

Details for implementation of PROFIBUS PA interface with Liquisys S CCM 223 / CCM 253

Scope

This file is effective for the following software versions:

Liquisys S CCM 223 / CCM 253 PROFIBUS PA: 2.10

This file contains additional information to the operating manuals of Liquisys S CCM 223 / CCM 253 with a PROFIBUS PA communication interface.

Cyclic Service of Liquisys S CCM 223 / CCM 253

The telegram of the cyclic service of Liquisys S CCM 223 / CCM 253 has the following format:

byte	data item	access	data format	unit
0, 1, 2, 3	main measured value	r	32-bit floating point number (IEEE-754)	CCM223 / CCM253 : mg/l
4	status of main measured value	r	80h ¹ = O.K.	-
5, 6, 7, 8	temperature measured value	r	32-bit floating point number (IEEE-754)	°C
9	status of temperature measured value	r	80h = O.K.	-
10,11,12,13	pH/Redox measured value	r	32-bit floating point number (IEEE-754)	ph or mV
14	status of pH/Redox measured value	r	80h = O.K.	-

The cyclic telegram can be tailored to meet the requirements of a specific process. The above table reflects the maximum contents of a cyclic diagram.

In case not all outputs of Liquisys S CCM 223 / CCM 253 are required, any combination of blocks can be eliminated from the cyclic telegram. This can be achieved by a “negative” selection in configuration tool. By eliminating blocks from the telegram, the throughput of a PROFIBUS PA system can be improved.

To achieve the correct assignment of the data items in the cyclic telegram, the PROFIBUS master has to send a FREE_PLACE (0) for the inactive blocks.

¹ 80h means 80 hex

Example:

byte	data item	status	configuration data ²
--	main measured value	inaktiv	0
0 .. 4	temperature measured value + status	aktiv	42h, 84h, 08h, 05h
--	pH/Redox measured value + Status	inaktiv	0

The cyclic telegram of this example contains 5 bytes of device data. The configuration data string (CHK_CFG) is: 0, 42h, 84h, 8h, 5h, 0.

byte	data item	status	configuration data
0 .. 4	main measured value	aktiv	42h, 84h, 08h, 05h
--	temperature measured value + status	inaktiv	0
5 .. 9	pH/Redox measured value + Status	aktiv	42h, 84h, 08h, 05h

The cyclic telegram of this example contains 5 bytes of device data. The configuration data string (CHK_CFG) is: 42h, 84h, 8h, 5h, 0, 42h, 84h, 8h, 5h.

byte	data item	status	configuration data
0 .. 4	main measured value	aktiv	42h, 84h, 08h, 05h
5 .. 9	temperature measured value + status	aktiv	42h, 84h, 08h, 05h
--	pH/Redox measured value + Status	inaktiv	0

The cyclic telegram of this example contains 5 bytes of device data. The configuration data string (CHK_CFG) is: 42h, 84h, 8h, 5h, 42h, 84h, 8h, 5h, 0.

² Depending on the PROFIBUS Master

Miscellaneous

- The implementation of the physical layer IEC 1158-2 ensures, that a reverse polarity on the signal lines has no effect on the functionality of the device.
- Proper cables for the signal lines are e.g. Belden 3097A or Siemens 6XY 1830-5AH10.
- 32-bit floating point number in IEEE-754 format:

byte n			byte n+1			byte n+2			byte n+3		
bit7	bit 6	bit 0	bit7	bit 6	bit 0	bit 7		bit 0	bit 7		bit 0
S	2 ⁷	2 ⁶ 2 ⁵ 2 ⁴ 2 ³ 2 ² 2 ¹	2 ⁰	2 ⁻¹	2 ⁻² 2 ⁻³ 2 ⁻⁴ 2 ⁻⁵ 2 ⁻⁶ 2 ⁻⁷	2 ⁻⁸	2 ⁻⁹ 2 ⁻¹⁰ 2 ⁻¹¹ 2 ⁻¹² 2 ⁻¹³ 2 ⁻¹⁴ 2 ⁻¹⁵		2 ⁻¹⁶	2 ⁻¹⁷ 2 ⁻¹⁸ 2 ⁻¹⁹ 2 ⁻²⁰ 2 ⁻²¹ 2 ⁻²² 2 ⁻²³	
Sign	exponent		mantissa			mantissa			mantissa		

Formula: **Value** = $(-1)^S * 2^{(\text{exponent} - 127)} * (1 + \text{mantissa})$

Example: 40 F0 00 00 h = 0100 0000 1111 0000 0000 0000 0000 0000 b

$$\begin{aligned}
 \text{Value} &= (-1)^0 * 2^{(129 - 127)} * (1 + 2^{-1} + 2^{-2} + 2^{-3}) \\
 &= 1 * 2^2 * (1 + 0,5 + 0,25 + 0,125) \\
 &= 1 * 4 * 1,875 \\
 &= 7,5
 \end{aligned}$$

- Coding of status according to „PROFIBUS PA Profile for Process Control Devices - General Requirements“ V 2.0:

STATUS-CODE (HEX)	MEANING	DEVICE-CONDITION
08	not connected (no measvalue available)	BAD
0C	device failure	BAD
80	ok	GOOD
44	last usable value	HOLD