

FCCA8-DM | FREE COOLING CONTROLLER

Modbus register map



MODBUS REGISTER MAP

INPUT REGISTERS						
Input register		Data Type	Description	Raw Data Range	Resolution / Unit	Values
↓ General ↓						
1	Device status – errors	R	Shows the critical faults of the specific device part. For example, 'Internal Voltage Fault' indicates that the connected power supply is not supported by the controller. 'Memory Fault' indicates an error with the microcontroller.	Bitwise b0–b15		b0 = Reserved b1 = Internal Voltage Fault b2 = Memory Fault b3–b15 = Reserved
2	Device status – warnings	R	Shows non-critical warnings related to the specific device part. For example, "Internal Voltage Warning" indicates that the internal power supply is out of range.	Bitwise b0–b15		b0 = Reserved b1 = Internal Voltage Warning b2–b15 = Reserved
↓ Analogue Output ↓						
11	Analogue output level	R	Shows the current analogue output level.	0–1.000	1/10 %	500 = 50 % Output
↓ Relay Output ↓						
21	Relay state	R	Shows the state of the relay.	0–1		0 = OFF 1 = ON
↓ Temperature Probe 1 ↓						
31	Outdoor temperature sensor state	R	Shows the state of the outdoor temperature sensor.	0–2		0 = Connected 1 = Not Connected 2 = Short Circuit
32	Outdoor temperature	R	The measured outdoor temperature value.	-185–550	1/10 °C	-185 = -18,5 °C 550 = 55 °C
↓ Temperature Probe 2 ↓						
33	Indoor temperature sensor state	R	Shows the state of the indoor temperature sensor.	0–2		0 = Connected 1 = Not Connected 2 = Short Circuit
34	Indoor temperature	R	The measured indoor temperature value.	-185–550	1/10 °C	-185 = -18,5 °C 550 = 55 °C

INPUT REGISTERS

Input register	Data Type	Description	Raw Data Range	Resolution / Unit	Values
↓ Application ↓					
41	Application state	R	Shows the current application state.	1-212	1 = Idle 6 = Override Control 100 = Pre Alarm 101 = Alarm 102 = Post Alarm 104 = Locked Alarm 211 = Variable Speed Control 212 = Fixed Speed Control
42	Variable speed control state	R	Shows the current status of the sub-state machine.	1-9	1 = Standby 2 = Damper Start Up 3 = Always ON 4 = Ramp Up 5 = Ramp Down 6 = Reserved 7 = Shutting down 8 = Fan coast-down 9 = Boost
43	Fixed speed control state	R	Shows the current status of the sub-state machine.	1-9	1 = Standby 2 = Damper Start Up 3 = Always ON 4 = Reserved 5 = Reserved 6 = Run State 7 = Shutting down 8 = Fan coast-down 9 = Boost
44	Critical HW alarm	R	Shows the critical faults of the application. For example, it indicates sensor errors with one of the sensors ("Outdoor Temperature Sensor Fault" or "Indoor Temperature Sensor Fault") or other hardware defects. When b0 "Device Status – Errors" is present, refer to Input register 1 (Device status – errors) for additional information.	Bitwise b0 is LSB	- b0 = Device Status – Errors - b1 = Outdoor Temperature Sensor Fault - b2 = Indoor Temperature Sensor Fault - b3-b15 = Reserved
45	HW warnings	R	Shows non-critical warnings of the application. When bit 0 "Device status – Warnings" is present, refer to input register 2 for additional information.	Bitwise b0 is LSB	- b0 = Device Status – Warnings - b1-b15 = Reserved

Note: The input registers can be read via the Modbus command: "Read input registers".

HOLDING REGISTERS

Holding register		Data Type	Description	Raw Data Range	Resolution / Unit	Values	Factory Default Values
↓ General ↓							
1	Device slave address	R/W	Modbus device address.	1-247			1
2	Modbus baud rate	R/W	Modbus communication baud rate.	0-6		0 = 4.800 1 = 9.600 2 = 19.200 3 = 38.400 4 = 57.600 5 = 115.200 6 = 230.400	2
3	Modbus parity	R/W	Parity check mode.	0-2		0 = 8N1 1 = 8E1 2 = 8O1	1
4	Device type	R	Sentera article code of the device.	XXXX		Device specific	1056 = FCCA8-DM
5	HW version	R	Hardware version of the device.	XXXX		Hardware version specific 0x0100 = HW version 1.00	Depends on the hardware release
6	FW version	R	Firmware version of the device.	XXXX		Firmware version specific 0x0100 = FW version 1.00	Depends on the firmware release
9	Modbus network resistor termination (NBT)	R/W	To avoid communication losses and reflections on the Modbus line, the NBT in two devices (at both ends of the line) must be activated.	0-1		0 = NBT Disconnected 1 = NBT Connected	0
10	Modbus registers reset		To reset the Modbus Holding registers to their default values, set this register to "1". After the reset is completed, the register is automatically set back to "0".	0-1		0 = Idle 1 = Reset Modbus Registers	0

