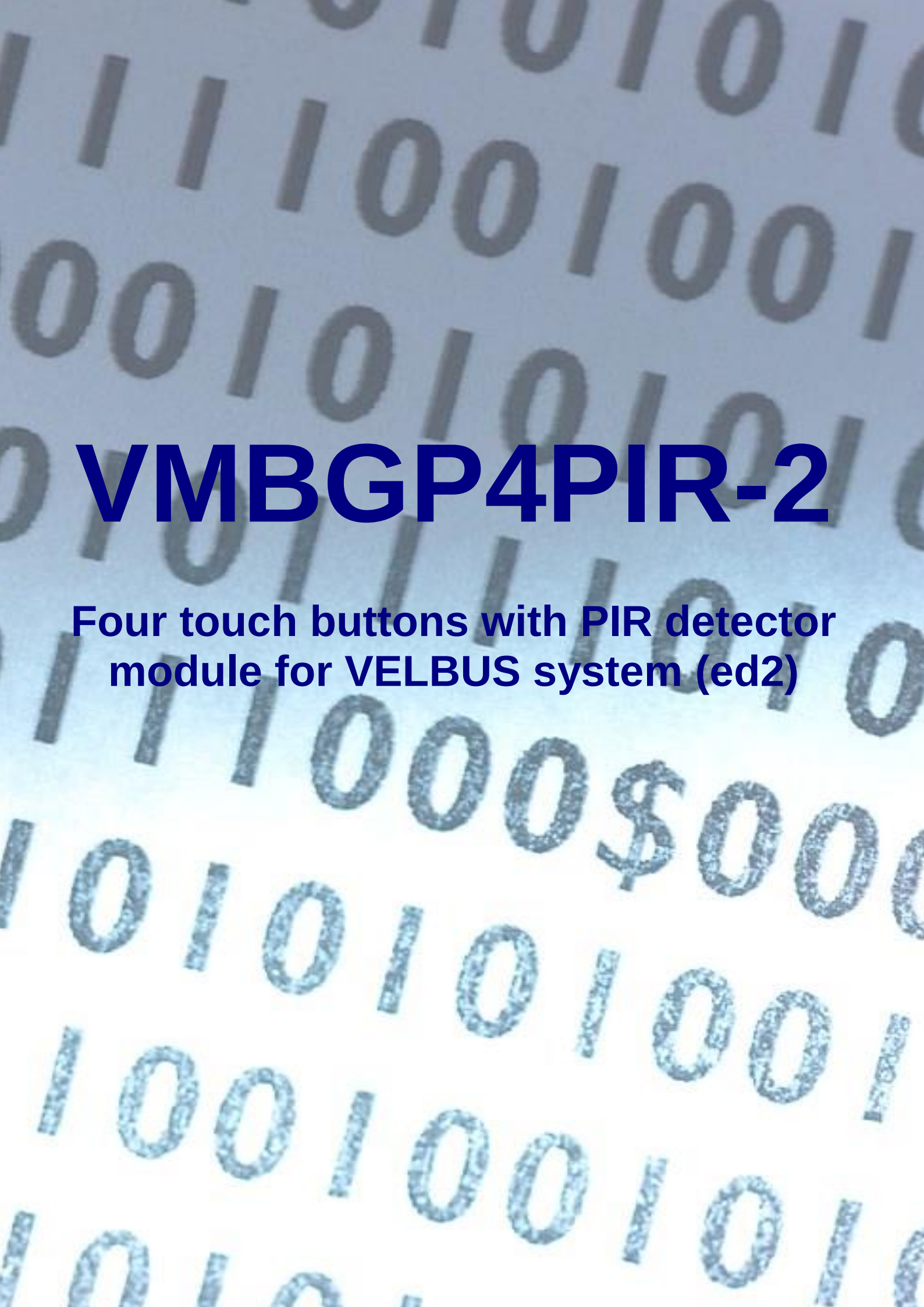

VMBGP4PIR-2

Four touch buttons with PIR detector module 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
- Module status
- 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
- 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 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)

