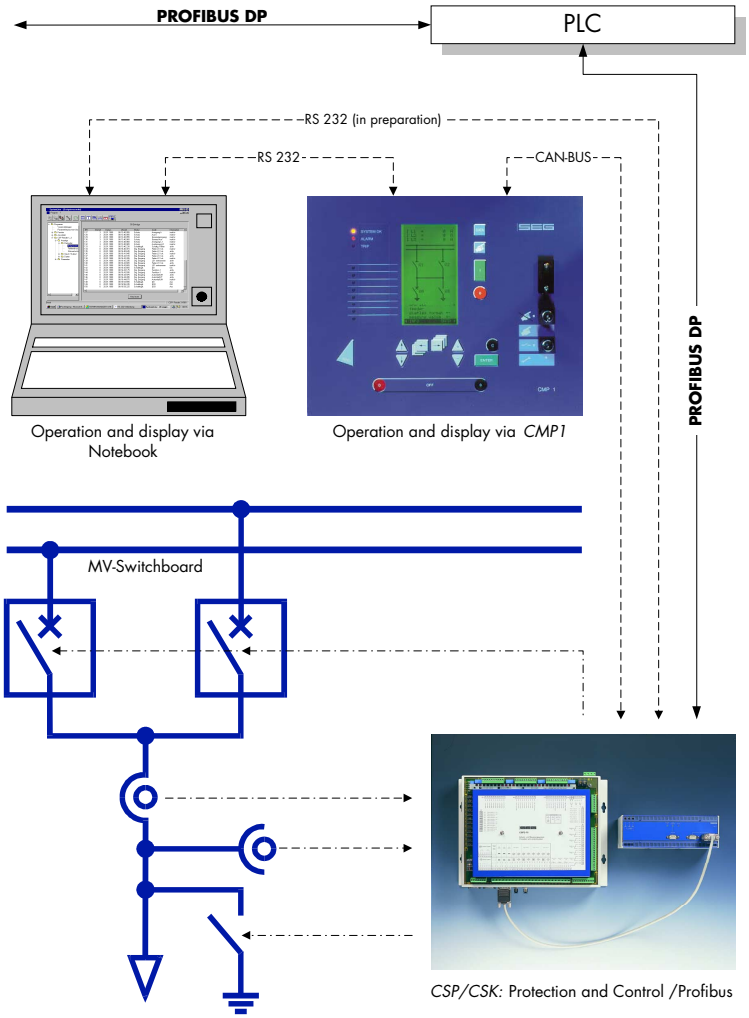
# ***CSK1-P*** Description Profibus DP




*CSP/CSK:* Protection and Control /Profibus

## Contents

# 1 General

This *CSK1-P* Profile describes linking of the combined protection and control device *CSP-Feeder* to the control system via *CSK1* and ***Profibus-DP*** communication as per EN 50170/2.

On account of speed, efficiency and low, optimised connection costs, ***Profibus-DP*** is the communication profile most frequently used in bus systems and is particularly suited for communication between decentralised peripheral devices and various automation systems.

The *CSP-F* is a high-quality digital protection and control system for many medium-voltage applications. In addition to a great number of feeder protection functions it combines measuring, supervision as well as controlling of switching devices in one system.
All relevant information of the medium-voltage compartment is processed by the *CSP* System and provided to a higher-level control system via a bus line.

The connection of the *CSP* System with ***Profibus-DP*** via *CSK1-P* permits the integration of medium-voltage applications into the world of automation such as building and process control technology.
The recorded data of the feeder level become more transparent for the most varied applications thanks to further processing in industrial communication systems and can be further processed, for example, in energy management systems in higher-level interlinked systems.

