128'...127')	0x0393	Sunset 5 December - sunset 21 Nov. (-128'...127')
0x0394	Sunset 21 December – sunset 5 December (-128'...127')	0x0395	Sunset 5 January – sunset 21 December (-128'...127')
0x0396	Not used	0x0397	Not used
0x0398	Sensor name character 1	0x0399	Sensor name character 2
...	...	...	...
0x03A6	Sensor name character 15	0x03A7	Sensor name character 16
0x03A8	Temp. sensor: zone	0x03A9	Temp. sensor: calibration offset
0x03AA	Temp. sensor: calibration gain	0x03AB	Temp. sensor: hysteresis
0x03AC	Temp. sensor: boost difference	0x03AD	Temp. sensor: Pump delayed on
0x03AE	Temp. sensor: pump delayed off	0x03AF	Temp. sensor: min switching time
0x03B0	Temp. sensor: default sleep time byte 0 (low)	0x03B1	Temp. sensor: default sleep time byte 1 (high)
0x03B2	Temp. sensor: default sleep time byte 2	0x03B3	Temp. sensor: default sleep time byte 3 (msb)
0x03B4	Temp. sensor: heater lower temperature range low byte	0x03B5	Temp. sensor: heater lower temperature range high byte
0x03B6	Temp. sensor: heater upper temperature range low byte	0x03B7	Temp. sensor: heater lower temperature range high byte
0x03B8	Temp. sensor: heater safe temperature set	0x03B9	Temp. sensor: heater night temperature set
0x03BA	Temp. sensor: heater day temperature set	0x03BB	Temp. sensor: heater comfort temperature set
0x03BC	Temp. sensor: cooler lower temperature range low byte	0x03BD	Temp. sensor: cooler upper temp. range high byte
0x03BE	Temp. sensor: cooler upper temperature range low byte	0x03BF	Temp. sensor: cooler upper temp. range high byte
0x03C0	Temp. sensor: cooler safe temperature set	0x03C1	Temp. sensor: cooler night temperature set
0x03C2	Temp. sensor: cooler day temperature set	0x03C3	Temp. sensor: cooler comfort temperature set
0x03C4	Temp. sensor: alarm 1 temperature set	0x03C5	Temp. sensor: alarm 2 temperature set
0x03C6	Temp. sensor: alarm 3 temperature set	0x03C7	Temp. sensor: alarm 4 temperature set
0x03C8	Temp. sensor settings	0x03C9	Temp. sensor alarm 1 & 2 settings
0x03CA	Temp. sensor alarm 3 & 4 settings	0x03CB	Not used
0x03CC	Open collector output name character 1	0x03CD	Open collector output name character 2
...	...	...	...
0x03DA	Open collector output name character 15	0x03DB	Open collector output name character 16

Remark:
Unused locations contain H'FF'

Valid reaction times

Contents	*Reaction time*
0x01	immediately (default)
0x1C	1s
0x38	2s
0x54	3s
0xFF	Channel disabled

Channel x start/end function

Contents	*Function*
1	Channel 1 (default)
2	Channel 2 (default)
...	...
7	Channel 7 (default)
8	Channel 8 (default)

Remark:
For a normal one button function, 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'xxxxxxx0'	Dual function disabled (default)
B'xxxxxxx1'	Dual function enabled
B'xxxxxx0x'	Multi-function auto reset disabled (default)
B'xxxxxx1x'	Multi-function auto reset enabled
B'xxxxx0xx'	Led backlight off
B'xxxxx1xx'	Led backlight on

B’xxxx0xxx’	Led monitor mode
B’xxxx1xxx’	Led feedback mode (default)
B’xxx0xxxx’	Slow blinking led feedback disabled
B’xxx1xxxx’	Slow blinking led feedback enabled (default)
B’xx0xxxxx’	Fast blinking led feedback disabled
B’xx1xxxxx’	Fast blinking led feedback enabled (default)
B’x0xxxxxx’	Very fast blinking led feedback disabled
B’x1xxxxxx’	Very fast blinking led feedback enabled (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*
0x17	0.8s (default)
0x2E	1.6s