- 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

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

Transmits the channel switch status:

SID10-SID9 = 00 (highest priority)
SID8...SID1 = Module address
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

Contents	***Channel number***
B'00000001'	Button 1
B'00000010'	Button 2
B'00000100'	Button 3
B'00001000'	Button 4
B'00010000'	Dark/Light output
B'00100000'	Motion output
B'01000000'	Light depending motion
B'10000000'	Absence output

Transmits the sensor output switch status:

SID10-SID9 = 00 (highest priority)
SID8...SID1 = Subaddress
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 = VMBGP4PIR-2 type (H'3E')
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. (currently: rev 0x0)

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 = VMBGP4PIR-2 type (H'3E')
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'03FF'

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'03FC'

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…4, 9 (channel 9 = 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…4, 9 (channel 9 = 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…4, 9 (channel 9 = 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
RTR = 0
DLC3...DLC0 = 8 databytes to send
DATABYTE1 = COMMAND_MODULE_STATUS (H'ED')
DATABYTE2 = channel 1 to 8 status (1 = pressed / 0 = released)
DATABYTE3 = test modus, light sensor value bits9&8, button enabled/disable

Contents	
B'xxxxxxx0'	Button 1 disabled
B'xxxxxxx1'	Button 1 enabled
B'xxxxxx0x'	Button 2 disabled
B'xxxxxx1x'	Button 2 enabled
B'xxxxx0xx'	Button 3 disabled
B'xxxxx1xx'	Button 3 enabled
B'xxxx0xxx'	Button 4 disabled
B'xxxx1xxx'	Button 4 enabled
B'xx00xxxx'	Light sensor value bits 9 & 8
B'xx01xxxx'	Light sensor value bits 9 & 8
B'xx10xxxx'	Light sensor value bits 9 & 8
B'xx11xxxx'	Light sensor value bits 9 & 8
B'x0xxxxxx'	Dark output selected
B'x1xxxxxx'	Light output selected
B'0xxxxxxx'	Test modus disabled
B'1xxxxxxx'	Test modus enabled

DATABYTE4 = light sensor value low byte
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

DATABYTE8 = light value auto send interval time
(Valid range: 10…255s)
(5…9 = auto send on light value change with min interval 5…9s)
(<5 = auto send disabled)

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	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 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 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.
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)

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 databytes to send
DATABYTE1 = COMMAND_FAST_BLINKING_LED (H'F8')
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 databytes to send
DATABYTE1 = COMMAND_PROGRAM_STEP_INFO (H'C1')
DATABYTE2 = Program step number (1…85 / 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

'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

'Real time clock status request' command received:

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')

'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…4 & 9 (9 for temperature sensor name)

Remark: channel = H'FF' for all 4 channel names & temperature sensor name

'Light value request' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 data bytes to send
DATABYTE1 = COMMAND_LIGHT_VALUE_REQUEST (H'AA')
DATABYTE2 = Auto send interval time into seconds
(valid range: 10…255s)
(5…9 = auto send on change)
(1…4 = auto send disabled)
(0 = no change on auto send interval time)

'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***
B'00000000'	Normal
B'00000001'	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 = Module address
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
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
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
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
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
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'03FF'

'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'03FC'

'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')

'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 at least 10ms for sending a next command on the velbus.
Address range: H'0000' to H'03FF'
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.
Terminate always with a write command at the last memory location.
Address range: H'0000' to H'03FC'

'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 (9 for enable temperature sensor)

Contents	***Channel***
1	Button 1
2	Button 2
3	Button 3
4	Button 4
5	Dark/light output
6	Motion output
7	Light depending motion output
8	Absence output
9	Temperature sensor
255	All channels

'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 (9 for disable temperature sensor)

Contents	***Channel***
1	Button 1
2	Button 2
3	Button 3
4	Button 4
5	Dark/light output
6	Motion output
7	Light depending motion output
8	Absence output
9	Temperature sensor
255	All channels

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 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

