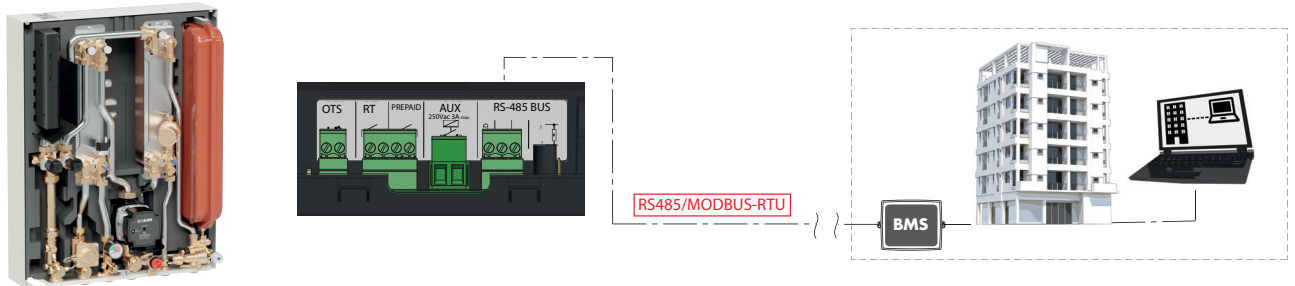


Guide to MODBUS registers for SATK22 and SATK32 series HIUs.

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Transmission

| Protocol type | BUS | Baud Rate | Data bit | Parity | Stop bit | Handshake | Unit Load |
|---------------|--------|-----------|----------|--------|----------|-----------|-----------|
| MODBUS-RTU | RS-485 | 9600 | 8 | NONE | 1 | None | 1/8UL |

MODBUS functions:

Function 0x03 - Read Holding Registers

Used to read one or more parameters (the size of every parameter is 16 bit)

The frame has the following structure:

| dev. Addr. | func | start addr H | start addr L | N.regs H | N.regs L | CRC16H | CRC16L |
|------------|------|--------------|--------------|----------|----------|--------|--------|
| HH | 03 | HH | HH | 00 | HH | HH | HH |

dev. Addr. – Address of the device on the RS485 net (1-250)

Func – Function code = 3

start addr H - MSByte of the address of the parameter:

start addr L - LSByte of the address of the parameter

N.regs H - MSByte of the number of registers to read (always 0)

N.regs L - LSByte of the number of registers to read

CRC16H - MSByte of CRC16

CRC16L - LSByte of CRC16

Function 0x06 - Write Single Register

Used to write a single parameter (16 bit)

The frame has the following structure:

| dev. Addr. | func | Reg.addr H | Reg.addr L | Reg. val. H | Reg. val. L | CRC16H | CRC16L |
|------------|------|------------|------------|-------------|-------------|--------|--------|
| HH | 06 | HH | HH | HH | HH | HH | HH |

dev. Addr. - Address of the device on the RS485 net (1-250)

Func - Function code = 6

Reg. addr H - MSByte of the address of the parameter

Reg addr L - LSByte of the address of the parameter

Reg. val. H - MSByte of the value of the parameter

Reg val. L - LSByte of the value of the parameter

CRC16H - MSByte of CRC16

CRC16L - LSByte of CRC16

(1) Function 0x42 - Change primary address via serial number

REQUEST (MASTER TO SLAVE) - The frame has the following structure:

| All Addr. | func | SN5 | SN4 | SN3 | SN2 | SN1 | SN0 | dev. Addr. | - | CRC HI | CRC LO |
|-----------|------|-----|-----|-----|-----|-----|-----|------------|----|--------|--------|
| ADDR=00 | 42 | HH | HH | HH | HH | HH | HH | HH | 00 | HH | HH |

ACKNOWLEDGE (SLAVE TO MASTER)

| dev. Addr. | func | SN5 | SN4 | SN3 | SN2 | SN1 | SN0 | dev. Addr. | - | CRC HI | CRC LO |
|------------|------|-----|-----|-----|-----|-----|-----|------------|----|--------|--------|
| HH | 42 | HH | HH | HH | HH | HH | HH | HH | 00 | HH | HH |

es. allocation of primary address = 2 to serial number **123456789091**

REQUEST (MASTER TO SLAVE)