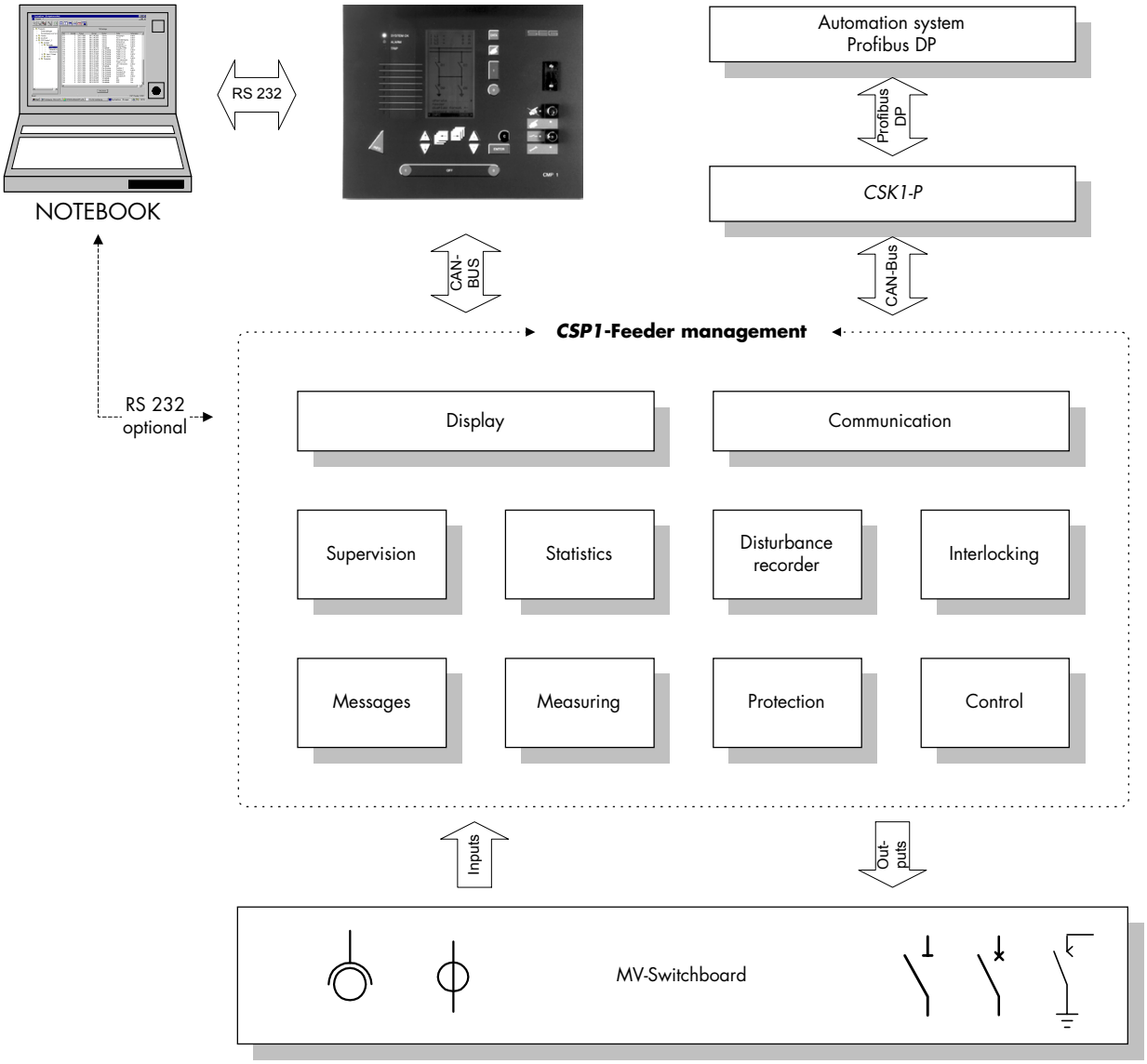



*Fig. 1.1: CSP1 as feeder management system*

The ***CSK1-P*** transfers the data of the ***CSP***-System from the CAN-Bus to the ***Profibus DP***. It works as an independent converter and can also be used as external gateway for communication connection to certain protocols for other SEG products. The device has a wide-range power pack, is easy to install and is designed to be used in medium-voltage compartments.

*General functioning principle:*
For demonstration purposes the picture shows the possible coupling of a medium-voltage compartment to an automation system via the ***CSP*** system.

