Arcus-EDS

Application Description

SK08-T8

KNX Controller 8-Channel Temperature for PT1000

802 e4

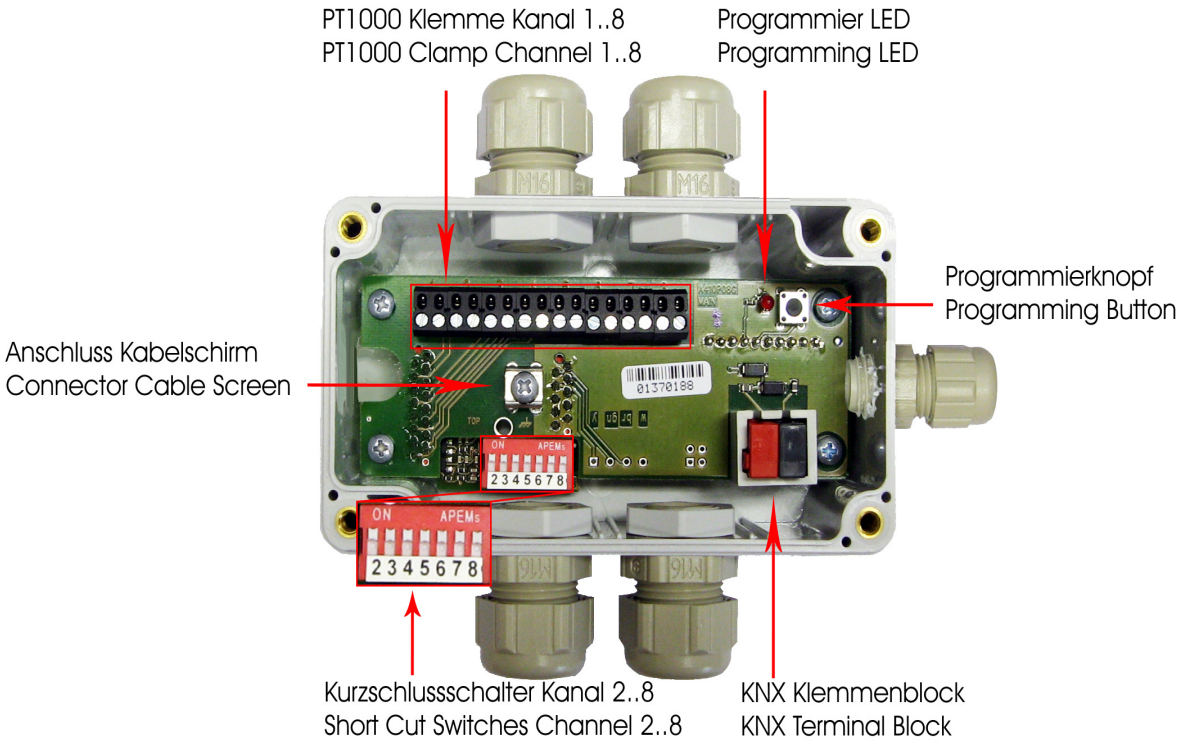
Operating Principals and Areas of Application:

The production series S8 uses sensors and controllers for a number of physical and chemical measurements for indoor and outdoor areas.

The measuring system SK08-T8 records the temperatures using PT1000 for 8 different measuring points. The sensors change their resistance with the temperature. This change is converted electronically and displayed on the KNX bus. Any standard temperature sensor can be used, provided it is PT1000 compatible.

A number of controller models with various functions are available.

The devices in the series MS08 come in a housing for surface mounting with PG single connection for EIB/KNX insert and several connections for the sensor cable.



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Application and Functions:

KNX sensors are set up using the ETS (KNX Tool Software) with the associated application program SK08-T8. The device is delivered unprogrammed. All functions are parameterized and programmed by ETS. The controller can be switched on or off by activation or locking via the KNX bus.