Valid dual function long pressed times

Contents	*Long pressed time*
0x1C	1s
0x38	2s (default)
0x54	3s

Feedback led brightness for GPx series

Contents	*Brightness*
B’xxxx0000’	0% Minimum brightness
B’xxxx0001’	7% Minimum brightness
B’xxxx0010’	9% Minimum brightness
B’xxxx0011’	11% Minimum brightness
B’xxxx0100’	14% Minimum brightness
B’xxxx0101’	17% Minimum brightness
B’xxxx0110’	20% Minimum brightness
B’xxxx0111’	23% Minimum brightness
B’xxxx1000’	26% Minimum brightness
B’xxxx1001’	30% Minimum brightness
B’xxxx1010’	35% Minimum brightness
B’xxxx1011’	40% Minimum brightness
B’xxxx1100’	46% Minimum brightness
B’xxxx1101’	53% Minimum brightness
B’xxxx1110’	63% Minimum brightness
B’xxxx1111’	77% Minimum brightness
B’0000xxxx’	7% Maximum brightness
B’0001xxxx’	9% Maximum brightness
B’0010xxxx’	11% Maximum brightness
B’0011xxxx’	14% Maximum brightness
B’0100xxxx’	17% Maximum brightness
B’0101xxxx’	20% Maximum brightness
B’0110xxxx’	23% Maximum brightness
B’0111xxxx’	26% Maximum brightness
B’1000xxxx’	30% Maximum brightness
B’1001xxxx’	35% Maximum brightness
B’1010xxxx’	40% Maximum brightness
B’1011xxxx’	46% Maximum brightness
B’1100xxxx’	53% Maximum brightness
B’1101xxxx’	63% Maximum brightness
B’1110xxxx’	77% Maximum brightness
B’1111xxxx’	100% Maximum brightness

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)

Temp. sensor zone

Contents	*Zone*
0'	No zone
1.	Zone 1...
...	...
7	Zone 7

Temperature 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'	Independent temperature alarms (default)
B'xxxxx1xx'	Dependent temperature alarms

Temperature 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

Temperature sensor calibration gain:

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

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

Temperature sensor hysteresis (resolution 0.5°):

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

Temperature 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

Temperature 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

Temperature sensor default sleep time into minutes

valid range 0x0001 to 0xFEFF or 1min to 65.279min

Temperature sensor lower range, upper range, 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

Temperature 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

Temperature 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

Address	*Contents*	*Address*	*Contents*
0x03DC	Links in use byte 0 (LSB)	0x03DD	Links in use high byte1
0x03DE	Links in use low byte 2	0x03DF	Links in use low byte 3 (MSB)
0x03E0	Linked Push button 1 module address	0x03E1	Linked Push button 1 bit number
0x03E2	Linked Push button 1 action	0x03E3	Linked Push button 1 parameter 1
0x03E4	Linked Push button 1 parameter 2	...	…
...	...	...	...
…	…	0x051B	Linked Push button 64 address
0x051C	Linked Push button 64 bit number	0x051D	Linked Push button 64 action
0x051E	Linked Push button 64 parameter 1	0x051F	Linked Push button 64 parameter 2

Remark: Unused locations contain 0xFF

Action

Action number	**Action**	**Parameter 1**	**Parameter 2**
0	Switch status led indication	-	Channel 1...8
1	Lock channel at closed switch	-	Channel 1...8 or 18
2	Lock channel at opened switch	-	Channel 1...8 or 18
3	Lock channel	Timeout	Channel 1...8 or 18
4	Lock/unlock channel	Timeout	Channel 1...8 or 18
5	Unlock channel	-	Channel 1...8 or 18
6	Disable channel program at closed switch	-	Channel 1...8 or 18
7	Disable channel program at opened switch	-	Channel 1...8 or 18
8	Disable channel program channel	Timeout	Channel 1...8 or 18
9	Disable/enable channel program	Timeout	Channel 1...8 or 18
10	Enable channel program	-	Channel 1...8 or 18
11	Select no programs	-	-
12	Select program group 1	-	-
13	Toggle program group 1	-	-
14	Select program group 2	-	-
15	Toggle program group 2	-	-
16	Select program group 3	-	-
17	Toggle program group 3	-	-
18	Enable Alarm 1 at closed switch	-	-
19	Enable Alarm 1 at open switch	-	-
20	Disable Alarm 1 at closed switch	-	-
21	Disable Alarm 1 at open switch	-	-
22	Enable Alarm 1	-	-
23	Enable/Disable Alarm 1	-	-
24	Disable Alarm 1	-	-
25	Enable Alarm 2 at closed switch	-	-
26	Enable Alarm 2 at open switch	-	-
27	Disable Alarm 2 at closed switch	-	-
28	Disable Alarm 2 at open switch	-	-
29	Enable Alarm 2	-	-
30	Enable/Disable Alarm 2	-	-
31	Disable Alarm 2	-	-
32	Enable Sunrise at closed switch	-	-
33	Enable Sunrise at open switch	-	-
34	Disable Sunrise at closed switch	-	-
35	Disable Sunrise at open switch	-	-
36	Enable Sunrise	-	-
37	Enable/Disable Sunrise	-	-
38	Disable Sunrise	-	-
39	Enable Sunset at closed switch	-	-
40	Enable Sunset at open switch	-	-
41	Disable Sunset at closed switch	-	-
42	Disable Sunset at open switch	-	-
43	Enable Sunset	-	-
44	Enable/Disable Sunset	-	-
45	Disable Sunset	-	-
46	Output momentary	-	-
47	Output off	-	-
48	Output on	-	-
49	Output toggle	-	-
50	Output start/stop timer	timeout	-