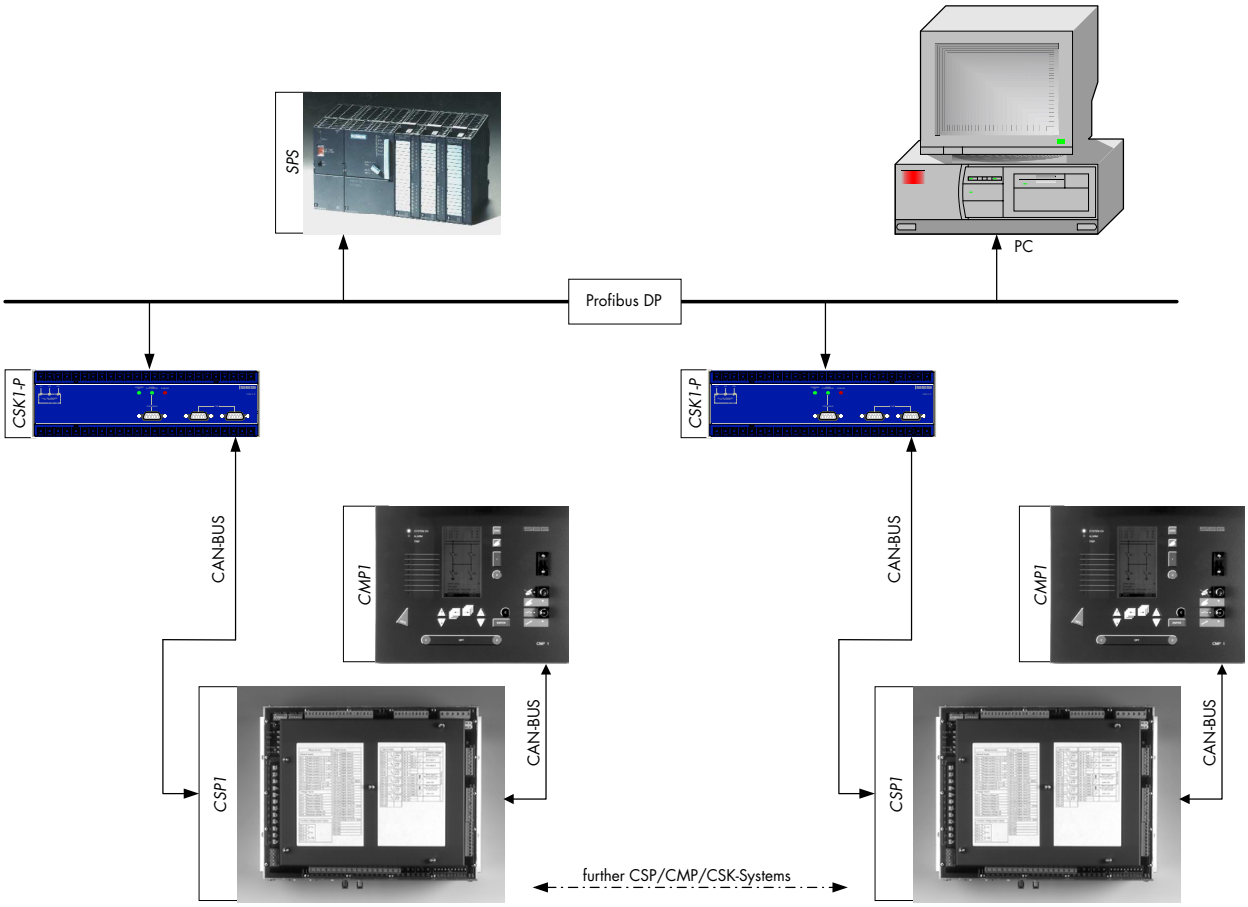



*Fig. 1.2: Coupling*

# 2 Structure

## 2.1 Housing dimensions

The *CSK1-P* is designed for snap-action fastening on DIN-rail as per DIN EN 50022 or by screw fastening. The front plate of the device is protected by a transparent cover (IP40).

*Connection terminals*
The connection terminals of the device permit connection of up to 1 x 2.5 $mm^2$ max. conductor cross section.

