

HARDWARE

KR C2

Configuration

Profibus CP 5613/14

© Copyright **KUKA Roboter GmbH**

This documentation or excerpts therefrom may not be reproduced or disclosed to third parties without the express permission of the publishers. Other functions not described in this documentation may be operable in the controller. The user has no claim to these functions, however, in the case of a replacement or service work.

We have checked the content of this documentation for conformity with the hardware and software described. Nevertheless, discrepancies cannot be precluded, for which reason we are not able to guarantee total conformity. The information in this documentation is checked on a regular basis, however, and necessary corrections will be incorporated in subsequent editions.

Subject to technical alterations without an effect on the function.

PD Interleaf

Contents

1	Configuration tools	5
1.1	COM Profibus	5
1.2	Transfer_Configuration	5
2	Special features	6
2.1	CP 5613/14 operating modes	6
2.1.1	Master and slave operation	6
2.1.2	Master operation	6
2.1.3	Slave operation	6
2.1.4	Response in the event of a bus error	6
2.1.5	Checking the configuration data of the slave module	7
2.2	Activation/deactivation of slaves	7
3	The files pfbms.ini and iosys.ini	8
3.1	The file pfbms.ini	8
3.1.1	Section [CP_5613/14]	8
3.1.2	Section [MASTER]	9
3.1.3	Section [SLAVE]	10
3.1.4	Section [SWAP]	12
3.2	The file iosys.ini	13
3.2.1	Section [DRIVERS]	13
3.2.2	Section [PBMA SL]	13



1 Configuration tools

1.1 COM Profibus

The bus structure is configured using the COM Profibus software from Siemens. (See COM PB documentation, Siemens AG).

A database is generated in which the bus structure, bus parameters and bus devices are described. The CP5614 master requires this database to operate the bus.

A GSD file (S0100008.gsd) for the slave module is located in the directory KRC\INIT. This GSD file is required in order to be able to integrate the slave module into other configuration tools, such as Step 7, in the bus structure.

At present, a maximum baud rate of 1.5 Mbit/s is enabled. During configuration, bear this value in mind and ensure that the bus termination of your wiring is satisfactory.

1.2 Transfer_Configuration

The CP_5614 driver makes it possible to allocate slave data (input, output or diagnostic data) between different slaves of the master component or to the slave module.

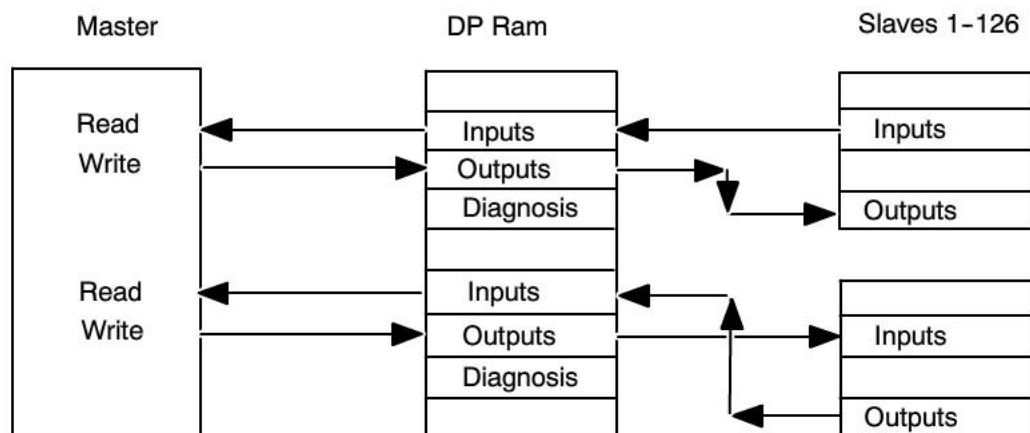
In this way, for example, diagnostic data from slave modules in the subordinate PB network can be passed on to the host computer of the higher-level PB network.