Contents	***Channel***
1	Button 1
2	Button 2
3	Button 3
4	Button 4
5	Dark/light output
6	Motion output
7	Light depending motion output
8	Absence output
255	All 8 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

Contents	***Channel***
1	Button 1
2	Button 2
3	Button 3
4	Button 4
5	Dark/light output
6	Motion output
7	Light depending motion output
8	Absence output
255	All 8 channels

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 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 programl***
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 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 sensor zone number' command received:

SID10-SID9 = 11 (lowest priority)
SID8...SID1 = Module address
RTR = 0
DLC3...DLC0 = 2 databytes to send
DATABYTE1 = COMMAND_SET_SENSOR_ZONE_NUMBER (H'C5')
DATABYTE2 = Zone number (0= no zone / 1…7 = valid zone)

Remark: The module answers with his type

'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	Current 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
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 any more 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 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 any more 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 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 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 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 and local control is disabled.
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…85)
DATABYTE3 = Program group number (1…3)
DATABYTE4 = Channel (1…8 for buttons or 128 for temperature channel)
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 databytes to send
DATABYTE1 = COMMAND_WRITE_PROGRAM_STEP (H'C2')
DATABYTE2 = Program step number (1…85)
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

Memory map version 2 for build 1803 or higher (PCB With New Touch Controller CAP1188)

