SIEMENS

SIMATIC Ident

RFID systems
FB 45
for MOBY U, MOBY D, RF200, RF300

Function Manual

07/2012

J31069-D0166-U001-A4-7618

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

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⚠ CAUTION

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CAUTION

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Table of contents

Introduction

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1.1 Overview

FB 45 is a STEP 7 function for RFID technology. It can be used with both the SIMATIC S7-300 and S7-400 for various RFID communications modules.

RF170C RF180C ASM 456 ASM 475

Figure 1-1 Communications modules for FB 45

The section "Brief description of the hardware" in the Appendix illustrates configurations with the various communications modules. FB 45 can be operated in various different configurations:

- The CM is operated directly in a SIMATIC S7-300.
- The communications module is located in the rack of an ET 200M or ET 200pro. The ET 200M/ET 200pro is used with an S7-300 or S7-400.
- The CM is a self-contained PROFIBUS slave and is connected to the integrated PROFIBUS connector of a SIMATIC S7-300 or S7-400.
- The CM can be operated both via PROFIBUS or PROFINET.
- The CM is operated on PROFINET via the IE/PB Link.

These configurations can be mixed and different communications modules can also be connected.

Assign parameters for the RF600 reader with FB 45

A separate manual is available for the parameter assignment of the RF620R/RF630R readers. In the "Configuration Manual RF620R/RF630R (http://support.automation.siemens.com/WW/view/en/33287195)" manual, you will find all the important information about commissioning, parameter assignment, error messages and how to handle errors/faults as well as many examples and applications for using the RF600.

Compatibility note

FB 45 is the successor to FC 45. FB 45 is almost completely compatible with FC 45. Users can run FC 45 application programs with FB 45 without modification. Unlike FC 45, a separate instance DB has to be assigned for each FB 45 call. UDT 10 has been shortened from 300 bytes to 50 bytes as a result. The application-related variables of UDT 10 are the same.

Features of the interface

The features of the individual CMs are described in the section "Brief description of the hardware (Page 81)".
Since the features of the individual CMs are continuously being expanded, you should always use the latest edition of this description.

Performance features of FB 45

- All identification systems (RFID and code reading systems) can be operated with FB 45.
- The user can process a complete transponder with one command (up to 64KB).
- The user can chain several commands together. This means that many small data areas of a transponder can be processed with one command start.
- The data structures are set up conveniently via user-defined data types (UDTs). The UDTs are available with English (UDT 10, 20), German (UDT 11, 21) and Spanish (UDT 14, 24) commentary. In this description, the UDTs are always referred to by their English designation (UDT 10, 20).
- Data is transmitted to and from the CM and commands are executed on the CM at the same time. This means optimal data throughput.
- The use of symbolic names enhances the clarity in the user program, even where complex configurations are involved.

Position in the information landscape

This function manual describes the use of FB 45 for the RFID systems MOBY D, MOBY U, RF200 and RF300. MV400 code readers can also be used with FB 45.

Please note that a separate manual is available for parameter assignment of the RF620R/RF630R reader with function block FB 45. In the "Configuration Manual RF620R/RF630R (http://support.automation.siemens.com/WW/view/en/33287195)" manual, you will find all the important information about commissioning, parameter assignment, error messages and how to handle errors/faults as well as many examples and applications for using the RF600.

You will find the documentation on parameter assignment of the code reading systems in: "Parameter assignment of the code reading systems (http://support.automation.siemens.com/WW/view/en/38845041)"

PROFIBUS configuration

A GSD file is available on the "RFID Systems Software & Documentation" DVD (6GT2080-2AA20) for the communications modules that can be connected directly to PROFIBUS.

PROFINET configuration

A GSDML file is available on the "RFID Systems Software & Documentation" DVD (6GT2080-2AA20) for the communications modules that can be connected directly to PROFINET.

Non-SIMATIC applications

Applications programmed on third-party controllers cannot use FB 45.

When programming the third-party controller, keep to the standard IEC 61131:

- The third-party controller can be programmed according to IEC 61131:

  Use the function block RFID standard profile. You will find the source code to match the block on the DVD "RFID Systems, Software & Documentation" (6GT2080-2AA20). You can compile the source code into the machine code of the target system. You will also find the documentation for this on the DVD.

- The third-party controller cannot be programmed according to IEC 61131:

  The relevant interface is described in the section "Programming the communication modules on PROFIBUS/PROFINET (Page 99)" of this manual. Programmers of a third-party controller can use this interface to develop their own RFID function. The same or similar data structures as in FB 45 can be reproduced on a third-party PLC in conjunction with FB 45 description and the UDTs.

Requirements for using FB 45

FB 45 can access the communications module via any PROFIBUS/PROFINET master that has the system function blocks SFB 52/53. It is irrelevant whether the PROFIBUS/PROFINET master is integrated in the S7-CPU or plugged into the rack as an add-on module (e.g. IM 467).

Please note that FB 45 uses acyclic frames (SFB 52/53). Older CPUs of the SIMATIC family or small model series may not have these services. Please check this during configuration.

- STEP 7 version

  The ASM 475 module requires a STEP 7 version ≥ V 5.1.

- TIA Portal

1.2 Preface

Purpose of this document

This Function Manual contains all the information needed to configure and commission the system.

It is intended both for programming and testing/debugging personnel who commission the system themselves and connect it with other units (automation systems, further programming devices), as well as for service and maintenance personnel who install expansions or carry out fault/error analyses.

Conventions

The following terms/abbreviations are used synonymously in this document:

- Reader, read/write device, write/read device
- Transponder, mobile data memory, MDS
- Communications module, CM, interface module, ASM

Validity of this documentation

This documentation is valid for FB 45. The documentation describes the product shipped as of September 2011.

History

Previous edition(s) of these operating instructions:

Edition	Note
05/2005	First Edition
03/2006	Inclusion of the RF170C communication module
10/2009	Parameter assignment of the RF620R/RF630 reader. RF300 and ISO transponders
07/2012	The document is expanded by RF200. Various interface modules as well as MOBY I and MOBY E have been omitted.

1.3 Navigating in the Function Manual

Structure of contents	Contents
Table of Contents	Organization of the documentation, including the index of pages and sections
Introduction	Purpose, layout and description of the important topics.
Description	Description of FB45
Parameter assignment	Description of the parameter settings
Commissioning	Description of the commissioning procedure
Error messages and troubleshooting	Overview of error messages and troubleshooting guide
Examples/applications	Describes the application of FB 45 based on example applications.
Appendix A: Brief description of the hardware	Description of the communications modules that can be used for FB 45
Appendix B: Programming the communications modules on PROFIBUS	Information for control using a PC or third-party control system
Appendix C: Service & Support	Service and support, contact partners, training centers

Description

2

2.1 Block specification

Block number:	FB 45
Block name:	FB 45
Symbolic name:	"MOBY FB"
Family:	–
Work memory requirement:	8256 bytes
Local data:	100 bytes
Version:	1.6
Called blocks:	SFB 52, SFB 53, SFC 20, SFC 21, SFC 1
Data block resources:	MOBY Param = 50 bytes per channel (defined via UDT 10) Instance DB for FB 45 = 464 bytes per channel
Bit memories used:	None
Counters used:	None
Registers used:	AR1, AR2
Call:	cyclic

Note

A calculation tool for calculating the data throughput is available for various communications modules. You will find this on the DVD "RFID Systems, Software & Documentation" (order number: 6GT2080-2AA20).

RFID data throughput calculation

The data throughput with FB 45 can be calculated according to the formulas in the relevant RFID system manual.

A configuration manual is provided for each RFID system.
The following applies in general:

$$t_k = k + t_{bytes} \cdot n$$

t k	Communication time between CM, reader and tag
n	Amount of user data
k	Constants (see table in configuration manual)
t_{bytes}	Transmission time for 1 byte (see table in configuration manual)

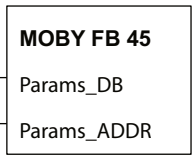
Data is transmitted to the tag and data is transmitted between the CM and FB 45 at the same time. Usually no further time must be added for data transmission between the CM and FB 45 so that the time t_k calculated above represents the total duration of the command.

However, commands may require more time under the following conditions.

- A very large number of RFID channels are processed in parallel.
- Very few (or only one) system resources are available for non-cyclic frames.
- Slow transmission speeds are used on PROFIBUS.
- Other applications are running on the S7 which require the non-cyclic frame services (SFB 52/53) of the SIMATIC very frequently.
- High-speed identification systems are used (e.g. RF300).

2.2 Configuration scheme

Table 2- 1 MOBY FB configuration scheme

Ladder logic programming box	Parameters	Data type	Permissible range	Description
"Inst-DB FB 45" 	Params_DB Params_ADDR	INT INT	2 to 32767 0, 50, 100,*...	Parameter data block number for an RFID channel (reader) Address pointer in the parameter data block to the start of a UDT 10
*) These values are exemplary whenever only data structures of the UDT 10 type are arranged in succession. These values change if UDT 10 is followed by a command structure (UDT 20).				

Params_DB and Params_ADDR form a pointer to a data structure. This data structure is defined by calling UDT 10 (English) or UDT 11 (German). A separate data structure must be defined for each RFID channel (reader).

See also

Data structures of FB 45 (Page 13)

2.3 Data structures of FB 45

The following figure shows an example of a definition of several RFID channels with the related tag commands and the user data.

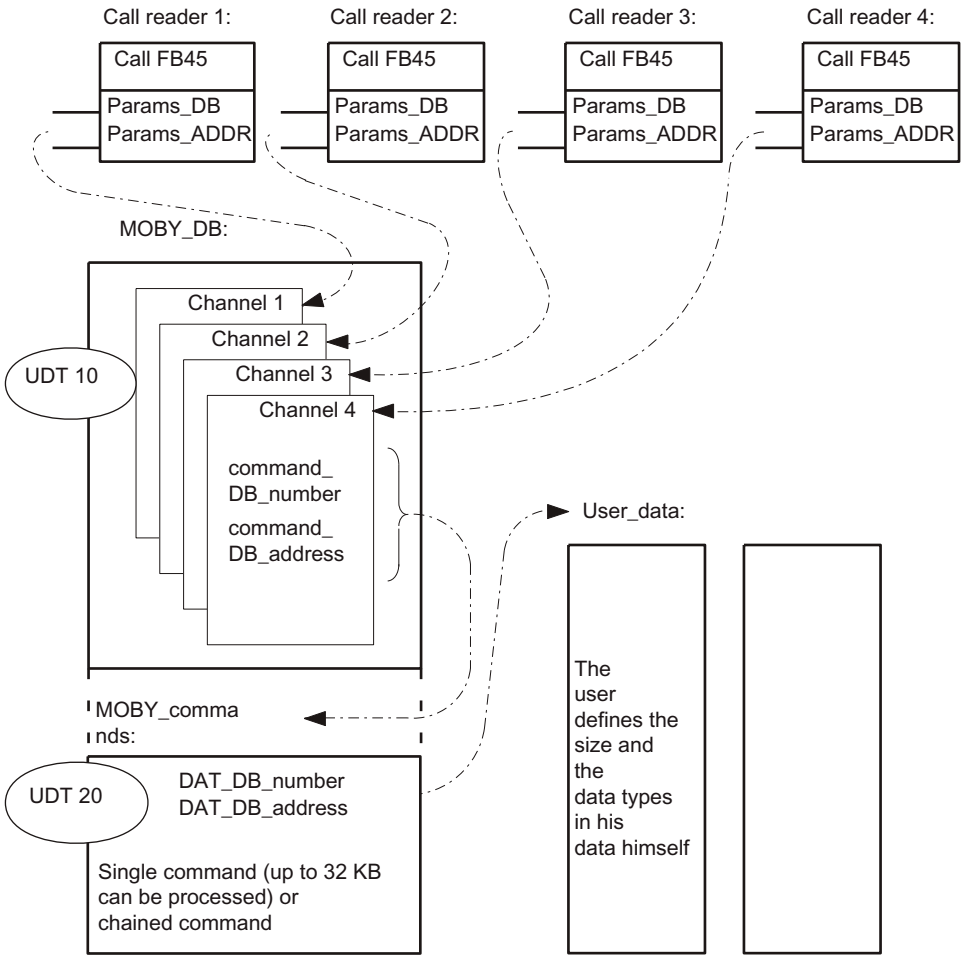


Figure 2-1 Configuration scheme of FB 45

Each FB 45 call points to a separate parameter data block (Params_DB, Params_ADDR), which is defined by a UDT 10 The variables "command_DB_number" and "command_DB_address" are stored in the UDT 10. These variables point to the RFID command that will be executed with the tag.

UDT 20 is used to define the RFID command. Different commands or chains of commands can be defined by calling UDT 20 several times (see Section "Command chaining"). The variables "DAT_DB_number" and "DAT_DB_address" are defined in the UDT 20. This variable definition forms the pointer to the user data which is simply referred to as DAT_DB in this function manual. Tag data is stored there when it is read out. When using a write command, the user must store his data before executing the command.

2.4 Number of RFID channels that can be connected

Each reader channel occupies 1 word in the input and output area of a SIMATIC S7. The maximum number of bus nodes permitted by SIMATIC can always be operated. The following table provides an overview.

Table 2- 2 Number of RFID channels

S7 CPU type[1)]	315-2 DP		316-2 DP; 318-2 DP		416; 417; CP 443-5 Ext	
	Max. no. of CMs	Max. readers (channels)	max. no. of CMs	Max. readers (channels)	Max. no. of CMs	Max. readers (channels)
ASM 475 (centralized)[2)]	32	64	32	64	–	–
ASM 475 (distributed via ET 200M)[3]	64 x 8	1024	123 x 8	1968	123 x 8	1968
RF170C (distributed via ET 200pro)[4)]	64 x 9	1152	123 x 9	2214	123 x 9	2214
ASM 456	64	128	123	246	123	246
RF180C [5)]						

[1)]The CPU types specified here may not be complete since the range of CPUs and the associated functions are being continuously expanded.
[2)] Central installation can include up to 3 expansion racks. A DP connector is not necessary in this configuration variant.
[3)] In the distributed configuration, up to 8 RFID modules (ASM 475) can be operated in each ET 200M.
[4)] In an ET 200pro distributed I/O, up to 9 RF170C can be plugged in.
[5)] The number of RF180C communications modules depends on the network and the CPU being used (number of IO addresses). The system configuration (redundancy) may lead to restrictions. Note the manuals of the CPUs and the manual "SIMATIC PROFINET system description".

2.5 Addressing of the RFID channels

Centralized configuration with ASM 475

In the centralized configuration, HW Config assigns fixed slot-specific addresses for the ASM 475. The ASM 475 is located in the analog area of a SIMATIC S7-300 and starts at address 256.

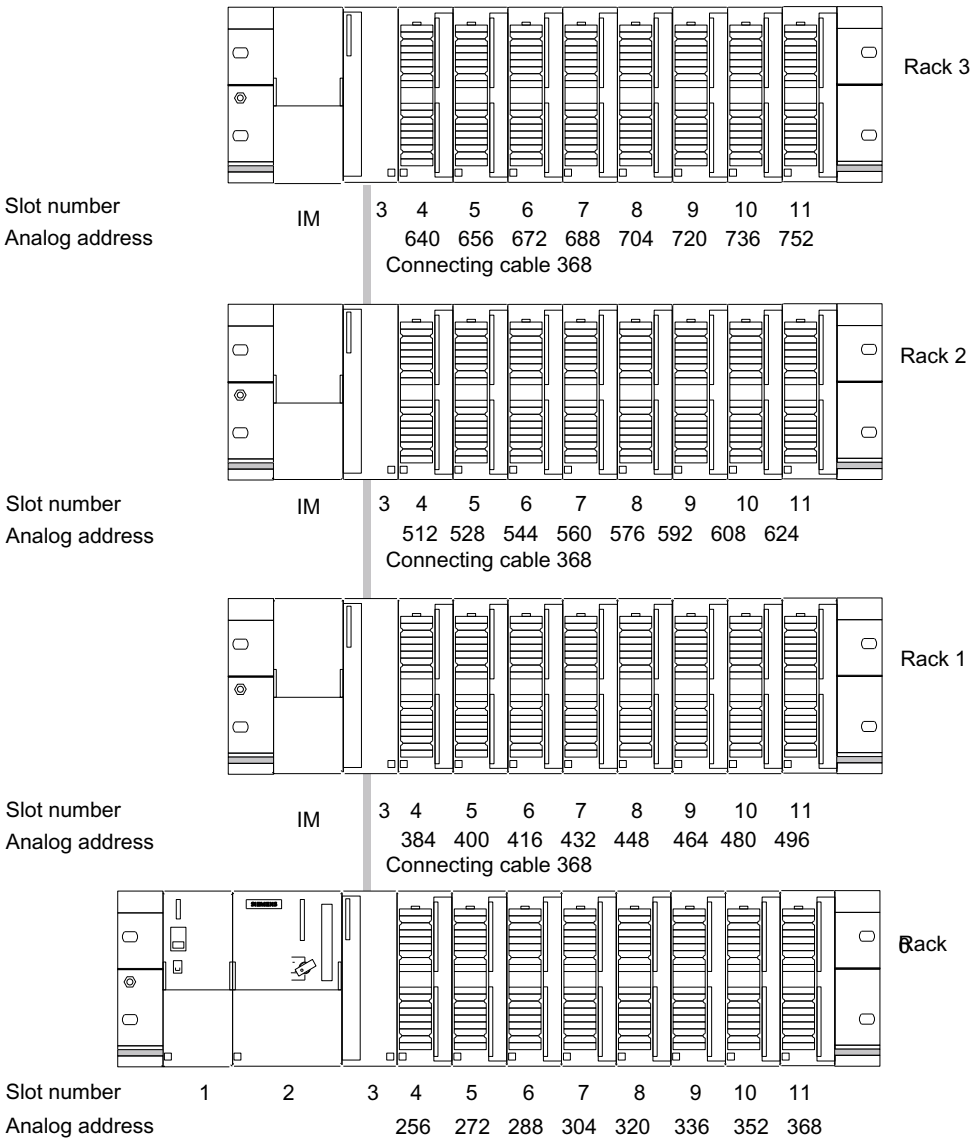


Figure 2-2 Slots for S7-300 and analog addresses for ASM 475

Addressing via PROFIBUS

When addressing via PROFIBUS, any addresses can be selected in HW Config for the communications modules. HW Config assigns a free address by default.

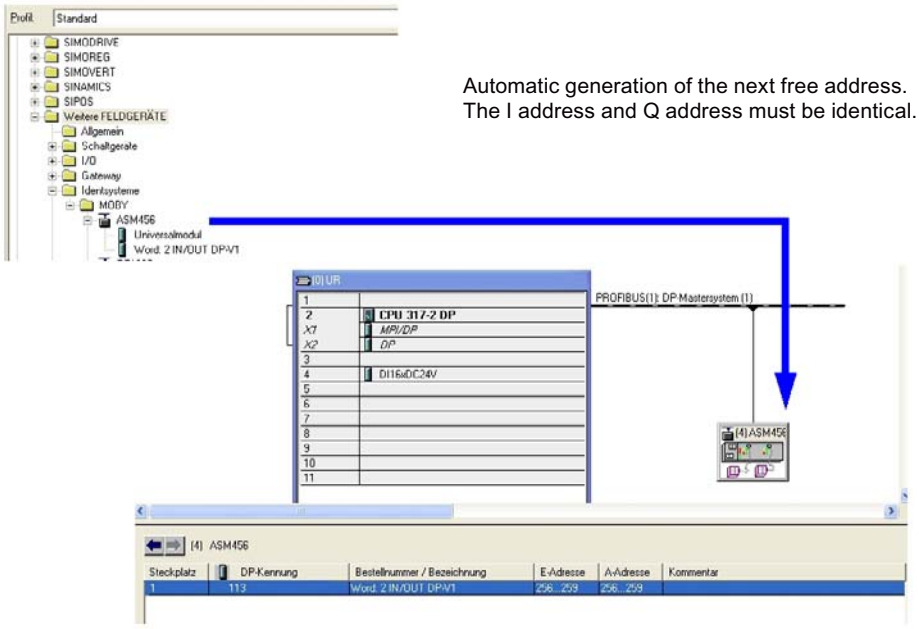


Figure 2-3 Example: Automatic address generation of an ASM 456

Assignment of addresses in FB 45

The unique I/O addresses of the communications modules from HW Config must be saved in the parameter data block (UDT 10).

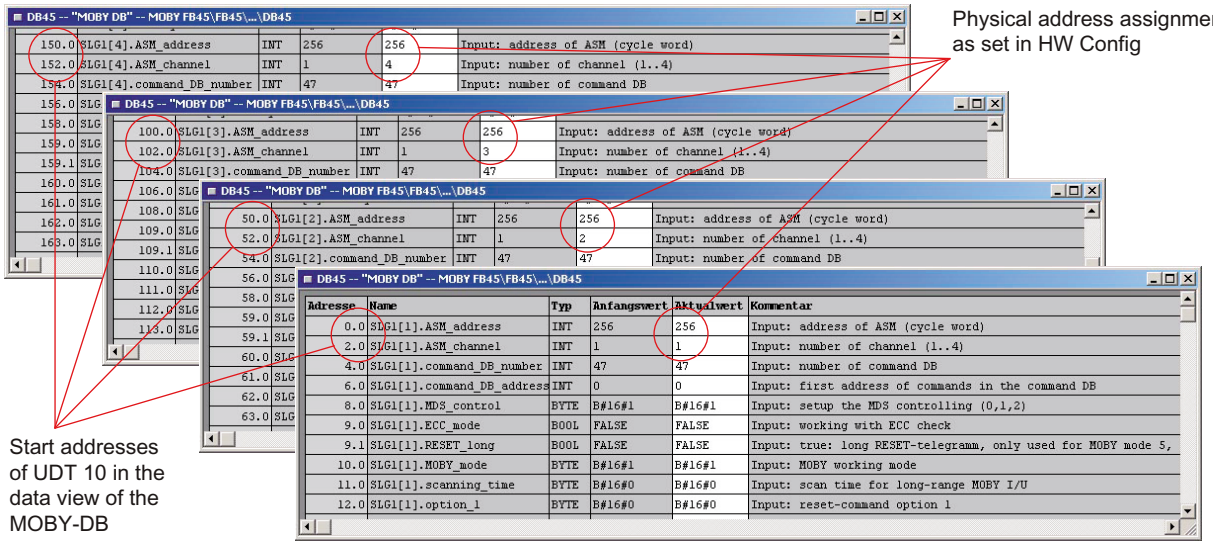


Figure 2-4 Setting the physical address assignment in UDT 10

In addition to the address (ASM_address), the RFID channel (ASM_channel) must also be assigned uniquely. If a communications module is operated with two channels, a separate UDT 10 must be defined for each channel. The "ASM_address" entry is the same. The "ASM_channel" is set from 1 to 2.

Parameterizing

3

3.1 Parameter data block

Each RFID channel (reader) needs its own parameters. These are predefined in a data structure as UDT 10 (with commentary in English) or UDT 11 (with commentary in German) or UDT 14 (with commentary in Spanish). You need to call this UDT in a data block for each RFID channel in which the widest range of variables are defined:

- **INPUT parameters:** These variables **must** be entered by the user once during configuration (exception: command_DB_number/command_DB_address). Throughout the run time it is not necessary to change or scan these parameters.

  Please note that you need to execute an init_run after changing an INPUT parameter before the new setting is activated (see Section "Programming a cold and warm restart").
- **Control bits:** The user starts his commands with these Boolean variables.
- **Displays:** The displays indicate the command progress to the user. Error analyses can be performed easily.
- **FB-internal variables:** These variables are not relevant for the user. They must not be changed by the application. Malfunctions and data corruption would otherwise ensue.

The following table shows the complete UDT. The relative addresses are shown in the first column for programmers who prefer to address with absolute values.

Table 3- 1 UDT 11 "MOBY Param_d"

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	ASM_address	INT	0	Input: Basic address of the ASM (cyclic word)
+2.0	ASM channel	INT	1	Input: Number of the channel (1 to 4)
+4.0	command_DB_number	INT	47	Input: Command data block number
+6.0	command_DB_address	INT *	0	Input: Start address of data in the BEDB
+8.0	MDS control	BYTE	B#16#1	Input: Presence check and tag(0, 1, 2)
+9.0	ECC mode	BOOL	FALSE	Input: mode with ECC
+9.1	RESET_long	BOOL	FALSE	Input: true: long RESET frame, only for MOBY mode 5
+10.0	MOBY mode	BYTE	B#16#1	Input: Operating mode
+11.0	scanning time	BYTE	B#16#0	Input: Scanning time for MOBY U
+12.0	option 1	BYTE	B#16#0	Input: Init run Option 1
+13.0	distance limiting	BYTE	B#16#F	Input: Distance/capacity setting **
+14.0	multitag	BYTE	B#16#1	Input: Max. number of tags in field
+15.0	field ON control	BYTE	B#16#0	Input: BERO
+16.0	field_ON_time	BYTE	B#16#0	Input: MOBY U: BERO time MOBY D: Tag Type ***
+17.0	reserved0	BYTE	B#16#0	
+18.0	ANZ MDS present	BOOL	FALSE	Presence of a tag
+18.1	ANZ cancel	BOOL	FALSE	Cancel-bit in the PIW is set.
+18.2	ANZ ECC	BOOL	FALSE	reserved
+18.3	reserved	BOOL	FALSE	
+18.4	LR bat	BOOL	FALSE	reserved

Address	Name	Type	Initial value	Comment
+18.5	battery_low	BOOL	FALSE	Battery check has indicated low voltage
+18.6	error	BOOL	FALSE	Error during command execution
+18.7	ready	BOOL	FALSE	Command chain has been finished.
+19.0	cancel	BOOL	FALSE	Set: abort command or command chain
+19.1	command_start	BOOL	FALSE	Set: start signal for command or command chain
+19.2	repeat command	BOOL	FALSE	Set: repeat last command
+19.3	init run	BOOL	TRUE	Set: reset CM and set new parameters
+19.4	ASM failure	BOOL	FALSE	OB122 Set: CM failed
+19.5	FB45 active	BOOL	FALSE	FB active
+19.6	ANZ next	BOOL	FALSE	NEXT command was last command
+19.7	ANZ reset	BOOL	FALSE	Init run was last command
+20.0	ASM busy	BOOL	FALSE	CM processes a command
+20.1	command rep active	BOOL	FALSE	CM repeats command
+21.0	number MDS	BYTE	B#16#0	Number of tags actually in field
+22.0	error MOBY	BYTE	B#16#0	Error indicated by CM
+23.0	error FB	BYTE	B#16#0	Error indication of FB
+24.0	error BUS	WORD	W#16#0	Error indicated for PROFIBUS/PROFINET
+26.0	version MOBY	WORD	W#16#0	Firmware version CM
+28.0	counter_customer	BYTE	B#16#2	Setting for S7 cycles per command execution
*4.0		DWORD		
+44.0	initRUN_timeout	INT	1000	FB-internal variables. You should not attempt to modify these variables.
+46.0	PEW_timeout_ASM_fail	BYTE	B#16#5	FB-internal variables. You should not attempt to modify these variables.
+47.0	PEW_timeout	BYTE	B#16#32	FB-internal variables. You should not attempt to modify these variables.
+48.0	reserved3	BYTE	B#16#0	FB-internal variables. You should not attempt to modify these variables.
+49.0	Testbyte	BYTE	B#16#0	FB-internal variables. You should not attempt to modify these variables.
=50.0		END_STRUCT		

*) Parameter data block UDT 60 is available for transponders > 32 KB. The data type here is WORD.