For this purpose, diagnostic data from slaves in the subordinate PB network are mapped to the inputs of the slave module. As this slave module belongs to the bus of the higher-level DP network, the host computer can now read from this module the diagnostic data from the subordinate bus devices.

The Transfer_Configuration software (Siemens AG) is used to generate a mapping table, in which these assignments are recorded.

For safety reasons, the controller I/O system cannot write to slave outputs to which other slave data are already assigned in this mapping table.

One special feature of the slave module is that the KRC, if it has been configured accordingly, writes to the slave module's inputs (NOT THE OUTPUTS AS IS THE CASE WITH SLAVES THAT HAVE BEEN CONFIGURED FOR THE MASTER!). If the slave module's inputs are assigned in the mapping table, the KRC cannot write to these inputs.



2 Special features

2.1 CP 5613/14 operating modes

2.1.1 Master and slave operation

If the file pfbms.ini contains the entries MASTER_USED=1 (or this entry is not present because this value is by default 1), and MODUL_USED=1 (must be present because the default value here is 0), both the master and the slave module of the card are put into operation.

The entry DATABASE_PATH must indicate a valid database, which corresponds with the configuration of the PB network.

The slave module can be accessed with authorization to read and write via DP address 127 (see 3.2.2).

2.1.2 Master operation

If the file pfbms.ini contains the entries MASTER_USED=1 (or this entry is not present because this value is by default 1), and MODUL_USED=0 (or this entry is not present because this value is by default 0), only the master component of the card is put into operation.

The entry DATABASE_PATH must indicate a valid database, which corresponds with the configuration of the PB network.

It is not then possible to access the slave module, either via the KRC or from a higher-level master.

2.1.3 Slave operation



See also pfbms.ini, Section [SLAVE], entry "STANDBY"

If the file pfbms.ini contains the entries MASTER_USED=0 (must be present because the default value here is 1), and MODUL_USED=1 (must be present because the default value here is 0), only the slave module of the card is put into operation.

The entry DATABASE_PATH must nevertheless be present and refer to a valid database!

The configuration itself is irrelevant as the master is not started.

The empty database Slave.ldb is located in the directory KRC\INIT.

This can be used if the master is not going to be started.

If the entry refers to an invalid database, the database cannot be loaded and the driver cannot be started!

The slave module can be accessed with authorization to read and write via DP address 127 (see 3.2.2).

2.1.4 Response in the event of a bus error

Bus error in the master circuit:

If a bus error occurs in the master circuit, the slaves of the master cannot be accessed either to read or write.

The slave module can still be accessed with authorization to read, but not to write.

Bus error in the slave circuit:

If a bus error occurs in the higher-level circuit, in which the slave module is integrated, the slave module cannot be accessed either to read or write.



The master can access its slaves with authorization to read, but not to write.

2.1.5 Checking the configuration data of the slave module

It is possible to check, and if necessary reject, the configuration data that the master sends to the slave module. (See Section 3.1.3).

If the slave module has been configured on a modular basis with COM Profibus and individual modules have different consistency conditions or data formats (byte/word), then it is not possible to check the configuration data! (The entry CHECK_CONFIGURATION must be 0).

2.2 Activation/deactivation of slaves

The CP_5614 driver allows you to add or remove slaves while the bus is running.

This makes it possible, for example, to carry out a tool change while the bus is running.

The precondition for this function is that all slaves which might possibly be required during bus operation are made known to the master via the database.

It is not therefore necessary for all the slaves that are configured in the database to be physically connected to the bus.

Slaves that are not connected to the bus when the system is booted must be made known to the driver by means of an entry in the driver-specific ini file pfbms.ini.

The corresponding entry reads: DEACTIVATED_SLAVES=X,Y,Z

where X,Y,Z stands for the slave address of the module. Slaves marked in this entry as deactivated are ignored by the driver, despite being configured with COM Profibus.

These deactivated slaves must also have been configured in the file iosys.ini (see Section 3.2), so that the KR C1 can exchange data with them once they have been activated.