Functions:

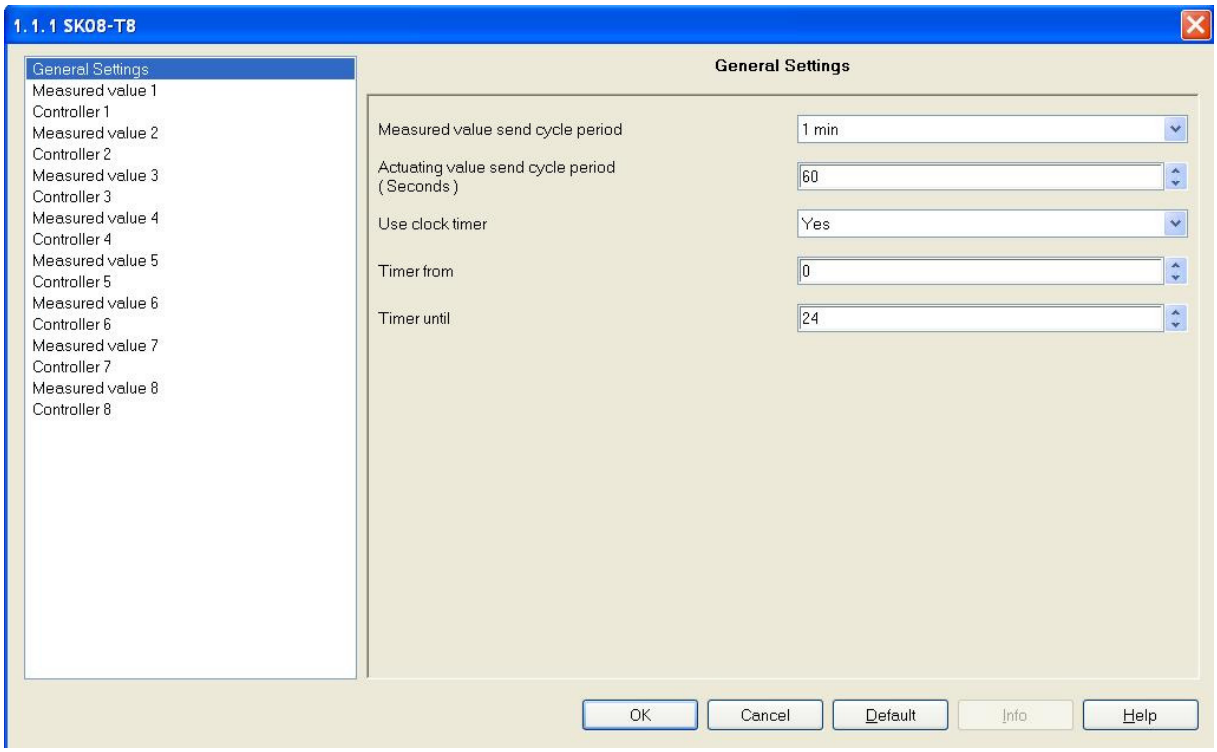
- 8 * Temperature measurements with the following:
- Two position controller with switch and pulse 1-bit output or
- PI controller with continuous 8-bit or pulse-width modulated 1-bit output
- Adjustable periodic display of control variable : no periodic display /10-250 seconds
- Adjustable release and lock with all controllers
- Threshold alarm for upper and lower thresholds
- Auxiliary quantity of set value or threshold via the bus
- Calibration of the sensor (offset cancellation)

General Settings:

Periodic Measured Data Cycle: Measured data to be periodically displayed can be configured from a length of 1 to 120 minutes.

Periodic Actuating Variable Cycle: The actuating variable cycle can be set between 10 and 250 seconds.

To display the measured data periodically use the measured data settings; to display the control variable periodically use the controller settings.



When using the **internal timer**, there are two additional objects for the system-time and –date available. Each controller can be locked independent from each other depending on the time. In this page you can set whether the timer is used at all and the span of time the controllers are active. Whether the timer is used for a controller is determined at his parameter page.