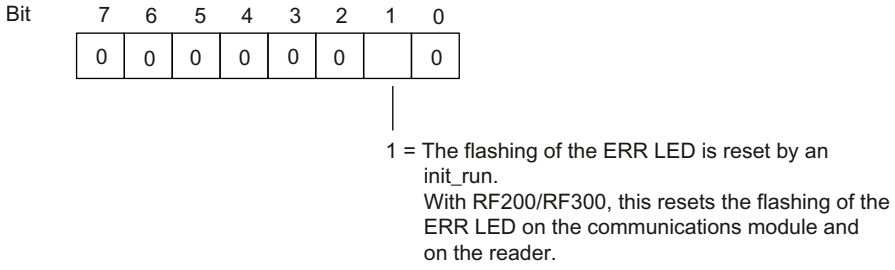
**) RF300, reader only: 6GT2801-3AB10

***) RF300 reader in ISO mode

3.1.1 INPUT parameters

Table 3- 2 INPUT parameter for MOBY D, MOBY U, RF200 and RF300

<table>
<tr><th>Variable</th><th colspan="4">Description</th></tr>
<tr><td>ASM_address</td><td colspan="4">Logical base address of the CM; this address must match the "start address" of the CM in HW Config of the SIMATIC Manager. Remember that this address has nothing to do with the PROFIBUS address that is set on the CM or the ET 200M.</td></tr>
<tr><td rowspan="3">ASM_channel</td><td colspan="4">Number of the MOBY channel which is to be used</td></tr>
<tr><td colspan="2">CM type</td><td colspan="2">Value range</td></tr>
<tr><td colspan="2">ASM 475, 456; RF170C, RF180C</td><td colspan="2">1, 2</td></tr>
<tr><td>command_DB_ number</td><td colspan="2">Number of the data block in which the tag command is specified</td><td colspan="2" rowspan="2">These INPUT parameters can be changed whenever ready = 1. An init_run does not need to be executed after changing these parameters.</td></tr>
<tr><td>command_DB_ address</td><td colspan="2">Address within the "command_DB". The next tag command starts at this address. "command_DB_number" and "command_DB_address" form a data pointer to the next command (see Section "Configuration scheme").</td></tr>
<tr><td></td><td colspan="4">Please note:
The input parameters command_DB_number and command_DB_address can be changed only when ready = 1. An init_run does not need to be executed after changing these parameters.</td></tr>
<tr><td rowspan="4">MDS_control</td><td colspan="4">MDS_control turns on/off the presence check or the tag control on the CM (see section "Presence check and tag control").</td></tr>
<tr><td>Value</td><td colspan="2">Tag / transponder control</td><td>CM type</td></tr>
<tr><td>0</td><td colspan="2">Presence check is off. The variable ANZ_MDS_present does not indicate a valid value.</td><td>all</td></tr>
<tr><td>1</td><td colspan="2">Presence check is on. MDS control is off. The variable ANZ_MDS_present indicates a tag in the transmission window of a reader.</td><td>all</td></tr>
<tr><td>ECC_mode</td><td colspan="4">reserved</td></tr>
<tr><td>RESET_long</td><td colspan="4">MOBY U/D, RF200 and RF300 = 1</td></tr>
<tr><td rowspan="8">MOBY_mode</td><td colspan="4">Setting the mode of the Ident system</td></tr>
<tr><td>Value</td><td>Operating mode</td><td colspan="2">Note</td></tr>
<tr><td>0</td><td>reserved</td><td colspan="2">reserved for the setting with the switch or GSD parameter assignment</td></tr>
<tr><td>1</td><td>reserved</td><td colspan="2">Short init_run (only the MOBY_mode and option1 parameters are transferred to the reader).</td></tr>
<tr><td>5</td><td>MOBY U/D, RF200 and RF300 - without multitag handling</td><td colspan="2">475; 456; RF170C, RF180C</td></tr>
<tr><td>6</td><td>reserved for multitag handling (FB 55)</td><td colspan="2">(see description of FB 55)</td></tr>
<tr><td>7</td><td>reserved for multitag handling (FB 55)</td><td colspan="2">(see description of FB 55)</td></tr>
<tr><td colspan="4">Please note:
MOBY_mode may only be changed after a CM is turned on.</td></tr>
</table>

Variable	Description
scanning_time	**RF200, RF300, MOBY D:** 00 hex (reserved)
	MOBY U: Scanning_time describes the standby time for the transponder. If the transponder receives an additional command before scanning_time has expired, this command can be executed immediately. If the transponder receives a command after scanning_time has expired, command execution is delayed by sleep_time of the transponder. Scanning_time should only be set when both of the following conditions exist. • The transponder uses several commands *and* • command execution must be concluded within a minimum time. 00 hex = no standby time (default) 01 hex = 7ms standby time 02 hex = 14ms standby time : C8 hex = 1400ms standby time Remember: Scanning_time affects the life of the battery. The longer scanning_time is, the shorter the life of the battery. For precise calculations, see the MOBY U manual for configuration, mounting and service.
option_1	This byte is bit-coded. Its standard value is B#16#0. It can be used for special control on the ASM/reader. 

<table>
<tr><th>Variable</th><th>Description</th></tr>
<tr><td>distance_limiting</td><td>MOBY D:
HF power from 0.5 W to 10 W in steps of 0.25 W
only effective for SLG D10S; a power of 1 W (04 hex) is set for SLG D11S / D12S and cannot be changed.
02 hex = 0.5 W
:
10 hex = 4 W (default)
:
28 hex = 10 W</td></tr>
<tr><td></td><td>RF200:
00 hex (reserved)</td></tr>
<tr><td></td><td>RF300:
With this parameter, a change to the output power can only be made for the RF380R (order no. 6GT2801-3AB10). In doing this, you must take into consideration that the change to the output power will affect both the upper and lower limit range, as well as the minimum distance that is to be maintained between adjacent RF380Rs. Refer to the "RF300 system manual", section Field data
The following settings are possible:
<table>
<tr><td>Value</td><td></td></tr>
<tr><td>02</td><td>0.5 W</td></tr>
<tr><td>03</td><td>0.75 W</td></tr>
<tr><td>04</td><td>1.0 W</td></tr>
<tr><td>05</td><td>1.25 W</td></tr>
<tr><td>06</td><td>1.5 W</td></tr>
<tr><td>07</td><td>1.75 W</td></tr>
<tr><td>08</td><td>2.0 W</td></tr>
</table>
Settings outside of the specified values mean that the default value of 1.25 W is set and no error message occurs for compatibility reasons!</td></tr>
<tr><td></td><td>MOBY U:
Range limitation
<table>
<tr><td>Normal output power[1)]</td><td colspan="2">Reduced output power</td></tr>
<tr><td>05 hex = 0.5 m
0A hex = 1.0 m
0F hex = 1.5 m
14 hex = 2.0 m
19 hex = 2.5 m
1E hex = 3.0 m
23 hex = 3.5 m</td><td>85 hex
8A hex
8F hex
91 hex
99 hex
9E hex
A3 hex</td><td>Reduced output power must be set when several readers are positioned close together or when data memories located in the vicinity of a reader are detected later or not at all.
Disadvantage: The field lobe becomes smaller and there is less time for communication or positioning must be more precise.</td></tr>
</table>
[1)] Intermediate values in steps of 0.1 m are possible (02, 03, ..., 23 hex)</td></tr>
<tr><td>multitag</td><td>MOBY U/D, RF200 and RF300:
Maximum number of transponders being processed in the field at the same time.
Permitted values: 1</td></tr>
</table>

<table>
<tr><th>Variable</th><th colspan="4">Description</th></tr>
<tr><td rowspan="6">field_ON_control</td><td colspan="4">MOBY D, RF200 and RF300:
00 hex (reserved)</td></tr>
<tr><td colspan="4">MOBY U:
BERO mode; automatic activation/deactivation of the antenna field. The "Antenna ON/OFF" command is superimposed by the BERO mode.</td></tr>
<tr><td>00 hex</td><td>=</td><td colspan="2">without BEROs; no write/read device synchronization</td></tr>
<tr><td>01 hex</td><td>=</td><td colspan="2">one or two BEROs
The BEROs are combined according to logic OR. The field is ON during actuation of a BERO.</td></tr>
<tr><td>02 hex</td><td>=</td><td colspan="2">One or two BEROs
The 1st BERO switches the field on and the 2nd BERO switches the field off. If two BEROs exist and a field_ON_time is set, the field is automatically deactivated if the 2nd BERO does not switch within this BERO time.
If no field_ON_time is set, the field remains on until the 2nd BERO is actuated.</td></tr>
<tr><td>03 hex</td><td>=</td><td colspan="2">Activate write/read device synchronization via cable connection (see manual for configuring, mounting and service for MOBY U)</td></tr>
<tr><td rowspan="12">field_ON_time (ftim)</td><td colspan="4">RF200:</td></tr>
<tr><td>Value</td><td colspan="2">Transponder type</td><td>Comment</td></tr>
<tr><td>01</td><td colspan="2">Any ISO tag</td><td>-</td></tr>
<tr><td colspan="4">RF300:
With the aid of the "ftim" parameter, a decision is made whether the reader is operated in RF300 mode or in ISO 15693 mode (mixed operation is not intended).
The following values can be set:</td></tr>
<tr><td>Value</td><td colspan="2">Transponder type</td><td>Comment</td></tr>
<tr><td>00</td><td colspan="2">RF300</td><td>To be used for all transponders of the type RF3xxT</td></tr>
<tr><td>01</td><td colspan="2">Any ISO tag</td><td>Activation of the general ISO mode with rudimentary ISO commands. With this setting, operation is basically guaranteed with every ISO-compatible tag.</td></tr>
<tr><td>03</td><td colspan="2">ISO my-d (Infineon SRF 55V10P)</td><td>e.g. MDS D324, D339</td></tr>
<tr><td>04</td><td colspan="2">ISO (Fujitsu MB89R118)</td><td>e.g. MDS D421, D422, D423, D424, D425, D426, D428, D460,</td></tr>
<tr><td>05</td><td colspan="2">ISO I-Code SLI (NXP SL2 ICS20)</td><td>e.g. MDS D100, D124, D126, D139, D150, D165</td></tr>
<tr><td>06</td><td colspan="2">ISO Tag-it HFI (Texas Instruments)</td><td>e.g. MDS D200 (order no. 6GGT2600-1AA00-0AX0), D261</td></tr>
<tr><td>07</td><td colspan="2">ISO (ST LRI2K)</td><td>e.g. MDS D200(order no. 6GGT2600-1AA01-0AX0), D261</td></tr>
</table>

Variable	Description		
	Note: 1. The following ISO special functions are not supported: – AFI (Application Family Identifier) – DSFID (Data Storage Format Identifier) – Chip-specific added functions such as EAS, Kill commands, etc. 2. If a previously unknown tag cannot be identified based on the parameters above, an error message is generated (error_MOBY "0D"[hex]). 3. Invalid parameters are rejected with an error message (error_MOBY "15"[hex]). 4. By selecting the values 03 to 07, chip-specific commands are used if they exist. The commands have a positive effect on the communication time between the reader and tag and can therefore also allow faster data transfer depending on the tag.		
	MOBY U: Time for BERO mode (field_ON_control = 02)		
	00 hex	=	Timeout monitoring is deactivated. The 2nd BERO is needed in order to switch the field off.
	01 hex ... FF hex	=	1 ... 255s turn on time for the write/read device field.
	MOBY D: Transponder type		
	Binary value: 0 ... 255	=	Transponder type
	00 hex	=	I-Code 1 (e.g. MDS D139, 6GT2600-0AA00)
	01 hex	=	ISO transponder
	02 hex	=	I-Code 1 and ISO transponder
	03 hex	=	ISO-my-D (with SLG D10S only; the value 01 hex is set for ISO-my-D with SLG D11S / D12S)
	04 hex	=	ISO-FRAM (with SLG D11S/D12S only; the value 01 hex is set for ISO-FRAM with SLG D10S) *
counter_customer:	Setting for S7 cycles per command execution. Default value is 02.		
	00 hex	=	FB requires 6 S7 cycles per command
	01 hex	=	Depending on the ASM type and the overall configuration, the number of S7 cycles can be reduced to 3 per command
	02 hex	=	Depending on the ASM type and the overall configuration, the number of S7 cycles can be reduced to 2 per command
	Note: If an optimum short cycle time is required on the PLC, "counter_customer" must be set to "0". Larger values can lengthen the cycle time in the PLC.		

The permissible values of the INPUT parameters are listed in the hardware specifications.

3.1.2 Command and status word

The **control bits** of FB 45 are defined in the command and status word.

The command and status word and the variables are generated using UDT 10. The variables and the associated relative addresses in UDT 10 are shown in the following figure.

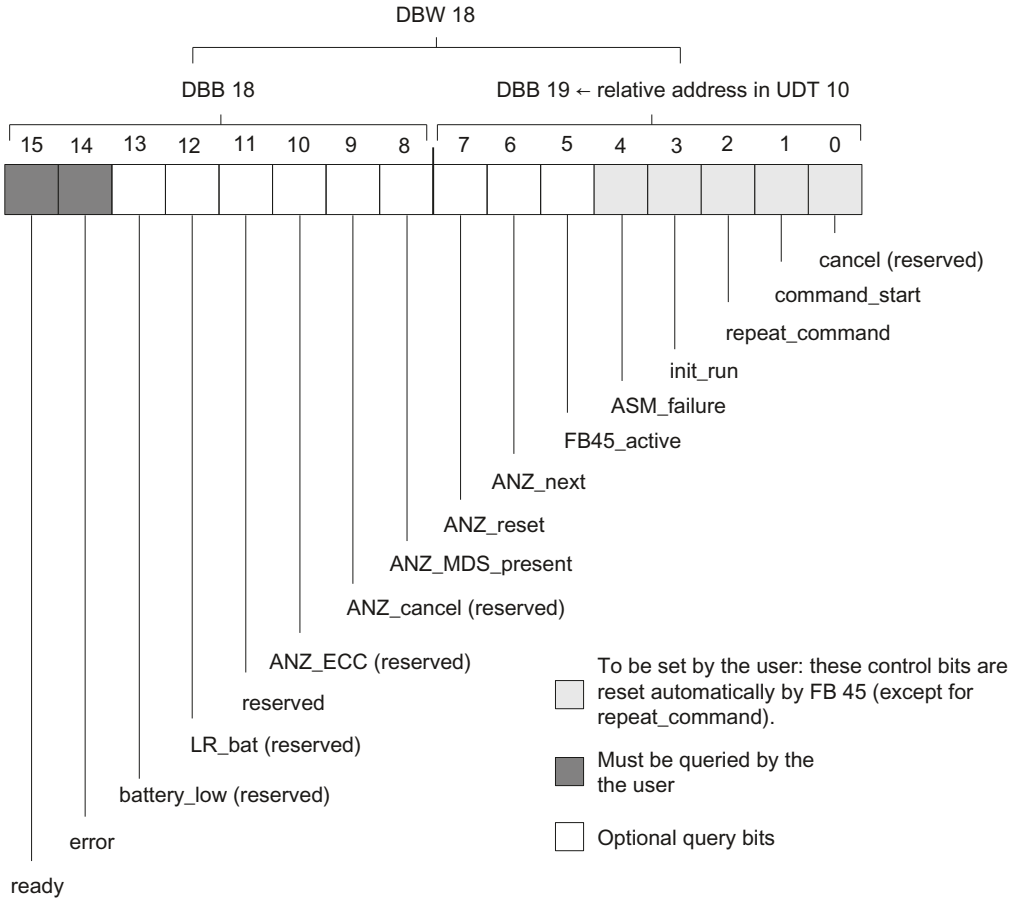


Figure 3-1 Assignment of the command and status word (DBW 18) with variable names

Table 3- 3 Variables in BEST

Variable	Description
cancel	The cancel variable is not available. A command termination must be executed via the init_run variable. The cancel command is not executed.
command_start	TRUE = Start a command or a command chain. FALSE = Reset occurs automatically triggered by FB 45.
repeat_command	TRUE = Command repetition: The last command or command chain stored on the CM is processed again with the next tag. Command processing for the tag is not started until the tag that has already been processed has left the transmission window (ANZ_MDS_present = 0) and a new tag has entered the transmission window of the reader (ANZ_MDS_present: 0 → 1). In the case of RFID systems with unique tag IDs (UID) (e.g. RF300, MOBY U), the next tag entering the field must have a different UID from the previous one for the command to be repeated. FALSE = No command repetition or command repetition is stopped after the command started with the repeat command has been processed. Remember that this bit must be reset by the user to stop command repetition. The result of command repetition is fetched when command_start is set by the user. The repeat_command is not automatically reset by FB 45 after command processing. The init_run command resets the repeat_command variable. This also interrupts a command repetition on the CM. The repeat_command can be set again by the application with the next command_start. The handling of command repetition is described in Section "Command repetition (Page 37). Refer to the system manual of the relevant RFID/MOBY system. RF200 does not support this function.
init_run	TRUE = Restart of the communications module. FB 45 is reset and the CM parameters are reassigned. All data and commands on the CM are lost. This bit must be set in the restart OB (OB 100) for each RFID channel. After a failure of the MOBY ASM, error_MOBY=0F is signaled to the user. The user must then perform an init_run. FALSE = FB 45 triggers an automatic reset. **Note:** • The init_run bit is initialized with TRUE when a parameter data block is downloaded from the programming device to SIMATIC. This causes an automatic restart on the CM. • The execution time of init_run is normally in the millisecond range. In the event of an error, the time may be up to 15s.
ASM_failure	TRUE = The CM has failed. This bit is set by the user in OB 122 (see section "Programming a module failure (Page 68)"). FB 45 signals an error to the user (error_FC = 09) and interrupts a command in progress. If OB 122 is not programmed by the user, the PLC changes to STOP if there is a CM failure. FALSE = Reset occurs automatically triggered by FB 45.
FB45_active	FB 45 is currently executing a command. This variable is set when the command is started (command_start=TRUE) and remains active until • FB 45 has received the last acknowledgment from the CM • the init_run bit has been set • An error message was signaled by the CM
ANZ_next	The "next" command is not supported by the readers (MOBY U/D, RF200 and RF300).
ANZ_reset	This bit indicates that the last command to be executed was a RESET. The RESET command was started by the user with "init_run".

Variable	Description
ANZ_MDS_present	Indicates the presence of a transponder in the transmission window of the reader. ANZ_MDS_present is only indicated when the INPUT parameter MDS_control (see section "INPUT parameters (Page 21)") was set by the user. Remember that when an init_run is being executed, the ANZ_MDS_present indication disappears briefly even when a transponder is permanently located in the transmission window.
ANZ_cancel	The "cancel" command is not supported by the readers (MOBY U/D, RF200 and RF300).
ANZ_ECC	Not currently used
reserved	Not currently used
LR_bat	Not currently used
battery_low	Not currently used The battery status of a MOBY U transponder is queried with the MDS-status command.
error	FB 45 sets this bit if a command is terminated abnormally. The error bit is the checksum error bit for all errors which occur. The exact cause of the error is stored in the variable error_ MOBY, error_FB or error_BUS (see section "Further displays (Page 29)" or section "Error messages and troubleshooting (Page 47)"). The error bit is reset when a command is restarted.
ready	Ready message: error bit = FALSE must be checked after ready = TRUE is signaled. This ensures that the command was executed normally. **Note:** The ready bit does not need to be set in order to start "init_run".

3.1.3 Further displays

Table 3- 4 Displays

Variable	Description
ASM_busy	No significance. This variable is always FALSE.
command_rep_active	The CM is currently running a command repetition. The bit is set as a response to the control variable repeat_command. After an init_run, command_rep_active is first reset by FB 45 and then set again after a delay because FB 45 first transfers the RFID commands to the CM.
number_MDS	The number of transponders currently in the transmission window is displayed. If there are more than 15 transponders in the field, the number_MDS display remains set to 0F hex. The display is only available and valid if the reader being used has this function (MOBY U, MOBY D and RF300).
error_MOBY	This error was signaled by the CM or reader. The error is usually displayed by the ERR LED on the CM and/or reader (see Section "Error messages and troubleshooting (Page 47)").
error_FB	Error message from FB 45 (see section "Error messages and troubleshooting (Page 47)")
error_BUS	The transmission path between FB 45 and the CM reports an error. This is usually a PROFIBUS/PROFINET error. (see section "Error messages and troubleshooting (Page 47)"). This error is signaled by system functions SFC 58/59.
version_MOBY	Display of the communications module firmware version. The value entered here is updated each time the CM starts up. It is ASCII-coded. Example: DBB 26 = 31 hex (“1“), DBB 27 = 30 hex (“0“) → Version 1.0

All other variables of UDT 10 are for FB-internal use. They must never be changed by the user.

3.2 RFID commands

Note

Notation for the commands

For reasons of compatibility the obsolete terms "MOBY", "MDS" and "SLG" have been retained in commands and the descriptions of the commands. These terms are stored in the program and in the data blocks and therefore continue to be used in this manual.

Note

This section provides a description of all commands that can by processed by FB 45. The commands that can actually be processed by the communications module you are using, are described in section Brief description of the hardware (Page 81).

Before you can start an RFID command with command_start, you need to define the command. UDT 20 (commentary in English), UDT 21 (commentary in German) or UDT 24 (Spanish commentary) is available for the simple definition of a command.

Table 3- 5 UDT 21 "MOBY CMD_d"

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	command	BYTE	B#16#2	MDS: 2 = read, 1 = write
+1.0	sub command	BYTE	B#16#0	INIT = bit pattern; END, SET, MDS, SLG=mode
+2.0	length	INT *)	1	Amount of data to be written/read in bytes
+4.0	address_MDS	WORD	W#16#0	Start address on transponder, memory size for INIT; date for transponder
+6.0	DAT DB number	INT	48	Number of DAT DB, data for transponder
+8.0	DAT_DB_address	INT *)	0	Pointer to start word in DAT_DB
=10.0		END_STRUCT		
*) For transponder memory > 32 KB, UDT 70 must be used (data type WORD instead of INT). The "length" value is then specified as a hexadecimal value.				

The "actual value" of the variables can be modified using the editor in the data view of the DB or in the STEP 7 application program.

Please note that the actual values can only be changed if no command is active (ready = 1).

3.2.1 Command parameters

Overview of commands

Table 3- 6 Overview of commands

Command [hex]		Command	
normal	chained*)	Syntax	Description
01	41	WRITE	Write data to transponder
02	42	READ	Read data from transponder
03	43	INIT	Initialize transponder
04	44	SLG STATUS	Query reader status
08	48	END	Terminate communication with the transponder
0A	4A	SET-ANT	Antenna on/off
0B	4B	MDS-STATUS	Query transponder status
*) Chained commands are not supported by all readers or CMs. You should also note the information in the relevant system manual.			

WRITE

Table 3- 7 Write to the tag

Command [hex]	sub_command [hex]	length [dec]	address_MDS [hex]	DAT_DB [dec]	Note
01	–	1 to 32767 *) Length of transponder data to be written	0000 to FFFF **) The data is written to the transponder starting at this start address.	Pointer to user data to be written to the transponder	RF200: The data length can have a maximum value of 1024 [dec]
*) When UDT 70 is used, "length" is specified as a hexadecimal value. The value range is then from 0001 to FFFF. This means that a complete 64 KB transponder can be processed. **) Please refer to section "Processing of data memories/transponders (Page 60)" for addressing individual transponder types.					

READ

Table 3- 8 Read tags

Command [hex]	sub_command [hex]	length [dec]	address_MDS [hex]	DAT_DB [dec]	Note
02	–	1 to 32767 *) Length of transponder data to be read	0000 to FFFF **) The data is read from the transponder starting at this address.	Pointer to user data. FB 45 stores the read transponder data here	RF200: The data length can have a maximum value of 1024 [dec]
*) When UDT 70 is used, "length" is specified as a hexadecimal value. The value range is then from 0001 to FFFF. This means that a complete 64 KB transponder can be processed. **) Please refer to section "Processing of data memories/transponders (Page 60)" for addressing individual transponder types.					

INIT

Table 3- 9 Initialize tag

Command [hex]	sub_command [hex]	length [dec]	address_MDS [hex]	DAT_DB [dec]	Note
03	00 to FF Hexadecimal value that is written to the transponder	–	Memory size of transponder to be initialized	–	

Transponder type			Memory size	Init duration
2 KB	MOBY U:	RAM *)	08 00	Approx. 1 s
32 KB	MOBY U:	RAM *)	80 00	Approx. 1.5 s
44 bytes	MOBY D:	I-Code 1	00 2C	Approx. 0.4 s
112 bytes	MOBY D:	ISO I-Code SLI	00 70	Approx. 0.5 s
256 bytes	MOBY D:	ISO Tag-it HF-I	01 00	Approx. 1 s
992 bytes	MOBY D:	ISO my-d	03 E0	Approx. 3 s
2000 bytes	MOBY D	FRAM	07 D0	Approx. 3 s
20 bytes	RF300:	EEPROM	00 14	Approx. 0.2 s
8 KB	RF300:	FRAM *)	20 00	0.9 s
32 KB	RF300:	FRAM *)	80 00	3.6 s
64 KB	RF300	FRAM *)	FF 00	7.2 s
*) The OTP memory is not initialized by this command.				

Note

RF200 does not support the "initialize" command. Instead use the "Write" command.

SLG STATUS

Table 3- 10 SLG status

Command [hex]	sub_command [hex]	length [dec]	address_MDS [hex]	DAT_DB [dec]	Note
04	01 = status after UDT 110 [1)]	–	–	Pointer to the result. The result is indicated with the corresponding UDT (see sub_command)	MOBY U/D, RF200 and RF300
	02 = status after UDT 120 [1)] (last commands)	–	–		MOBY U
	03 = status after UDT 130 [1)] (error messages)	–	–		MOBY U
	04 = status after UDT 140[1)] (transponder in field)	–	–		MOBY U
	05 = status after UDT 150 (communication quality)	–	–		MOBY U
	06 = status after UDT 280 (diagnostics data)	–	–		RF300
[1)] You will find the UDT description in the section "UDTs of FB45".					

END

Table 3- 11 Terminate communication with the transponder (MOBY U)

Command [hex]	sub_command [hex]	length [dec]	address_MDS [hex]	DAT_DB [dec]	Note
08	00 = Processing with transponder has terminated	–	–	–	ANZ_MDS_present is reset.
	01 = Processing pause with the transponder[1)]				ANZ_MDS_present remains set.
[1)] MOBY U: This command is recommended when the selected scanning_time is greater than 0 (standby time). Use of this command optimizes the life of the transponder battery. Before another transponder command can execute, the sleep_time of the transponder must first expire.					

SET-ANT

Table 3- 12 Switch antenna of reader ON/OFF

Command [hex]	sub_command [hex]	length [dec]	address_MDS [hex]	DAT_DB [dec]	Note
0A	01 = antenna on 02 = stand-by; antenna off	–	–	–	The antenna on/off command cannot be started by command repetition (see section "Command repetition (Page 37)").

This command is not needed for normal operation because, when a reader is turned on, its antenna is always on.
The antennas must be turned off if two sensitive readers are positioned very close to each other. The application software must ensure that only one antenna is on at a time.

MDS-STATUS

Table 3- 13 Transponder status and diagnosis

Command [hex]	sub_command [hex]	length [dec]	address_MDS [hex]	DAT_DB [dec]	Note
0B	00 = status and diagnosis	–	Today's date (week/year) for calculating the battery life (e.g. 1401 hex = 20th week of the year 2001)	Pointer to result. The result is presented with UDT 100.	MOBY U only (see section "The UDTs of FB 45 / FC 45 (Page 74)")
	01 = type and write protection status for RF300 tags	–	–	Pointer to result. The result is presented with UDT 260.	RF300 (see Section "UDTs of FB 45")
	02 = diagnostic data	–	–	Pointer to result. The result is presented with UDT 270.	RF300 (see section "The UDTs of FB 45 / FC 45 (Page 74)".)
	03 = Type and write protection ISO tags	-	-	UDT 230	RF300 with ISO transponders RF200, MOBY D *)
*) SLG D10S only					

3.2.2 Command chaining

Command chaining permits various address areas of the transponder to be processed by starting just one command. The advantage of command chaining is the optimum speed at which commands can be processed on the communications module and on the reader.

A command chain is set up by the user by storing a succession of UDT 20s in a DB. The chained commands must all be command type 4x. The last command in a chain must be type 0x.

FB 45 uses this to detect the end of a command chain.

Example:

A transponder must process 4 data records. The command structure is stored in DB 47. The transponder data is stored consecutively in DB 48.

Read	Transponder address	0000 hex	Length 600
Read	Transponder address	1000 hex	Length 100
Read	Transponder address	1200 hex	Length 1
Write	Transponder address	1200 hex	Length 1

Execution steps:

1. Define structure

Table 3- 14 DB 47 - declaration view

Partial command	STRUCT	
Partial command	ARRAY [1 ... 4]	**Note**: 1 ... 4 = No. of partial commands
Partial command	UDT 20	
Partial command	END_STRUCT	

2. Specify the "starting values" in the data view

Table 3- 15 DB 47 - data view

Name	Initial value	Comment
Partial command [1].command	42	Read command; followed by another command
Partial command [1].pattern	00	
Partial command [1].length	600	
Partial command [1].adress_MDS	0000	
Partial command [1].DAT_DB_number	48	
Partial command [1].DAT_DB_address	0	
Partial command [2].command	42	Read command; followed by another command
Partial command [2].pattern	00	
Partial command [2].length	100	
Partial command [2].adress_MDS	1000	
Partial command [2].DAT_DB_number	48	
Partial command [2].DAT_DB_address	600	
Partial command [3].command	42	Read command; followed by another command
Partial command [3].pattern	00	
Partial command [3].length	1	
Partial command [3].adress_MDS	1200	
Partial command [3].DAT_DB_number	48	
Partial command [3].DAT_DB_address	700	
Partial command [4].command	01	Write command, last command in chain
Partial command [4].pattern	00	
Partial command [4].length	1	
Partial command [4].adress_MDS	1200	
Partial command [4].DAT_DB_number	48	
Partial command [4].DAT_DB_address	701	

See also

Command parameters (Page 30)

3.2.3 Command repetition

Operating principle

After a new start (or init_run) of the CM, FB 45 transfers the command (or command chain) once to the CM. Command transmission is automatic with the first command_start. This command (or the last command or the command chain) always remains buffered on the CM. If command repetition is started now, the command buffered on the CM is executed again, and the result(s) transferred to FB 45.