Address	*Contents*	*Address*	*Contents*
0x0000	Channel 1 name character 1	0x0001	Channel 1 name character 2
...	...	...	...
0x000E	Channel 1 name character 15	0x000F	Channel 1 name character 16
0x0010	Channel 1 reaction time	0x0011	Channel 1 start function
0x0012	Channel 1 end function	0x0013	Channel 1 mode
0x0014	Channel 2 name character 1	0x0015	Channel 2 name character 2
...	...	...	...
0x0022	Channel 2 name character 15	0x0023	Channel 2 name character 16
0x0024	Channel 2 reaction time	0x0025	Channel 2 start function
0x0026	Channel 2 end function	0x0027	Channel 2 mode
0x0028	Channel 3 name character 1	0x0029	Channel 3 name character 2
...	...	...	...
0x0036	Channel 3 name character 15	0x0037	Channel 3 name character 16
0x0038	Channel 3 reaction time	0x0039	Channel 3 start function
0x003A	Channel 3 end function	0x003B	Channel 3 mode
0x003C	Channel 4 name character 1	0x003D	Channel 4 name character 2
...	...	...	...
0x004A	Channel 4 name character 15	0x004B	Channel 4 name character 16
0x004C	Channel 4 reaction time	0x004D	Channel 4 start function
0x004E	Channel 4 end function	0x004F	Channel 4 mode
0x0050	Long pressed delay	0x0051	Dual function long pressed time
0x0052	Led backlight intensity	0x0053	Led intensity
0x0054	Dark value low byte	0x0055	Dark value high byte
0x0056	Light value low byte	0x0057	Light value high byte
0x0058	Light/dark reaction time (default 1min)	0x0059	Dark/light timer mode = non restartable timer
0x005A	Dark/light timeout (default momentary)	0x005B	Dark/light flags (default cycling protect off & external overwrite off)
0x005C	Motion reaction time = 0s	0x005D	Motion timer mode = restartable timer
0x005E	Motion timeout (default 2min)	0x005F	Motion flags cycling protect = off (default external overwrite off)
0x0060	Light depending motion reaction time = 0s	0x0061	Light depending motion timer mode = restartable timer
0x0062	Light depending motion timeout (default 2min)	0x0063	Light depending motion flags (default cycling protect = on & external overwrite off)
0x0064	Light depending motion dark reaction time = 5sec	0x0065	Light depending motion dark timer mode = non restartable timer
0x0066	Light depending motion dark timeout = momentary	0x0067	Light depending motion dark flags = cycling protect off & external overwrite off
0x0068	Motion sensitivity (default medium)	0x0069	One button mode
0x006A	Light depending motion dark value low byte	0x006B	Light depending motion dark value high byte
0x006C	Light depending motion light value low byte (0.98*motion dark value)	0x006D	Light depending motion light value high byte
0x006E	Absence timeout	0x006F	Absence output mode
0x0070	Dark/light output selection	0x0071	Not used
…	…	…	..
0x00A2	Not used	0x00A3	Not used
0x00A4	Alarm clock configuration	0x00A5	Wake up 1 hour (0…23)
0x00A6	Wake up 1 minutes (0…59)	0x00A7	Go to bed 1 hour (0…23)
0x00A8	Go to bed 1 minutes (0…59)	0x00A9	Wake up 2 hour (0…23)
0x00AA	Wake up 2 minutes (0…59)	0x00AB	Go to bed 2 hour (0…23)
0x00AC	Go to bed 2 minutes (0…59)	0x00AD	Sunrise hour at 21 December (0…23)
0x00AE	Sunrise minutes at 21 December (0…59)	0x00AF	Sunrise 21 January – sunrise 5 January (-128'..127')
0x00B0	Sunrise 5 February – sunrise 21 January (-128'..127')	0x00B1	Sunrise 21 February – sunrise 5 February (-128'..127')
0x00B2	Sunrise 5 March – sunrise 21 February (-128'..127')	0x00B3	Sunrise 21 March – sunrise 5 March (-128'..127')
0x00B4	Sunrise 5 April – sunrise 21 March (-128'..127')	0x00B5	Sunrise 21 April – sunrise 5 April (-128'..127')
0x00B6	Sunrise 5 May – sunrise 21 April (-128'..127')	0x00B7	Sunrise 21 May – sunrise 5 May (-128'..127')
0x00B8	Sunrise 5 June – sunrise 21 May (-128'..127')	0x00B9	Sunrise 21 June – sunrise 5 June (-128'..127')
0x00BA	Sunrise 5 July – sunrise 21 June (-128'..127')	0x00BB	Sunrise 21 July – sunrise 5 July (-128'..127')
0x00BC	Sunrise 5 August – sunrise 21 July (-128'..127')	0x00BD	Sunrise 21 August – sunrise 5 August (-128'..127')
0x00BE	Sunrise 5 September – sunrise 21 August (-128'..127')	0x00BF	Sunrise 21 September – sunrise 5 September (-128..127')
0x00C0	Sunrise 5 October – sunrise 21 September (-128'..127')	0x00C1	Sunrise 21 October – sunrise 5 October (-128'..127')
0x00C2	Sunrise 5 November – sunrise 21 October (-128'..127')	0x00C3	Sunrise 21 November – sunrise 5 November (-128'..127')
0x00C4	Sunrise 5 December – sunrise 21 November (-128'..127')	0x00C5	Sunrise 21 December – sunrise 5 December (-128'..127')
0x00C6	Sunrise 5 January – sunrise 21 December (-128'..127')	0x00C7	Sunset hour at 21 December (0…23)