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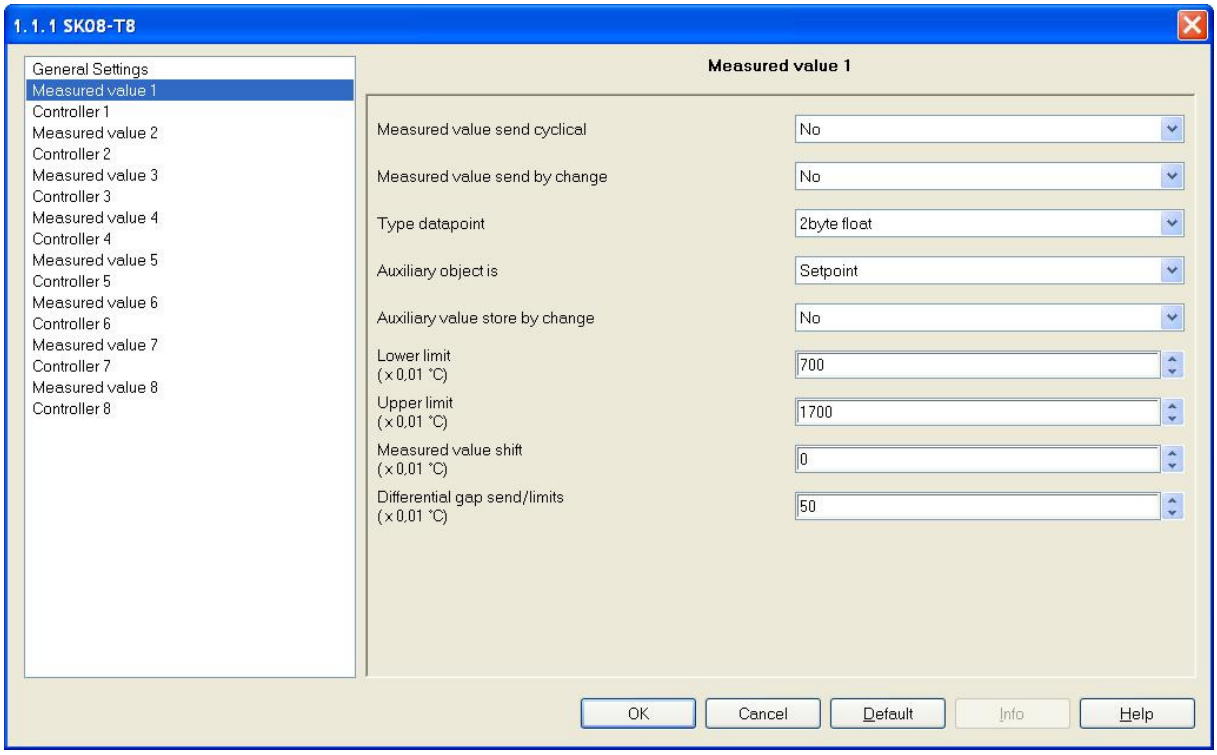
Measured Data T1 … T8 :

Measured value send cyclical: Yes/No The display period is set in General Settings.

Measured value send by change: Yes/No The threshold is defined in "Display Differential Gap/Threshold".

Value Type: 1-byte Integer /2-byte Integer /2-byte float/4-byte float Measured Data Output and Auxiliary data are defined concurrently.



Auxiliary Object is: Set point/Upper Threshold/Lower Threshold Every controller has an auxiliary object which can control either the set point of the controller or the limit values.

Auxiliary value store by change: Yes/No When the auxiliary data is changed the new value is carried over to EEPROM and saved in case of a bus voltage breakdown. This should be used only when the data is not frequently changed as EEPROM has only a limited memory cycle.

Lower Threshold: -99,99 … +99,99 °C

Upper Threshold: -99,99 … +99,99 °C

Measured value shift: -99,99 … +99,99 °C A calibration/offset adjustment of the sensors can occur when the measured displacement is offset due to cable length or other known external influences.

Differential gap send/limits: 0 … 10 °C To reduce the bus load when a value is changed and to avoid multiple switching between measured data and thresholds, a hysteresis between 0,1 and 1°C should be used.