Advantages of command repetition

- The data transfer on PROFIBUS/PROFINET is minimized. This is particularly noticeable with extensive bus configurations and slow (bus) transmission speeds.
- The CM processes each tag independent of FB 45. In concrete terms, this means each tag is processed even in applications with a very fast sequence of tags. This takes place no matter what the (PROFI) BUS speed.
- Total data throughput is increased considerably particularly with controllers which have few system resources for non-cyclic frames.

Command overview for use with command repetition

Command [hex]		Command		Permitted with command repetition
normal	chained*	Syntax	Description	
01	41	WRITE	Write data to transponder	yes; but only with identical write data
02	42	READ	Read data from transponder	yes
03	43	INIT	Initialize transponder	yes
04	44	SLG STATUS	Query reader status	No
08	48	END	END; terminate communication with the transponder	yes
0A	4A	SET-ANT	Switch antenna on/off	No
0B	4B	MDS-STATUS	Query transponder status	yes
*) Chained commands are not supported by all readers. You should also note the information in the relevant system manual.				

Programming

There are two programming methods.

- Continuous reading (processing) of each passing transponder. After the CM is programmed with a command, "repeat_command" is set and remains set. The following diagram shows the primary states.

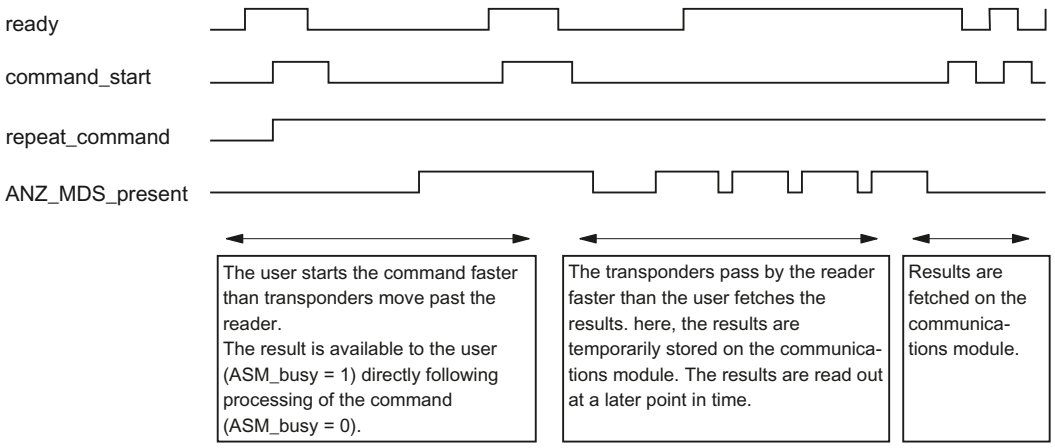


Figure 3-2 Continuous reading of each passing tag/transponder (repeat_command remains set)

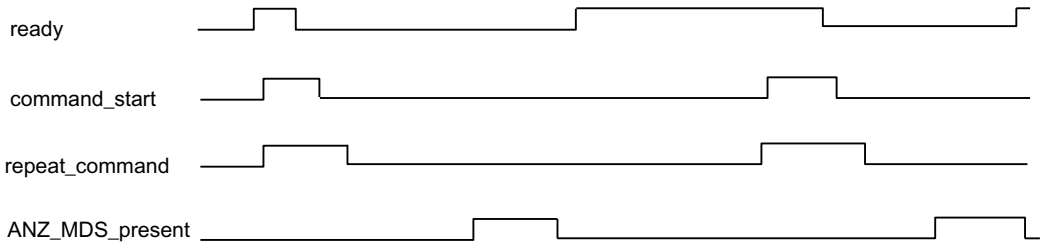
When permanent command repetition is used, data may be transferred to FB 45 slower than new tags are being processed (fast tag sequence, slow data transmission). In this case, the results are temporarily stored on the CM. The CM or reader has a number of buffers for this intermediate storage. When the buffers are full and FB 45 has not fetched data and additional tags arrive, these tags are no longer processed.

Table 3- 16 Readers that support command repetition

Device type	No. of buffers per channel	Max. user data which can be processed with command repetition
SLG U92	150	34950 byte
SLG D10S	100	23300 byte
SLG D11S/D12S	1	233 byte
RF300 reader	246	57318 byte

One buffer can hold up to 233 bytes of user data.

- Specific reading (processing) of a tag. The user starts the processing of each new tag in his/her application. The following time diagram illustrates this principle.



The following sequence must be programmed by the user:
- At the beginning of the command, the user sets "command_start" and "repeat_command" simultaneously.
- The user then waits for ASM_busy = 1 and then resets "repeat_command".
- Once ready = 1 has been signaled by the FB, the command has been processed.
  The communications module does not automatically process any further transponders.

Figure 3-3 Specific reading with repeat_command by the user

Note

In the case of RFID systems with unique tag IDs (UID) (e.g. RF300, MOBY U), the stored command is only repeated when the next tag entering the read field has a different UID from the previous one. If the same tag (identical UID) enters the field again and again, the tag will not be processed again.

3.3 Presence check

This section explains the mechanism of the presence check. As default, the CM or the reader operates with the presence check.

Presence check

The presence check is detection logic in the firmware of the reader that detects whether or not a mobile data memory is currently located in the area of the reader. It can be controlled with various mechanisms. Selection is carried out using the parameter MDS_control. Currently the mechanism "with field scanning" is available with the MDS_control = 1 parameter.

Field scanning (MDS_control = 1):

The reader's firmware continuously scans its surroundings via the magnetic field to determine whether a transponder is present. A hysteresis during field scanning suppresses most of the switching back and forth of ANZ_MDS_present when a tag stops at the border of the field.

Presence

A transponder is currently within the operating range of the reader. The presence bit (ANZ_MDS_present in the command and status word) is set (see section "Command and status word (Page 26)"). The presence display is indicated by the PRE LED on the front of the communications module (see section Brief description of the hardware (Page 81)). Some of the readers have their own LEDs and display responses that can be found in the relevant manual.

3.3.1 No tag control, no presence check: MDS_control = 0

The message about the presence of a tag is suppressed by the ANZ_MDS_present variable.

3.3.2 No tag control, presence control with field scanning: MDS_control = 1

In this mode, the field of the selected reader is always on. As soon as a tag moves into the field of the reader, this is indicated to the user via the ANZ_MDS_present bit (see section "Command and status word (Page 26)"). The user can then start a command at any time. No error message is generated if the tag leaves the field during processing.

Commissioning

4

1st step: Install communications module in STEP 7

To install the communications modules in STEP 7, follow the steps below depending on the communications modules you are using:

- RF170C, ASM 475
  The installation program for RF170C and ASM 475 must be run once on the STEP 7 PC.
- PROFIBUS ASM 456
  The GSD file must be added to the device catalog using HW Config ("Options" > "Install new GSD..."):
  - Siem8114.GSD for ASM456
- PROFINET RF180C
  The GSDML file must be added to the device catalog using HW Config ("Options" > "Install new GSD..."):
  - GSDML-V2.2-SIEMENS-RF180C-20100329.xml

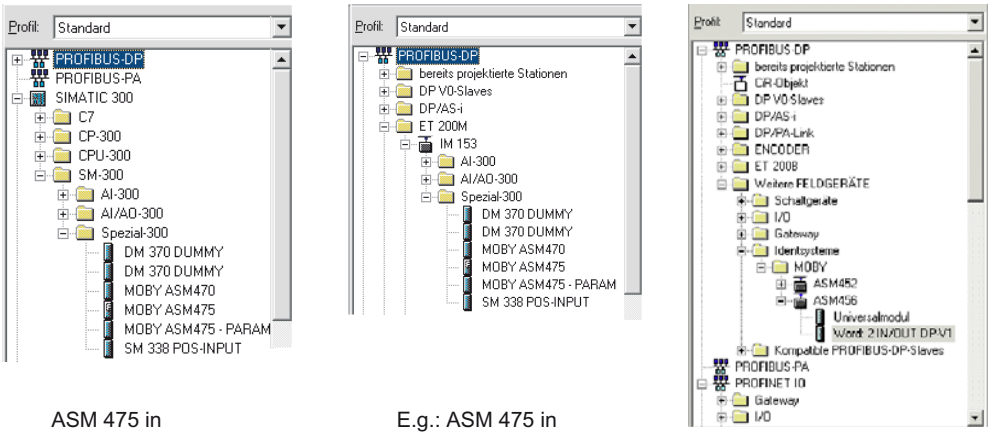
NOTICE
The "S7-compatible" setting results in addressing errors!
To operate the ASM 456 using the GSD file, the DP interface of the DP master must be set to "DP-V1".

2nd step: Configure hardware in STEP 7

To configure the hardware in STEP 7, follow the steps below depending on the communications module and the configuration you are using:

- ASM 475: Centralized configuration in S7-300
- ASM 475: Distributed configuration with PROFIBUS and ET 200M
- RF170C: distributed configuration via PROFIBUS or PROFINET and ET 200pro
- ASM 456: Distributed configuration with PROFIBUS
- RF180C: Distributed configuration with PROFIBUS

The following figure shows the position of the communications modules in the hardware catalog.



ASM 475 in a centralized configuration

E.g.: ASM 475 in a distributed configuration via ET 200M

ASM 456 in a distributed configuration via PROFIBUS

Figure 4-1 Location of the communications modules in the hardware catalog

When configuring the ASMs, make sure that the I address and the Q address have the same values. The value in the I address field must be copied later on into the ASM_address variable in the STEP 7 project. If a communications module has more than one channel (e.g. ASM 475 = 2 channels), the same I address must be used for every channel. The following figure shows an example of a hardware configuration:

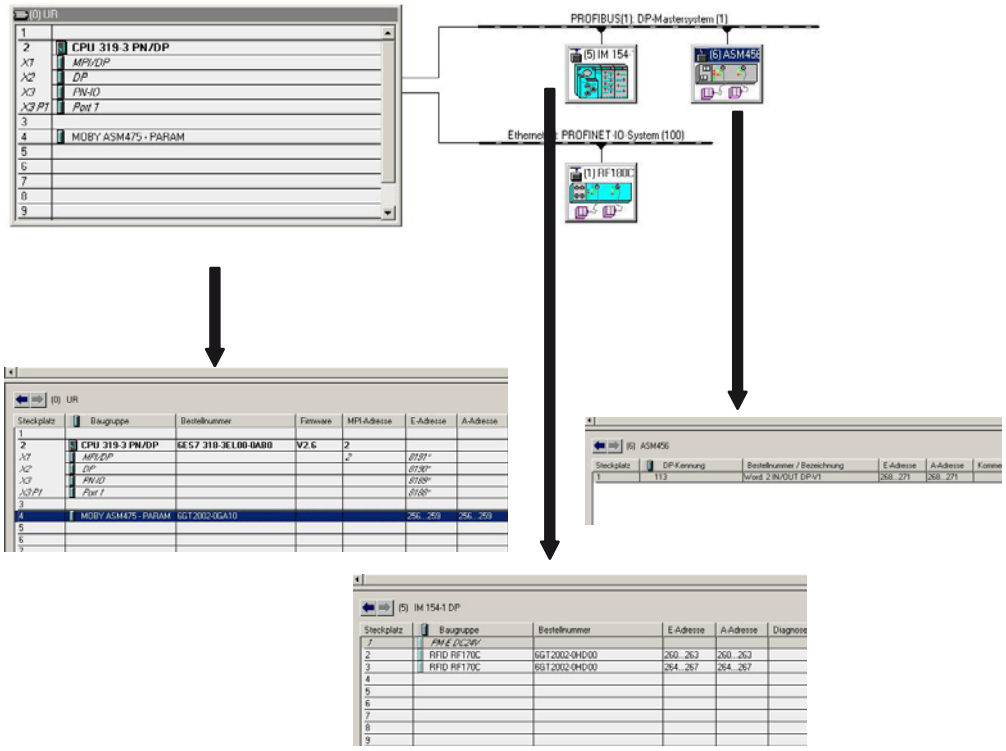
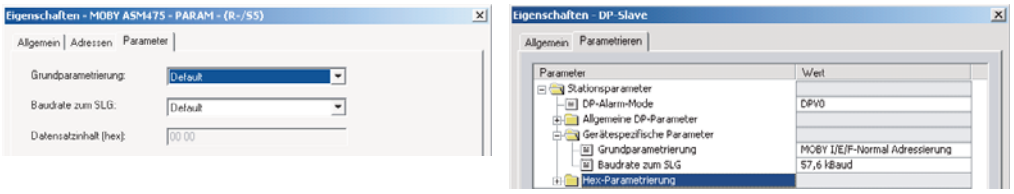


Figure 4-2 Example of a hardware configuration

If the project is downloaded to the hardware in this step (without a user program), the SIMATIC CPU and the PROFIBUS must change to RUN. If this is not the case, continue troubleshooting PROFIBUS/PROFINET (check the PROFIBUS address settings on the communications module or the IP address with PROFINET against the configuration in HW Config).

3rd Step: Set the properties of the communications module

You can set the basic function of the communications module in the object properties of the module (e.g. MOBY U, serial baud rate). The object properties are shown in one of the following windows. The possible options are shown in the drop-down lists.



ASM 475 object properties

ASM 456 object properties are stored in the GSD file

Figure 4-3 Configuring the object properties

4th step: Edit STEP 7 project

This step is described based on the supplied sample program.

- Copy the sample program for FB 45 into the new STEP 7 project.
- Depending on the number of configured readers:
  - Declare the UDT 10 in DB 45 and the associated command(s) (UDT 20) in DB 47.
  - Then display DB 45 in the "data view" of the editor and modify the "input parameters" in the "Actual value" column. For simple commissioning of RF200/RF300, all you have to do is adjust the ASM_address and ASM_channel parameters to the HW Config addresses.

    Constraint: Each reader uses the same command (DB 47) and the same data (DB 48).

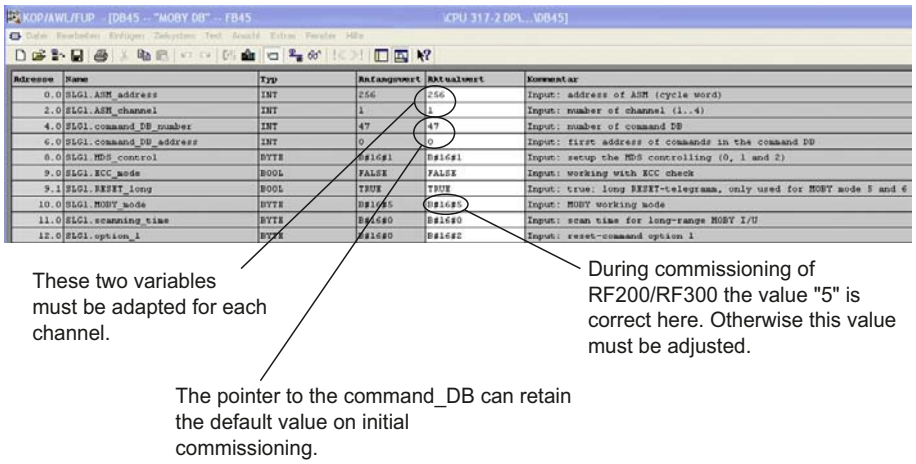


Figure 4-4 Edit DB 45

- Edit OB 1 and program a cyclic FB 45 call for each channel; declare a memory bit for the command start for each RFID channel.
- Set the variable "init_run" in the parameter DB in OB 100 for each RFID channel.

5th step: Download and test the program

- Download the project to the SIMATIC CPU.
- Connect a reader of the selected RFID type to each RFID channel.
- After restarting the SIMATIC CPU (STOP → RUN), the CPU should not be in STOP mode. If the CPU does indicate STOP, you should continue by troubleshooting. This is done by evaluating the diagnostic messages of the CPU (function: "PLC - Module Information").

  The main causes of errors are:

  – There is a mismatch between the I/O address of the modules in HW Config and the ASM_address configured in the MOBY DB (UDT 10) or the ASM_address does not exist on the I/O.

  – A slave has failed and OB 122 is not programmed.

- Since the default parameter assignment of FB 45 is set with MDS_control = B#16#1, the presence check on the reader must already be active now. You can recognize this on the CM by the flickering RxD LED or on the reader by the permanently lit LED. If you now place a transponder in the transmission window of a reader, the PRE or ANW LED must light up.

  If the RxD LED does not go on, continue with trouble-shooting as described in the next point.

- Checking operation using the programming device

  Use the "Modify variables" function to monitor the status of communication between FB 45 and the CM and to track errors and start commands. The following figure shows the necessary variables: This variable table can be found in the sample project under the name "Status Channel 1":

Status Channel 1 -- MOBY FB45\FB45

		Operand	Symbol	Statuswert	Steuerwert
1		M 1.0	"Strt_cmd_chn1"		
2		M 1.2	"Strt_init_run_chn1"		
3					
4		// Cancel			
5		DB45.DBX 19.0	"MOBY DB".SLG[1].cancel		
6		// Command Start			
7		DB45.DBX 19.1	"MOBY DB".SLG[1].command_start		
8		// System Start Up			
9		DB45.DBX 19.3	"MOBY DB".SLG[1].init_run		
10		// Ready			
11		DB45.DBX 18.7	"MOBY DB".SLG[1].ready		
12		// Presence of a MDS			
13		DB45.DBX 18.0	"MOBY DB".SLG[1].ANZ_MDS_present		
14					
15		// Error			
16		DB45.DBX 18.6	"MOBY DB".SLG[1].error		
17		// Errors			
18		DB45.DBB 22	"MOBY DB".SLG[1].error_MOBY		
19		DB45.DBB 23	"MOBY DB".SLG[1].error_FC		
20					
21		// MOBY Command			
22		DB47.DBB 0	"Command".Kanal_1_Befehl[1].command		
23		DB47.DBB 1	"Command".Kanal_1_Befehl[1].sub_command		
24		DB47.DBW 2	"Command".Kanal_1_Befehl[1].length		
25		DB47.DBW 4	"Command".Kanal_1_Befehl[1].address_MDS		
26		DB47.DBW 6	"Command".Kanal_1_Befehl[1].DAT_DB_number		
27		DB47.DBW 8	"Command".Kanal_1_Befehl[1].DAT_DB_address		
28					

Figure 4-5 Variables for checking functions - VAT "Status Channel 1"

The variables ready = TRUE and error = FALSE should now be indicated for each channel. If this is not the case continue troubleshooting (see section "Error messages and troubleshooting (Page 47)").

If ready = FALSE:

- This channel is not called in OB 100.
- This channel is not processed cyclically by an FB 45 call in OB 1.

If error = TRUE:

- Read out the precise cause of the error using the variables error_MOBY, error_FB or error_BUS. The causes of errors and their remedies are described in the section Error messages and troubleshooting (Page 47).

The variable ANZ_MDS_present now indicates the presence of a tag as soon as you place a tag in the transmission window of the reader. This is the same display as the PRE LED on the CM or the yellow/orange LED on the reader.

You can now start the selected MOBY command with the auxiliary variable "Strt_cmd_chn1" = TRUE. If there is no tag in the reader's transmission window, the command is processed on the CM for an indefinite length of time.

The status is indicated by the ready bit "MOBY DB.SLG1.ready" = FALSE. Now place a tag in the transmission window. As soon as the tag has been processed, the result is transferred to FB 45 and "ready" = TRUE is indicated.

Commissioning of the RFID components is now complete. You can now program your own Ident application based on the sample program.

Error messages and troubleshooting 5

5.1 General errors

Automation system switches to STOP

- OB 86 not programmed and a slave has failed.
- A slave has failed, and OB122 is not programmed.

The error does not occur until FB 45 is called.

- The pointer Params_DB, command_DB or DAT_DB does not exist or is pointing to a non-existent address area.

5.2 Error messages

An error condition exists in FB 45 whenever the "Error" variable is enabled on a channel. If this is the case, the exact cause of the error can be determined from variable "error_MOBY", "error_FB" or "error_BUS".

Table 5- 1 Classification of error messages

Error variable	Classification
error_MOBY	This error is reported by the communications module or reader. There are two main reasons for this: • Errors have occurred in communication between the communications module and the reader or between the reader and the transponder. • The CM cannot process the command. Error_MOBY is indicated on the CM by the ERR LED with the corresponding flashing pattern.
error_FB	This error is signaled by FB 45. Main cause • There is a parameter error in "Params_DB" or "command_DB".
error_BUS	The transport layer of PROFIBUS or PROFINET is signaling an error. A PROFIBUS tracer and a PROFIBUS device (BT 200; order No. 6ES7181-0AA00-0AA0) or a diagnostics repeater (order no. 6ES7972-0A801-0XA1) are invaluable tools for accurate troubleshooting. The PROFIBUS system diagnostics can provide further information about the cause of the error. The error shown here is reported by the SFB 52/53 system function in the RET_VAL parameter. For a detailed description of the RET_VAL parameter, please refer to the SIMATIC S7 system manuals (see System software for S7-300/400).

NOTICE
When several error occur with chained commands, the "error variable" always indicates the first error detected.

error_MOBY

The ERR LED of the reader flashes when there are error messages. Some errors are also indicated by the flashing ERR LED of the CM.

Table 5- 2 Error messages of the communication module/reader using the "error_MOBY" variable

Error code (B#16#...)	Flashing of ERR LED	Description
00	–	No error Default value if everything is ok.
–	1x	No error CM has started up and is waiting for an init_run.
01	2x	Presence error: The tag has moved out of the transmission window of the reader. The command was executed only partially. Read command: No data are transmitted to FB 45. Write command: The tag that has just left the field contains an incomplete data record. • The operating distance from reader to tag is not being kept to. • Configuration error: The data record to be processed is too large (in dynamic mode) The next command is automatically executed on the next tag. A read/write command is possible.
02	2x	Presence error: A tag has passed by a reader without being processed by a command. This error message is not reported immediately. Instead, the CM is waiting for the next command (read, write). This command is immediately replied to with this error. This means that a read or write command is not processed. Only the next command is executed normally by the ASM again. An init_run from FB 45 also resets this error state.

Error code (B#16#...)	Flashing of ERR LED	Description
03	3x	Error in the connection to the reader. The reader is not answering. • The cable between the CM and reader is wired incorrectly or there is a cable break • The 24 V supply voltage is not connected or is not turned on or has failed briefly • The automatic fuse on the CM has blown • The hardware is defective • Another reader is in the vicinity and is active • Coupled interference on reader - or PROFIBUS cable • After eliminating the problem, run init_run
04	4x	Error in tag memory The tag has never been written to or has lost the contents of its memory due to battery failure. • Replace tag (possibly defective) • Reinitialize tag (see section Parameterizing (Page 19)).
05	5x	Unknown command FB 45 is sending an uninterpretable command to the CM. • Command_DB contains invalid command parameters. • The command_DB was overwritten by the user • The tag has signaled an address error
06	6x	Field disturbance on reader The reader is receiving interference pulses from the environment. • External interference field • There is not enough distance between two readers and this does not correspond to the configuration guidelines • The connecting cable to the reader is subject to interference, is too long or does not comply with the specification • MOBY U: Tag has left the field during communication. • MOBY U: Communication between reader and tag was aborted due to a disruption (e.g. person/foreign body moving between reader and tag).
07	7x	Too many transmit errors The tag could not receive the command or the write data from the CM correctly even after several attempts. • The tag is positioned exactly in the boundary area of the transmission window • The data transmission to the tag is being disrupted by external interference.

Error code (B#16#...)	Flashing of ERR LED	Description
08	8x	CRC sending error • The tag is signaling CRC errors frequently. – The tag is in the boundary area of the reader. – The tag and/or reader have a hardware fault.
09	9x	Only during initialization: CRC error when receiving an acknowledgment from tag • Cause same as error B#16#06.
0A	10x	Only during initialization: Tag cannot execute the initialization command. • Tag is defective
0B	11x	MOBY U: Memory of the tag cannot be read correctly
0C	12x	The tag memory cannot be written to • Tag memory is defective • The EEPROM memory of the transponder has been written to too often and must be replaced
0D	13x	Address error The address area of the tag is exceeded. • The start address in command_DB is invalid at command start (see Section "Processing data memories") • The tag is not the right type • RF300: Attempted write access to write-protected areas (OTP area)
0E	14x	reserved
0F	1x	Startup message from CM. The CM was off and has not yet received a RESET command. • Execute an init_run • The same physical CM channel is used in two (or more) UDT 10 structures. Check ASM_address and ASM_channel in all UDT 10 structures.
10	16x	Note: The NEXT command is not supported by the readers (MOBY U/D, RF200 and RF300).
11	17x	Short-circuit or brief undervoltage of the 24 V supply of the CM or overload of the 24 V outputs (error code, presence) • The affected output is turned off. • All outputs are turned off when total overload occurs. • A reset can only be performed by turning the 24 V voltage off and on again. • Then start init_run.

Error code (B#16#...)	Flashing of ERR LED	Description
12	18x	Internal CM communication error. • Connector contact problem on the CM • Defective CM hardware – Return CM for repair • Start init_run command after error correction.
13	19x	CM or reader does not have enough buffer space to store the command temporarily.
14	20x	internal error. • Program execution error on the CM • Cycle power to the CM • Start init_run command after error correction. • MOBY U: Watchdog error on the reader.
15	21x	Bad parameter assignment of the CM or reader • Check INPUT parameters in UDT 10 • Check parameters in HW Config • RESET command is has incorrect parameter settings. • After a startup, the CM has not yet received an init_run.
16	22x	The FB command cannot be executed with the PROFIBUS/PROFINET parameter assignment. • Length of the input/output areas too small for the cyclic I/O word. Did you use the right GSD file? • The CM or the reader have received a data record that is too long (data length > 233 bytes). The FB being used does not match the CM/reader.
17	23x	Communication error between FB 45 and communications module. Handshake error • Params_DB (UDT 10) of this reader is being overwritten by other parts of the program. • Check the parameter assignment of the reader in UDT 10 • Check FB 45 command which caused this error. • Start init_run command after error correction.
18	–	An error has occurred which must be acknowledged with an init_run. • A temporary short circuit has occurred on PROFIBUS. • The RESET command is faulty. • Start init_run command after error correction. • Check parameters ASM_address, ASM_channel, and MOBY_mode.