0x00C8	Sunset minutes at 21 December (0…59)	0x00C9	Sunset 21 January – sunset 5 January (-128'..127')
0x00CA	Sunset 5 February – sunset 21 January (-128'..127')	0x00CB	Sunset 21 February – sunset 5 February (-128'..127')
0x00CC	Sunset 5 March – sunset 21 February (-128'..127')	0x00CD	Sunset 21 March – sunset 5 March (-128'..127')
0x00CE	Sunset 5 April – sunset 21 March (-128'..127')	0x00CF	Sunset 21 April – sunset 5 April (-128'..127')
0x00D0	Sunset 5 May – sunset 21 April (-128'..127')	0x00D1	Sunset 21 May – sunset 5 May (-128'..127')
0x00D2	Sunset 5 June – sunset 21 May (-128'..127')	0x00D3	Sunset 21 June – sunset 5 June (-128'..127')
0x00D4	Sunset 5 July – sunset 21 June (-128'..127')	0x00D5	Sunset 21 July – sunset 5 July (-128'..127')
0x00D6	Sunset 5 August – sunset 21 July (-128'..127')	0x00D7	Sunset 21 August – sunset 5 August (-128'..127')
0x00D8	Sunset 5 September – sunset 21 August (-128'..127')	0x00D9	Sunset 21 September – sunset 5 September (-128'..127')
0x00DA	Sunset 5 October – sunset 21 September (-128'..127')	0x00DB	Sunset 21 October – sunset 5 October (-128'..127')
0x00DC	Sunset 5 November – sunset 21 October (-128'..127')	0x00DC	Sunset 21 November – sunset 5 November (-128'..127')
0x00DE	Sunset 5 December – sunset 21 November (-128'..127')	0x00DF	Sunset 21 December – sunset 5 December (-128'..127')
0x00E0	Sunset 5 January – sunset 21 December (-128'..127')	0x00E1	Sensor name character 1
0x00E2	Sensor name character 2	0x00E3	Sensor name character 3
...	...	...	...
0x00F0	Sensor name character 16	0x00F1	Temp. sensor: zone
0x00F2	Temp. sensor: flags	0x00F3	Temp. sensor: calibration offset
0x00F4	Temp. sensor: calibration gain	0x00F5	Temp. sensor: hysteresis
0x00F6	Temp. sensor: boost difference	0x00F7	Temp. sensor: Pump delayed on
0x00F8	Temp. sensor: pump delayed off	0x00F9	Temp. sensor: min switching time
0x00FA	Temp. sensor: default sleep time low byte	0x00FB	Temp. sensor: default sleep time high byte
0x00FC	Temp. sensor: heater lower temperature range	0x00FD	Temp. sensor: heater upper temperature range
0x00FE	Temp. sensor: heater safe temperature set	0x00FF	Temp. sensor: heater night temperature set
0x0100	Temp. sensor: heater day temperature set	0x0101	Temp. sensor: heater comfort temperature set
0x0102	Temp. sensor: cooler lower temperature range	0x0103	Temp. sensor: cooler upper temperature range
0x0104	Temp. sensor: cooler safe temperature set	0x0105	Temp. sensor: cooler night temperature set
0x0106	Temp. sensor: cooler day temperature set	0x0107	Temp. sensor: cooler comfort temperature set
0x0108	Temp. sensor: alarm 1 temperature set	0x0109	Temp. sensor: alarm 2 temperature set
0x010A	Temp. sensor: alarm 3 temperature set	0x010B	Temp. sensor: alarm 4 temperature set
0x010C	Temp. sensor alarm1 & 2 modes	0x010D	Temp. sensor alarm3 & 4 modes
0x010E	Module settings	0x010F	Module terminator

Remark:
Unused locations contain H'FF'

Valid reaction times

Contents	*Reaction time*
H'01'	immediately (default)
H'4C'	1s
H'99'	2s
H'E0'	3s
H'FF'	Channel disabled

Channel x start/end function

Contents	*Function*
1	Channel 1 (default)
2	Channel 2 (default)
3	Channel 3 (default)
4	Channel 4 (default)

Remark:
The start and end function channel can be channel1 to channel4.

Channels mode

Contents	*Description*
B'xxxxxxx0'	Dual function disabled (default)
B'xxxxxxx1'	Dual function enabled (not allowed)
B'xxxxxx0x'	Multi-function auto reset disabled (default)
B'xxxxxx1x'	Multi-function auto reset enabled (not allowed)
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)

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 (fixed)
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’10’	Minimum
...	...
H’29’	Maximum (default)

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)

Module settings

Contents	*Description*
B’x0xxxxxx’	Keybeep off
B’x1xxxxxx’	Keybeep enabled (default)

Module terminator

Contents	*Description*
B’xxxxxxx0’	Module terminator not placed
B’xxxxxxx1’	Module terminator placed

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’	VMBGP4 local thermostat control starts sleep timer at long press(default)
B’xxx1xxxx’	VMBGP4 local thermostat control starts sleep timer at short press
B’xx0xxxxx’	Independent temperature alarms (default)
B’xx1xxxxx’	Dependent temperature alarms
B’x0xxxxxx’	Normal Led indication (default)
B’x1xxxxxx’	Thermostat Led indication for VMBGP4
B’0xxxxxxx’	Button 4 of VMBGP4 operates normal (default)
B’1xxxxxxx’	Button 4 of VMBGP4 as local thermostat control