51	Output restartable timer	timeout	-
52	Output retriggerable timer	timeout	-
53	Output trigger on release timer	timeout	-
54	Sensor: Comfort mode	Short press sleep time	Long press sleep time
55	Sensor: Day mode	Short press sleep time	Short press sleep time
56	Sensor: Night mode	Short press sleep time	Short press sleep time
57	Sensor: Safe mode	Short press sleep time	Short press sleep time
58	Sensor: Heating mode	-	-
59	Sensor: Cooling mode	-	-
90	Sensor: Forced Safe mode at closed switch	-	-
91	Sensor: Forced Safe mode at open switch	-	-
92	Sensor: Forced Safe mode	Timeout	-
93	Sensor: Forced or Cancel Forced Safe mode	Timeout	-
94	Sensor: Cancel Forced Safe mode	-	-
101	Output pulse (Build1927 or higher)	Timeout (multiple of 10ms)	-
102	Output logical OR (Build1927 or higher)		
103	Output logical NOR (Build1927 or higher)		
104	Output logical AND (Build1927 or higher)		
105	Output logical NAND (Build1927 or higher)		
106	Output logical XOR (Build1927 or higher)		
107	Output logical XNOR (Build1927 or higher)		
108	Output pulse interval at closed switch (Build1927 or higher)	Pulse time (multiple of 10ms)	Pause time (multiple of 10ms)

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*
0x0520	Program steps used byte 0 (LSB)	0x0521	Program steps used byte 1

0x0522	Program steps used byte 2	0x0523	Program steps used byte 3 (MSB)
0x0524	Program step 1 byte1	0x0525	Program step 1 byte2
0x0526	Program step 1 byte3	0x0527	Program step 1 byte4
0x0528	Program step 1 byte5	0x0529	Program step 1 byte6
…	..	..	..
0x06B6	Program step 68 byte1	0x06B7	Program step 68 byte2
0x06B8	Program step 68 byte3	0x06B9	Program step 68 byte4
0x06BA	Program step 68 byte5	0x06BB	Program step 68 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 (only allowed for button channels)
1	1s Pulse (only allowed for button channels)
2	2s Pulse (only allowed for button channels)
...	...
119	1min59s Pulse (only allowed for button channels)
120	2min Pulse (only allowed for button channels)
121	2min15s Pulse (only allowed for button channels)
...	...
131	4min45s Pulse (only allowed for button channels)
132	5min Pulse (only allowed for button channels)
133	5min30s Pulse (only allowed for button channels)
...	...
181	29min30s Pulse (only allowed for button channels)
182	30min Pulse (only allowed for button channels)
183	31min Pulse (only allowed for button channels)
...	...
211	59min Pulse (only allowed for button channels)
212	1h Pulse (only allowed for button channels)
213	1h15min Pulse (only allowed for button channels)
...	...
227	4h45min Pulse (only allowed for button channels)
228	5h Pulse (only allowed for button channels)
229	5h30min Pulse (only allowed for button channels)
...	...
237	9h30min Pulse (only allowed for button channels)
238	10h Pulse (only allowed for button channels)
239	11h Pulse (only allowed for button channels)
...	…
246	18h Pulse (only allowed for button channels)
247	Press (only allowed for button channels)
248	Long Press (only allowed for button channels)
249	Release (only allowed for button channels)
250	Lock
251	Unlock
252	Thermostat safe mode (only allowed for temperature sensor channel)
253	Thermostat night mode (only allowed for temperature sensor channel)
254	Thermostat day mode (only allowed for temperature sensor channel)
255	Thermostat comfort mode (only allowed for temperature sensor channel)

Contents program byte6	**Channel**
1	Channel 1
2	Channel 2
..	…
7	Channel 7
8	Channel 8
9	Temperature sensor
18	Open collector output

Address	*Contents*	*Address*	*Contents*
0x06BC	Location id low byte	0x06BD	Location id high byte
0x06BE	Group id low byte	0x06BF	Group id high byte
0x06C0	Module name character 1	0x06C1	Module name character 2
…	..	..	..
0x06FE	Module name character 63	0x06FF	Module name character 64
0x0700	Not used	0x0701	Not used
0x0702	Not used	0x0703	Used for flash writing