Error code (B#16#...)	Flashing of ERR LED	Description
19	25x	Previous command is active or buffer overflow. The user sent a new command to the CM although the last command was still active. • Active command can only be terminated with an init_run. • Before a new command can be started the READY bit must be 1 (exception: init_run). • Two FB 45 calls were assigned the same parameters ("ASM_address" and "ASM_channel"). • Two FB 45 calls are using the same Params_DB pointer. • Start init_run command after error correction. • When command repetition is used, no data is fetched from the tag. The data buffer on the CM has overflowed. Tag data has been lost.
1A	–	PROFIBUS DP error occurred. • The PROFIBUS DP bus connection was interrupted – Wire break on the bus – Bus connector on CM was briefly unplugged • PROFIBUS DP master no longer addressing CM • Execute an init_run • The CM has detected a frame interruption on the bus. The PROFIBUS may have been reconfigured (e.g. with HW Config). This error is only indicated when access monitoring has been enabled in the PROFIBUS configuration.
1B	27x	Other application active (for example firmware download)
1C	28x	The antenna of the reader is turned off. A tag command to the CM was started in this status. • Turn on the antenna with the "SET-ANT" command • The antenna is turned on (off) and has received an additional turn-on (turn-off) command.
1D	–	More transponders are located in the transmission window than can be processed at the same time by the reader. • Only 1 tag can be processed at a time with FB 45
1E	30x	Error when processing the function • The data in UDT 10 are invalid (e.g. write command with length = 0); check UDT 10 and execute init_run • Hardware defect: CM receives wrong data with init_run. • The "number of bytes" byte does not match the user data length (see Section "Programming the MOBY-ASM on PROFIBUS DP-V1").
1F	–	Active command canceled by RESET (init_run) or bus connector was unplugged • Communication with the tag was aborted by init_run. • This error can only be reported on init_run or cancel

error_FB

Table 5- 3 Error variable "error_FB"

Error code (B#16#...)	Description
00	No error; default value if everything is ok.
01	Params_DB not available in SIMATIC
02	Params_DB too small • UDT 10/11 was not used during definition • Params_DB must be 300 bytes in length (for each channel) • Check that Params_DB and Params_ADDR are correct
03	The DB after the "command_DB_number" pointer is not available in the SIMATIC.
04	"command_DB" in the SIMATIC too small • UDT 20/21 was not used during command definition • The last command in "command_DB" is a chained command; reset the chaining bit • Check command pointer command_DB_number/command_DB_address
05	Invalid command type. You will find a description of the valid commands in the section "RFID commands (Page 29)". • Check command pointer command_DB_number/command_DB_address • Check the current values in command_DB – Execute an init_run
06	Unexpected acknowledgement received. The parameters of the command and acknowledgement frame do not match (command, length, address_MDS). • The user changed the command_DB_number/_address pointer during command execution. • The user changed the command parameters in the MOBY CMD data block (UDT 20) during command execution. • Check the ASM_address and ASM_channel parameter settings. ASM_address and ASM_channel have the same parameters for different channels. • The acknowledgement counter and command counter (see section "Cyclic control word between master and communications module (Page 102)") between the CM and FB are no longer synchronized – Execute an init_run
07	The MOBY_mode or MDS_control parameter (defined in UDT 10) has an illegal value (see Section "Parameter data block").
08	A bus error has occurred which is reported by system functions SFB 52/53. More information on this error is available in the error_BUS variable. • ASM_address or ASM_channel not available • Execute an init_run

Error code (B#16#...)	Description
09	The CM has failed. • Loss of power on CM • PROFIBUS connector removed or PROFIBUS cable interrupted • ASM_address or ASM_channel not available This error is indicated if the ASM_failure bit (see section "Command and status word (Page 26)") was set in OB 122. OB 122 is called if FB 45 can no longer access the cyclic word for the CM.
0A	Another init_run was started without waiting for ready during execution of the init_run command • Do not set init_run cyclically • The same physical channel/reader is used in two (or more) UDT 10 structures. Check ASM_address and ASM_channel in all UDT 10 structures. Note: If the init_run was set cyclically without waiting for ready, after the error has been detected, you will need to run a second init_run to end this error.
0B	init_run cannot be executed; cyclic process image for the CM is disrupted; FB 45 reports timeout of the process image for the CM The timeout time can be adapted in DBB 47 of UDT 10 if required. The default value is 50 (dec)=2 seconds. Greater values (255 max.) will increase the timeout time. • ASM_address in UDT 10 is set incorrectly. ASM_address may be for wrong module. • ASM_channel setting is >8 or ≤0 • CM hardware/firmware is faulty. • The same physical channel/reader is used in two (or more) UDT 10 structures. Check ASM_address and ASM_channel in all UDT 10 structures.
0C	Area length error on block move for FB 45. • DAT_DB does not exist or is too small. Check DAT_DB_number and DAT_DB_address in UDT 20 • Write command with length = 0 was issued. • Execute an init_run
0D	An init_run was not completed correctly. The process image is inconsistent. This message is equivalent to a timeout. A timeout is reported 15s after starting init_run. This time can be adjusted in DBW 44 if necessary. • Run init_run again • Turn CM off and on again • The RUN/STOP switch on the CPU was pressed rapidly several times in succession (particularly with slow PROFIBUS baud rates) • The same physical channel/reader is used in two (or more) UDT 10 structures. Check ASM_address and ASM_channel in all UDT 10 structures.

error_BUS

Note

The following table of bus errors does not claim to be complete. If you receive any messages that are not documented here, you will find them in "System and standard functions S7-300/400, volume 1/2 (http://support.automation.siemens.com/WW/view/en/44240604)".

Table 5- 4 Error variable "error_BUS" when operating via PROFIBUS/PROFINET

Error code (W#16#...)	Description
800A	CM is not ready (temporary message) • This message is received by a user who is not using FB 45 and is querying the CM acyclically in very quick succession.
8x7F	Internal error on parameter x. Cannot be remedied by the user.
8x22 8x23	Area length error on reading parameter. Area length error on writing parameter. This error code indicates that parameter x is partially or completely outside the operand area or the length of a bit array for an ANY parameter is not divisible by 8.
8x24 8x25	Area error on reading parameter. Area error on writing parameter. This error code indicates that parameter x is within an area not allowed for the system function.
8x26	Parameter contains a time cell number which is too high.
8x27	Parameter contains a counter cell number which is too high.
8x28 8x29	Alignment error on reading parameter. Alignment error on writing parameter. The reference to parameter x is an operand whose bit address is not equal to 0.
8x30 8x31	The parameter is located within the write-protected global DB. The parameter is located within the write-protected instance DB.
8x32 8x34 8x35	The parameter contains a DB number which is too high. The parameter contains an FC number which is too high. The parameter contains an FB number which is too high.
8x3A 8x3C 8x3E	The parameter contains a DB number which is not loaded. The parameter contains an FC number which is not loaded. The parameter contains an FB number which is not loaded.
8x42 8x43	An access error occurred while the system was attempting to read a parameter from the I/O area of the inputs. An access error occurred while the system was attempting to write a parameter to the I/O area of the outputs.
8x44 8x45	Error on nth (n > 1) read access after an error occurred. Error on nth (n > 1) write access after an error occurred.
8090	Specified logical base address is invalid: No assignment in SDB1/SDB2x exists, or it is not a base address.
8092	A type other than BYTE has been specified in an ANY reference.

Error code (W#16#...)	Description
8093	The area identifier contained in the configuration (SDB1, SDB2x) of the logical address is not permitted for these SFCs. Permitted: • 0 = S7-400 • 1 = S7-300 • 2, 7 = DP modules
80A0	Negative acknowledgment while reading from module. FB fetches acknowledgment although no acknowledgment is ready. A user who is not using FB 45 would like to fetch DS 101 (or DS 102 to104) although no acknowledgment is available. • Perform an init_run for new synchronization between ASM and application.
80A1	Negative acknowledgment while writing to the module. FB sends command although a CM is unable to receive a command
80A2	DP protocol error with layer 2 • DP-V1 mode must be set in the header module for distributed I/O. • Possible hardware defect
80A3	DP protocol error in Direct-Data-Link-Mapper or User-Interface/User. Could be a hardware defect.
80B0	• SFC not possible for module type • Data record unknown to module • Data record number ≥ 241 is not allowed. • Data records 0 and 1 are not permitted for SFB 52/53 "WR_REC."
80B1	The length specified in the RECORD parameter is wrong.
80B2	The configured slot is not occupied.
80B3	Actual module type is not the module type specified in SDB1.
80B7	Incorrect length specified
80C0	• RDREC: The module has record, but it doesn't have any read data. • WRREC: CM is not ready to receive new data – Wait until the cyclic counter has been incremented
80C1	The data of the preceding write job on the module for the same data record have not yet been processed by the module.
80C2	The module is currently processing the maximum possible number of jobs for a CPU.
80C3	Required resources (memory, etc.) are currently in use. This error is not reported by FB 45. If this error occurs, FB 45 waits until the system is able to provide resources again.

Error code (W#16#...)	Description
80C4	Communication error • Parity error • SW ready not set • Error in block length management • Checksum error on CPU side • Checksum error on module side
80C5	Distributed I/O not available

Examples/applications

6

6.1 FB 45 scanning by user

Scanning of FB 45 takes place in accordance with the structogram in the following figure.

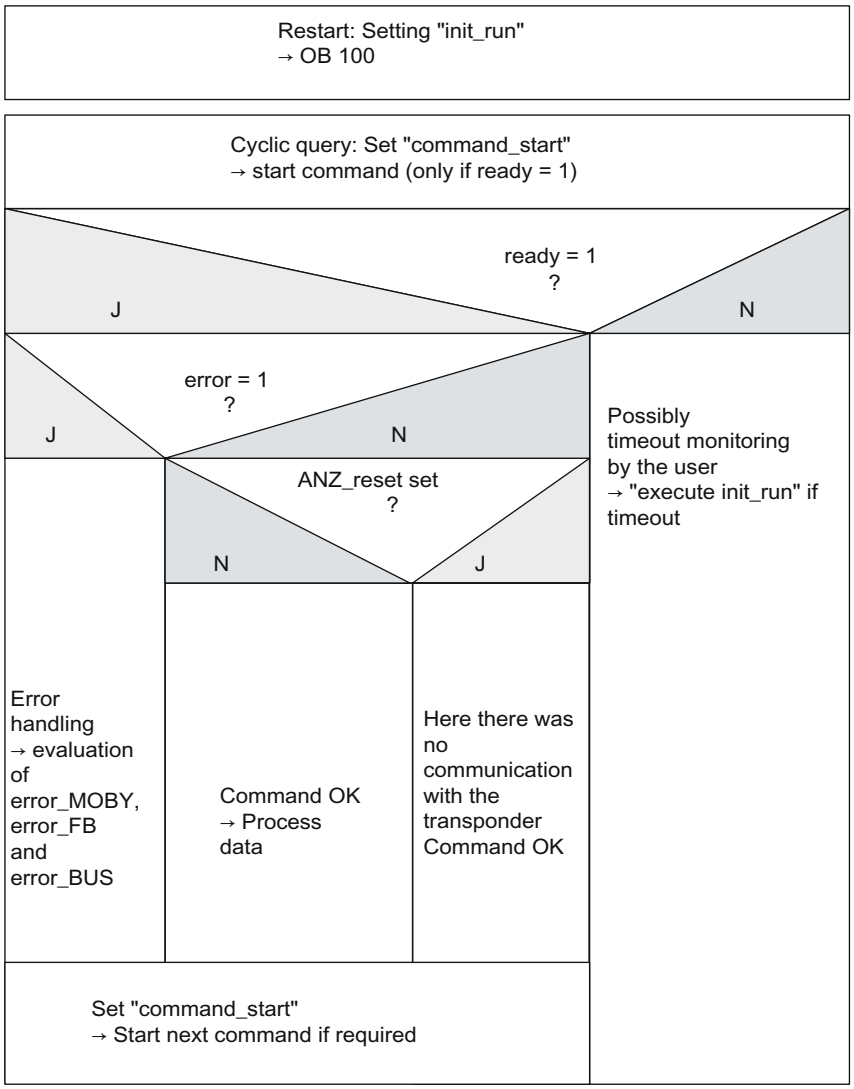


Figure 6-1 Structogram for scanning of FB 45

6.2 Processing of data memories/transponders

Data memory types

Mobile data memories with different storage capacities are available. The following table specifies the memory capacities currently available.

Table 6- 1 Available memory capacities

Memory capacity	Memory type	MOBY family	Transponder type
2 KB	RAM, 16 bytes OTP	MOBY U	e.g. MDS U315
32 KB	RAM, 16 bytes OTP	MOBY U	e.g. MDS U525
44 bytes	EEPROM	MOBY D	e.g. MDS D139/ I-Code 1
112 bytes	EEPROM	MOBY D, RF200, RF300	I-Code SLI / MDS D1xx
256 bytes	EEPROM	MOBY D, RF200, RF300	Tag-it HF-I/MDS D2xx
992 bytes	EEPROM	MOBY D, RF200, RF300	MDS D3xx
2000 bytes	FRAM	MOBY D, RF200, RF300	MDS D4xx
20 bytes	EEPROM	RF300	RF320T
8 KB	FRAM	RF300	e.g. RF340T
32 KB	FRAM	RF300	e.g. RF350T
64 KB	FRAM	RF300	e.g. RF370T (64 K)

Addressing

The data memories are addressed linearly from address 0000 (or the specified start address) to the end address. The CM or reader automatically recognizes the size of the memory on the transponder. If the end address on the transponder is exceeded, an error message is indicated in error_MOBY.

The next table shows the address space of the individual tag versions. The address_MDS and length variables (see Table "UDT 20 MOBY CMD" in section "RFID commands (Page 29)") must be configured according to this address space.

Address space of the transponder/MDS variants according to ISO 15693 for RF200, RF300 and MOBY D

System	Addressing	16-bit hexadecimal number	Integer number
RF200, RF300, MOBY D	**MDS D139 (I-Code 1; 44 bytes)**		
	Start address	0000	+0
	End address	002B	+43
	ID no.: (fixed-coded; can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	ISO-MDS (I-Code SLI; 112 bytes)		
	Start address	0000	+0
	End address	006F	+111
	ID no.: (fixed-coded; can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	ISO MDS (Tag-it HF-I; 256 bytes)		
	Start address	0000	+0
	End address	00FF	+255
	ID no.: (fixed-coded; can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	ISO MDS (my-d SRF55V10P; 992 bytes)		
	Start address	0000	+0
	End address	03DF	+991
	ID no.: (fixed-coded; can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	ISO-MDS (MB 89R118B, 2000 bytes)		
	Start address	0000	+0
	End address	07CF	+1999
	ID no.: (fixed-coded; can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8

Address space of the transponder versions for RF300

System	Addressing	16-bit hexadecimal number	Integer number
RF300	**20 bytes of data memory (EEPROM)**		
	R/W or OTP memory (EEPROM) (The EEPROM user memory for RF300 can be used either as R/W memory or as an OTP memory (see RF300 system manual))		
	Start address	FF00	-256
	End address	FF13	-237
	ID no.: (fixed-coded; can only be output as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	8 KB data memory (FRAM/EEPROM)		
	R/W or OTP memory (EEPROM) (The EEPROM user memory for RF300 can be used either as R/W memory or as an OTP memory (see RF300 system manual))		
	Start address	FF00	-256
	End address	FF13	-237
	R/W memory (FRAM)		
	Start address	0000	+0
	End address	1FFC	+8188
	ID no.: (fixed-coded, can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	32 KB data memory (FRAM/EEPROM)		
	R/W or OTP memory (EEPROM) (The EEPROM user memory for RF300 can be used either as R/W memory or as an OTP memory (see RF300 system manual))		
	Start address	FF00	-256
	End address	FF13	-237
	R/W memory (FRAM)		
	Start address End address	0000 7FFC	+0 +32764
	ID no.: (fixed-coded; can only be output as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	64 KB data memory (FRAM/EEPROM)		
	R/W or OTP memory (EEPROM) (The EEPROM user memory for RF300 can be used either as R/W memory or as an OTP memory (see RF300 system manual))		
	Start address	FF00	-256
	End address	FF13	-237
	R/W memory (FRAM)		

System	Addressing	16-bit hexadecimal number	Integer number
	Start address End address	0000 FEFC	+0 –
	ID no.: (fixed-coded; can only be output as a whole)		
	Start address Length	FFF0 0008	-16 +8

RF300: General notes on the meaning of the OTP memory

RF300 tags and ISO tags have a memory area that can be protected against overwriting. This memory area is called OTP. Five block addresses are available for activating the OTP function:

- FF80, FF84, FF88, FF8C and FF90

A write command to this block address with a valid length (4, 8, 12, 16, 20 depending on the block address) protects the written data from subsequent overwriting.

NOTICE
OTP writing/locking should only be used in static operation.

NOTICE
Use of the OTP area is not reversible. If you use the OPT area, you cannot undo it, because the OPT area can only be written to once.

RF300: Address mapping of OTP memory on the RF300 transponder

R/W EEPROM memory and OTP memory is only available once on the transponder.

The following table shows the mapping of addresses on the transponder.

Data can be read via the R/W address or the OTP address.

R/W EEPROM		Write RF300 OTP once	
Address	Length	Address	Length
FF00	1 .. 20	FF80	4,8,12,16,20
FF01	1 .. 19		
FF02	1 .. 18		
FF03	1 .. 17		
FF04	1 .. 16	FF84	4,8,12,16
FF05	1 .. 15		
FF06	1 .. 14		
FF07	1 .. 13		
FF08	1 .. 12	FF88	4,8,12
FF09	1 .. 11		
FF0A	1 .. 10		
FF0B	1 .. 9		
FF0C	1 .. 8	FF8C	4,8
FF0D	1 .. 7		
FF0E	1 .. 6		
FF0F	1 .. 5		
FF10	1 .. 4	FF90	4
FF11	1 .. 3		
FF12	1 .. 2		
FF13	1		

NOTICE

Write access to addresses starting at FF80 to FF93 activates the write protection (OTP function) on the EEPROM user memory. This operation is not reversible. Switching on write protection must always take place in ascending order without gaps, starting at address FF80.

Address space of the transponder/MDS variants for MOBY U

System	Addressing	16-bit hexadecimal number	Integer number
MOBY U	**2 KB data memory**		
	Start address	0000	+0
	End address	07FF	+2047
	Read OTP memory (write access only possible once. The OTP memory of MOBY U can only be processed completely, i.e. the start address must always be specified with value FFF0 hex and the length with value 10 hex.)		
	Start address	FFF0	-16
	Length	10	+16
	ID no.: (4 fixed-coded bytes; can only be read with the MDS status command)		
	32 KB data memory		
	Start address	0000	+0
	End address	7FFF	+32767
	Read OTP memory (write access only possible once)*		
	Start address	FFF0	-16
	Length	10	+16
	ID no.: (4 fixed-coded bytes; can only be read with the MDS status command)		

RF300: Address mapping of OTP memory on the ISO transponders

For the OTP area, a 16-byte address space is always reserved at the end of the memory area. The subdivision of the blocks depends on the chip type. The corresponding addresses for the user data are therefore not available to the application when the OTP area is used.

The last 16 bytes of the MDS address can be used as an OTP data area:

R/W EEPROM								Write ISO OTP once		
MDS D1xx		MDS D2xx		MDS D3xx		MDS D4xx				
Start address (hex)	Length	Start address (hex)	Length	Start address (hex)	Length	Start address (hex)	Length	Start address (hex)	Length	Length with MDS D4xx
0060	1...16	00F0	1...16	03D0	1...16	07C0	1...16	FF80	4, 8, 12, 16	8, 16
0064	1...12	00F4	1...12	03D4	1...12	07C4	1...12	FF84	4, 8, 12	-
0068	1...8	00F8	1...8	03D8	1...8	07C8	1...8	FF88	4, 8	8
006C	1...4	00FC	1...4	03DC	1...4	07CC	1...4	FF8C	4	-

NOTICE

Write access to addresses starting at FF80 to FF8F activates the write protection (OTP function) on the EEPROM user memory. This operation is not reversible.

Note

With the RF2xx readers and MOBY D, the OTP memory remains readable. Writing via the address FF80, on the other hand, is not possible.

6.3 Cyclic calling of FB 45 (e.g. in OB 1)

The following program is an example of how to call and scan FB 45 in an application. The definition of the data structure is described in the section "Data structure definition (Page 70)". The parameter settings for the RFID command were made during the definition of the "MOBY DB".

```
Network 1:    call FB45
memory bit 1.0 is set: Start MOBY command for 1st reader
memory bit 1.1 is set: Start MOBY command for 2nd reader
memory bit 1.2 is set: Start init_run for 1st reader
memory bit 1.3 is set: Start init_run for 2nd reader
memory byte 2: OB1 used as edge triggered memory
```

```
      CALL "MOBY FB" , "Instance DB K1"       // Call FB 45 for each reader in each
      Params_DB :=45                          cycle
      Params_ADDR:=0


      CALL "MOBY FB" , "Instance DB K2"
      Params_DB :=45
      Params_ADDR:=50

      A     "Strt_init_run_chn1"              // memory bit init_run for 1st reader
      FP    M 2.2
      S     "MOBY DB".SLG1.init_run
      JC    x01

      UN    "MOBY DB".SLG1.ready
      JC    x01
      A     "MOBY DB".SLG1.error
      JC    x01

      A     "Strt_cmd_chn1"                   // memory bit command_start for 1st
      FP    M 2.0                             reader
      S     "MOBY DB".SLG1.command_start

x01:  A     "Strt_init_run_chn2"              // memory bit init_run for 2nd reader
      FP    M 2.3
      S     "MOBY DB".SLG2.init_run
      JC    x02

      UN    "MOBY DB".SLG2.ready
      JC    x02
      A     "MOBY DB".SLG2.error
      JC    x02

      A     "Strt_cmd_chn2"                   // memory bit command_start for 2nd
      FP    M 2.1                             reader
      S     "MOBY DB".SLG2.command_start

x02:  NOP   0
```

6.4 Programming a cold and warm restart

The communications module and the reader are restarted by setting the "init_run" variable. The CM and FB 45 are reassigned parameters and synchronized with init_run.

An init_run is necessary after

- switching on the SIMATIC (OB 100)
- turning on the power supply of the CM
- plugging the reader onto the CM
- an interruption in PROFIBUS communication
- an error message in variable "error_BUS"

```
OB100: "Complete restart"
```

```
Network 1: set init run bit for all channels that are configured in DB45
```

```
SET
S      "MOBY DB".SLG1.init_run
S      "MOBY DB".SLG2.init_run
```

In a distributed configuration of a CM (e.g. via PROFIBUS), it is possible that the CM is switched off and on again as a result of the system(see section Programming a module failure (Page 68)). When this happens, the CM signals the power failure to FB 45 (and so to the user). The user must then send an init_run for this CM before an RFID command can be started again.

Note:
The "init_run" variable is set to TRUE in the project supplied with the system. This automatically triggers an "init_run" whenever the parameter data block is downloaded onto the PLC (see Table "INPUT parameters" in Section "INPUT parameters").

6.5 Programming a module failure

The failure of a PROFIBUS/PROFINET module can be detected primarily using PROFIBUS/PROFINET system diagnostics.

However, if a failed slave is addressed via FB 45, an I/O access error is generated in SIMATIC.

As a result

- OB 122 is called.
- the PLC changes to STOP if OB 122 is not programmed.

A feature implemented in FB 45 allows a normal error to be signaled to the user (error_FB=09) when an RFID PROFIBUS slave fails. To do this, the user sets bit "ASM_failure = 1" in OB 122 for the failed RFID channel. The following example shows a possible OB 122 implementation.

```
OB122: "Module Access Error"
```

```
Network 1: Reset channel 1 when error occurs
```

```
      L     #OB122_MEM_ADDR                 // Temporary OB 122 variable
      L     "MOBY DB".SLG1.ASM_address
      -D
      SRW   1                               // Formula:
      L     1                               // (#OB122_MEM_ADDR -
      +D                                    SLG[x].ASM_address) / 2 + 1

      L     "MOBY DB".SLG1.ASM_channel      // Compare with conf. channel
      ==I
      JCN   x1
      SET
      S     "MOBY DB".SLG1.ASM_failure      // Power failure on ASM

x1:   NOP   0
```

```
Network 2: Reset channel 2 when error occurs
```

```
      L     #OB122_MEM_ADDR                 // Temporary OB 122 variable
      L     "MOBY DB".SLG2.ASM_address
      -D
      SRW   1                               // Formula:
      L     1                               // (#OB122_MEM_ADDR -
      +D                                    SLG[x].ASM_address) / 2 + 1

      L     "MOBY DB".SLG2.ASM_channel      // Compare with conf. channel
      ==I
      JCN   x2
      SET
      S     "MOBY DB".SLG2.ASM_failure      // Power failure on ASM

x2:   NOP   0
```

OB 86 must also be available on the automation system in addition to OB 122 to prevent the system from switching to STOP if a PROFIBUS slave fails. No code needs to be programmed in OB 86 for the correct operation of FB 45.

After the error on the CM has been corrected and the CM is ready for operation again, the user needs to start an init_run for FB 45. The CM is then ready for operation.

6.6 Data structure definition

The developer can define different RFID data structures depending on the structure of the application. Some example structures are given below.

1st example

3 readers are configured. One command is assigned to each reader. RFID parameters (DB 45), RFID commands (DB 47), and data (DB 48) are assigned to different data blocks. The declaration view is shown.

```
Block: DB45; MOBY DB
```

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	Reader	ARRAY [1..4]		
*50.0		UDT10		
=200.0		END_STRUCT		

```
Block: DB47; Command
```

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	Command	ARRAY [1..4]		
*10.0		UDT20		
=40.0		END_STRUCT		

```
Block: DB48; Data
```

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	Data	ARRAY [1..1024]		
*1.0		BYTE		
=1024.0		END_STRUCT		

When the data blocks have been defined, the "Actual value" of the data must be edited using the "View" > "Data View" menu.

2nd example

2 commands are assigned directly to each RFID channel. The RFID parameters and the RFID commands of all readers are stored in a "MOBY DB". A nested structure is used in the declaration.

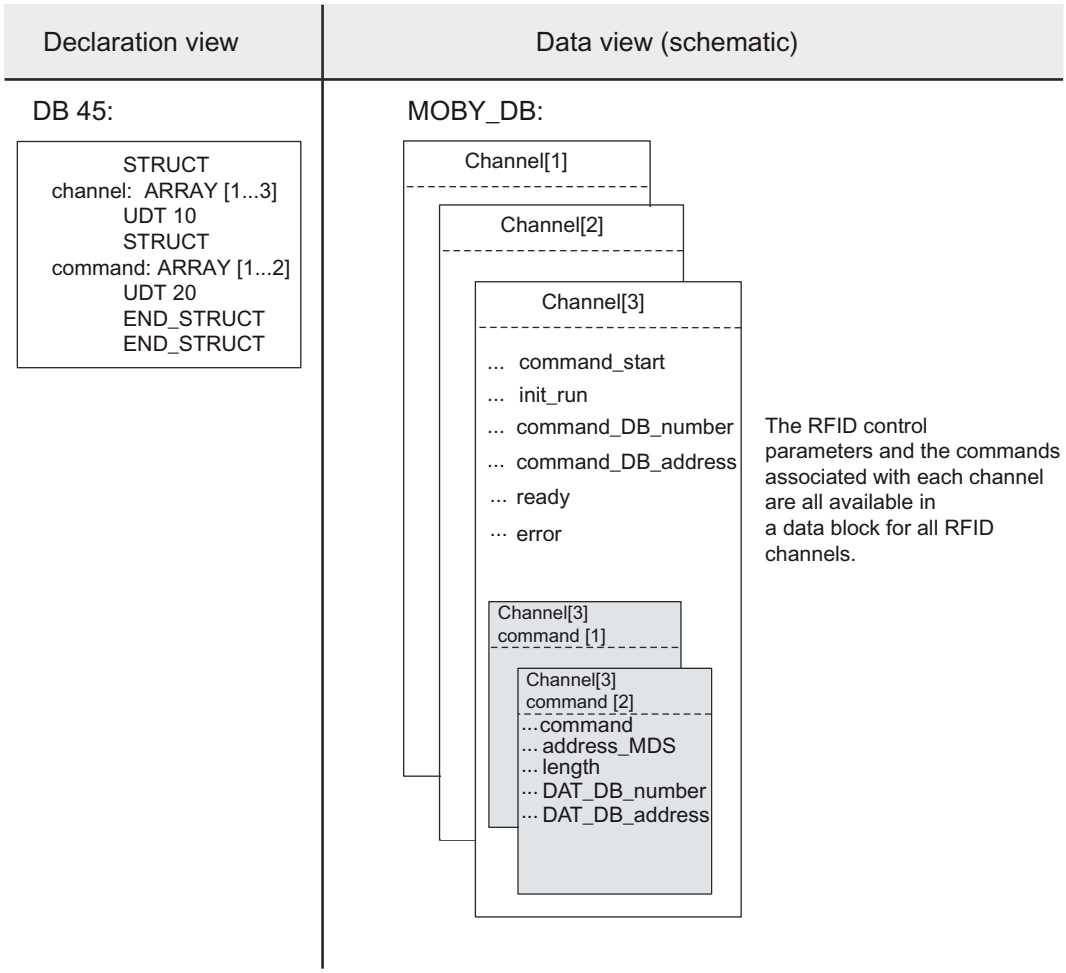


Figure 6-2 Example of when several RFID commands are assigned to one channel

The following shows an extract from a STEP 7 user program. It shows how a large number of RFID channels can be handled easily using symbolic names. A command is started via each of the inputs 0.0, 0.1 and 0.3. An edge memory bit is used to prevent the command from being started several times:

```
A         MOBY_DB.channel[1].ready       // 1st READER
AN        MOBY_DB.channel[1].error
A         I 0.0
AN        Edgememorybit_1
S         MOBY_DB.channel[1].command_start
S         Edgememorybit_1
AN        I 0.0
R         Edgememorybit_1


A         MOBY_DB.channel[2].ready       // 2nd READER
AN        MOBY_DB.channel[2].error
A         I 0.1
AN        Edgememorybit_2
S         MOBY_DB.channel[2].command_start
S         Edgememorybit_2
AN        I 0.1
R         Edgememorybit_2


A         MOBY_DB.channel[3].ready       // 3rd READER
AN        MOBY_DB.channel[3].error
A         I 0.3
AN        Edgememorybit_3
S         MOBY_DB.channel[3].command_start
S         Edgememorybit_3
AN        I 0.3
R         Edgememorybit_3


Call      "MOBY_FB", DB100
          Params_DB: = 45
          Params_ADDR: = 0


Call      "MOBY_FB", DB101
          Params_DB: = 45
          Params_ADDR: = 70


Call      "MOBY_FB", DB102
          Params_DB: = 45
          Params_ADDR: = 140
```

3rd example

A separate data block is assigned to each RFID channel. It contains the parameters, commands and data for a channel. Space for 10 RFID commands should be reserved on each channel.