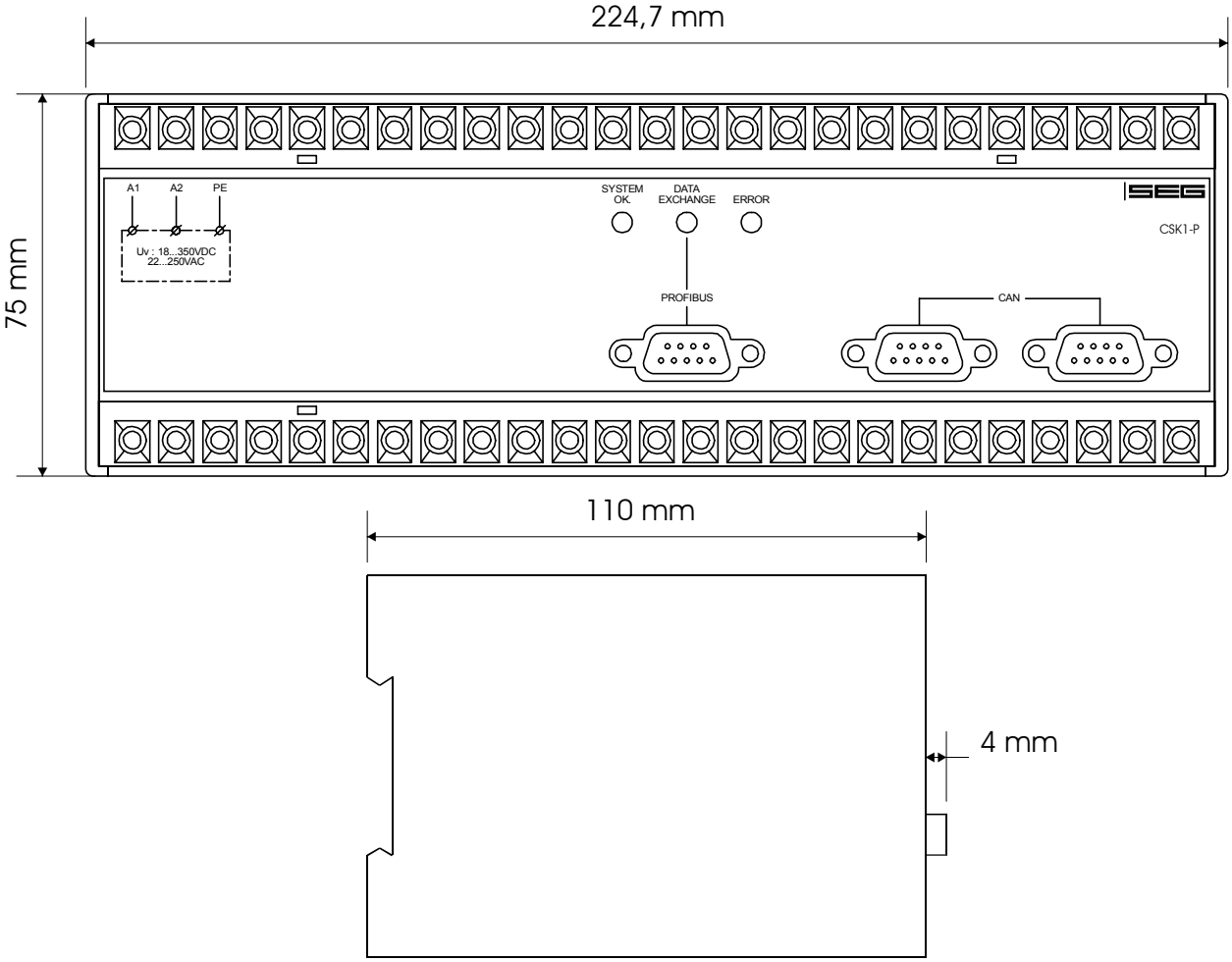



*Fig. 2.1: Dimensional drawing*

## 2.2 Function

Like the *CSP* System, the *CSK1-P* is equipped with a wide-range power supply and can be connected to any auxiliary voltages from 18 - 290 V DC / AC. The *CSK1-P* has 2 CAN-Bus interfaces with which it can be connected to the *CSP*. The *Profibus* interface is designed as RS485 connection so that FO converters can also be connected to it. The two green LEDs will only work after a *Profibus* Master has been recognised as connected.

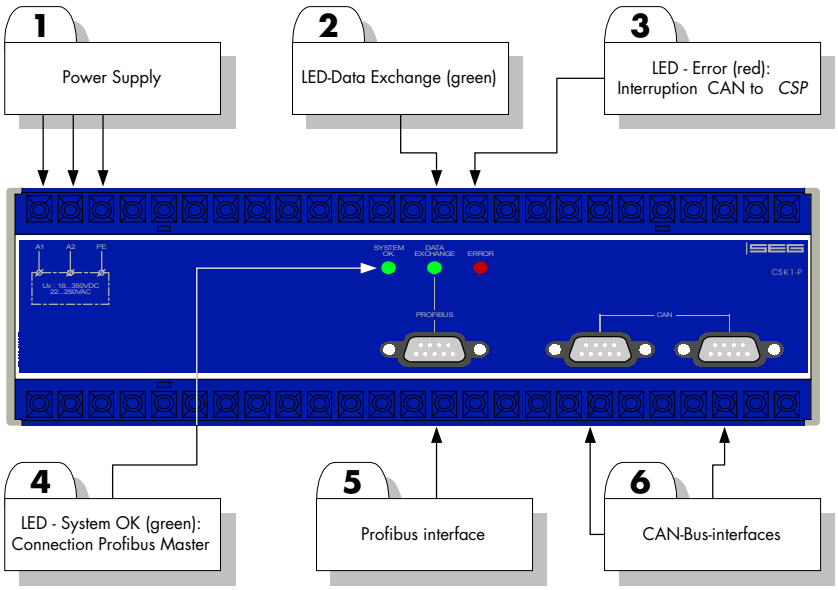



*Fig. 2.2: Front view*

# 3 Functioning scope of the communication link

The *Profibus*-DP expands the functionality of the device *CSP*-Feeder (communication interface):

Output data of the *CSP* Slave:

- Information on device version,
- Measured values,
- Switch positions,
- Device status,
- Time and date,
- Status of the digital device inputs,
- Protection status messages and
- Number of switching cycles.

The *CSP* allows the *Profibus-DP Master* controlling of the following properties via the input data of the *CSP*-Slave:

- Controlling of switch elements,
- Changing of parameter sets,
- Resetting and acknowledging of messages,
- Setting of date and time and
- Controlling of signal relays.

The *CSK1-P* has an automatic Baud rate recognition function up to 12 MBit/s. The device address (Slave) is adjusted via a relevant menu in the *CSP1-Fx*.

# 4 Technical Data

## 4.1 Voltage supply CSK1

| | |
|---|---|
| Supply voltage range $U_b$ | DC: 18...350 V<br>AC: 22...250 V |
| Max. power consumption ($P_{vmax.}$) | 12 VA |

## 4.2 Mechanical test loads

| | |
|---|---|
| Mechanical test load, shock test:<br>IEC 255 T21-2 | Class 1<br>(5 – 10 g) |
| Mechanical test load, fatigue testing:<br>IEC 255 T21-1 | Class 1<br>(0,5 g) |

## 4.3 Climatic stress

| | |
|---|---|
| Humidity stress Class F<br>DIN 40040 and IEC 68, Part 2-3 | 56 d at 40 °C and 95 % rel. humidity |
| Temperature range during storage | - 40 °C to + 85 °C |
| Temperature range during operation | - 20 °C to + 55 °C |

## 4.4 Dimensions and weights

| | |
|---|---|
| Dimensions | 22,4 x 7,5 x 11 cm |
| Weight | 700 g |

## 4.5 Standards

### 4.5.1 General rules and regulations

| | |
|---|---|
| Protection class relay housing | IP 40 |
| Protection class electronics | IP 40 |
| Protection class terminals | IP 20 |