No slaves may be entered here, however, which have not been configured with COM Profibus and are thus not contained in the database.

The activation and deactivation of slaves can be carried out using the following KRL command in a KRL program.

Return value = IOCTL(Driver ID, REQUEST, SLAVE No.)

Return value:	OK or ERROR (0 or -1)
Driver ID:	Fixed at 11 for Profibus Master Slave with CP5614
Request:	1001 activate slave, 1002 deactivate slave
Slave no.:	Profibus address of the slave to be activated/deactivated

3 The files pfbms.ini and iosys.ini

3.1 The file pfbms.ini

The file is divided into the following 4 sections:

[CP_5613/14]	General settings for CP5614 operation, which are not specific to the master or the slave, are made in this section (see Section 3.1.1).
[MASTER]	The parameters relevant for operation of the CP5614 master are set in this section (see Section 3.1.2).
[SLAVE]	The parameters relevant for operation of the slave module are defined in this section (see Section 3.1.3).
[SWAP]	In some modules, especially analog modules, “swapping” (exchange of high byte and low byte) may be necessary. This is defined in this section (see Section 3.1.4).

3.1.1 Section [CP_5613/14]

Parameter	Value	Description
Debug=	0 1	If the value is 0 or the entry is missing, no text outputs are made to the Telnet shell. If this value is 1, text outputs concerning the booting of the driver and the time response (e.g. slave error during operation) are carried out on the Telnet shell.
LOGFILE_PATH=	Directory / file name	If a file name and directory (within the KRC directory) are specified, a log file of the same name is created, in which the boot process and relevant messages from the running operation are logged. If this entry is missing, no log file is created.
ERROR_TEXT=	German English	If the value here is “German”, the Siemens-specific driver messages are generated in German (DEBUG=1) and logged in the log file. If the value here is “English” or missing, the Siemens-specific driver messages are generated in English (DEBUG=1) and logged in the log file.
FORCE_RESET=	0 1	If this value is 0 or the entry is missing, the CP_5614 master or slave module is only restarted in the event of a reset command from the GUI if a bus error is genuinely present. If this value is 1, the master and the slave module are always restarted in the event of a reset command from the GUI.

3.1.2 Section [MASTER]

Parameter	Value	Description
MASTER_USED=	0 1	If this value is 0, the master is not started and is thus not available to a DP network. If this value is 1, the master is started and is thus available to a DP network.
DATABASE_PATH=	Directory / file name	This entry must correspond to the directory (within the KRC directory) and the name of the database (see Section 1.1). If the driver does not find a database at the specified location, the bus cannot be put into operation.
FIRMWARE_PATH=	Directory / file name	The CP_5614 has no permanent memory for its firmware. For this reason, it is loaded into the card when the driver is booted. This entry must correspond to the directory (within the KRC directory) and the name of the firmware (FW_CP5613.bin). If the driver does not find the firmware at the specified location, the bus cannot be put into operation.
WATCHDOG_TIME=	0 3 - 65534	This entry is used to set the watchdog which monitors the robot controller. The setting is made in increments of 10 ms. If the watchdog is not retriggered in the time set, the master goes to the operational state Clear and the slaves are set to a defined state. If this entry is 0, the watchdog is deactivated. Default value = 0 if this entry is missing. If the master has only write access to the slave, i.e. no INB, INW, INDW or ANIN is configured for the master in the IOSYS.INI file, then the entry must be WATCHDOG_TIME=0.
MAPPING_USED=	0 1	If this value is 0, the mapping function (see Section 1.2) is deactivated and the entry MAPPING_PATH is ignored. If this entry is 1, the mapping table specified in the following entry is read and the mapping function is executed according to this table. This entry must correspond to the directory (within the KRC directory) and the name of the mapping table (see Section 1.2). If the driver does not find a mapping table at the specified location, the bus cannot be put into operation.
MAPPING_PATH=	Directory / file name	If the entry is MAPPING_USED=0, the entry MAPPING_PATH is ignored. If MAPPING_USED=1, the entry must correspond to the directory (within the KRC directory) and the name of the mapping table (see Section 1.2). If the driver does not find a mapping table at the specified location, the bus cannot be put into operation.