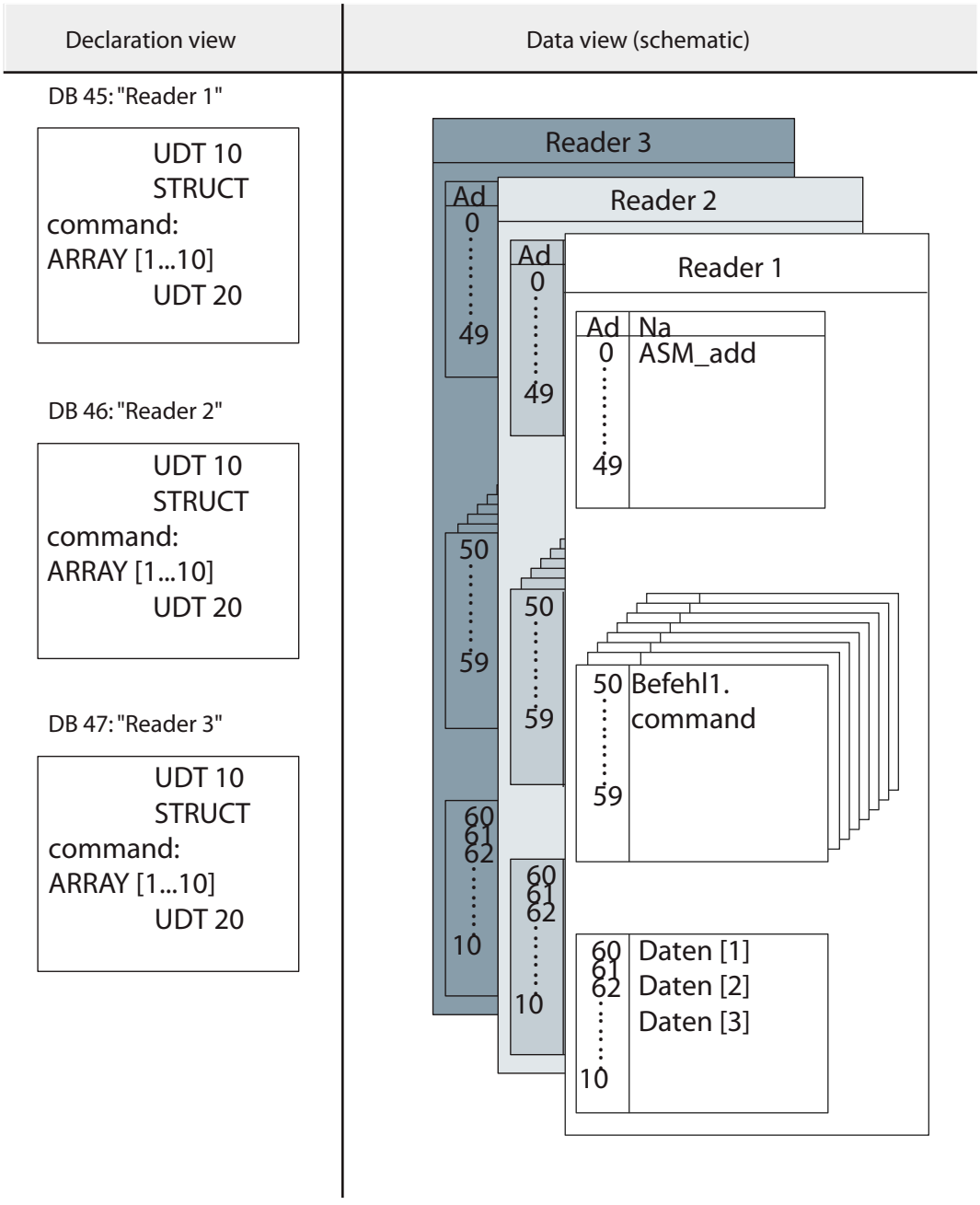


Figure 6-3 Example of when a separate data block is assigned to each RFID channel

6.7 The UDTs of FB 45 / FC 45

The "MDS status" and "SLG status" commands supply a variety of data. The UDTs described in the following section can be used for clear presentation and easy definition of the data blocks for the result.

Table 6- 2 UDT overview table

UDT			Description	Described in
English	German	Spanish		
10	11	14	Parameter data block	Section "Parameter data block (Page 19)"
20	21	24	RFID commands	Section "RFID commands (Page 29)"
60	61	64	Parameter data block for transponder > 32 KB	Section "Parameter data block (Page 19)"
70	71	74	RFID commands for transponder > 32 KB	Section "RFID commands (Page 29)"
100	101	104	Result of transponder status	Section "The UDTs of FB 45 / FC 45 (Page 74)"
110	111	114	Result of reader status (sub_command = 01)	
120	121	124	Result of reader diagnostics I (sub_command = 02)	
130	131	134	Result of reader diagnostics II (sub_command = 03)	
140	141	144	Result of reader diagnostics III (sub_command = 04)	
230	231	234	Result of transponder status (sub_command = 03, RF300)	
260	261	264	Result of transponder status (sub_command = 01, RF300)	Sample project on software DVD
270	271	274	Result of transponder status (sub_command = 02, RF300)	
280	281	284	Result of reader status (sub_command = 06, RF300)	

UDT 101: Result of transponder status

Table 6- 3 UDT 101 "MOBY transponder status"

Address	Name	Type	Comment
0.0		STRUCT	
+0.0	UID	DWORD	Tag (unique identifier)
+4.0	MDS type	BYTE	Tag
+6.0	sum subframe access	DINT	Sum of subframe access
+10.0	sum searchmode access	INT	Sum of searchmode
+12.0	ST date Week	BYTE	Date of last sleep-time change (week of year)
+13.0	ST date Year	BYTE	Date of last sleep-time change (year)
+14.0	battery left	INT	Battery left (percentage)
+16.0	ST	BYTE	Set Sleep_time value on tag
=18.0		END_STRUCT	

UDT 111: Result of reader status (mode 1)

Table 6- 4 UDT 111 "MOBY SLG Status"

Address	Name	Type	Comment
0.0		STRUCT	
+0.0	status_info	BYTE	Reader mode
+1.0	hardware	CHAR	Type of hardware
+2.0	hardware_version	WORD	HW version
+4.0	loader_version	WORD	Version of loader
+6.0	firmware	CHAR	FW
+8.0	firmware_version	WORD	Firmware version
+10.0	driver	CHAR	Type of driver
+12.0	driver_version	WORD	Version of driver
+14.0	interface	BYTE	Interface (RS 232/RS 422)
+15.0	baud	BYTE	Baud rate
+16.0	reserved1	BYTE	Reserved
+17.0	reserved2	BYTE	Reserved
+18.0	reserved3	BYTE	Reserved
+19.0	distance_limiting_SLG	BYTE	Ranges/performance setting (RF200/RF300: res.)
+20.0	multitag_SLG	BYTE	Multitag reader
+21.0	field_ON_control_SLG	BYTE	BERO operating mode (RF200/RF300: res.)
+22.0	field_ON_time_SLG	BYTE	MOBY U: BERO time MOBY D: transponder type ((RF200/RF300: ISO transponder type)
+23.0	sync_SLG	BYTE	Semaphore control (synchronization with reader) (RF200/RF300: res.)
+24.0	status_ant	BYTE	Status of antenna
+25.0	stand_by	BYTE	Standby time after a command was executed (RF200/RF300: res.)
+26.0	MDS_control	BYTE	Presence
=28.0		END_STRUCT	

UDT 121: Result of reader diagnostics I

Table 6- 5 UDT 121 "MOBY SLG-Stat Diag 1"

Address	Name	Type	Comment
0.0		STRUCT	
+0.0	status info	BYTE	Reader status mode
+1.0	number functions	BYTE	Range: 1...33
+2.0	function 01 01	BYTE	*
+3.0	function 01 02	BYTE	*
+4.0	function 01 03	BYTE	*
. . .	. . .		
=234.0		END_STRUCT	
*) An area of 7 bytes each is reserved for 33 commands.			

UDT 131: Result of reader diagnostics II

Table 6- 6 UDT 131 "MOBY SLG-Stat Diag 2"

Address	Name	Type	Comment
0.0		STRUCT	
+0.0	status info	BYTE	Reader status mode
+1.0	number errors	BYTE	Range: 1...235
+2.0	error number	ARRAY [1...235]	Error that occurred on the reader
*1.0		BYTE	
=238.0		END_STRUCT	

UDT 141: Result of reader diagnostics III

Table 6- 7 UDT 141 "MOBY SLG-Stat Diag 3"

Address	Name	Type	Comment
0.0		STRUCT	
+0.0	status info	BYTE	Reader status mode
+1.0	number MDS	BYTE	Range: 1...24
+2.0	UID	ARRAY [1...24]	identified UID (tag number)
*4.0		DWORD	
=98.0		END_STRUCT	

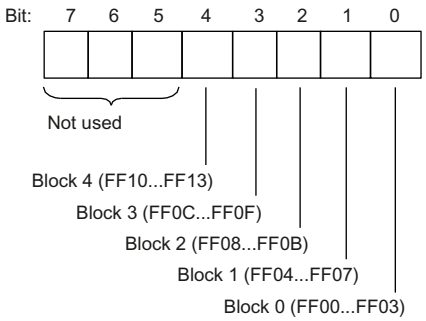
UDT 231: Result of MDS status (mode 3, RF200, RF300)

Table 6- 8 UDT 231: "MDS status (mode 3, RF300)"

Address	Name	Type	Comment
0.0		STRUCT	
+0.0	reserved0	BYTE	
+1.0	status info	BYTE	Tag status mode
+2.0	UID	ARRAY[1...1]	
*0.0		STRUCT	
+0.0	Byte_1_4	DWORD	Tag number (unique identifier)
+4.0	Byte_5_8	DWORD	
=8.0		END_STRUCT	
+10.0	MDS type	BYTE	Tag type
+11.0	IC version	BYTE	Chip version (for my-d = 00h)
+12.0	Size	WORD	Memory size in bytes
+14.0	lock state	BYTE	Size of the user memory
+15.0	block size	BYTE	EEPROM write-protection status
+16.0	nr of blocks	BYTE	Number of blocks in user memory
=18.0		END_STRUCT	

UDT 261: Result of MDS status (mode 1, RF300)

Table 6- 9 UDT 261 "MDS status (mode 1, RF300)"

Address	Name	Type	Comment
0.0		STRUCT	
+0.0	reserved0	BYTE	
+1.0	status info	BYTE	Tag status mode
+2.0	UID	ARRAY[1...1]	
*0.0		STRUCT	
+0.0	Byte_1_4	DWORD	Tag number (unique identifier)
+4.0	Byte_5_8	DWORD	
=8.0		END_STRUCT	
+10.0	MDS type	BYTE	Tag type
+11.0	Lock_state	BYTE	EEPROM write protection status  Write protection status: 0 = block is not protected (r/w) 1 = block is write-protected (ro)

Address	Name	Type	Comment
+12.0	reserved1	ARRAY[1...6]	
*1.0		BYTE	
=18.0		END_STRUCT	

UDT 271: Result of MDS status (mode 2, RF300)

Table 6- 10 UDT 271: "MDS status (mode 2, RF300)"

Address	Name	Type	Comment
0.0		STRUCT	
+0.0	reserved0	BYTE	
+1.0	status_info	BYTE	Tag status mode
+2.0	UID	ARRAY[1...1]	
*0.0		STRUCT	
+0.0	Byte_1_4	DWORD	Tag number (unique identifier)
+4.0	Byte_5_8	DWORD	
+8.0		END_STRUCT	
+10.0	LFD	BYTE	Power flux density: Relationship between the limit value and measured value
+11.0	FZP	BYTE	Error counter, passive (errors during idle time)
+12.0	FZA	BYTE	Error counter, active (errors during communication)
+13.0	ANWZ	BYTE	Presence counter
+14.0	reserved1	ARRAY[1...3]	
*0.0		BYTE	
=18.0		END_STRUCT	

UDT 281: Result of read/write status (mode 6, RF300)

Table 6- 11 UDT 281 "Reader status (mode 6, RF300)"

Address	Name	Type	Comment
0.0		STRUCT	
+0.0	status info	BYTE	Reader status mode
+1.0	FZP	BYTE	Error counter, passive (errors during idle time)
+2.0	ABZ	BYTE	Abort counter
+3.0	CFZ	BYTE	Code error counter
+4.0	SFZ	BYTE	Signature error counter
+5.0	CRCFZ	BYTE	CRC error counter
+6.0	BSTAT	BYTE	Current command status
+7.0	ASMFZ	BYTE	Interface error counter for CM
+8.0 to +26.0	res.	BYTE	Reserved
=28.0		END_STRUCT	

6.8 Determing the memory requirement in the SIMATIC

The memory resources used in SIMATIC S7 by a MOBY application should normally not reach the system limits on the PLC. However, if the following conditions occur simultaneously, the memory requirement must be considered:

- SIMATIC S7 with small memory configuration
- Processing of a large number of RFID channels (readers) on an S7
- Processing of large volumes of data on each Ident channel

The example below shows a configuration for the S7 memory required by FB 45. 20 readers with 1 KB tag data each are to be processed:

	Memory Requirements [KB]	
	per channel	Total
FB 45 (needed once)	–	~8
Instance DB	0,45	9,1
Parameter data block (UDT 10)	0,1	2
Command data block (UDT 20)	0,01	0,2
DB for tag data	1	20
Total	1,56	**39,2**

In this configuration, a SIMATIC CPU with only 48 KB memory can reach the memory limits quickly if further programs are also running.

Brief description of the hardware

A

This appendix covers the special features of the individual communications modules that can be addressed with FB 45.

You will find a detailed hardware description of the communications modules with the installation instructions in the manual of the particular communications module.

A.1 RF170C

Area of application

The RF170C communication module is a SIMATIC S7 module. It can be plugged into the ET 200pro distributed I/O station. The ET 200pro is operated by the user over PROFIBUS DP V1 or PROFINET IO. An S7-300 or S7-400 with integrated PROFIBUS/PROFINET connection can be used as the controller.

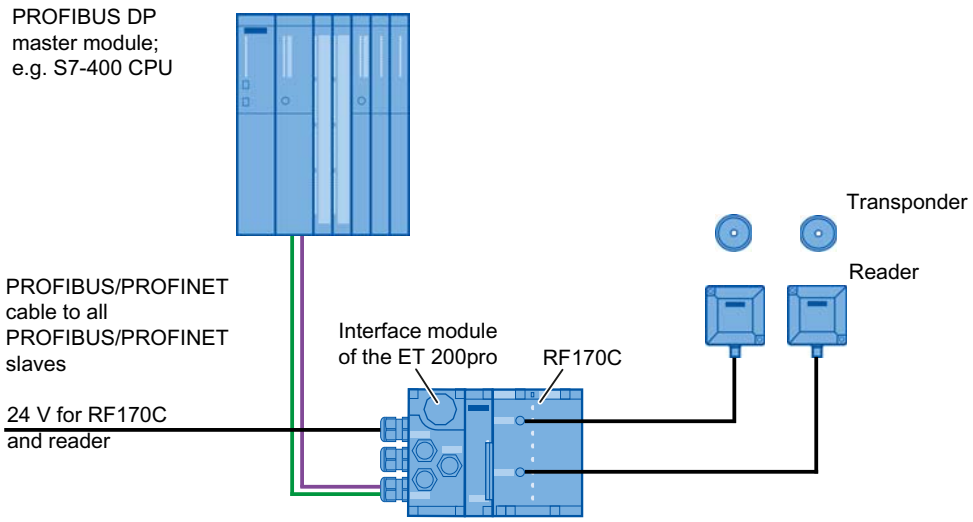


Figure A-1 Configurator for an RF170C

Hardware configuration

The RF170C is integrated into the hardware configuration of the SIMATIC Manager preferably via the Object Manager. The object manager is available on the DVD "RFID Systems Software & Documentation" (6GT2080-2AA20) as "SETUP.exe". The object manager provides the functions for PROFIBUS DP and PROFINET IO.

Integration into the PROFIBUS master is carried out by means of a GSD file:

- SIEM8118.GSD for ET 200pro with IM 154-1
- SIEM8119.GSD for ET 200pro with IM 154-2 High Feature

The GSD file can be optionally incorporated into HW Config of the SIMATIC Manager using the function "Options > Install new GSD…". You will find the file under Support and ET 200pro.

For full functionality (e.g. firmware update), support for GSD revision 5 or higher is required.

Integration into other PROFINET IO controllers is carried out by means of a GSDML file:

- GSDML-V1.0-SIEMENS-ET200pro-"Date in format yyyymmdd".xml for ET 200pro with IM 154- PN High Feature

Parameter setting by means of GSD file

In addition to the PROFIBUS-relevant control parameters, several RFID-relevant control parameters are also defined for the RF170C in the GSD file. The RFID-relevant parameters are set using the object properties of the slave in HW Config. You will find a description of the parameters in the section "Parameterizing (Page 19)". The table below shows the possible settings:

Table A- 1 Setting of RFID-relevant parameters

Parameter name	Value	Note
USER_Mode	FB 45 / FC 45	Default
	FB 55 / FC 55	-
	FB 56 / FC 56	-
	RFID standard profile	Available soon
MOBY_Mode	MOBY I, E normal addressing	Default
	MOBY I filehandler	only with FB 56/FC 56
	MOBY U, D / RF300 standard addressing	(also applies to RF200)
	MOBY U filehandler	only with FB 56/FC 56 (multitag)
Baud rate reader	19.2 kBd	MOBY U/D / RF200 / RF300
	57.6 kBd	MOBY U/D / RF200 / RF300 [1)]
	115.2 kBd	MOBY U/D / RF200 / RF300 [1)]
Diagnostics with diagnostics messages	None	Standard diagnostics only
	Hard errors	Hardware-related messages only
[1)] Not permitted with MOBY D with SLG D11S/D12S		

Input parameters for RF170C with FB 45/FC 45

Assignment is made in UDT 10.

You will find the list of the input parameters for RF170C in the section "Parameter data block (Page 19)".

Command table of the RF170C for normal addressing (FB 45 / FC 45 / FB 55 / FC 55)

Assignment is made in the UDT 20 by means of the "command" variable.

You will find a list and description of the commands in the section "Command parameters (Page 30)".

Table A- 2 Number of buffers for intermediate storage

	No. of buffers per channel	Maximum amount of data for intermediate storage
Number of buffers for intermediate storage of commands and results	150	34 950 bytes

Diagnostics using LEDs

The figure below shows the layout of the LED display of the RF170C connection module:

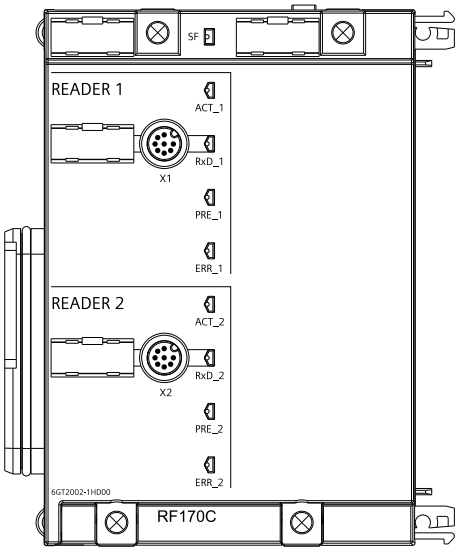


Figure A-2 LED display on the RF170C communication module

Table A- 3 Status and error LEDs for RF170C

LEDs	Meaning
SF	Group error
ACT_1, ACT_2	The corresponding reader is active in processing a user command.
ERR_1, ERR_2	A flashing pattern indicates the last error to occur (see section "Error messages (Page 47)").
PRE_1, PRE_2 *	Indicates the presence of a transponder.
RxD_1, RxD_2	Indicates live communication with the reader. May also indicate malfunctions on the reader.
* In multitag operation, this LED uses a flashing interval to indicate the number of data carriers currently within the range of the reader.	

After start-up or updating the firmware, the LEDs SF, PRE, ERR and ACT indicate the operating status or faults of the RF170C:

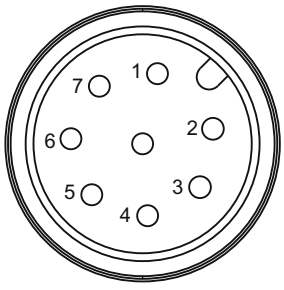
SF	PRE_1	ERR_1	ACT_1	PRE_2	ERR_2	ACT_2	Description
Off	Off	Off	On	Off	Off	Off	Start-up active
On	Off	On	Off	Off	Off	Off	Checksum error at start-up *
On	Off	Off	Off	Off	On	Off	Firmware invalid *
On	On	On	On	On	On	On	LED test for approximately 4 seconds; otherwise firmware fault *
On	Off	On	On	Off	On	On	Checksum error at start-up *
On	On	On	On	Off	On	On	Checksum error of the firmware *
On	Off	On	On	On	On	On	External RAM defective *
On	On	Off	On	On	On	On	ESSA3 defective *
On	Off	On	On	On	Off	On	ID error firmware *
–	Off	1 x flash every 3 s	Off	Off	1 x flash every 3 s	Off	RF170C successfully started up, waiting for reset command
–	–	n x flash every 3 s	–	–	m x flash every 3 s	–	The number of flashes (n, m) indicates the last reported error on a given channel.
–	–	Flashing	Rapid flashing	–	Flashing	Rapid flashing	Firmware update; alternate flashing of the error LEDs at approximately 1 Hz

– = not relevant
* If this error recurs, the module is defective and must be replaced.

Interfaces of the RF170C

Table A- 4 Pin assignment of the interfaces of the RF170C

X1, X2: Connector for reader



Pin	Signal
1	+24 V
2	–RxD
3	0 V
4	RxD
5	TxD
6	–TxD
7	free
8	PE / shield

Pre-assembled reader connecting cables are available for the RF170C.

The appropriate cable and M12 connectors are available for users who want to assemble their own SIMATIC RFID cables.

A.2 RF180C

Area of application

The RF180C communications module is a module for connecting Siemens Ident devices to PROFINET. The RF180C communications module can be connected both to SIMATIC S7 controllers as well as to any other controllers. Up to two readers can be operated on the RF180C at the same time. The user can start a command on 2 readers simultaneously (FB 45 when operating on a SIMATIC S7).

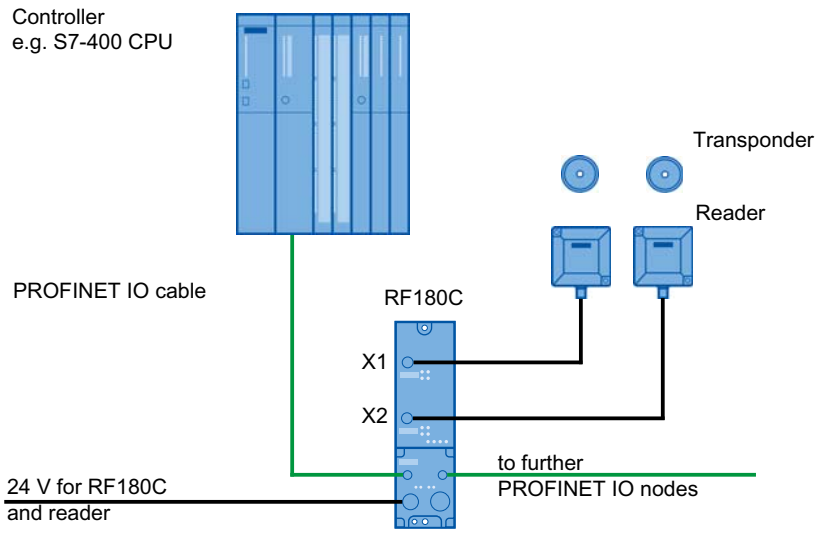


Figure A-3 Configurator for RF180C

Hardware configuration

The RF180C is integrated into the hardware configuration by means of a GSDML file. The RF180C can then be configured using HW Config of the SIMATIC manager or another PROFINET tool. The GSDML file can be found on the "RFID Systems Software & Documentation" DVD or on the Internet (see section "Service & Support (Page 121)").

- GSDML-V2.2-SIEMENS-RF180C-date in format "yyyymmdd.xml"
- The RF180C must have a valid IO device name. The default device name is RF180C

Parameter setting by means of GSDML file

The GSDML file contains four parameters relevant to RFID that must be set. They are set by selecting the "Object properties" for slot 0 of the RF180C in HW Config.

The table below shows the possible settings:

Table A- 5 Setting of RFID-relevant parameters

Parameter name	Value	Note
USER_Mode	FB 45	Default
	FB 55	for multitag applications
	FB 56	With later firmware version
	RFID standard profile	With later firmware version
MOBY_Mode	MOBY I / E standard addressing	-
	MOBY I filehandler	reserved
	MOBY U/D / RF300 / RF600 standard addressing	Default (also applies to RF200)
	MOBY U filehandler	With later firmware version
	RF300 Filehandler	-
Baud rate reader	19.2 kBd	MOBY U/D / RF200 / RF300
	57.6 kBd	MOBY U/D / RF200 / RF300 1)
	115.2 kBd	MOBY U/D / RF200 / RF300 1)
Diagnostics with diagnostics messages	None	Standard diagnostics only
	Hard errors	Hardware-related messages only
	Hard/soft errors low priority	All messages
	Hard/soft errors high priority	All messages high-priority
1) Not permitted with MOBY D with SLG D11S/D12S		

Input parameters for RF180C with FB 45/FC 45

Assignment is made in UDT 10.

You will find the list of the input parameters for RF180C in the section "Parameter data block (Page 19)".

Table of commands of the RF180C for standard addressing (FB 45)

Assignment is made in the UDT 20 by means of the "command" variable.

You will find a list and description of the commands in the section "Command parameters (Page 30)".

Table A- 6 Number of buffers for intermediate storage

	No. of buffers per channel	Maximum amount of data for intermediate storage
Number of buffers for intermediate storage of commands and results	150	34 950 bytes

Diagnostics using LEDs

The following figure shows details of the LEDs of the RF180C.

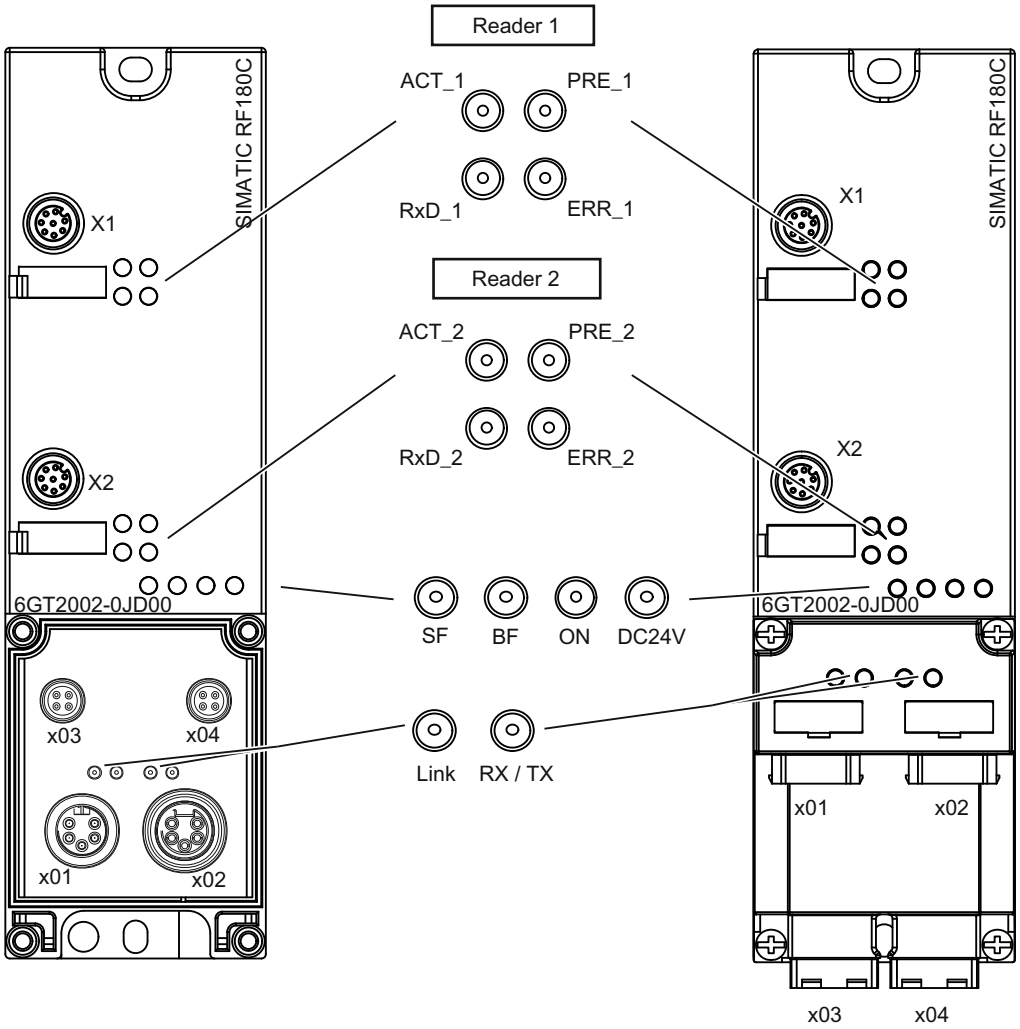


Figure A-4 LEDs of the RF180C

Table A- 7 Status LEDs for the RF180C

LEDs	Meaning
ON	Lights up when the RF180C has completed start-up without errors.
24 V DC	Lights up when the 24 V supply voltage is connected to the RF180C.
ACT_1, ACT_2	The corresponding reader is active in processing a user command.
ERR_1, ERR_2	A flashing pattern indicates the last error to occur (see section "Error messages (Page 47)").
PRE_1, PRE_2 *	Indicates the presence of a tag.
RxD_1, RxD_2	Indicates live communication with the reader. May also indicate malfunctions on the reader.
*) In multitag operation, this LED uses a flashing interval to indicate the number of data carriers currently within the range of the reader.	