| All Addr. | func | SN5 | SN4 | SN3 | SN2 | SN1 | SN0 | dev. Addr. | - | CRC HI | CRC LO |
|-----------|------|-----------|-----------|-----------|-----------|-----------|-----------|------------|----|--------|--------|
| 00 | 42 | 5B | 5A | 4E | 38 | 22 | 0C | 02 | 00 | 83 | 1E |
| | | 91 | 90 | 78 | 56 | 34 | 12 | | | | |

| USER LEVEL: READ ONLY GENERAL INFO | | | | | | |
|------------------------------------|---|--------|---------|--|-----------|--|
| Parameter | Description | Access | Address | Notes | Data type | Example |
| System_state | Status: heating/DHW/Comfort cycle in progress | R | 1100 | 0 = stand-by 1 = heating mode 2 = DHW product. in progress 4 = comfort cycle active | u8 | 0001 hex = 1 = heating cycle in progress |
| Active_error | Active error code | R | 1101 | Refer to the instruction manual | u8 | 0045 hex = 69 |
| T_DHW | DHW temperature | R | 1102 | | u16 | 01E0 hex = 480 = 48.0 °C |
| T_heat | Heating temperature | R | 1103 | | u16 | 0192 hex = 402 = 40.2 °C |
| T_ret | Primary return temperature | R | 1104 | | u16 | 00FA hex = 250 = 25.0 °C |
| T_ext | External temperature | R | 1105 | | u16 | 0032 hex = 50 = 5.0 °C |
| T_ambient | Ambient temperature from the user interface | R | 1123 | | u16 | 00CD hex = 205 = 20.5 °C |