DEACTIVATED_SLAVES=	Slave Addr,..	Addresses of the slaves which are not connected to the bus when the driver is booted, but which have been configured with com Profibus (see Section 2.2).
WAIT_FOR_SLAVES	1	The master waits a maximum of 5 seconds until all slaves are in the state Active before it changes to the state OPERATE. If AUTOCLEAR was activated in the configuration, the master waits a maximum of 60 seconds for the slaves.
	0	The master changes to the state OPERATE without waiting for the slaves.

3.1.3 Section [SLAVE]

Parameter	Value	Description
MODUL_USED=	0	If this value is 0, the slave module is not started and is thus not available to a higher-level DP network. If this value is 1, the slave module is started. After booting, the module waits for the parameterization and configuration data of the corresponding master. Once these are received, the module goes into data exchange mode.
	1	
MODUL_ADDRESS=	PB address	The address, selected during configuration, of the slave module in the higher-level PB network must be entered here.
START_TIME=	>= 20	In order to be able to compare, during the loading process, the configuration of the slave module with the data range in the file iosys.ini, the module must be in DATA_EXCHANGE mode. This is assured by means of this time factor (min. 20 as default value).
CHECK_CONFIGURATION_DATA=	0	If this value is 0, the configuration data that the slave module receives from the master in the higher-level PB network are accepted without being checked. If this value is 1, the configuration data received by the slave module are checked. The criteria for this check are defined in the following entries.
	1	
ERROR_ACTION=	0	If this value is 0 and the master of the slave module goes to the state CLEAR (e.g. STOP in the Siemens S7), the KR C1 is not stopped and no error message is generated. If this value is 1 and the master of the slave module goes to the state CLEAR, the KR C1 is stopped and a corresponding error message is generated. The default setting is "1" if this entry is missing!
	1	

STANDBY=	0	This function is only supported from driver version 1.18 onwards. The default setting is "0". In order to start, the slave must be subordinated to a master, otherwise the driver is deactivated. A reload must be carried out before it can be started again.
	1	In this mode, error messages from the slave component are ignored. As long as the slave is not initialized by a master, read and write errors will appear. If the slave is initialized by a master, the read and write errors are automatically cleared and the exchange of data can begin. The driver does not have to be loaded again. Checking of data lengths is carried out cyclically with each read and write access, and not during initialization as is the case with the STANDBY mode deactivated. Errors in the configuration of the slave component (iosys.ini / COM Profibus) thus appear only after successful initialization by a master.
ACCEPTABLE_INPUT_LENGTH=	1-244	If CHECK_CONFIGURATION_DATA=1, the maximum configured input data length may not exceed this specified value. If the slave module receives a configuration telegram exceeding this value, it is rejected and the slave module does not go into data exchange mode. If the slave module is divided into several individual modules, the value refers to each of the modules in the slave module. Thus the value which is entered must correspond to the module with the largest data width.
ACCEPTABLE_OUTPUT_LENGTH=	1-244	If CHECK_CONFIGURATION_DATA=1, the maximum configured output data length may not exceed this specified value. If the slave module receives a configuration telegram exceeding this value, it is rejected and the slave module does not go into data exchange mode. If the slave module is divided into several individual modules, the value refers to each of the modules in the slave module. Thus the value which is entered must correspond to the module with the largest data width.

IO_DATA_BASE=	0 or 1	0 means byte as database, 1 means word. If CHECK_CONFIGURATION_DATA=1, the database which was used to configure the slave module must correspond with this entry. If the slave module receives a configuration telegram that does not correspond with this value, it is rejected and the slave module does not go into data exchange mode.
CONSISTENCE=	0 or 1	0 signifies no guarantee of consistency over the whole slave module. If this entry is 1, data consistency is guaranteed over the entire length of the module. If CHECK_CONFIGURATION_DATA=1, the consistency condition which was used to configure the slave module must correspond with this entry. If the slave module receives a configuration telegram that does not correspond with this value, it is rejected and the slave module does not go into data exchange mode.