Table A- 8 LED display for PROFINET diagnostics

BF	SF	Cause of error	Error correction
On	–	• Communication module is in start-up mode. • No cable inserted	When the bus is configured correctly, this state ends a few seconds after switching the module on.
Flashes	-	• There is no connection to the PROFINET IO controller.	• Check the PROFINET IO connection. • Check your PROFINET IO configuration (device name, GSDML file). • Reload the configuration into the RF180C (see the Section "Configuration parameters of the RF180C")
Off	On	• A PROFINET diagnostic signal exists.	• Analyze the diagnostic data.
Off	Off	• Normal mode	–
– = Status not relevant			

Table A- 9 LEDs on connection block

Link (green)	Tx / Tx (yellow)	Meaning
Off	Off	No physical connection over PROFINET IO
On	Off	Physical connection over PROFINET IO, no data communication
On	Flashes	Physical connection over PROFINET IO, with data communication
Off	On	Temporary state following switch-on
The table is applicable to both left and right PROFINET IO connection.		

Other communication module operating modes are indicated by the PRE, ERR, ACT, SF and ON LEDs:

Table A- 10 LED display for operating states

ON	BF	SF	PRE_1	ERR_1	ACT_1	PRE_2	ERR_2	ACT_2	Description
Off	Off	Off	Off	Off	Off	Off	Off	Off	Start-up active
On	On	On	On	On	On	On	On	On	LED test on start-up (start PROFINET IO)
Off	Off	On	On	On	Off	On	On	Off	Internal fault
Off	Off	On	On	Off	On	On	Off	On	Checksum error of the firmware
Off	Off	On	Off	Slow flashing	Off	Off	Slow flashing	Off	Firmware update (flashes with every described area)

A.3 ASM 456

Area of application

The ASM 456 communications modules are slave modules for operating RFID components via the PROFIBUS DP/DP-V1 on any control systems.

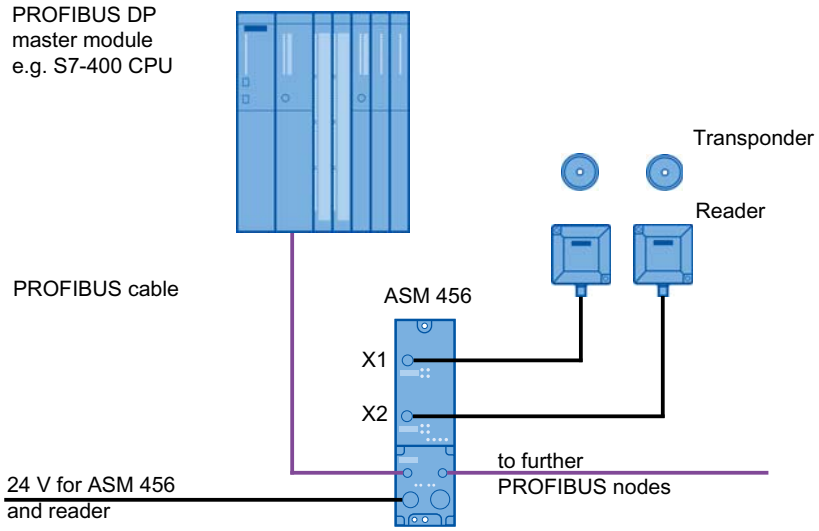


Figure A-5 ASM 456 configurator

Design

The ASM has a connection block for connecting up to the PROFIBUS DP which is available as an option and the ECOFAST version or M12, 7/8".

The following figure shows the basic design of the ASM 456.

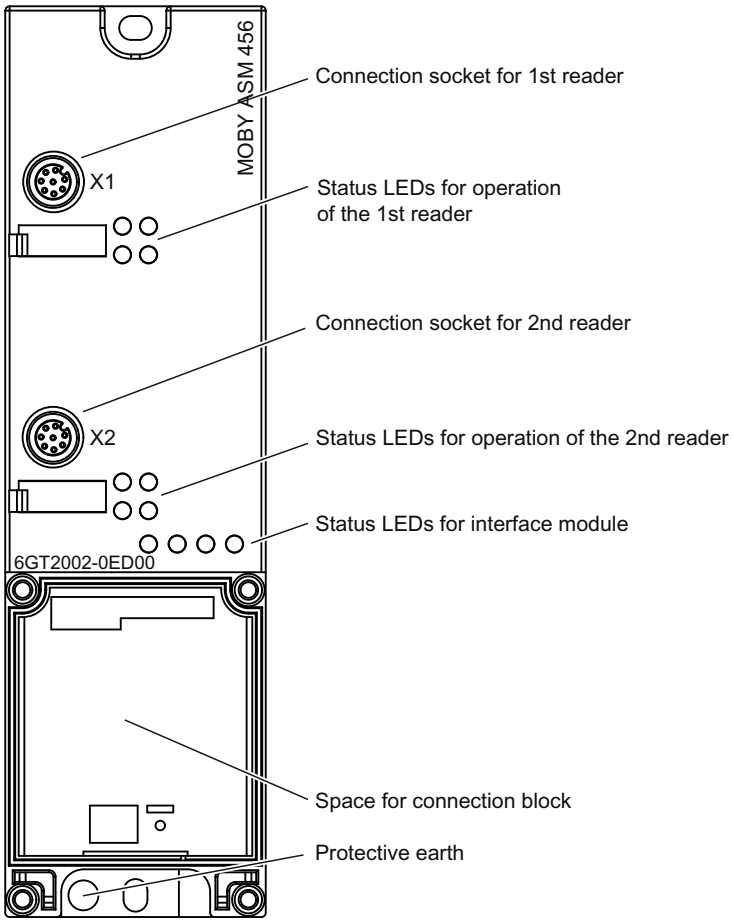


Figure A-6 Basic design of the ASM 456

Hardware configuration

The ASM 456 is integrated into the hardware configuration of the SIMATIC Manager or into another PROFIBUS Master by means of the GSD file SIEM8114.GSD. The file is incorporated into HW-Config of the SIMATIC Manager using the function "Options - Install new GSD ...". You will find the file on the DVD "RFID Systems Software & Documentation" in the directory "daten\PROFI_GSD\ASM456".

For full functionality (diagnostics texts, firmware update), support for GSD revision 5 or higher is required.

Parameter setting by means of GSD file

In addition to the control parameters relevant for PROFIBUS, several control parameters relevant for RFID are also defined for the ASM 456 in the GSD file. The parameters relevant for RFID are set using the "Object properties" of the slave in HW Config. The following table shows the possible settings:

Table A- 11 Setting of MOBY-relevant parameters

Parameter name	Value	Note
USER_Mode	FB 45 / FC 45	Default
	FB 55 / FC 55	-
	FB 56 / FC 56	-
	RFID standard profile	dependent on the firmware version
MOBY_Mode	MOBY I, E normal addressing	Default
	MOBY I filehandler	only with FC 56
	MOBY U, D / RF300 standard addressing	(also applies to RF200)
	MOBY U filehandler	only with FC 56 (multitag)
	RF300 Filehandler	-
Baud rate reader	19.2 kBd	MOBY U/D / RF200 / RF300
	57.6 kBd	MOBY U/D / RF200 / RF300 [1)]
	115.2 kBd	MOBY U/D / RF200 / RF300 [1)]
Diagnostics with diagnostic messages (see Section "Error messages and troubleshooting")	None	Standard diagnostics only
	Hard errors	Hardware-related messages only
	Hard/soft errors low priority	All messages
	Hard/soft errors high priority	All messages high-priority
[1)] Not permitted with MOBY D with SLG D11S/D12S		

Input parameters for ASM 456

Assignment is made in UDT 10.

You will find the list of the input parameters for ASM 456 in the section "Parameter data block (Page 19)".

Table of commands for ASM 456

Assignment is made in the UDT 20 by means of the "command" variable.

You will find a list and description of the commands in the section "Command parameters (Page 30)".

Table A- 12 Number of buffers for intermediate storage

	No. of buffers per channel	Maximum amount of data for intermediate storage
Number of buffers for intermediate storage of commands and results	150	34 950 bytes

Diagnostics using LEDs

The following figure shows details of the LEDs of the ASM 456.

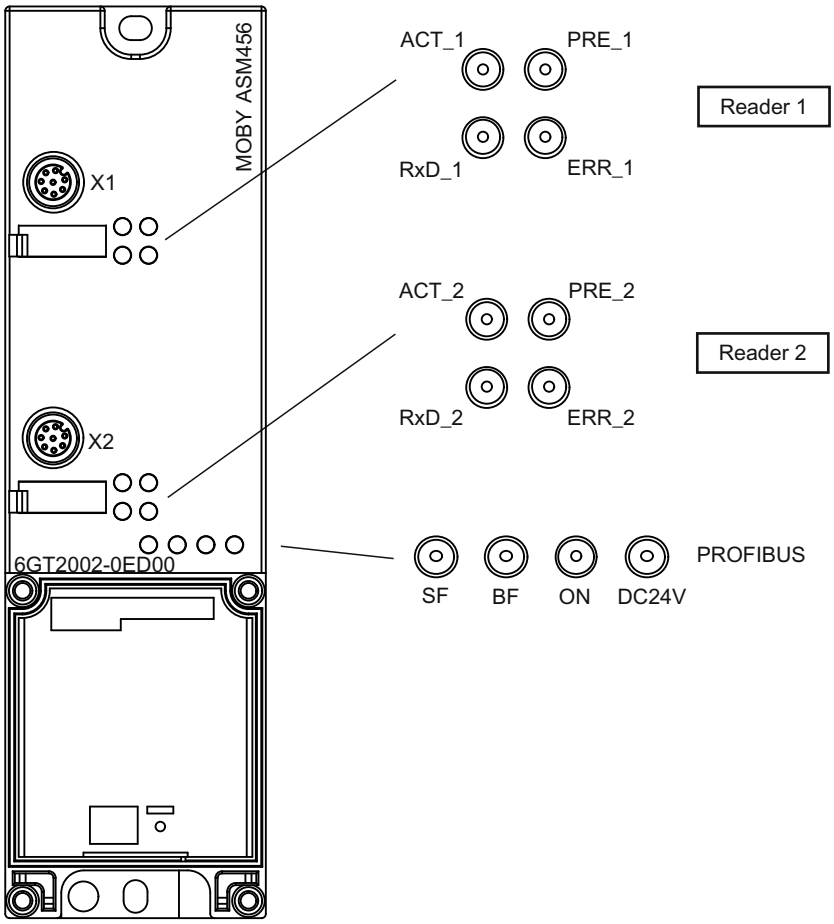


Figure A-7 LEDs of the ASM 456

Table A- 13 Status LEDs for ASM 456

LEDs	Meaning
ON	Lights up when there is logic voltage applied to the CM (is generated from the 24 V supply voltage.)
24 V DC	Lights up when the 24 V supply voltage is connected to the CM.
ACT_1, ACT_2	The corresponding reader is active in processing a user command.
ERR_1, ERR_2	A flashing pattern indicates the last error to occur (see section "Error messages (Page 47)").
PRE_1, PRE_2 *	Indicates the presence of a tag.
RxD_1, RxD_2	Indicates live communication with the reader. May also indicate malfunctions on the reader.
*) In multitag operation, this LED uses a flashing interval to indicate the number of data carriers currently within the range of the reader.	

Table A- 14 LED display for PROFIBUS diagnostics

BF	SF	Cause of error	Error correction
On	–	• ASM is in start-up mode.	–
		• Connection to DP Master failed. • ASM not detecting a baud rate	• Check the PROFIBUS DP connection. • Check the DP Master
		• Bus interrupt • DP Master not functioning	• Check all cables on your PROFIBUS DP network. • Check whether the connector plugs for the PROFIBUS DP are securely plugged into the ASM.
Flashes	On	• The project data sent to the ASM by the DP Master do not match the configuration of the ASM.	• Check the project for the ASM (input/output, PROFIBUS address). • Correct GSD file being used?
Flashes	–	• ASM has detected the baud rate, but is not activated by the DP Master. • ASM has not been assigned project plans.	• Check the PROFIBUS address set in ASM and/or in the project software. • Check the project for the ASM (station type).
On	Flashes	• There is a hardware defect in the ASM.	• Replace the ASM.
Off	On	• Diagnostics available	• Evaluate the diagnostic information.
On	Off	• The set PROFIBUS address is incorrect or greater than 99.	• Set the address in the range 1 to 99 and carry out new start-up.
– = Status not relevant			

Other ASM operating modes are indicated by the PRE, ERR, SF, ACT and ON LEDs:

ON	SF	PRE_1	ERR_1	ACT_1	PRE_2	ERR_2	ACT_2	Description
On	Off	Off	Off	On	Off	Off	Off	Start-up active
Off	On	Off	On	Off	Off	Off	Off	Checksum error at start-up
Off	On	Off	Off	Off	Off	On	Off	Firmware invalid
On	On	On	On	On	On	On	On	LED test for approximately 4 seconds; otherwise firmware fault
Off	On	Off	On	On	Off	On	On	Checksum error at start-up
Off	On	On	On	On	Off	On	On	Checksum error of the firmware
Off	On	On	On	On	On	On	On	External RAM defective
Off	On	On	Off	On	On	On	On	DPC-RAM defective
Off	On	Off	On	On	On	On	On	ID error firmware
On	–	Off	1 x flash every 3 s	Off	Off	1 x flash every 3 s	Off	ASM successfully started up, waiting for reset command
On	–	–	Flashing	Rapid flashing	–	Flashing	Rapid flashing	Firmware update; alternate flashing of the error LEDs at approximately 1 Hz
– = not relevant								

Pin assignment

Table A- 15 Connection assignment for ECOFAST connector plugs

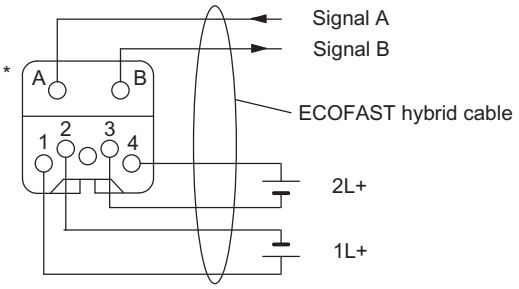
Pin	Assignment	View of ECOFAST connector plug (wiring end for supply and loop-through connection)
A	PROFIBUS DP signal A	
B	PROFIBUS DP signal B	
1	Electronics / encoder supply (1L+) (voltage supply for ASM 456 and reader)	
2	Ground for electronics/encoder supply (1M)	
3	Load voltage ground (2M)	
4	Load voltage supply (2L+) (unused on ASM 456)	
*) You will find the assembly instructions in the packaging of the Han Brid Cu cable connector and/or Han Brid Cu cable socket.		

Table A- 16 Connection assignment for M12 connector (PROFIBUS DP)

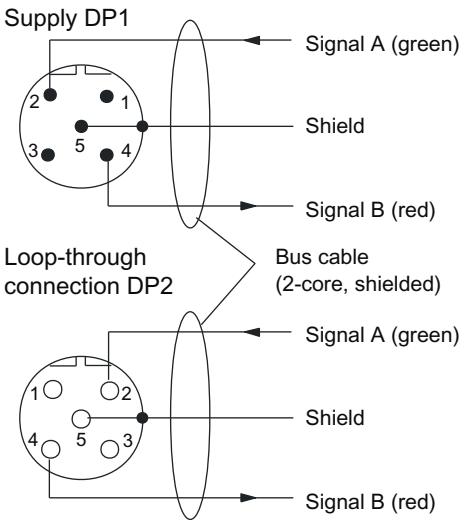
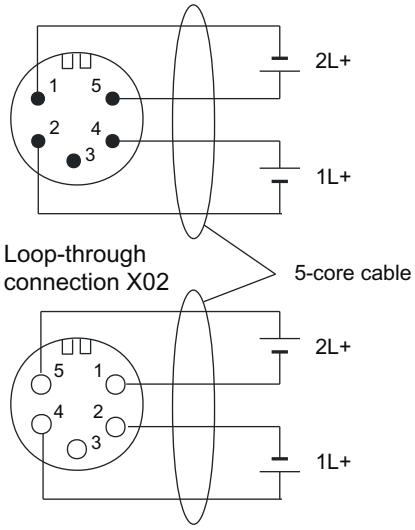
Pin	Assignment	View of M12 connector (wiring side)
1	Supply positive (P5V2) *	
2	Data line A (RxD / TxD-N)	
3	Data reference potential (M5V2) *	
4	Data line B (RxD / TxD-P)	
5	Shield	
Thread	Shield	
*) Can only be used for the M12 terminating resistor. Looping the voltage through to the next connector via a 5-core cable is not permitted.		

Table A- 17 Pin assignment for 7/8" connector (supply voltages)

Pin	Assignment	View of 7/8" connector (wiring side)
1	Load voltage ground (2M)	
2	Ground for electronics/encoder supply (1M)	
3	PE	
4	Electronics / encoder supply (1L+) (voltage supply for ASM 456 and reader)	
5	Load voltage supply (2L+) (unused on ASM 456)	

A.4 ASM 475

The ASM 475 is an S7-300 module. It can be used in a centralized layout with an S7-300 or in a distributed layout with an ET 200M.

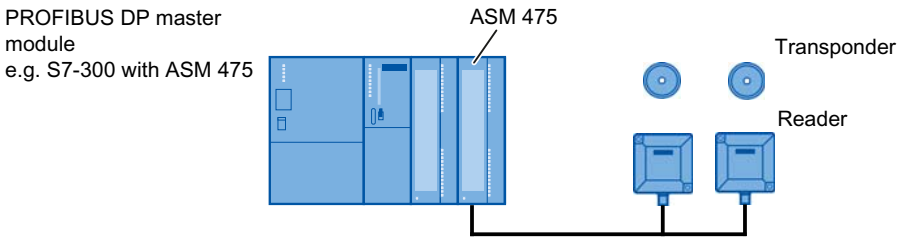


Figure A-8 Configurator for ASM 475 (centralized layout)

Hardware configuration

The ASM 475 is integrated in the hardware configuration of the SIMATIC Manager by calling "Setup.exe" in the directory "daten\S7_OM" on the DVD "RFID Systems, Software & Documentation". The integration of the ASM 475 in the third-party master is possible via the distributed I/O with an ET 200M. To do this, use the GSD file of the relevant ET 200 M head module. Note that the ASM 475 cannot be integrated in all head modules. You will find more information on this in the GSD file under the term "ASM 475".

Reader connection system

Pre-assembled reader connecting cables are available in various lengths for the ASM 475. At the open end to the ASM, the wires are marked with the connector numbers of the front plug. Please make sure that when you connect it up, the cable shield makes contact with the shield connection element.

Input parameters for ASM 475

Assignment is made in UDT 10.

You will find the list of the input parameters for ASM 475 in the section "Parameter data block (Page 19)".

Table of commands for ASM 475

Assignment is made in the UDT 20 by means of the "command" variable.

You will find a list and description of the commands in the section "Command parameters (Page 30)".

Table A- 18 Number of buffers for intermediate storage

	No. of buffers per channel	Maximum amount of data for intermediate storage
Number of buffers for intermediate storage of commands and results	70	16 310 bytes

Command repetition:
Command repetition as described in the section "Command repetition (Page 37)" is available on ASM 475 with order no. 6GT2 002-0GA10.

Interfaces and indicators of the ASM 475

The following figure shows details of the LEDs of the ASM 475.

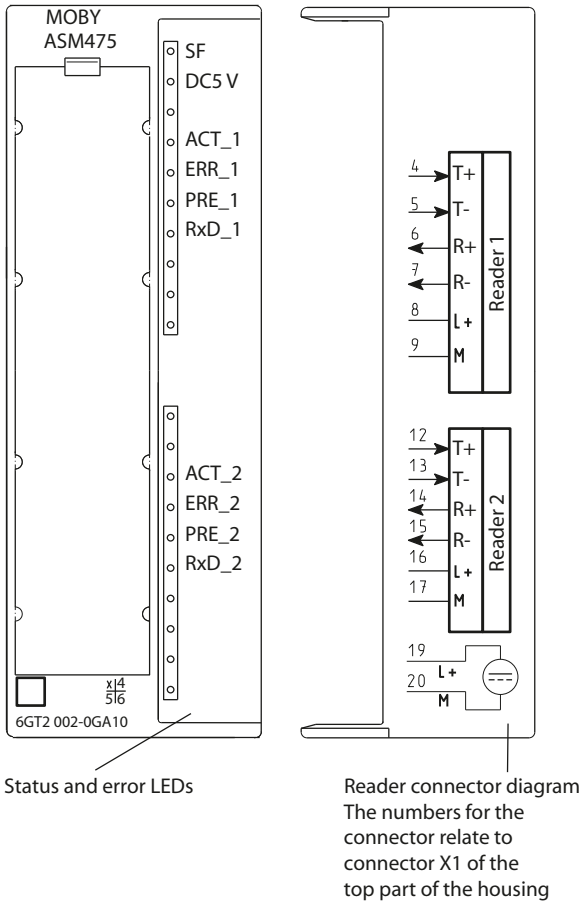


Table A- 19 Status LEDs for ASM 475

LEDs	Meaning
SF	System fault (hardware error on ASM)
5 V DC	Is lit when the 24 V supply voltage is connected to the ASM and the 5 V voltage on the ASM is OK.
ACT_1, ACT_2	The corresponding reader is processing an application command.
ERR_1, ERR_2	A flashing pattern indicates the last error to occur (see section "Error messages (Page 47)"). This display can be reset with the option_1 parameter (see section "INPUT parameters (Page 21)").
PRE_1, PRE_2	Indicates the application of a tag.
RxD_1, RxD_2	Indicates live communication with the reader.

The following ASM states are indicated with the LEDs PRE, ERR and SF.

SF	PRE_1	ERR_1	PRE_2	ERR_2	Description, Causes, Remedy
ON	OFF/ON	ON (perm.)	OFF/ON	ON (perm.)	Hardware is defective (RAM, Flash, …)
ON	OFF	ON	OFF	OFF	Loader is defective (can only be fixed at the plant).
OFF	2 Hz	OFF	2 Hz	OFF	Firmware loading process is active and/or no firmware detected → load firmware → do not switch off ASM during this process
OFF	2 Hz	2 Hz	2 Hz	2 Hz	Loading of firmware aborted due to error → restart needed → reload firmware → check update files
any	5 Hz	5 Hz	5 Hz	5 Hz	Operating system error → switch ASM off/on
OFF	OFF	1x flash every 2 s	OFF	1x flash every 2 s	ASM has booted and is waiting for a RESET (init_run) from the user.

Programming communications modules

B

B.1 Programming the communication modules on PROFIBUS/PROFINET

For whom is this Appendix intended?

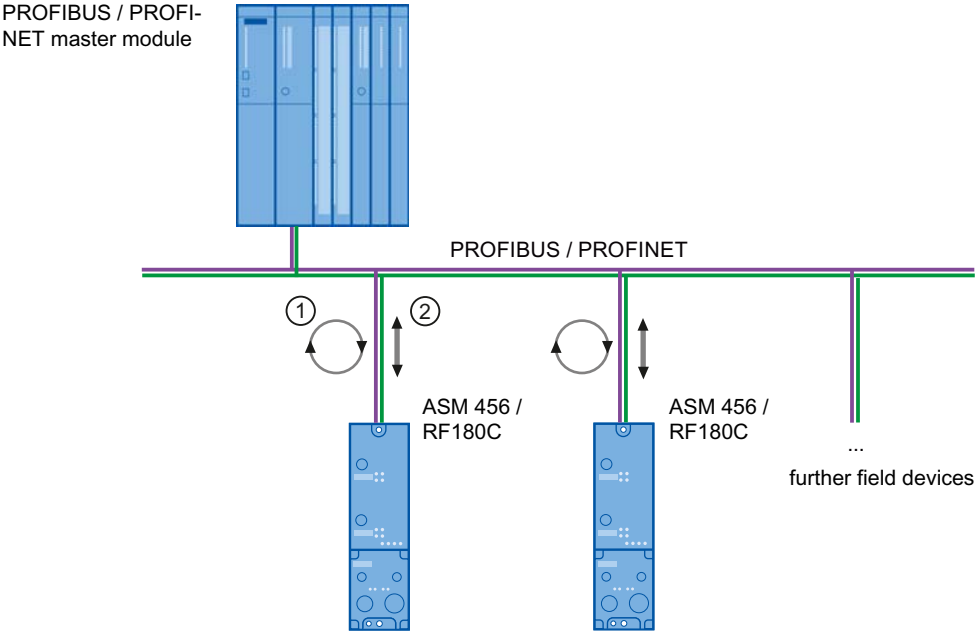
This section does not need to be considered by SIMATIC users. It is intended particularly for programmers of PCs and third-party PLCs. The information enables the programmer to develop customized function blocks or drivers for the communication module.

Note

Some signals in this appendix have the same meaning as the variables in section "Parameter data block (Page 19)". In order to distinguish between them, an underscore "_" is appended to the relevant signals (e.g. ANZ_MDS_present_).

Communication between communications module and PROFIBUS/PROFINET master

It must be possible to transfer both the cyclic (DP) and the acyclic data DP-V1 via PROFIBUS DP.



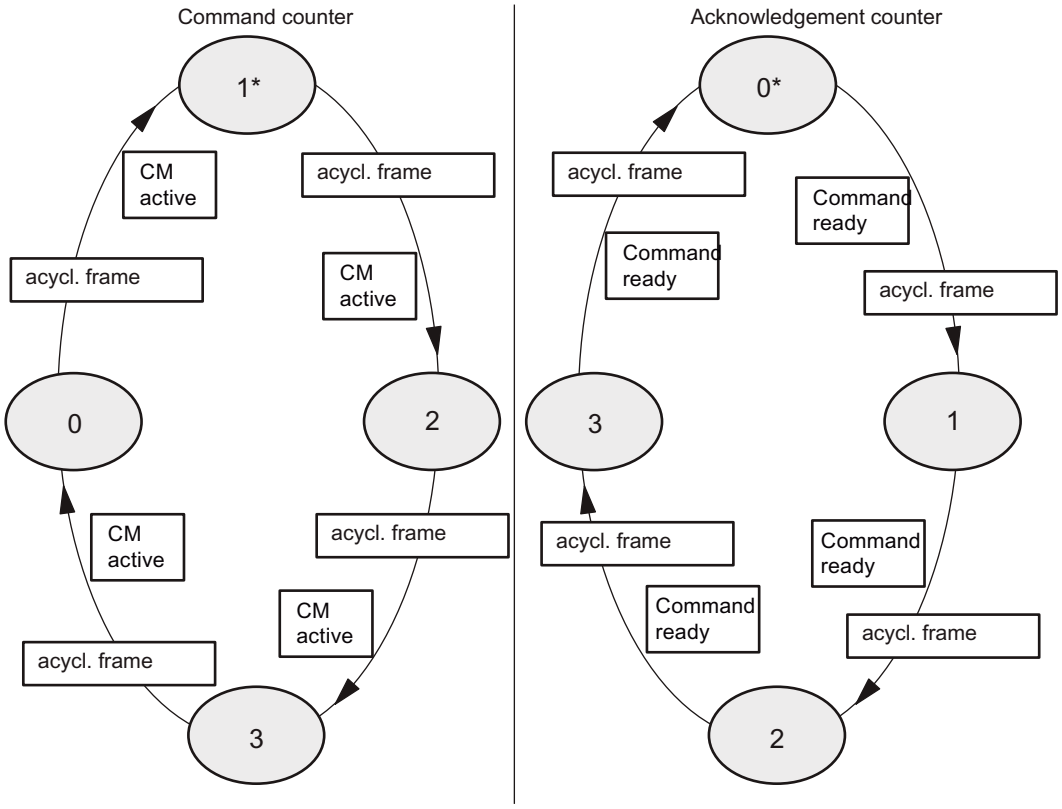
① Cyclic communication via PROFIBUS/PROFINET. Status information is exchanged (see section "Cyclic control word between master and communications module (Page 102)" and "Methods of operation with the communications module (Page 105)").