### 4.5.2 High-voltage tests

| | |
|---|---|
| Disturbance immunity against line-bound high-frequency electro-magnetic fields<br>EN 50141 | 10 V |
| Disturbance immunity against surges<br>EN 61000-45 | 4 kV |

### 4.5.3 EMV tests for disturbance immunity

| | |
|---|---|
| Rated withstand alternating voltage 1 min<br>IEC 255-5 | 2,5 kV |
| Rated chopped lightning voltage 1,2/50µs, 0,5J<br>IEC 255-5 | 5 kV |
| High-frequency test<br>IEC 255-22-1 | 2,5 kV / 1 MHz |
| Disturbance immunity against electromagnetic discharges (ESD)<br>EN 61000-4-2, IEC 255-22-1 | 8 kV air discharge<br>6 kV contact discharge |
| Disturbance immunity against fast transient disturbances (bursts)<br>EN 61000-4-8, IEC 255-22-2 | 4 kV / 2,5 kHz, 15 ms<br>Goal: 6 kV – 8 kV |
| Disturbance immunity against magnetic fields with energetic frequency | 100 A / m continuous<br>1000 A / m for 3 s |
| Disturbance immunity against high-frequency electromagnetic fields<br>EN 50140, IEC 255-22-3 | 10 V / m |

### 4.5.4 EMV test for disturbance signals

| | |
|---|---|
| Measuring radio interference voltage as per<br>EN 55011 | Limit value Class B |
| Measuring radio interference radiation as per<br>EN 55011 | Limit value Class B |

## 4.6 Communication interfaces CSK1-P

RS485

*Profibus DP*

Transmission as DP Slave as per EN 50170/2
Galvanically isolated via optocoupler (2,5 kV).
Automatic Baud rate recognition up to 12 Mbit/s
9-pole SUB-D bushing

CAN BUS 1,2

System interface to *CSP1*
CAN specification V2.0 part B
Siemens 80C167C on chip CAN Module
Galvanically isolated via optocoupler (2,5 kV).
9-pole SUB-D bushing and plug

# 5 Device Planning (DMD file*)

*PROFIBUS* devices feature different power characteristics. They differ with regard to the available functionality (e.g. number of I/O signals, diagnose messages) or possible bus parameters such as Baud rate and time supervision. These parameters vary for each type of device and its manufacturer. They are normally documented in the manual of the device. In order to achieve a simple plug-and-play configuration for the *PROFIBUS*, electronic-device data sheets (DMD files) for the communication characteristics of the devices have been established (device master file, DMD file). DMD files are provided by all *PROFIBUS* manufacturers.
The DMD files extend open communication right down to the operating level. All modern project planning tools permit reading in of the DMD files during configuration. This way integration of devices by different manufacturers into the *PROFIBUS* System becomes easy and user-friendly. The master files describe the characteristics of a device model clearly and completely in a precisely fixed format. The device manufacturer prepares the DMD files individually for each device type and provides them to the user in the form of a file. Thanks to the fixed file format, the project planning system can easily read in the master device data of any *PROFIBUS* device and take them into account when the bus system is configured. The project planning system is already able during the planning phase to automatically carry out checks for faulty entries and on the consistency of the entered data in relation to the overall system. The device master data are divided into:

*General fixed data*
This section contains information on manufacturer's and device name, hardware and software versions as well as on the supporting Baud rates, the possible time periods for supervision times and the signal assignment on the bus plug.

*Slave-related data*
Here we find all slave-related information such as e.g. the number and type of I/O channels, fixing of diagnose texts as well as information on the modules available in the case of modular devices.

---

*) DMD file = **D**evice **M**aster **D**ata file

# 6 Physical interface RS-485

Due to the simple wiring and the high transmission speed, communication via RS-485 is the most frequently used one.

Communication to a higher-level automation system such as PLC takes place via a twisted and shielded copper cable with 9-pole SUB-D plugs.

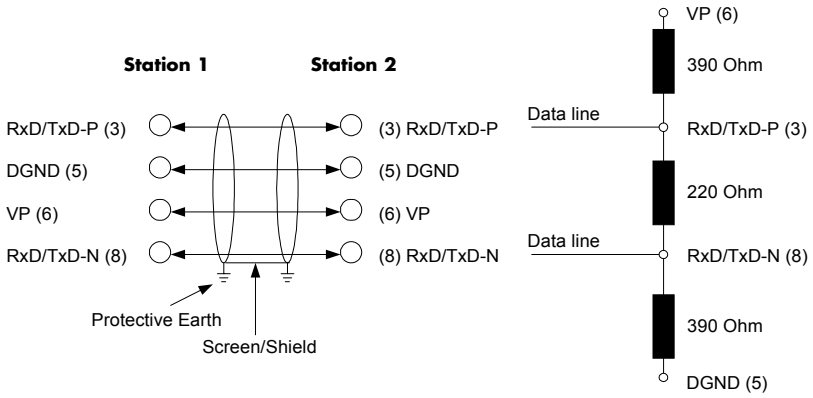



*Fig. 6.1: Cabling and bus finish for RS-485 transmission*

The bus line is extended in the plugs in order to prevent interruption in communication in case of device failure or replacement. A maximum of 31 *CSP* devices can be connected to one bus structure. The maximum line length of an RS-485 bus segment depends on the transmission speed (refer to Table 6.1).

| Transmission rate (Kbaud) | 9,6 – 93,75 | 187,5 | 500 | 1500 | 12000 |
|---|---|---|---|---|---|
| Range (m) | 1200 | 1000 | 400 | 200 | 100 |

*Table 6.1: Line length as a function of transmission rate*

The cabling must comply with the valid recommendations and regulations and has to be configured at each end with a bus finish resistor in order to prevent transmission faults right from the beginning.

