

Details for implementation of PROFIBUS- DP (EN50170) interface with Liquisys S CPM 223 / CPM 253 DP

Scope

This file is effective for the following software versions:

Liquisys S CPM 223 / CPM 253 PROFIBUS DP: 2.04

This file contains additional information to the operating manuals of Liquisys S CPM 223 / CPM 253 DP with a PROFIBUS DP communication interface due to the PROFIBUS- DP standard, EN 50170. This means, that you can exchange data with all masters, which fulfill this standard. But this doesn't mean that all tasks of this standard which are available can be also supported.

The max. PROFIBUS- DP bus speed is 12 MBaud.

Cyclic Service of Liquisys S CPM 223 / CPM 253 DP

The telegram of the cyclic service of Liquisys S CPM 223 / CPM 253 DP 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)	CPM223 / CPM253 : ph, mV, %
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.	-

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 CPM 223 / CPM 253 DP 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 DP system can be improved.

¹ 80h means 80 hex

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. Example:

byte	data item	status	configuration data ²
--	main measured value	inactiv	0
0 .. 4	temperature measured value + status	activ	42h, 84h, 08h, 05h

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

Miscellaneous

- 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
0C	device failure	BAD
80	ok	GOOD
44	last usable value	HOLD

² Depending on the PROFIBUS Master