② Acyclic communication via PROFIBUS/PROFINET. Commands and acknowledgements are exchanged (see section "Command and acknowledgement telegrams (Page 109)").

The master may only send new commands to the slave (communications module) when the CM is ready. Status information is used in cyclic communication to indicate that the communications module is ready. The same applies to acknowledgments. The communications module may only fetch new acknowledgments when a new acknowledgment is actually waiting (i.e. has not yet been read). This information is also indicated by status information.

Two condition codes are defined in the status information. Based on these, the PROFIBUS/PROFINET master can recognize whether an acylic frame can be sent to or from the communications module.

Principle of controlling non-cyclic communication with command and acknowledgment counter



* Status of counters after CM startup or after an init_run_

Figure B-1 Command and acknowledgement counter states

As can be seen from the diagram above, an acyclic frame triggers the change from one defined status to the next. A new acyclic frame is not permitted until the next status is reached. An acyclic frame is either a command to the CM or an acknowledgment from it.

For this reason, it is important to inform the master whether a new acyclic frame can be executed. Each state is coded in 2 bits and counted up (as shown in the diagram above) The terms status buts or status counters are also used.

The status bits are transferred cyclically via PROFIBUS DP or PROFINET IO to the master. The user must evaluate the bits in his program. When the state bit changes, a new state (new state = old state + 1) is created. Only now can the next acyclic frame be sent.

Two states must be coded.

1. Command status (command counter) to indicate to the user whether a new/next command may be transferred to the CM.
2. Acknowledgment status (acknowledgment counter) to indicate to the user whether a new acknowledgment from the CM is pending.

The user must evaluate the acknowledgement state with higher priority. In other words, when the user wants to send a frame to the ASM but a frame from the CM is waiting to be fetched at the same time, the frame from the CM must be fetched first.

Both the command and the acknowledgment state are coded in 2 bits each. The two statuses are stored in one byte.

B.2 Cyclic control word between master and communications module

The cyclic control word is used to synchronize frame traffic between master (FB/FC) and slave (communications module). The actual acyclic command and acknowledgment frame may not be started until this is indicated by the cyclic byte of the communications module in the command or acknowledgment counter.

Cyclic word to communications module: I/O output

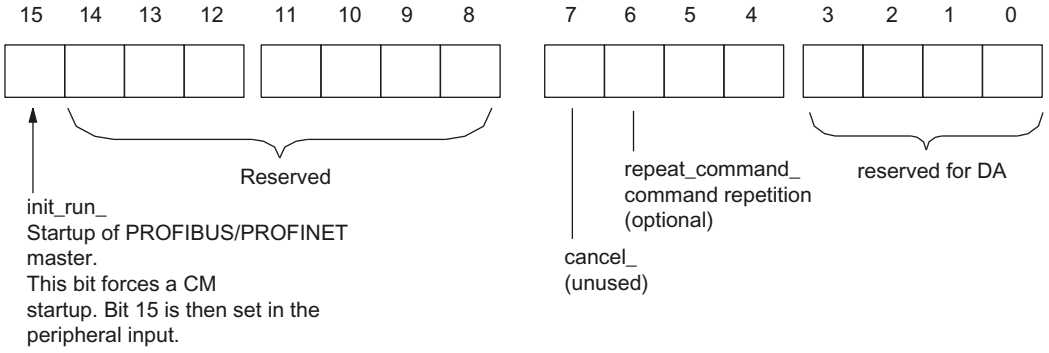


Figure B-2 Structure of the cyclic control word: Peripheral output

Cyclic word from communications module: I/O input

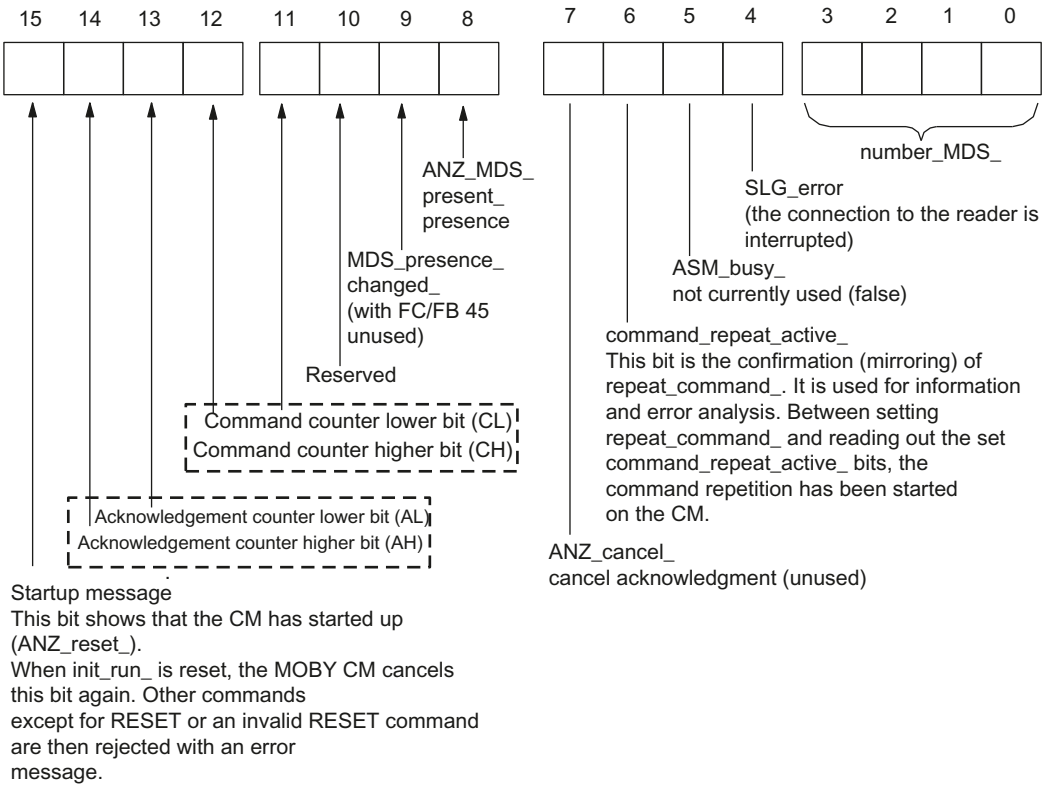
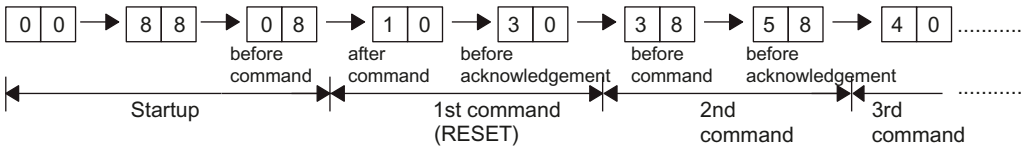


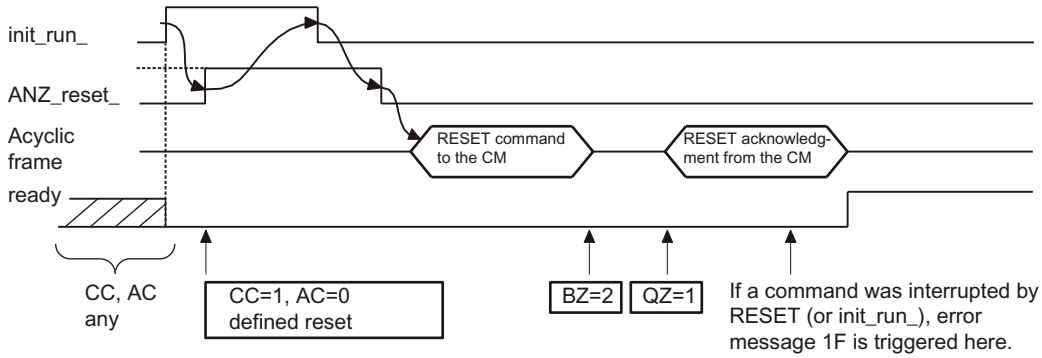
Figure B-3 Structure of the cyclic control word: Peripheral input

After startup, the "cyclic word from the CM" appears as follows in sequence (bits 8 to 15 are shown):



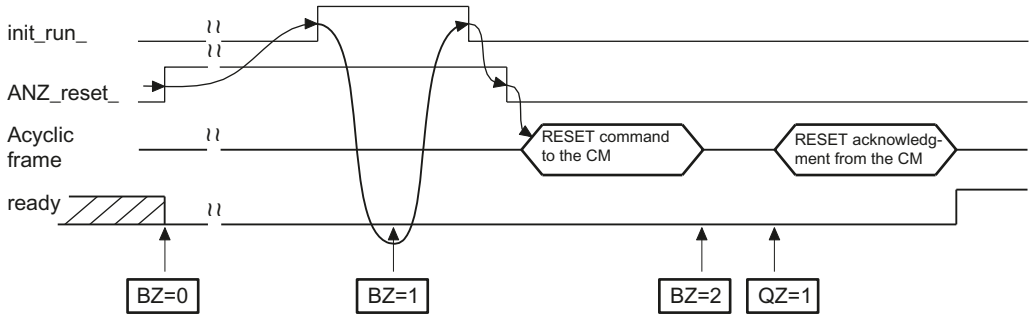
Synchronizing of command and acknowledgment counters

The command (BZ) and acknowledgment (QZ) counters are synchronized during a startup. The CM sets QZ = 0 and BZ = 1. The startup can be triggered by both the CM (return of power) and the user (init_run_).



ready = ready message in user program

Figure B-4 Power-up timing initiated by user



ready = ready message in user program

Figure B-5 Startup timing of the CM initiated by power down

B.3 Methods of operation with the communications module

Commands are executed one at a time

This means that, after each command, the user must wait for the acknowledgment (result) before the next command is sent to the CM. This type of programming involves the following characteristics.

- Simple function block programming
- No optimal-speed data transmission for several consecutive commands

The following diagram shows the sequence of the command and acknowledgement exchange between user (PROFINET/PROFIBUS master) and CM.

RFID command execution

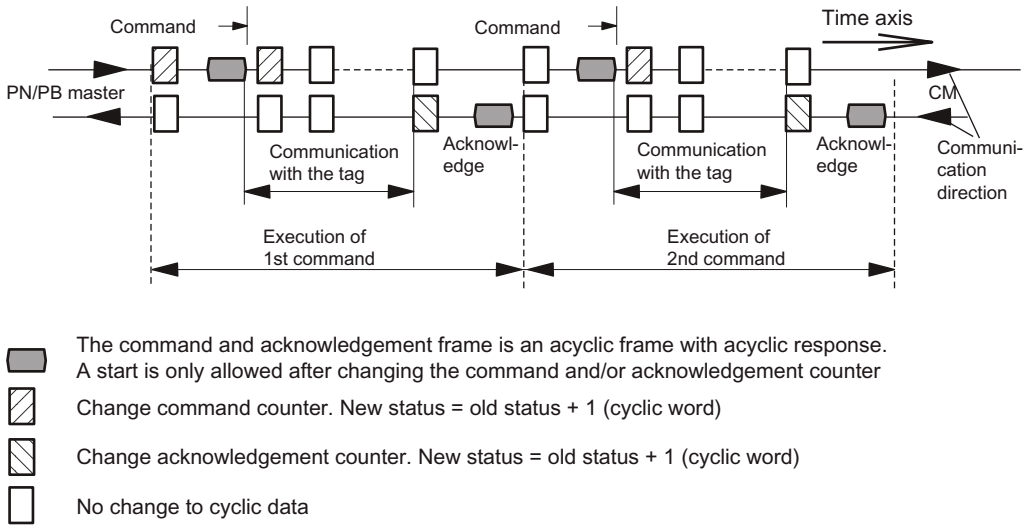


Figure B-6 Command execution: one command at a time

Command chaining and buffering on the CM

Command chaining is indicated when the chaining bit (bit 6 in the command) is set (see also the section "RFID commands (Page 29)").
Command buffering is a characteristic of the CM or the reader. A variety of buffers are available to the CM/reader for intermediate storage of commands and results.
Use of command chaining and command buffering involves the following properties:

- Programming a function block becomes more complex.
- Optimum data throughput to and from the tag.
  This is particularly noticeable with large amounts of data (> 1 KB) and slower PROFIBUS transmission rates.

The following diagram shows the procedure used for command and acknowledgment communication between user (PROFINET/PROFIBUS master) and communications module when a chained command is used:

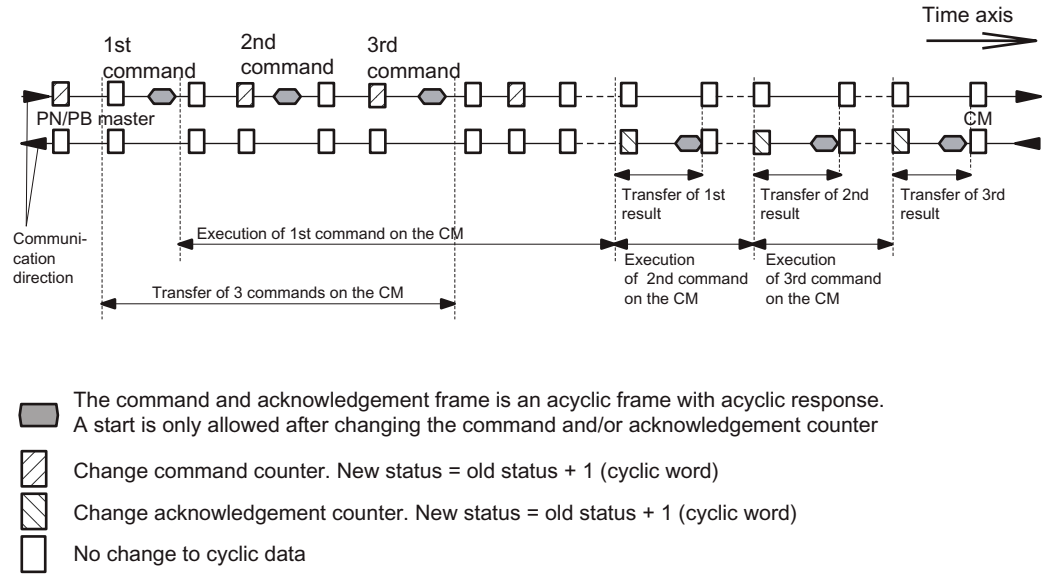


Figure B-7 Command execution: Command chaining and buffering

The following general conditions apply to the procedures shown in the diagram above.

- It is obvious that data transmission and execution of the commands take place parallel to each other.
- The sequences shown in the diagram above may vary depending on the bus transmission rate and the tag transmission rate.
- If the PN/PB master module only provides limited resources (buffers) for acyclic data transfer, data transmission may take quite some time. This is particularly noticeable in extensive bus configurations with CMs.
- If the master module can be set to permit several acyclic frames between cyclic data exchange, data transmission can be speeded up in a bus configuration with many CMs. However, this has a negative effect on the cyclic data exchange of I/O modules that are also part of the same PROFIBUS line. The cycle time of PN/PB becomes irregular and sporadically may become very high.
- When commands need to be processed by the CM or reader for which there is not enough buffer space on the CM/reader, the user must first fetch results from the CM before new commands can be sent to the CM.
- The CM does not necessarily need the chaining bit in the command. However, from the user's point of view, it is an elegant way to identify related partial commands. A chaining bit set in the command is returned by the CM in the acknowledgment.
- The number of buffers on the CM/reader depends on the CM or reader type. Refer to the table in the section "Command repetition (Page 37)" and section "Brief description of the hardware (Page 81)".

Command repetition

The procedure for command repetition and its advantages were described earlier in the section "Command repetition (Page 37)".

Programming of command repetition at the PN/PB level is described below. Command repetition is controlled by the I/O input or output word (see section "Cyclic control word between master and communications module (Page 102)").

The following diagram shows frame exchange between user (PN/PB master) and CM:

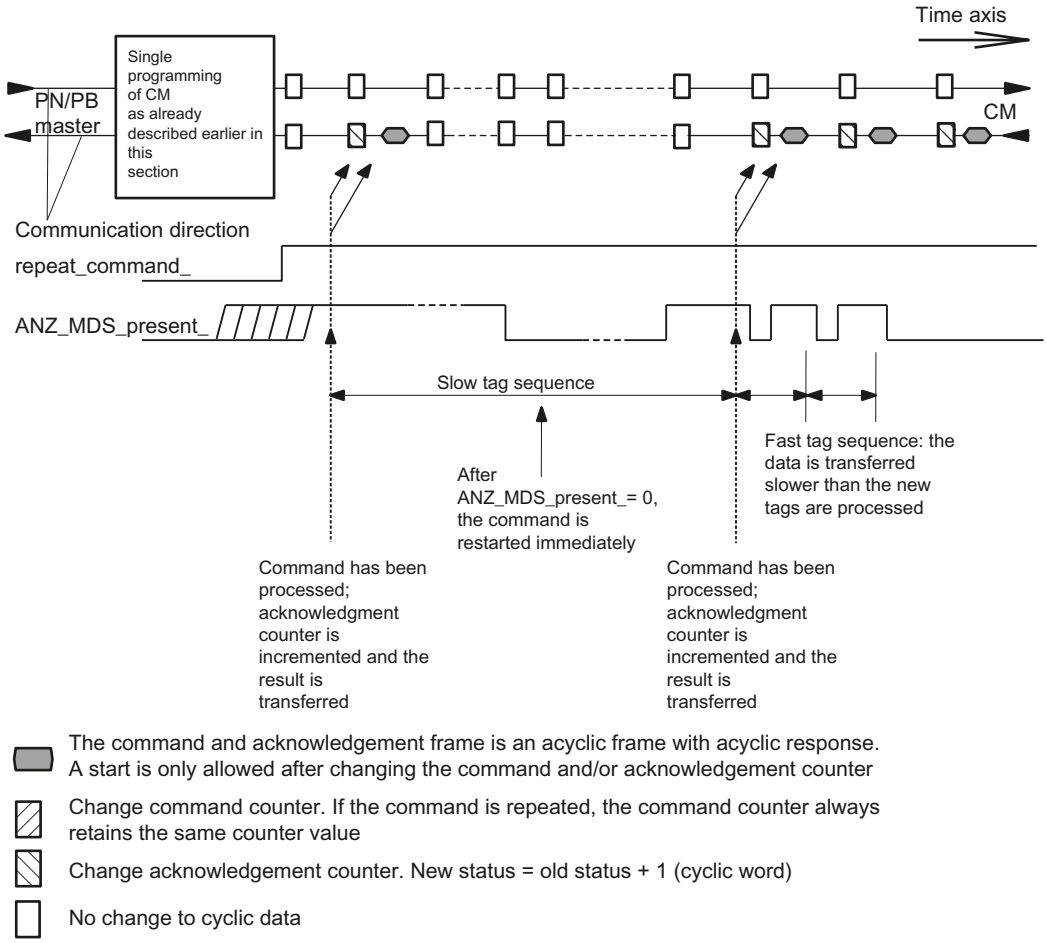
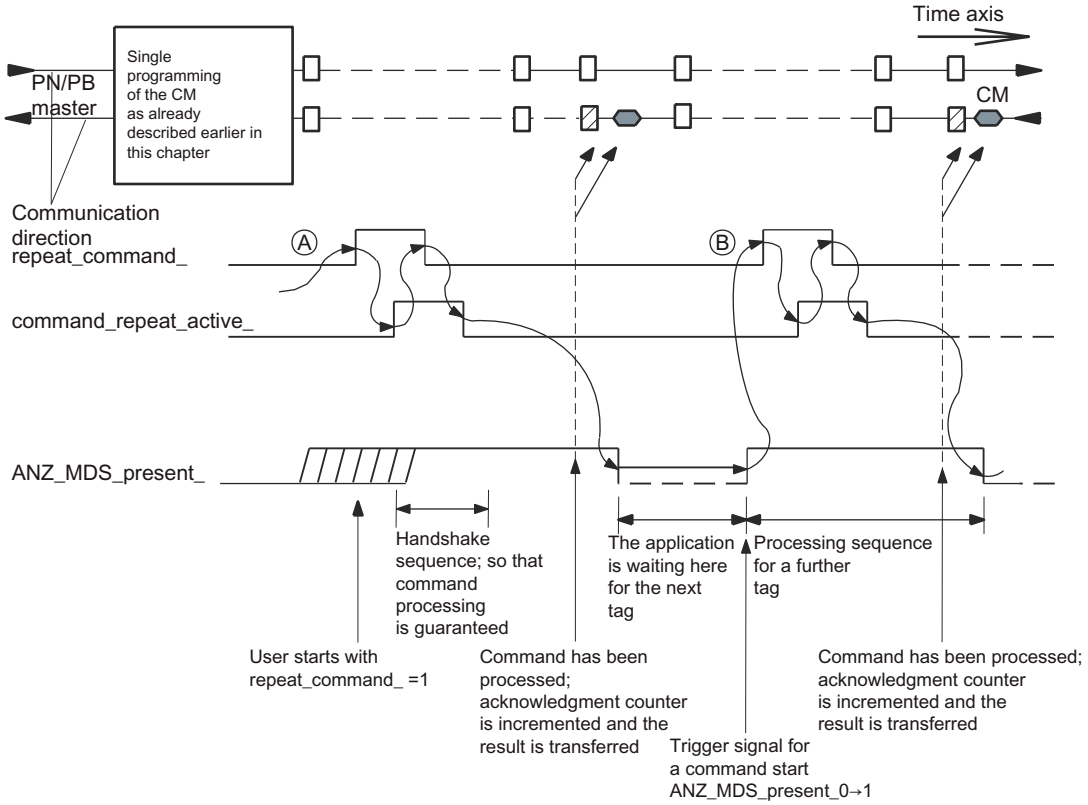


Figure B-8 Command repetition using I/O words

Command repetition can also be concretely controlled as shown below.

- An external proximity switch is used to signal that a new tag is entering the transmission window (see figure below: Ⓐ).
- A new tag is detected with the ANZ_MDS_present_ bit, and command repetition is then started (see figure below: Ⓑ).

In this case, the command_repeat_active_ bit must be scanned to make sure the command repetition was accepted.



The command and acknowledgement frame is an acyclic frame with acyclic response. A start is only allowed after changing the command and/or acknowledgement counter

Change command counter. If the command is repeated, the command counter always retains the same counter value.

Change acknowledgement counter. New status = old status + 1 (cyclic word)

No change to cyclic data

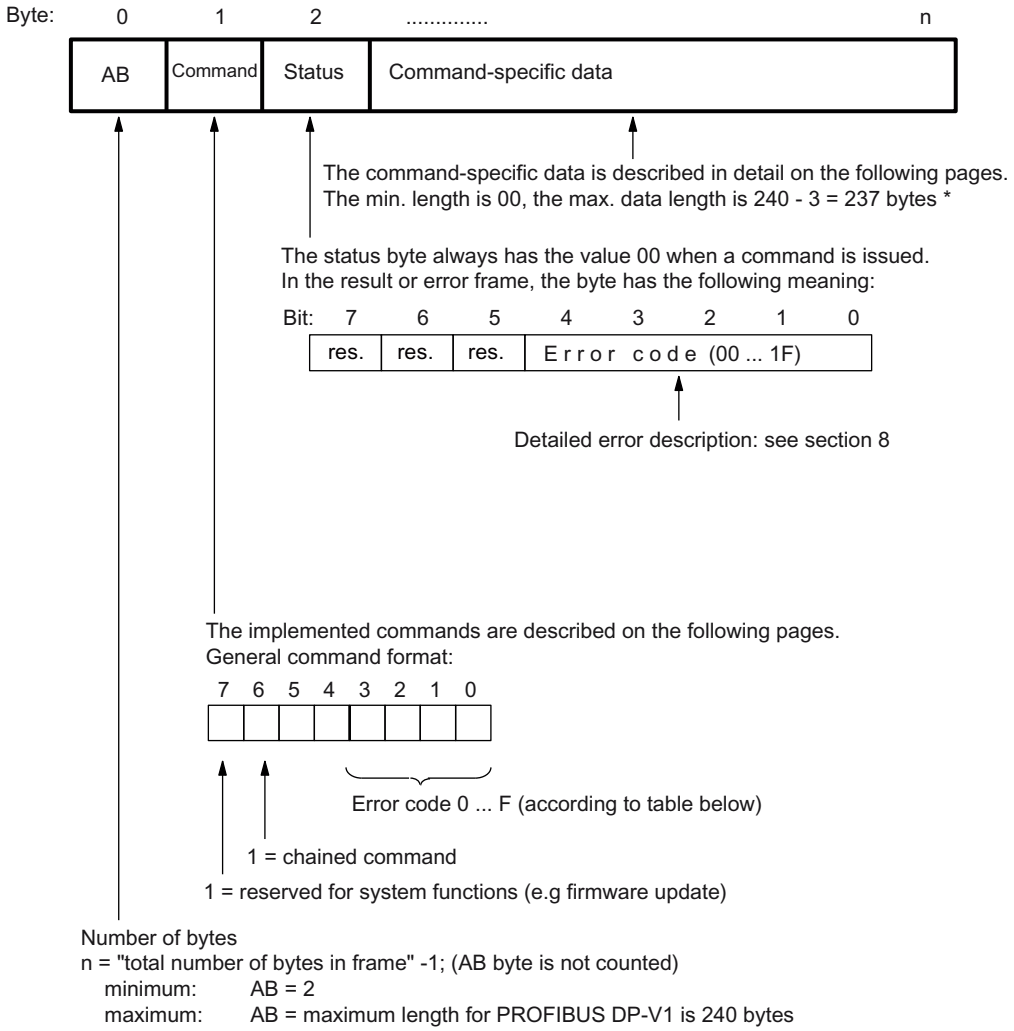
Figure B-9 Focused command repetition

B.4 Command and acknowledgement telegrams

Commands and results are transmitted and received using the acyclic frame service of PROFIBUS/PROFINET. The frames are described in this section.

General frame format

The frame structure applies to both command frames to the CM module and result frames from the CM.



* The length specified here is the maximum length for PROFIBUS. The ASM 475, 473 is an exception with a length 1 byte shorter (max. data length = 239; command-specific data = 236).

