

Details for implementation of PROFIBUS PA interface with Smartec S CLD132

Scope

This file is effective for the following software versions:

Smartec S CLD132 PROFIBUS PA: 1.00 or higher

This file contains additional information to the operating manuals of Smartec S CLD132 with a PROFIBUS PA communication interface.

Cyclic Service of Smartec S CLD132

The telegram of the cyclic service of Smartec S CLD132 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)	mS/cm, %
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	operating mode	r	0 : Conductivity 1 : Concentration	-

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 Smartec S CLD132 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. Example:

only temperatur::

byte	data item	status	configuration data ²
--	main measured value	inactiv	00h
0 .. 4	temperature measured value + status	activ	42h, 84h, 08h, 05h
--	operating mode	inactive	00h

The cyclic telegram of this example contains 6 bytes of device data. The configuration data string (CHK_CFG) is: 00h, 42h, 84h, 08h, 05h, 00h

main measurement value and operating mode::

byte	data item	status	configuration data
0 .. 4	main measured value	activ	42h, 84h, 08h, 05h
--	temperature measured value + status	inactiv	00h
5	operating mode	active	90h

The cyclic telegram of this example contains 6 bytes of device data. The configuration data string (CHK_CFG) is: 42h, 84h, 08h, 05h, 00h, 90h

¹ 80h means 80 hex

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