3.1.4 Section [SWAP]

Parameter	Description
INWORD_SLAVE_X=Y	"INWORD_SLAVE" means: data are read by the KR C1. X stands for the DP address of the slave, within which a word is to be swapped. Y stands for the offset of the word in the slave. If several words have to be swapped within a slave, this can be specified in the following way: INWORD_SLAVE_X=Y,A,B where "Y, A, B" stand for the different offsets of the words in the slave. NOTE: A "SWAP entry" is only effective if the corresponding data object has a data width of 2 bytes (or 1 word). This is the case for all analog inputs and outputs or if the object has been created accordingly in IOSYS.INI (e.g. INB10=4,0,x2 or INW12=6,2,x1).
OUTWORD_SLAVE_X=Y	"OUTWORD_SLAVE" means: data are written by the KR C1. X stands for the DP address of the slave, within which a word is to be swapped. Y stands for the offset of the word in the slave. If several words have to be swapped within a slave, this can be specified in the following way: INWORD_SLAVE_X=Y,A,B where "Y, A, B" stand for the different offsets of the words in the slave. NOTE: A "SWAP entry" is only effective if the corresponding data object has a data width of 2 bytes (or 1 word). This is the case for all analog inputs and outputs or if the object has been created accordingly in IOSYS.INI (e.g. OUTB10=4,0,x2 or OUTW12=6,2,x1).



3.2 The file iosys.ini

The following entries in the iosys.ini file refer to the Profibus Master Slave with CP_5614.

3.2.1 Section [DRIVERS]

PBMASL=11,pbmsInit,pfbmsdrv.o

This entry is the same for all configurations and must be present.

3.2.2 Section [PBMASL]

Digital modules:

I/O SYSTEM = DP address, offset, multiplication factor

Analog modules:

I/O SYSTEM = DP address, offset, number of bits, mode

Special feature: the slave module of the CP5614:

The slave module of the CP_5614 has the fixed slave address 127. Using this slave address, the I/O system can access the slave module with authorization to read and write.

This special slave address must not be confused with the entry "MODUL_ADDRESS=".

The entry "MODUL_ADDRESS=" defines the PB address by which the slave module is known in the higher-level PB network.

Examples:

INW8=127,4,x1	One word of the I/O system (this word begins at the 9th byte) is read by the slave module. The reading starts with the 5th byte (offset = 4). The data length is 1 word (multiplier = 1).
INB10=3,0,x1	IN byte 10 (the 11th byte) of the I/O system is assigned to the slave with DP address 3. Within the slave the 1st byte is addressed (offset = 0). The data length is 1 byte (multiplier = 1).
OUTW10=10,0,x2	Two words of the I/O system (the word begins at the 11th byte) are assigned to the slave with the DP address 10. Within the slave the 1st byte is addressed (offset = 0). The data length is 2 words (multiplier = 2)
INB11=10,2,x2	IN byte 11 (the 12th byte) of the I/O system is assigned to the slave with DP address 10. Within the slave the 3rd byte is addressed (offset = 2). The data length is 2 bytes (multiplier = 2).
ANIN1=4,2,12,0	Analog input no. 1 of the I/O system is assigned to the slave with DP address 4. The analog module has a data width of 2 bits within the module. The analog module has a data width of 12 bits (possible values: 8 to 16). The last value sets the mode of the analog module. Possible values are:

Mode:	Meaning:
0	- Without sign. - Bits within the data word aligned to the right.
1	- With sign. - Bits within the data word aligned to the right.
2	- Without sign. - Bits within the data word aligned to the left.
3	- With sign. - Bits within the data word aligned to the left.



In some analog modules it may be necessary to exchange the high byte and low byte within the data word.
This is configured by means of the corresponding entry in the section [SWAP]
(see Section 3.1.4).