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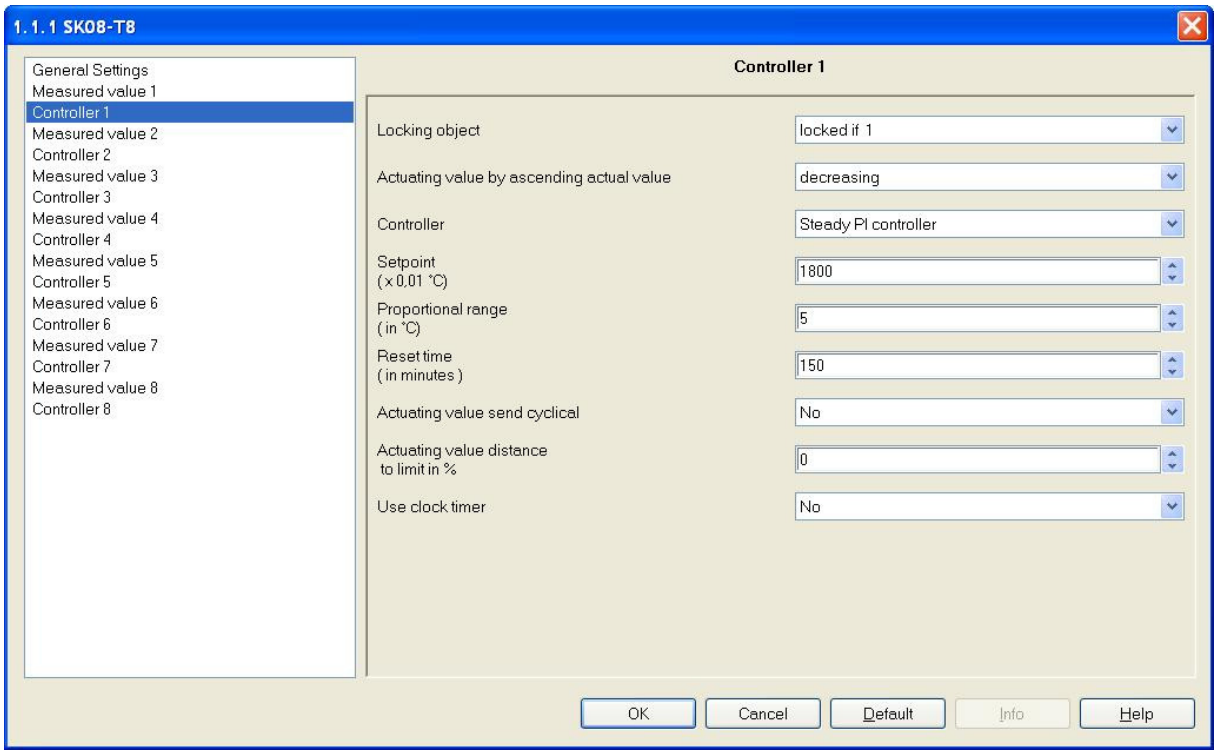
Controller T1 … T8 :

Locking object: locked if 0/locked if 1 When using the lock function the controller output is deactivated. The lock function can be set up for "release" or "lock".



Actuating value by ascending actual value: decrease/increase The Actuating direction of the controller can be adapted to the characteristics of the controlled system.

Set point: -99,99 … +99,99 °C

Controller: Two-position Controller / Pulsed Two-position Controller / Continuous PI Controller / Switching PI Controller These controller models and their applicable parameters are covered in the section "Controller Algorithms".

Actuating value send cyclical: Yes/No The cycle period is set in "General Settings"

Actuating value distance to limit in %: 0…50 When the lower threshold is surpassed 0% is set, when the upper threshold is surpassed 100% will be set. This is important for actuators which do not operate reliably at threshold levels.

Use clock timer: Yes/No The use of the clock timer can be enabled/disabled for each channel separately.

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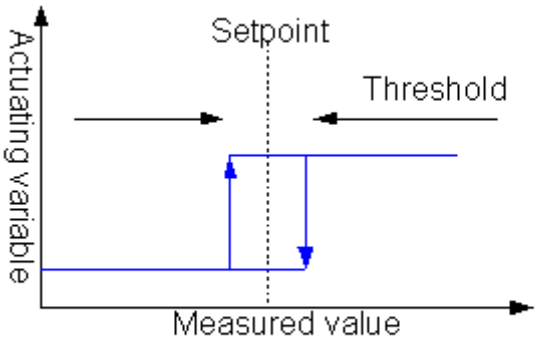
Controller Algorithms:

Controller models available are the PI controller or a two-position controller. Both controllers are equipped with pulsed output. The pulsed two-position controller works with constant duty cycle, which like the cycle duration is parameterized. The duty cycle of the pulsed PI controller is variable and depends on the control variable (pulse-width modulation).