| USER LEVEL: READ/WRITE SETTINGS | | | | | | | |
|---------------------------------|--|--------|---------|---|--------------------------------|---------|--------------------------------|
| Parameter | Description | Access | Address | Notes | Data type | Example | Default |
| Heat_prog_1_1 | Heating program 00:00<>08:00 Monday | RW | 1000 | Bit 0 = first 30 minutes of the time range Bit 1 = From the 30th minute to the 60th ... | 16 bits | - | F000 hex = 1111 0000 0000 0000 |
| Heat_prog_1_2 | Heating program 08:00<>16:00 Monday | RW | 1001 | | 0000 hex = 0000 0000 0000 0000 | | |
| Heat_prog_1_3 | Heating program 16:00<>24:00 Monday | RW | 1002 | | 0FFE hex = 0000 1111 1111 1110 | | |
| Heat_prog_2_1 | Heating program 00:00<>08:00 Tuesday | RW | 1003 | | F000 hex = 1111 0000 0000 0000 | | |
| Heat_prog_2_2 | Heating program 08:00<>16:00 Tuesday | RW | 1004 | | 0000 hex = 0000 0000 0000 0000 | | |
| Heat_prog_2_3 | Heating program 16:00<>24:00 Tuesday | RW | 1005 | | 0FFE hex = 0000 1111 1111 1110 | | |
| Heat_prog_3_1 | Heating program 00:00<>08:00 Wednesday | RW | 1006 | | F000 hex = 1111 0000 0000 0000 | | |
| Heat_prog_3_2 | Heating program 08:00<>16:00 Wednesday | RW | 1007 | | 0000 hex = 0000 0000 0000 0000 | | |
| Heat_prog_3_3 | Heating program 16:00<>24:00 Wednesday | RW | 1008 | | 0FFE hex = 0000 1111 1111 1110 | | |
| Heat_prog_4_1 | Heating program 00:00<>08:00 Thursday | RW | 1009 | | F000 hex = 1111 0000 0000 0000 | | |
| Heat_prog_4_2 | Heating program 08:00<>16:00 Thursday | RW | 1010 | | 0000 hex = 0000 0000 0000 0000 | | |
| Heat_prog_4_3 | Heating program 16:00<>24:00 Thursday | RW | 1011 | | 0FFE hex = 0000 1111 1111 1110 | | |
| Heat_prog_5_1 | Heating program 00:00<>08:00 Friday | RW | 1012 | | F000 hex = 1111 0000 0000 0000 | | |
| Heat_prog_5_2 | Heating program 08:00<>16:00 Friday | RW | 1013 | | 0000 hex = 0000 0000 0000 0000 | | |
| Heat_prog_5_3 | Heating program 16:00<>24:00 Friday | RW | 1014 | | 0FFE hex = 0000 1111 1111 1110 | | |
| Heat_prog_6_1 | Heating program 00:00<>08:00 Saturday | RW | 1015 | | C000 hex = 1100 0000 0000 0000 | | |
| Heat_prog_6_2 | Heating program 08:00<>16:00 Saturday | RW | 1016 | | FFFF hex = 1111 1111 1111 1111 | | |
| Heat_prog_6_3 | Heating program 16:00<>24:00 Saturday | RW | 1017 | | 3FFF hex = 0011 1111 1111 1111 | | |
| Heat_prog_7_1 | Heating program 00:00<>08:00 Sunday | RW | 1018 | | C000 hex = 1100 0000 0000 0000 | | |
| Heat_prog_7_2 | Heating program 08:00<>16:00 Sunday | RW | 1019 | | FFFF hex = 1111 1111 1111 1111 | | |
| Heat_prog_7_3 | Heating program 16:00<>24:00 Sunday | RW | 1020 | | 3FFF hex = 0011 1111 1111 1111 | | |
| Heat_prog_8_1 | Heating program 00:00<>08:00 Holiday (Jolly day) | RW | 1021 | | C000 hex = 1100 0000 0000 0000 | | |
| Heat_prog_8_2 | Heating program 08:00<>16:00 Holiday (Jolly day) | RW | 1022 | | FFFF hex = 1111 1111 1111 1111 | | |
| Heat_prog_8_3 | Heating program 16:00<>24:00 Holiday (Jolly day) | RW | 1023 | | 3FFF hex = 0011 1111 1111 1111 | | |
| Comfort_prog1_1 | Comfort program 00:00<>08:00 Monday | RW | 1024 | | F000 hex = 1111 0000 0000 0000 | | |
| Comfort_prog1_2 | Comfort program 08:00<>16:00 Monday | RW | 1025 | | 0000 hex = 0000 0000 0000 0000 | | |
| Comfort_prog1_3 | Comfort program 16:00<>24:00 Monday | RW | 1026 | | 0FFC hex = 0000 1111 1111 1100 | | |
| Comfort_prog2_1 | Comfort program 00:00<>08:00 Tuesday | RW | 1027 | | F000 hex = 1111 0000 0000 0000 | | |
| Comfort_prog2_2 | Comfort program 08:00<>16:00 Tuesday | RW | 1028 | | 0000 hex = 0000 0000 0000 0000 | | |
| Comfort_prog2_3 | Comfort program 16:00<>24:00 Tuesday | RW | 1029 | | 0FFC hex = 0000 1111 1111 1100 | | |
| Comfort_prog3_1 | Comfort program 00:00<>08:00 Wednesday | RW | 1030 | | F000 hex = 1111 0000 0000 0000 | | |
| Comfort_prog3_2 | Comfort program 08:00<>16:00 Wednesday | RW | 1031 | | 0000 hex = 0000 0000 0000 0000 | | |
| Comfort_prog3_3 | Comfort program 16:00<>24:00 Wednesday | RW | 1032 | | 0FFC hex = 0000 1111 1111 1100 | | |
| Comfort_prog4_1 | Comfort program 00:00<>08:00 Thursday | RW | 1033 | | F000 hex = 1111 0000 0000 0000 | | |
| Comfort_prog4_2 | Comfort program 08:00<>16:00 Thursday | RW | 1034 | | 0000 hex = 0000 0000 0000 0000 | | |
| Comfort_prog4_3 | Comfort program 16:00<>24:00 Thursday | RW | 1035 | | 0FFC hex = 0000 1111 1111 1100 | | |
| Comfort_prog5_1 | Comfort program 00:00<>08:00 Friday | RW | 1036 | | F000 hex = 1111 0000 0000 0000 | | |
| Comfort_prog5_2 | Comfort program 08:00<>16:00 Friday | RW | 1037 | | 0000 hex = 0000 0000 0000 0000 | | |
| Comfort_prog5_3 | Comfort program 16:00<>24:00 Friday | RW | 1038 | | 0FFC hex = 0000 1111 1111 1100 | | |
| Comfort_prog6_1 | Comfort program 00:00<>08:00 Saturday | RW | 1039 | | 8000 hex = 1000 0000 0000 0000 | | |
| Comfort_prog6_2 | Comfort program 08:00<>16:00 Saturday | RW | 1040 | | FFFF hex = 1111 1111 1111 1111 | | |
| Comfort_prog6_3 | Comfort program 16:00<>24:00 Saturday | RW | 1041 | | 0FFF hex = 0000 1111 1111 1111 | | |
| Comfort_prog7_1 | Comfort program 00:00<>08:00 Sunday | RW | 1042 | | 8000 hex = 1000 0000 0000 0000 | | |
| Comfort_prog7_2 | Comfort program 08:00<>16:00 Sunday | RW | 1043 | | FFFF hex = 1111 1111 1111 1111 | | |
| Comfort_prog7_3 | Comfort program 16:00<>24:00 Sunday | RW | 1044 | | 0FFF hex = 0000 1111 1111 1111 | | |