# 7 General information on the protocol used

The *CSP* uses a protocol superimposed on level 2 of the *Profibus DP* in order to be able to offer the device functionality clearly structured at the communication interface. The data traffic between *Profibus-DP* Master and *CSP* (*Profibus* Slave) takes place via two different data packages. In this context we distinguish between the following data packages:

Request package Packages of this type must be transmitted from the external *Profibus* Master to the *CSP* Slave.

Response package Packages of this type are transmitted from the *CSP* Slave to the Master.

Request- and Response package have a constant length, independent of the respective device function required.

| Package | Size in Bytes | Remarks |
|---|---|---|
| Request-Package | 8 | refer Fig 7.1 |
| Response-Package | 32 | refer Fig. 7.2 |

The principle rule for using the superimposed protocol can be described as follows:

- The master transmits a request package to the slave which is coded with the required data and/or function.
- The slave replies with a response package which contains the required data and/or acknowledgement of a function it has carried out.
- The request- and response-packet have to be acessed consistent.

## 7.1 Blocks and registers

The present profile distinguishes between the terms »Block« and »Register«. All slave data relevant to the *Profibus* are provided either in a block or in a register, and with the following distinction:

- (Time-variable) data which the master can read but not change are always assigned to a certain block and must be selected by the master by choosing a Block Index. The measured values of the slave, for example, are all available in blocks.
- Other, typically not time-variable data, which can be read or possibly also written, are provided by the slave in so-called registers. In order to select a register, the master not only has to choose the Register Index but must also define the required function (reading or writing) in a command. The only readable registers are indicated by a suffix »R« and the writable registers are indicated by a »W«.
- The master has to use the toggle bit CTGL for read and write block and register commands.
- The block respectively register index is shown in hexadecimal code.

### 7.1.1 Appearance of Request and Response Package

Fig. 1 shows the structure of the Request Packages. All elements of the Request Packages bear the suffix »R« in their name in order to clearly assign them to the Request Package. The individual elements of this package have the following functions:

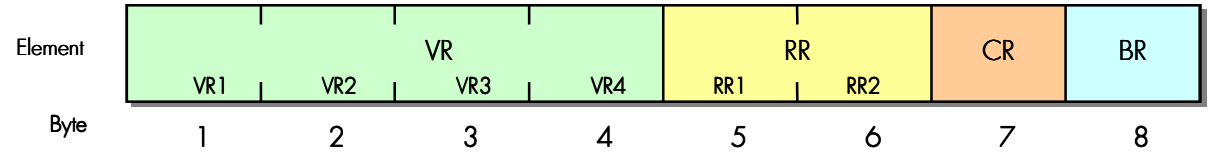



*Fig. 7.1: Structure of the Request Packages*

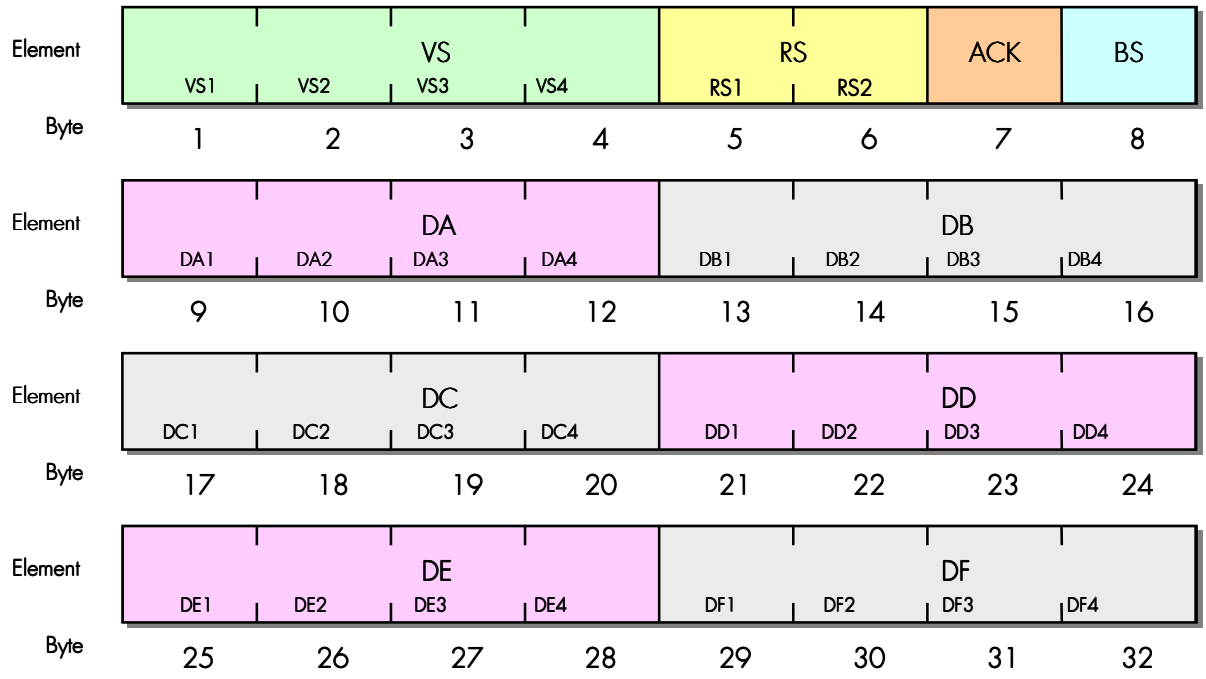
| Element | |
|---|---|
| BR | serves for selecting the Block Index. The Master must determine the required Block No. by means of BR. |
| RR | contains the Register No. required by the Master.<br>The Register Number must be entered in RR1 with the higher value byte and analogously to that in the RR2 with the lower-value byte. |
| CR | via this element the Master must determine the required command (read or write). The information to be saved in the CR element by the Master is bit-coded and explained in more detail in Fig. 7.3. |
| VR | in this element the Master must enter the data to be written while writing in a Register. If there is to be no writing in a Register, the Slave will ignore this element.<br>The format in which the data are to be entered into the VR element always depends on the chosen Register (refer to element RR) and is explained in more detail in the Appendix. |

*Table 7.1: Structure of the Request Package*

This means that two parallel functions can be carried out by means of one single Request package.

- Via Element BR the Data Block can be chosen which is to be provided by the Slave.
- Via the Elements CR and RR a register-based function of the unit (reading or writing into a Slave Register) can be carried out.

The structure of the relevant Response package is shown in Fig. 7.2.




*Fg. 7.2: Structure of the Response Package*

The Response package always consists of two parts and incorporates, in addition to the response elements which can be directly assigned to the relevant elements of the Request package, a data block of 24 Byte length. All elements of the Response package for which a corresponding analogue element exists in the Request package are marked with the suffix »S«.

The individual elements of the Response Telegram are treated by the Slave as follows:

| Element | |
|---|---|
| BS | The Slave sets this element onto the requested Block No. which was specified by the Master in the BR element of the Request package processed by the Slave. |
| RS | The Slave assigns the Register No. to the element as it has been specified by the Master in the RR element of the Request package.<br>The Slave enters the Register No. in the RS1 with the higher-value Byte and in the RS2 with the lower-value Byte.. |
| ACK | This element contains information about the execution of the functions contained in the corresponding Request package. This means, it contains the reaction of the Slave to the instructions given by the Master in the data sections CR and BR.<br>The information saved in this element by the Slave is bit-coded and explained in more detail in Fig. 4. |
| VS | This element contains the read data of a Register<br>**The format in which the data are to be entered in the VS element always depends on the chosen Register (refer to Element RS) and is explained in more detail in the Appendix** |

*Table 7.2: Response Telegram*

Detailed list of the individual Package Elements:

**Request-Package**

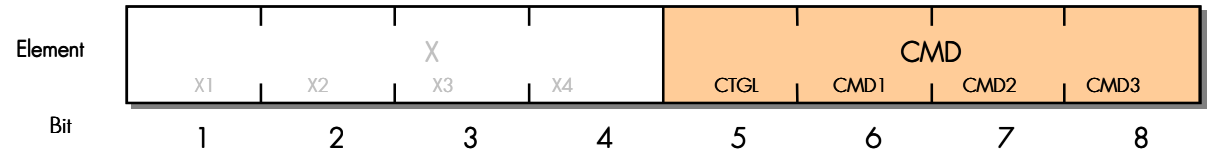



*Fig. 7.3: Bit-Structure of the Element CR*

CR

| Element CR | | |
|---|---|---|
| Bit Element | Possible value | Explanation |
| X | 0000b | Element X is reserved. |
| CTGL | 0 or 1 | The Bit COMMAND_TOGGLE is explained in more detail in the following |
| CMD | 000b<br>001b<br>010b | CMD_ZERO: Slave does not ignore the Elements RR and VR<br>CMD_READ: read out RR Register at Slave<br>CMD_WRITE: writes VR value into the RR Register at the Slave if the Bit CTGL has been inverted with the command in hand. |

*Table 7.3*

The remaining elements:

BR

This element selects the required Data Block which is transmitted by the Slave in the elements DA to DF of the Response package. If the Master does not wish to select a Data Block, it must use the ZERO Block 00h. The Slave then sets the elements DA to DF in the corresponding Response Telegram to 0.