HOLDING REGISTERS

Holding register		Data Type	Description	Raw Data Range	Resolution / Unit	Values	Factory Default Values
↓ Analogue Output ↓							
11	Analogue output type	R/W	Select the analogue / modulating output type.	0–6		0 = 0–10 VDC 1 = 0–20 mA 2 = PWM 12 VDC 3 = PWM Open Collector 4 = 2–10 V 5 = 4–20 mA 6 = 0–5 V	0
12	Analogue output start /minimum/ pre-shutdown value	R/W	The lowest valid output signal that corresponds to the minimum guaranteed fan speed specified by the fan manufacturer. Any output value below this threshold is treated as a zero output. Removes dead zones of the fan. This is the minimum fan speed permitted during start and pre-shutdown in application operation.	0–800	1/10 %	200 = 20 % Output	200
13	Maximum analogue output value	R/W	The highest valid output signal that corresponds to the maximum guaranteed fan speed specified by the fan manufacturer. Any output value above this limit does not increase the physical speed of the fan. Removes dead zones of the fan. This is the maximum fan speed permitted during application operation.	200–1.000	1/10 %	1.000 = 100 % Output	1.000
14	Analogue output override value	R/W	Override and Boost control value for the analogue output. This parameter is not limited by the analogue output range (HR12 , HR13).	0–1.000	1/10 %	1.000 = 100 % Output	500
15	Analogue output source	R/W	Indicates the actual source that controls the analogue output.	0–1		0 = Auto (Application, based on sensor measurements) 1 = Override	0
16	Analogue output always ON	R/W	Enables continuous fan operation at the configured minimum speed, specified in HR12 . If the application requests zero output, the fan runs at minimum speed instead of stopping. This setting does not override fault conditions.	0–1		0 = Disable 1 = Enable	0
↓ Relay Output ↓							
31	Relay output override value	R/W	Override value for the relay output.	0–1		0 = OFF 1 = ON	1
32	Relay output source	R/W	Indicates the actual source that controls the relay output.	0–1		0 = Auto (Application, based on sensor measurements) 1 = Override	0

HOLDING REGISTERS

Holding register		Data Type	Description	Raw Data Range	Resolution / Unit	Values	Factory Default Values
↓ Free Cooling Configuration ↓							
61	Indoor temperature setpoint	R/W	Defines the desired indoor temperature.	0-300	1/10 °C	200 = 20 °C	230
62	Delta temperature threshold	R/W	Defines the minimum temperature difference required between the indoor and the outdoor air before free cooling is allowed.	10-200	1/10 °C	200 = 20 °C	20
↓ Free Cooling Fan Control ↓							
81	Damper closing time	R/W	Refers to the period required for the fan to come to a complete stop after the control signal has been set to zero. Required for damper-equipped systems to prevent mechanical damage.	0-300	1	60 = 60 seconds	60
82	Analogue output minimum runtime	R/W	The analogue output runs at pre-shut down speed (HR12) until specified time. As long as the minimum runtime has not elapsed, the motor will not come to a complete stop. The analogue output signal will never drop below the minimum value (HR12) before the minimum runtime has elapsed. The minimum runtime starts running when the motor starts.	0-10	1	10 = 10 minutes	2
83	Damper opening time	R/W	The time required for the damper to fully open.	0-300	1	60 = 60 seconds	60
84	Application fixed fan speed	R/W	Fixed fan speed used during free cooling operation. When the set value is higher than 0 %, the fan operates at the configured fixed speed whenever free cooling conditions are met. If the value is set to 0 %, it disables the fixed-speed operation and allows temperature-based fan speed modulation.	0-1.000	1/10 %	500 = 50 % Output	0
85	Boost timeout	R/W	Duration for which the fan operates at boost speed (HR14) after the boost button is pressed. During boost mode, free-cooling conditions are ignored. Application control resumes when the timer expires.	1-30	1	10 = 10 minutes	10

HOLDING REGISTERS

Holding register	Data Type	Description	Raw Data Range	Resolution / Unit	Values	Factory Default Values
↓ LED Indication ↓						
91	LED indication Brightness	R/W	Selection of LED indication brightness.	0-10	0 = Off 1 = 10 % Brightness 2 = 20 % Brightness 3 = 30 % Brightness 4 = 40 % Brightness 5 = 50 % Brightness 6 = 60 % Brightness 7 = 70 % Brightness 8 = 80 % Brightness 9 = 90 % Brightness 10 = Full Brightness	5

Note: The holding registers can be managed via the following Modbus commands: "Read Holding Registers", "Write Single Register" or "Write Multiple Registers".

The free Sentera configuration and monitoring software 3SModbus can be downloaded via: <https://www.sentera.eu/en/3SMCenter>