| USER LEVEL: READ/WRITE SETTINGS | | | | | | | |
|---------------------------------|---|--------|---------|--|-----------|--|--------------------|
| Parameter | Description | Access | Address | Notes | Data type | Example | Default |
| Active services | OFF, summer mode (DHW only), winter mode (heating + DHW) | RW | 1106 | 0 = OFF 1 = DHW only (summer mode) 2 = Heating + DHW (winter mode) | u8 | - | 0 = OFF |
| T_DHW_set | DHW setpoint | RW | 1107 | From 40 to 60°C | u16 | 01E0 hex = 480 = 48.0 °C | 48 °C |
| T_DHW_maxreturn | Max primary return temp. in DHW mode | RW | 1108 | From 15 to 45°C | u16 | 012C hex = 300 = 30.0 °C | 30 °C |
| T_heat_set | Heating setpoint | RW | 1109 | From 25 to 45°C (reg. 2019 = 1) From 45 to 75°C (reg. 2019 = 0) | u16 | 015E hex = 480 = 35.0 °C | 35 °C |
| T_heat_maxreturn | Max primary return temp. in heating mode | RW | 1110 | From 15 to 42°C (reg. 2019 = 1) From 30 to 70°C (reg. 2019 = 0) | u16 | 012C hex = 300 = 30.0 °C | 30 °C |
| Time_h | Hour of the day (0-24) | RW | 1111 | From 0 to 23 | u8 | 0014 hex = 20 = 8 p.m. | - |
| Time_min | Minutes | RW | 1112 | From 0 to 59 | u8 | 001E hex = 30 | - |
| Time_day | Day of the week | RW | 1113 | 1 = First day of the week 2 = next day ... 7 = last day of the week | u8 | 0001 hex = 1 = first day of the week | - |
| T_set_day | Day set temperature when in auto mode | RW | 1114 | From 5 to 30°C OFFSET 5°C on Modbus (see example) | u16 | 0096 hex = 150 = 15.0°C +5°C OFFSET = 20.0°C | 20 |
| T_set_night | Night set temperature when in auto mode | RW | 1115 | | u16 | | 18 |
| T_set_manual | Manual set point temperature | RW | 1116 | | u16 | | 21 |
| Automode | Manual/auto/holiday mode | RW | 1117 | 0 = Manual mode 1 = AUTO mode 2 = Holiday mode | u8 | 0001 hex = 1 = AUTO mode | AUTO |
| Interface_mode | Defines whether the interface is left on board (thermostat function disabled) | RW | 1118 | p00 on the interface | u8 | 0001 hex = 1 = thermostat enabled | Thermostat enabled |
| Offset_ambient | Offset for correction of the ambient temperature | RW | 1119 | p01 on the interface OFFSET 5°C on Modbus (see example) | u8 | 0039 hex = 57 = 5.7°C - 5°C OFFSET = 0.7°C correction | 0 |
| Antifreeze | Ambient temperature at which the antifreeze function starts | RW | 1120 | p02 on the interface | u8 | 0050 hex = 80 = 8.0°C | 8 |
| Diff_OFF | Temperature differential with respect to the set point to stop the heating cycle | RW | 1121 | p03 on the interface | u8 | 0001 hex = 1 = 0.1°C | 0,1 |
| Diff_ON | Temperature differential with respect to the set point to start the heating cycle | RW | 1122 | p04 on the interface OFFSET 1°C on Modbus (see example) | u8 | 0009 hex = 9 = 0.9°C -1° OFFSET = -0.1°C temp. differential | 0,1 |