Figure B-10 General frame format

Command table

<table>
<tr><th>Command code
[hex]</th><th>Command code chained [hex]</th><th>Command</th><th colspan="5">Description</th></tr>
<tr><td>0</td><td>–</td><td>RESET</td><td colspan="5">CM is reset. The active command is terminated.
(If a tag command was terminated with RESET, the reset acknowledgment reports error 1F.)
The RESET command can be used to switch the CM to various operating modes.</td></tr>
<tr><td>1</td><td>41</td><td>WRITE</td><td colspan="5">Write data block to transponder</td></tr>
<tr><td>2</td><td>42</td><td>READ</td><td colspan="5">Read data block from transponder</td></tr>
<tr><td rowspan="12">3</td><td rowspan="12">43</td><td rowspan="12">INIT</td><td colspan="5">This command is required when a new transponder is used that has not yet been written to or after failure/replacement of the battery or when the transponder is to be operated in ECC mode. The transponder is already initialized for normal use.</td></tr>
<tr><td colspan="3">Tag type</td><td>INIT duration (normal)</td><td>Memory size + 1</td></tr>
<tr><td>2 KB</td><td>RAM</td><td>(MOBY U)</td><td>approx. 1 s</td><td>00 08 00</td></tr>
<tr><td>32 KB</td><td>RAM</td><td>(MOBY U)</td><td>approx. 1.5 s</td><td>00 80 00</td></tr>
<tr><td>44 bytes</td><td>I-Code</td><td>(MOBY D)</td><td>approx. 0.4 s</td><td>00 00 2C</td></tr>
<tr><td>112 bytes</td><td>I-Code SLI</td><td>(MOBY D)</td><td>approx. 0.5 s</td><td>00 00 70</td></tr>
<tr><td>256 bytes</td><td>Tag-it HF-I</td><td>(MOBY D)</td><td>approx. 1 s</td><td>00 01 00</td></tr>
<tr><td>996 bytes</td><td>my-d</td><td>(MOBY D)</td><td>approx. 3 s</td><td>00 04 00</td></tr>
<tr><td>2000 bytes</td><td>FRAM</td><td>(MOBY D)</td><td>approx. 3 s</td><td>00 07 D0</td></tr>
<tr><td>20 bytes</td><td>EEPROM</td><td>(RF300)</td><td>approx. 0.2 s</td><td>00 00 14</td></tr>
<tr><td>8 KB</td><td>FRAM</td><td>(RF300)</td><td>0.9 s</td><td>00 20 00</td></tr>
<tr><td>32 KB</td><td>FRAM</td><td>(RF300)</td><td>3.6 s</td><td>00 80 00</td></tr>
<tr><td>64 KB</td><td>FRAM</td><td>(RF300)</td><td>7.2 s</td><td>00 FF 00</td></tr>
<tr><td>4</td><td>44</td><td>SLG STATUS</td><td colspan="5">Returns as result the status byte, the selected reader and the ANZ_MDS_present_ bit. This command checks whether a reader is connected to the CM and, if so, whether it is functioning and ready for operation. An appropriate error is reported, if necessary. With MOBY U various diagnostic data can be fetched from the reader.</td></tr>
<tr><td>6</td><td>-</td><td>NEXT</td><td colspan="5">The command is not supported by the systems described here MOBY U/D, RF200 and RF300.</td></tr>
<tr><td>8</td><td>48</td><td>END</td><td colspan="5">Terminate communication with the transponder (MOBY U only)</td></tr>
<tr><td>A</td><td>4A</td><td>SET-ANT</td><td colspan="5">MOBY U/D, RF200 or RF300 only:
This command turns the antenna field on the reader off and on again.</td></tr>
<tr><td>B</td><td>4B</td><td>MDS-STATUS</td><td colspan="5">Returns the properties of the transponder in the result</td></tr>
</table>

Exact frame format

Command code	Command frame to the CM/reader	Result frame from the CM/reader
0 Startup	-- -- --	-- -- -- The startup of the CM is only signaled to the user via the cyclic word (see Appendix B.1).
RESET	0A | 00 | 00 | standby | Param | 00 | dili | multitag | fcon | ftim	05 | 00 | Stat | VersH | VersL | Res1

Expected number of tags in field

Firmware version in CM (version_MOBY)

MOBY U:
field_ON_time_ (see input parameter)
00 hex = without BEROs
01 hex ... FF hex = 1 ... 255 s Turn on time for the tag field

MOBY U:
field_ON_control (see input parameter)
BERO mode
00 hex = ohne BEROs; no SLG synchronization
01 hex = field_ON_time switches the field off
02 hex = 1. BERO switches the field on;
2. BERO switches the field off
03 hex = Activate write/read device synchronization via cable connection (see manual for configuring, mounting and service for MOBY U)
MOBY D, RF200, RF300 not used (00 hex)

MOBY D:
Tag type (see input parameter)
00 hex = I code 1 (z. B. MDS D139)
01 hex = ISO MDS
02 hex = (Dual driver, ICode1 and ISO)
03 hex = (MDS D324 optimization, only with SLG D10S)
04 hex = (MDS D4xx optimization, only with SLG D11S/12S)
RF300:
field_ON_time (see input parameter)
00 hex = RF300 Mode (no ISO)
01 hex = ISO tag
03 hex = ISO my-d (Infineon SRF 55V10P)
04 hex = ISO (Fujitsu MB89R118)
05 hex = ISO I-Code SLI (NXP SL2 ICS20)
06 hex = ISO Tag-it HFI (Texas Instruments)
07 hex = ISO (ST LRI2K)
RF200: 01 hex = ISO-Tag

MOBY U:
distance_limiting_ Range limitation (see input parameter)
05; 0A; 0F; 14; 19; 1E; 23 hex = 0.5; 1.0; 1.5; 2.0; 2.5; 3.0; 3.5 m
85; 8A; 8F; 94; 99; 9E; A3 hex = same with reduced output power
MOBY D: HF power (see input parameter)
RF300:
distance_limiting only for RF380R change of output power
02 hex = 0.5 W 06 hex = 1.5 W
03 hex = 0.75 W 07 hex = 1.75 W
04 hex = 1.0 W 08 hex = 2.0 W
05 hex = 1.25 W
RF200: reserved (00 hex)

Option 1: MOBY RF200 or RF300

Bit: 7 6 5 4 3 2 1 0

0 = not used

0 = not used

1 = Reset ERR-LED at CM and Reader
0 = Don't reset ERR-LED at CM and Reader

Bit: 7 6 5 4 3 2 1 0

6 = Multitag with 4 Byte UID
7 = Multitag with 8 Byte UID

res.

Presence check and tag control (MDS_control_)
000 = no ANW control
001 = no tag control; ANW check over firmware (default)

MOBY U:
scanning_time_; Standby time for the tag (see input parameter)
00 hex = no standby operation
01 hex ... C8 hex = 7 ms ... 1400 ms standby time
MOBY D, RF200, RF300: not used (00 hex)

Command code	Command frame to the CM/reader	Result frame from the CM/reader
01, 41 (WRITE)	AB | 01, 41 | 00 | Address MSB | LSB | LNG | D1 ... Dn	02 | 01, 41 | 00** (40,C0)
02, 42 (READ)	05 | 02, 42 | 00 | Address MSB | LSB | LNG	AB | 02, 42 | 00** (40,C0) | Address MSB | LSB | LNG | D1 ... Dn
03, 43 (INIT)	06 | 03, 43 | 00 | INIT pattern | End addr. + 1 00 | MSB | LSB	02 | 03, 43 | 00** (40,C0)

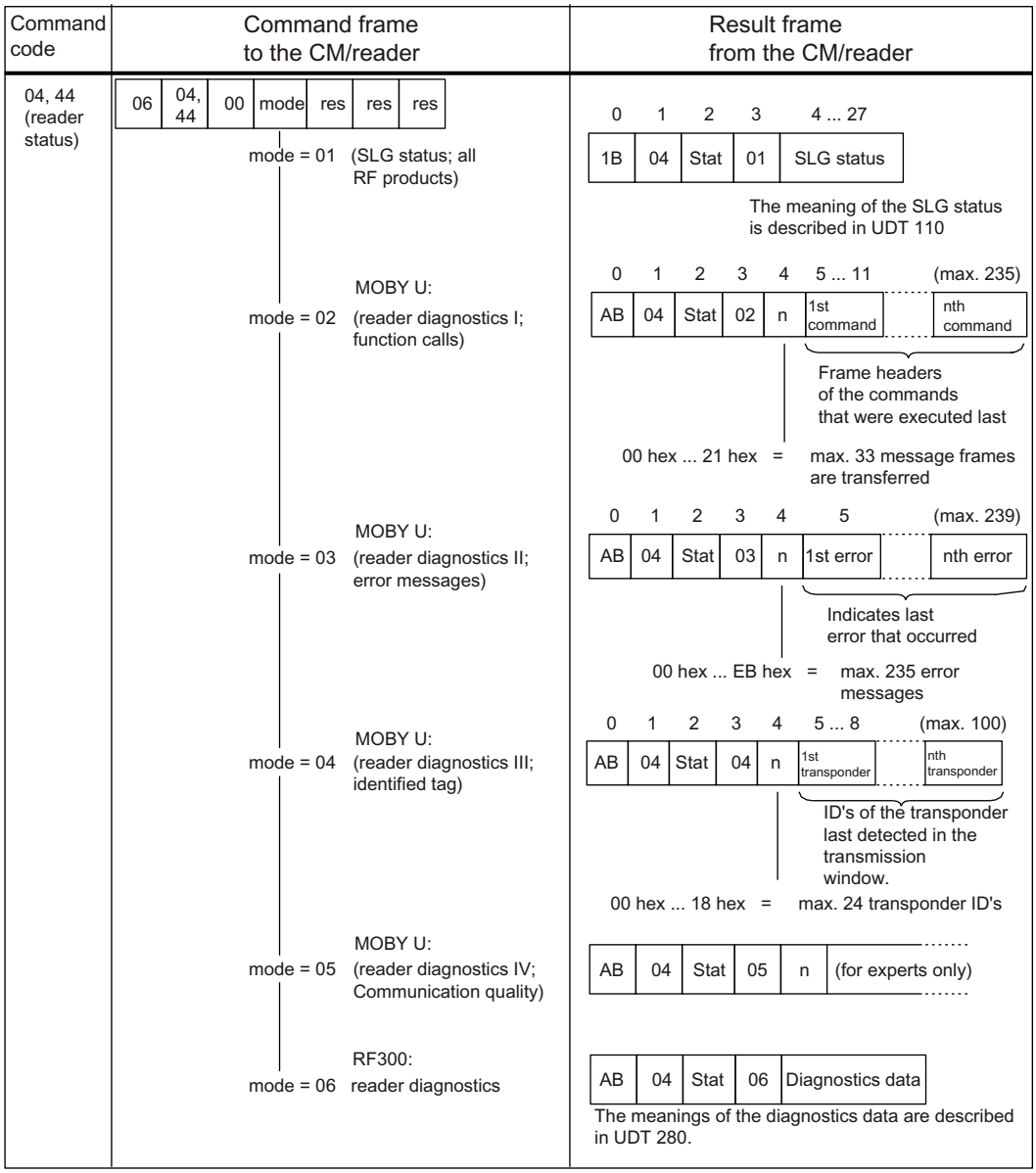
Meaning:

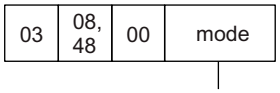
D1 ... Dn	User data of user (1 to 234; for ASM 475: 1 to 233)
LNG	Length of the data block (D1 .... Dn) Note: address + LNG must be smaller than the end address of the tag.
Address	Start address of the data to be processed on the tag: MSB = most significant address part LSB = least significant address part
AB	Number of the following characters in the frame. AB = LNG + 5 Note: AB + 1 must not be greater than the bus configuration
INIT pattern	The value "Init pattern" is written to the tag during initialization.
End addr. + 1	Memory size of the tag

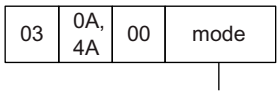
*) If an error occurs, the result frame has the following structure:
The AB byte (02) can store a value > 2 for the read command.
In this case, the data is only partially correct and must be discarded.
avoided.

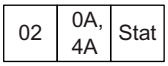
02	Com-	Fault

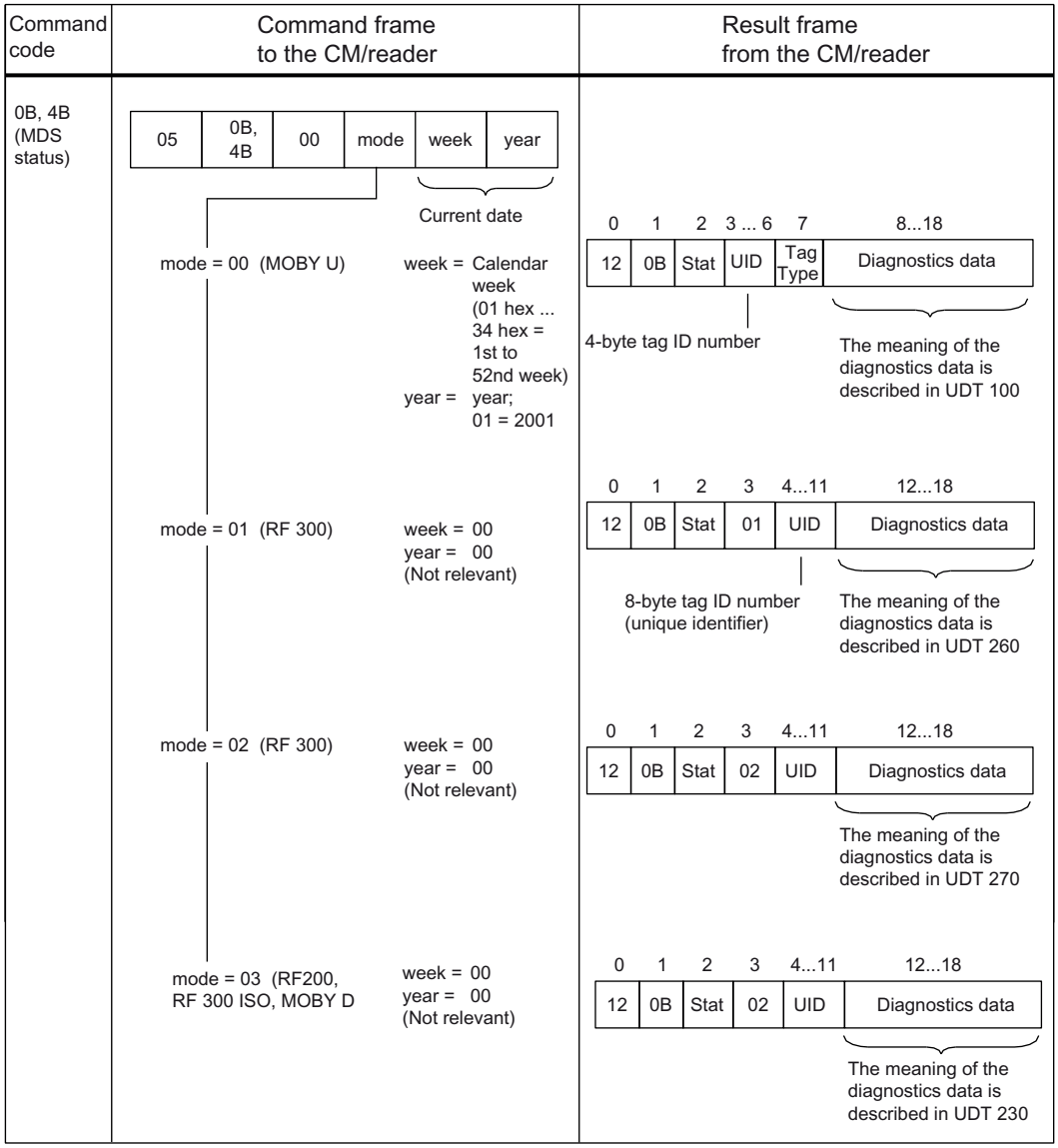
**) The status byte in the result frame depends on the tag type (battery states)


Command code
Command frame to the CM/reader
Result frame from the CM/reader
04, 44 (reader status)
06
04, 44
00
mode
res
res
res
mode = 01 (SLG status; all RF products)
0 1 2 3 4 ... 27
1B
04
Stat
01
SLG status
The meaning of the SLG status is described in UDT 110
MOBY U:
mode = 02 (reader diagnostics I; function calls)
0 1 2 3 4 5 ... 11 (max. 235)
AB
04
Stat
02
n
1st command
nth command
Frame headers of the commands that were executed last
00 hex ... 21 hex = max. 33 message frames are transferred
MOBY U:
mode = 03 (reader diagnostics II; error messages)
0 1 2 3 4 5 (max. 239)
AB
04
Stat
03
n
1st error
nth error
Indicates last error that occurred
00 hex ... EB hex = max. 235 error messages
MOBY U:
mode = 04 (reader diagnostics III; identified tag)
0 1 2 3 4 5 ... 8 (max. 100)
AB
04
Stat
04
n
1st transponder
nth transponder
ID's of the transponder last detected in the transmission window.
00 hex ... 18 hex = max. 24 transponder ID's
MOBY U:
mode = 05 (reader diagnostics IV; Communication quality)
AB
04
Stat
05
n
(for experts only)
RF300:
mode = 06 reader diagnostics
AB
04
Stat
06
Diagnostics data
The meanings of the diagnostics data are described in UDT 280.

<table>
<tr><th>Command code</th><th>Command frame
to the CM/reader</th><th>Result frame
to the CM/reader</th></tr>
<tr><td>08, 48
(END)</td><td> 

00 = Processing with transponder is completed
01 = Processing pause with transponder. End Scanning_time for the MOBY U transponder immediately.</td><td> 
</td></tr>
<tr><td>0A, 4A
(SET-ANT)</td><td> 

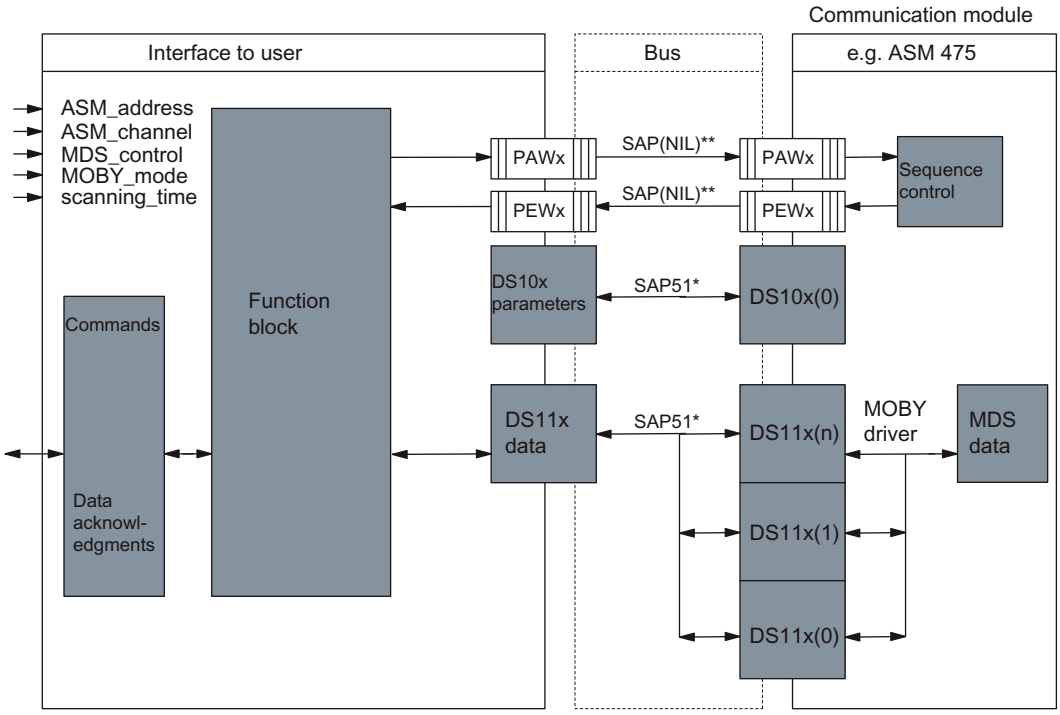
01 = Switch on antenna
02 = Standby; switch off antenna</td><td> 
</td></tr>
</table>


Command code
Command frame to the CM/reader
Result frame from the CM/reader
0B, 4B (MDS status)
05
0B, 4B
00
mode
week
year
Current date
mode = 00 (MOBY U)
week = Calendar week (01 hex ... 34 hex = 1st to 52nd week)
year = year; 01 = 2001
0 1 2 3 ... 6 7 8...18
12 0B Stat UID Tag Type Diagnostics data
4-byte tag ID number
The meaning of the diagnostics data is described in UDT 100
mode = 01 (RF 300)
week = 00
year = 00
(Not relevant)
0 1 2 3 4...11 12...18
12 0B Stat 01 UID Diagnostics data
8-byte tag ID number (unique identifier)
The meaning of the diagnostics data is described in UDT 260
mode = 02 (RF 300)
week = 00
year = 00
(Not relevant)
0 1 2 3 4...11 12...18
12 0B Stat 02 UID Diagnostics data
The meaning of the diagnostics data is described in UDT 270
mode = 03 (RF200, RF 300 ISO, MOBY D
week = 00
year = 00
(Not relevant)
0 1 2 3 4...11 12...18
12 0B Stat 02 UID Diagnostics data
The meaning of the diagnostics data is described in UDT 230

B.5 PROFIBUS/PROFINET implementation

PROFIBUS/PROFINET is implemented on the communication modules strictly in accordance with standard IEC 61784-1:2002 Ed1 CP 3/1. Cyclic data communication (standard specified by EN 50170) and optional non-cyclic data communication are used.

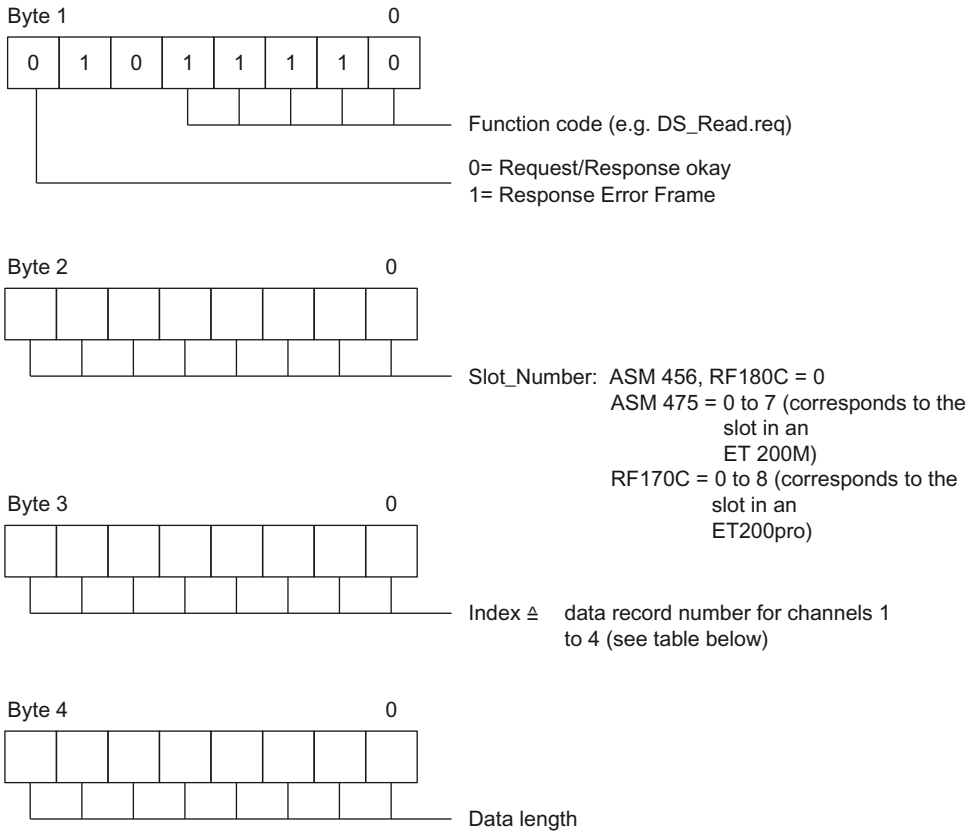
The following figure shows the communication interface to a communications module. PQW and PIW are exchanged cyclically between the CM and function block. PIW informs the function block when commands and data may be transferred to the communications module. Commands and data are put into data records.



x = channel
n = no. of command on CM (n_{max} = number of buffers on CM; see section "Command repetition".)
* = SIMATIC S7 uses SAP 51 and SAP 54 for acyclic communication.
** = The transfer of the control word (PQW/PIW) uses the cyclic data_exchange service of PROFIBUS (SAP = 255 = NIL).

The following figure shows the layout of a non-cyclic data record. SAP 51 is used to transmit the data. The data unit (DU) indicates how the communications module is addressed.

SD	LE	LEr	SD	DA	SA	FC	DSAP	SSAP	DU	FCS	ED
68H	x	x	68H	8x	8x	x	51/33H	51/33H	x...	x	16H



The following data records are implemented on the CM for communication.

Table B- 1 Data record numbers (index)

Data record number	Exist on CM/reader	Description
101	all	Parameter assignment channel 1
102	all	Parameter assignment channel 2
103	-	Parameter assignment channel 3
104	-	Parameter assignment channel 4
111	all	Data transmission channel 1
112	all	Data transmission channel 2
113	-	Data transmission channel 3
114	-	Data transmission channel 4
121	ASM 456, RF160C, (RF170C), RF180C	System command to reader (in preparation for RF170C)
122	ASM 456, RF160C, (RF170C), RF180C	System command to reader (in preparation for RF170C)
150	ASM 475	Reserved (diagnosis of powerparameters)
151	ASM 475	Reserved (diagnostic buffer)
180	RF180C	reserved
231	RF170C	I&M0
232	RF170C	I&M1
233	RF170C	I&M2
234	RF170C	I&M3
239	ASM 456, ASM 475, RF160C, RF170C, RF180C	Firmware update
246	ASM 475	SSL reserved
247	(ASM 456, RF160C)	SSL reserved
248	ASM 475, RF170C, (ASM 456, RF160C)	System: SSL processing I&A
255	ASM 456, RF160C	I&M PROFIBUS

Data record 10x

One RFID channel is assigned parameters with the data records (DS) 101 to 104. DR 10x must contain a RESET command. After the module starts up, DS 10x must be sent to each RFID channel. The channel is not ready for operation until this is done.

A DR 10x is also accepted during normal operation. DS 10x interrupts a running command. The user receives no further acknowledgment for the interrupted command.

Data record 11x

DRs 111 to 114 are used for sending the actual commands and related acknowledgments (all commands except RESET).

B.6 Example of a PROFIBUS Trace

The following trace shows all frames that were sent on the PROFIBUS interface during a CM startup or a read command. The trace is used to understand the sections Cyclic control word between master and communications module (Page 102) to PROFIBUS/PROFINET implementation (Page 116) and to help orientation or troubleshooting with customized implementations of the communications modules.

Note

Using FB 45 on PROFINET

If FB 45 is used on PROFINET, the PROFINET trace is similar to the PROFIBUS trace. The data contents are identical. The header data of the frames are different.

Startup of an ASM 456 and RESET sequence on the 2nd channel

68 07 07 68 03 02 5d 00 00 00 00 00 16 68 07 07 68 02 03 08 80 00 80 00 00 16	FB: --- CM: CM startup
68 07 07 68 03 02 7d 80 00 80 00 00 16 68 07 07 68 02 03 08 80 00 80 00 00 16	FB: sets the startup bit CM: ---
68 07 07 68 03 02 5d 80 00 80 00 00 16 68 07 07 68 02 03 08 88 00 88 00 00 16	FB: --- CM: sets the command counter to 1
68 07 07 68 03 02 7d 00 00 00 00 00 16 68 07 07 68 02 03 08 88 00 88 00 00 16	FB: resets the startup bit CM: ---
68 07 07 68 03 02 5d 00 00 00 00 00 16 68 07 07 68 02 03 08 08 00 08 00 00 16	FB: --- CM: resets the startup bit
68 0F 0F 68 83 82 5c 33 36 5F 01 66 06 05 00 00 00 2b 02 00 16 68 05 05 68 83 82 5c 33 36 00 16 68 09 09 68 82 83 08 36 33 5f 01 66 06 00 16	FB: RESET command to 2nd channel FB: request for acknowledgment CM: acknowledgment that RESET is being processed (PROFIBUS confirmation)
68 07 07 68 03 02 7d 00 00 00 00 00 16 68 07 07 68 02 03 08 08 00 10 00 00 16	FB: --- CM: command counter for 2nd channel is incremented to 2
68 07 07 68 03 02 7d 00 00 00 00 00 16 68 07 07 68 02 03 08 08 00 30 00 00 16	FB: --- CM: acknowledgment counter for 2nd channel is incremented to 1
68 07 07 68 03 02 7d 00 00 00 00 00 16 68 07 07 68 02 03 08 08 00 31 00 00 16	FB: --- CM: sets presence
68 09 09 68 83 82 5c 33 36 5e 01 66 06 00 16 68 05 05 68 83 82 5c 33 36 00 16 68 0F 0F 68 82 83 08 36 33 5e 01 66 06 05 00 00 00 00 00 00 16	FB: confirmation of "RESET being processed" FB: request for acknowledgment CM: RESET acknowledgment

--- ≙ no change

FB ≙ stands for a function block, but could also be any HOST function

RESET and read command to channel 1 of a communications module

(only acyclic frames are recorded)

68 0F 0F 68 83 82 7c 33 36 5f 01 65 06 05 00 00 00 2b 02 00 16	FB: RESET command to channel 1
68 05 05 68 83 82 7c 33 36 00 16	FB: request for an acknowledgment
68 09 09 68 82 83 08 36 33 5f 01 65 06 00 16	CM: acknowledgment that RESET is being processed (PROFIBUS confirmation)
68 09 09 68 83 82 5c 33 36 5e 01 65 06 00 16	FB: Confirmation of "RESET being processed"
68 05 05 68 83 82 5c 33 36 00 16	FB: request for the acknowledgment
68 0F 0F 68 82 83 08 36 33 5e 01 65 06 05 00 00 00 00 00 00 16	CM: RESET acknowledgment
68 0F 0F 68 83 82 7c 33 36 5f 01 6f 06 05 02 00 00 40 0c 00 16	FB: read command: tag addr. = 0, length = 0c
68 05 05 68 83 82 7c 33 36 00 16	FB: request for the acknowledgment
68 09 09 68 82 83 08 36 33 5f 01 6f 06 00 16	CM: acknowledgment that read is being processed
68 09 09 68 83 82 7c 33 36 5e 01 6f 12 00 16	FB: confirmation of "read being processed"
68 05 05 68 83 82 7c 33 36 00 16	FB: request for the acknowledgment
68 1b 1b 68 82 83 08 36 33 5e 01 6f 12 11 02 00 00 40 0c aa aa bb bb cc cc dd dd ee ee ff ff 00 16	CM: read acknowledgment with the tag data

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C

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