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

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

Light/dark reaction time

Contents	*Reaction time*
0	0s
1	1s
2	2s
...	
59	59s
60	1min (factory default)
61	1min1s
...	
…	
119	1min59s
120	2min
121	2min15s
...	
131	4min45s
132	5min
133	5min30s
...	
181	29min30s
182	30min
183	31min
...	
211	59min
212	1h

Timer mode (dark/light, motion & light depending motion)

Contents	*Timer mode*
0x00	non restartable timer (for dark & light)
0xFF	restartable timer (for motion & light depending motion)

Timeout (light/dark, motion & light depending motion)

Contents	*Timeout*
0	0 = momentary (factory default for dark, light & motion)
1	1s
2	2s
...	
119	1min59s
120	2min (factory default for light depending motion)
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

Absence timeout

Time parameter	Timeout
60	1min
61	1min1s
62	1min2s
...	
119	1min59s
120	2min
121	2min15s
...	
131	4min45s
132	5min
133	5min30s
...	
152	15min (default)
...	
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

Absence output mode

Contents	Absence output mode
0x00	Momentary (default)
0xFF	Pulse

Dark/light output selection

Contents	output selection
0x00	Dark output (default)
0xFF	Light output

Dark/light flags

Contents	*Timer mode*
B'xxxxxxx0'	Cycling protection disabled (default)
B'xxxxxxx1'	Cycling protection enabled
B'xxxxxx0x'	External overwrite disabled (default)
B'xxxxxx1x'	External overwrite enabled

Motion flags

Contents	*Timer mode*
B'xxxxxxx0'	Cycling protection disabled (default)
B'xxxxxxx1'	Cycling protection enabled
B'xxxxxx0x'	External overwrite disabled (default)
B'xxxxxx1x'	External overwrite enabled

Light depending motion flags

Contents	*Timer mode*
B'xxxxxxx0'	Cycling protection disabled
B'xxxxxxx1'	Cycling protection enabled (default)
B'xxxxxx0x'	External overwrite disabled (default)
B'xxxxxx1x'	External overwrite enabled

Motion sensitivity

Contents	*Sensitivity*
0x00	Low sensitivity
0x01	Medium sensitivity (default)
0x02	High sensitivity

One button mode

Contents	*Mode*
0x00	4 independent buttons (default)
0xFF	One button mode (the 4 buttons functions as one button)

Address	*Contents*	*Address*	*Contents*
H'0110'	Linked Push button 1 module address	H'0111'	Linked Push button 1 bit number
H'0112'	Linked Push button 1 action	H'0113'	Linked Push button 1 time parameter
H'0114'	Linked Push button 1 channel parameter	H'0115'	Linked Push button 2 module address
H'0116'	Linked Push button 2 bit number	H'0117'	Linked Push button 2 action
H'0118'	Linked Push button 2 time parameter	H'0119'	Linked Push button 2 channel parameter
H'011A'	…	H'011B'	…
...	...	...	...
H'01FA'	…	H'01F1'	Linked Push button 46 module address
H'01F2'	Linked Push button 46 bit number	H'01F3'	Linked Push button 46 action
H'01F4'	Linked Push button 46 time parameter	H'01F5'	Linked Push button 46 channel parameter

What has changed? Max limit Linked Push Buttons reduced to 46 (Previous 48)

Remark: Unused locations contain H'FF'

Action

Action number	**Action**	**Time parameter**	**Channel parameter**
0	Switch status led indication	-	Channel number (1...8)
1	Lock channel at closed switch	-	Channel number (1...8)
2	Lock channel at opened switch	-	Channel number (1...8)
3	Lock channel	Timeout	Channel number (1...8)
4	Lock/unlock channel	Timeout	Channel number (1...8)
5	Unlock channel	-	Channel number (1...8)
6	Disable channel program at closed switch	-	Channel number (1...8)
7	Disable channel program at opened switch	-	Channel number (1...8)
8	Disable channel program channel	Timeout	Channel number (1...8)
9	Disable/enable channel program	Timeout	Channel number (1...8)
10	Enable channel program	-	Channel number (1...8)
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	Reset absence timer at closed switch	-	-