| TECHNICAL LEVEL: READ ONLY INFO | | | | | | | |
|---------------------------------|--|--------|---------|--|-----------|--|---------|
| Parameter | Description | Access | Address | Notes | Data type | Example | Default |
| Serial_LO | Serial number, lowest digits | R | 2003 | | u8+u8 | 05-13 hex = the first 4 digits of the serial number are 19 05 | - |
| Serial_MD | Serial number, medium digits | R | 2004 | | u8+u8 | 04-12 hex = digits from 5th to 8th are 18 04 | - |
| Serial_HI | Serial number, highest digits | R | 2005 | | u8+u8 | 0E-10 hex = digits from 9th to 12th are 16 14 Full serial number = 190518041614 | - |
| IDB | Modbus primary address | R | 2006 | (1) | u8 | 000A hex = 10 | 1 |
| Info_day | Number of days the HIU has been ON | R | 2007 | | u16 | 016D hex = 365 | - |
| Info_heathours | Number of hours the HIU has been in heating mode | R | 2008 | | u16 | 0258 hex = 600 | - |
| Info_cycles_heat_LO | # heating cycles, lowest bytes | R | 2010 | | u32/LO | LO = 1170 hex, HI = 0001 hex | - |
| Info_cycles_heat_HI | # heating cycles, highest bytes | R | 2011 | | u32/Hi | 0001 1170 hex = 70000 | - |
| Info_cycles_DHW_LO | # DHW cycles, lowest bytes | R | 2014 | | u32/LO | LO = 1170 hex, HI = 0001 hex | - |
| Info_cycles_DHW_HI | # DHW cycles, highest bytes | R | 2015 | | u32/Hi | 0001 1170 hex = 70000 | - |
| Info_cycles_Comf_LO | # Comfort cycles, lowest bytes | R | 2016 | | u32/LO | LO = 1170 hex, HI = 0001 hex | - |
| Info_cycles_Comf_HI | # Comfort cycles, highest bytes | R | 2017 | | u32/Hi | 0001 1170 hex = 70000 | - |
| # accesses | # accesses to the protected parameters | R | 2018 | | u8 | 000F hex = 15 | 0 |
| SATK model | Code describing the SATK model | R | 3000 | 10 = SATK2210. 20 = SATK2220. 30 = SATK2230. 40 = SATK3210. | u8 | 0028 hex = 40 = SATK3210. | - |

| TECHNICAL LEVEL: READ/WRITE SETTINGS | | | | | | | |
|--------------------------------------|--|--------|---------|---|-----------|---|---------------------|
| Parameter | Description | Access | Address | Notes | Data type | Example | Default |
| Heat_T_range | Heating temperature range | RW | 2019 | t00 technical menu 0 = 45-75°C (high temperature mode) 1 = 25-45°C (low temperature mode) | u8 | 0001 hex = 1 = low temp. mode | 1 = 25-45°C |
| Heat_mode | Heating temperature control mode | RW | 2020 | t01 technical menu 0 = fixed set point 1 = fixed set point with RTL 2 = with compensation on the return 3 = with weather compensation | u8 | 0000 hex = 0 = fixed set point | 0 = fixed set point |
| Comfort_mode | Comfort mode | RW | 2021 | t02 technical menu 0=pre-heating 1=DHW recirculation | u8 | 0001 hex = 1 = DHW recirculation | 0 = pre-heating |
| N%_heat_max | Max opening % of the heating motor | RW | 2022 | t03 technical menu Range 50 - 100 | u8 | 0048 hex = 75 = 75% | 100 |
| N%_DHW_max | Max opening % of the DHW motor | RW | 2023 | t04 technical menu Range 50 - 100 | u8 | 0048 hex = 75 = 75% | 100 |
| Relay | Auxiliary contact configuration | RW | 2024 | t05 technical menu See instruction manual | u8 | 0007 hex = 7 = 1+2+4 (see manual) | 0 |
| DHW_mode | DHW temperature control mode | RW | 2025 | t06 technical menu 0 = fixed set point 1 = fixed set point with RTL | u8 | 0000 hex = 0 = fixed set point | 0 = fixed set point |
| Freeze | Freezing of return temperature set points | RW | 2026 | t07 technical menu 0 = unlocked 1 = locked | u8 | 0001 hex = 1 = set points locked | 1 = locked |
| t_recirculation | Duration of the recirculation cycle (in tenths of seconds) | RW | 2028 | t09 technical menu 1 unit = 10 seconds | u8 | 000C hex = 12 = 120 seconds | 12 = 120 seconds |
| Antilegionella | Enabling of antilegionella function | RW | 2029 | t08 technical menu 0 = OFF 1 = ON | u8 | 0000 hex = 0 = OFF | 0 = OFF |
| Firmware version | Firmware version | R | 2030 | | ASCII+u8 | 430A: 43 = 63 = ASCII("C") 0A = 10 Firmware version = C10 | - |
| Comfort_operation | Setting of the pre-heating/recirculation function | RW | 2031 | Accesible from SET menu 0 = OFF 1 = PROG 2 = ON | u8 | 0002 hex = 2 = always ON | 1 = PROG |