Two-Position Control:

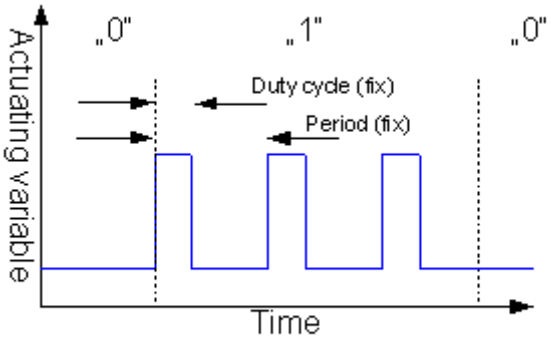
Two-position control is a very simple way of controlling. Once the actual value (+/- half the switching difference) exceeds or falls below the set point a switch-on or switch-off command is sent to the bus. Set the differential gap large enough to keep bus load to a minimum and configure the differential gap small enough to avoid extreme actual value fluctuations.

The two-position controller is parameterized using the set point and the switching threshold.



Two-Position Control with Pulsed Output:

The controller works analogous to the two-position controller, but the actuating variable emits pulses with fixed duty cycle.



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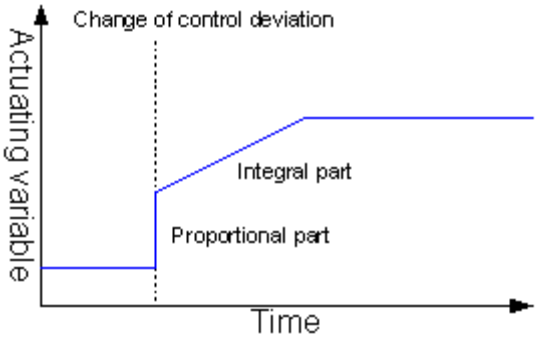
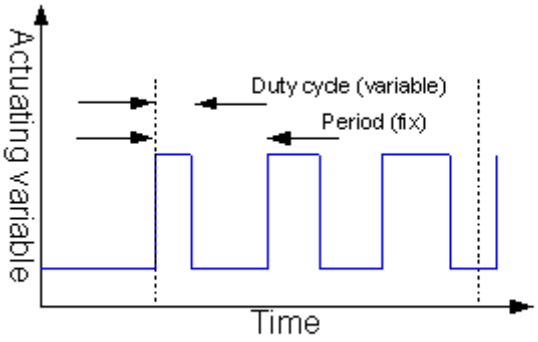
Continuous PI Control:

To understand a PI controller one should think of an algorithm consisting of a proportional and integral part. By combining these two parts it is possible to get a quick and exact adjustment of the actuating variable. The controller calculates the control variable every second. It can constantly be updated and is displayed periodically (value parameterized) by the PI controller. Through the integral part an offset is adjusted to 0 over a certain period of time.



Continuous PI Control with Pulsed Output (PWM):

The controller works analogous to the PI controller, but the actuating variable emits pulses with a variable duty cycle. PWM control sets the cycle duration of the transmission interval. This allows a permanent on and off within the cycle time with object 15, which reaches an average valve position. When the control variable reaches 40% in a cycle time of 10 minutes it will repeatedly turned on for 4 minutes and turned off for 6 minutes.



General Rules for Adjusting the PI Parameter:

The reset time must be significantly larger than the delay time of the control system. The proportional area corresponds to the reinforcement of the control circuit. The smaller the proportional area, the larger the reinforcement is.

Parameters	**Effect**
Low Proportional Area	Large overshooting of set point balance (potential for constant oscillation), quick set point reset
High Proportional Area	Little or no overshooting, but slow reset
Short Integration Time	Quick adjustment of control deviations (based on conditions) danger of constant oscillation

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Long Integration Time	Slow adjustment of control deviations

Object Table for Application SK08-T8:

Number	Name	Object Function	Length
0	Output,sensor status sho...	Output status	1 Byte
1	Output,sensor status break	Output status	1 Byte
2	Output, measured value ...	Measured value	2 Byte
3	Input, auxiliary object K1	Auxiliary object	2 Byte
4	Output, upper limit K1	Limit	1 bit
5	Output, lower limit K1	Limit	1 bit
6	Output, controller K1	Actuating value	1 Byte
7	Input, enable/lock K1	Enable/lock	1 bit
8	Output, Object status K1	Channel status	1 Byte
9	Output, measured value ...	Measured value	2 Byte
10	Input, auxiliary object K2	Auxiliary object	2 Byte
11	Output, upper limit K2	Limit	1 bit
12	Output, lower limit K2	Limit	1 bit
13	Output, controller K2	Actuating value	1 Byte
14	Input, enable/lock K2	Enable/lock	1 bit
15	Output, Object status K2	Channel status	1 Byte
16	Output, measured value ...	Measured value	2 Byte
17	Input, auxiliary object K3	Auxiliary object	2 Byte
18	Output, upper limit K3	Limit	1 bit
19	Output, lower limit K3	Limit	1 bit
20	Output, controller K3	Actuating value	1 Byte
21	Input, enable/lock K3	Enable/lock	1 bit
22	Output, Object status K3	Channel status	1 Byte
23	Output, measured value ...	Measured value	2 Byte
24	Input, auxiliary object K4	Auxiliary object	2 Byte
25	Output, upper limit K4	Limit	1 bit
26	Output, lower limit K4	Limit	1 bit
27	Output, controller K4	Actuating value	1 Byte
28	Input, enable/lock K4	Enable/lock	1 bit
29	Output, Object status K4	Channel status	1 Byte
30	Output, measured value ...	Measured value	2 Byte
31	Input, auxiliary object K5	Auxiliary object	2 Byte
32	Output, upper limit K5	Limit	1 bit
33	Output, lower limit K5	Limit	1 bit
34	Output, controller K5	Actuating value	1 Byte
35	Input, enable/lock K5	Enable/lock	1 bit
36	Output, Object status K5	Channel status	1 Byte
37	Output, measured value ...	Measured value	2 Byte
38	Input, auxiliary object K6	Auxiliary object	2 Byte
39	Output, upper limit K6	Limit	1 bit
40	Output, lower limit K6	Limit	1 bit
41	Output, controller K6	Actuating value	1 Byte
42	Input, enable/lock K6	Enable/lock	1 bit
43	Output, object status K6	Channel status	1 Byte
44	Output,measured value K7	Measured value	2 Byte
45	Input, auxiliary object K7	Auxiliary object	2 Byte
46	Output, upper limit K7	Limit	1 bit
47	Output, lower limit K7	Limit	1 bit
48	Output, controller K7	Actuating value	1 Byte
49	Input, enable/lock K7	Enable/lock	1 bit
50	Output, Object status K7	Channel status	1 Byte
51	Output, measured value ...	Measured value	2 Byte
52	Input, auxiliary object K8	Auxiliary object	2 Byte
53	Output, upper limit K8	Limit	1 bit
54	Output, lower limit K8	Limit	1 bit
55	Output, controller K8	Actuating value	1 Byte
56	Input, enable/lock K8	Enable/lock	1 bit
57	Output, Object status K8	Channel status	1 Byte
58	Equipment time	Time	3 Byte
59	Equipment date	Date	3 Byte

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The measured value objects change their width with the chosen type

The Status Functions 0 und 1 are coded as follows:

Sensor Number	Bit Number	Hexadecimal Value
1	0	0x01
2	1	0x02
3	2	0x04
4	3	0x08
5	4	0x10
6	5	0x20
7	6	0x40
8	7	0x80

The values of the individual bits are added and transmitted to the bus. Short circuits are tolerated and you have to short-circuit the channel if it is not used. Interruptions are not tolerated and will lead to a distortion in the measured data of the other channels. If several interruptions appear, all short circuit switches should be set and then resolved one by one until the interrupted sensor is found.

The Status Functions 8/15/22/29/36/43/50/57 are coded as follows:

Description	Bit Number	Hexadecimal value
Upper Threshold Exceeded	0	0x01
Lower Threshold Surpassed	1	0x02
Actuating Variable does not equal 0	2	0x04
Lock Active	4	0x08
Save Auxiliary Quantity	5	0x10

The values of the individual bits are added and transmitted to the bus. The status functions monitor the controller status for purposes of reporting and troubleshooting.

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