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

Bit Number

Contents	***Bit number***
1	Button 1
2	Button 2
3	Button 3
4	Button 4
5	Dark/light output
6	Motion output
7	Light depending motion output
8	Absence output

Address	*Contents*	*Address*	*Contents*
H'01F6'	Button Treshold TP1	H'01F7'	Button Treshold TP2
H'01F8'	Button Treshold TP3	H'01F9'	Button Treshold TP4
H'01FA'	Button Treshold TP5	H'01FB'	Button Treshold TP6
H'01FC'	Button Treshold TP7	H'01FD'	Touch Controller Param 1
H'01FE'	Touch Controller Param 2	H'01FF'	Touch Controller Param 3

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

Version 0

Button Treshold TP1 – TP7

Writes a byte that adjusts the threshold when a touch is detected. (7bit number!)

```
#ifdef VMBGP4
/*
 4 button glass panel
 ----------------
|        |       |
|   6    |   4   |
|        |       |
--------+--------
|        |       |
|   3    |   1   |
|        |       |
TP----------------
 */
#ifdef VMBGP4PIR
/*
 4 button glass panel
 ----------------
|        |       |
|   6    |   4   |
|        |       |
--------O--------
|        |       |
|   3    |   1   |
|        |       |
TP----------------
 */
#ifdef VMBGP1
/*
 1 button glass panel
 ------------------
| 6      5       4|
|                  |
|         2        |
|                  |
| 3      1       7|
TP-----------------
 */
#ifdef VMBGP2_PCB_ED4
/*
 2 button glass panel ed4
 -----------------
|    6    |    1    |
|         |         |
|    3    |    2    |
|         |         |
|    5    |    7    |
TP----------------
 */
#ifdef VMBGP2
/*
 2 button glass panel ed3
 ------------------
|         |         |
|         |         |
|    1    |    2    |
|         |         |
|         |         |
TP----------------
 */
#ifdef VMBGPO(PTC/D)
/*
 7 button glass panel (with flat OLED)
 -----------------
| 1             2|
|                |
| 6 |||||||||| 7|
|                |
| 4      5      3|
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'0200'	Program step 1 byte1	H'0201'	Program step 1 byte2
H'0202'	Program step 1 byte3	H'0203'	Program step 1 byte4
H'0204'	Program step 1 byte5	H'0205'	Program step 1 byte6
…	..	..	..
H'03B6'	Program step 74 byte1	H'03B7'	Program step 74 byte2
H'03B8'	Program step 74 byte3	H'03B9'	Program step 74 byte4
H'03BA'	Program step 74 byte5	H'03BB'	Program step 74 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
...	…
244	16h Pulse
245	Press
246	Long Press
247	Release
248	Lock push button
249	Unlock push button
250	Lock light/motion/abscence
251	Unlock light/motion/abscence
252	Sensor: Safe mode
253	Sensor: Night mode
254	Sensor: Day mode
255	Sensor: Comfort mode

Contents program byte6	**Channel**
1	Button 1
2	Button 2
3	Button 3
4	Button 4
5	Dark/light output (only action 250 & 251 allowed)
6	Motion output (only action 250 & 251 allowed)
7	Light depending motion output (only action 250 & 251 allowed)
8	Absence output (only action 250 & 251 allowed)
128	Temperature sensor (only action 252…255 allowed)

Address	*Contents*	*Address*	*Contents*
H’03BC’	Location id low byte	H’03BD’	Location id high byte
H’03BE’	Group id low byte	H’03BF’	Group id high byte
H’03C0’	Module name character 1	H’03C1’	Module name character 2
…	..	..	..
H’03FE’	Module name character 63	H’03FF’	Module name character 64