**RR**

By way of this element the Master must choose a Register to which the Command in element CR is to be applied. If the special value CMD_ZERO is used in CR, it is not necessary to provide an RR value.

**VR**

This element must only be assigned a value by the Master if the value CMD_WRITE is used in the CR element. In this case the Master wishes to write into a Register in the Slave and must consequently enter the value to be written into the element VR.

The data format of the VR element depends on the required Register RR. Details can be found in the Appendix.

## Response Package

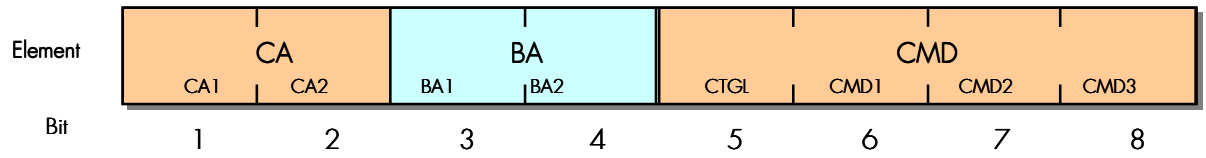



*Fig. 7.4 Bit-Structure of the Element ACK*

| Element ACK | | | |
|---|---|---|---|
| Bit-Element | Possible value | Explanation | |
| CA | 01b<br>10b<br>00b | CMD_ACK:<br>CMD_ERR:<br>CMD_NO | Execution of command successful.<br>Execution of command not successful<br>No execution of command |
| BA | 01b<br>10b | BL_ACK:<br>BL_ERR: | Block was supplied<br>Block could not be supplied |
| CTGL | 0 or 1 | The Bit COMMAND TOGGLE is described in more detail in the following | |
| CMD | see CR, Bit section CMD | The value supplied by the Slave in this Bit element is only of significance if CA is not equal to CMD_ZERO | |

*Table 7.4:*

### Explanations on bit-coded elements:

In case of bit-coded elements it must be ensured that the individual bits are correctly oriented. In all related graphs the individual bits are marked with the numbers 1 – 9. Numerically interpreted, the bit numbers correspond to the following value rating:

| Bit Number | Value | Remark |
|---|---|---|
| 1 | $2^7$ | highest significant Bit |
| 2 | $2^6$ | |
| 3 | $2^5$ | |
| 4 | $2^4$ | |
| 5 | $2^3$ | |
| 6 | $2^2$ | |
| 7 | $2^1$ | |
| 8 | $2^0$ | lowest significant Bit |

*Table 7.5:*

The tables also show some binary values. All of these are characterised by the suffix »b«. They must be entered into the bit elements as specified in the tables.

*The behaviour of the CTGL Bit (COMMAND TOGGLE) in the CMD section*

The ***Profibus*** Slave described herein replies to a Request Telegram sent by the Master with a Response Telegram. The ***Profibus*** ensures continuous transmission of the assigned input and output data sections between Master and Slave in which the Request and Response Telegrams are filed.
This continuous transmission of data between Master and Slave which is typical for the ***Profibus*** is problematic particularly when writing onto Registers of the Slave: If the Master wishes to write onto a Register of the Slave, it must set up an appropriate Request Package in its output data section. This Request Package would now be continuously transmitted to the Slave until the Master changes the data in its output data section again. It would therefore be feasible that the Slave processes the Request Telegram, which is continuously being sent to it, several times without any new information being transmitted.
Since, as a rule, writing onto Registers of the Slave has a modifying effect on the status of the device, unintentional multiple transmission of such telegrams is definitely not desirable.

Since the ***Profibus*** does not have the possibility to recognise such multiple telegrams, the present telegram focuses especially on this issue. For this reason the CTGL Bit in the CMD section was introduced in the Request and Response Telegram.

The Slave processes the Bit CTGL as follows:
When the Slave processes a Response Telegram, it copies the CTGL Bit of the Request Package into the CTGL Bit of the Response Package. In addition the Slave memorises the value of the CTGL Bit of the respective Request Package last processed.
If the command of the Request Package being processed by the Slave is CMD_WRITE, the Slave will only carry out the requested function if the CTGL Bit of the Request Package has actually been inverted in relation to the Request Package last processed. If, however, the CTGL Bit has not changed compared to the Request Package processed last, no function will be carried out by the Slave side, i.e. no Response Package will be sent to the Master.

On the side of the Master the CTGL Bit is used as follows:

If the Master wishes to read a Block or a Register, it prepares the relevant Request Telegram which will then be sent to the Slave via the ***Profibus.*** In this case the Master is free to invert the CTGL Bit for every new Request Package. It can then "trigger" to change of the CTGL Bit in the Response Package and thus has a simple criterion for recognising a new Response Package being processed by the Slave.
If the Master wishes to write on a Slave Register, it is essential that the CTGL Bit is inverted in order to achieve processing of the Request Package in the Slave. Here, too, the Master can recognise the slave processing the command on the CTGL Bit in the Response Package.

*Example*

The Slave provides the value 62 in hexa-decimal form for the element ACK. In binary writing this is equivalent to 01100010b.

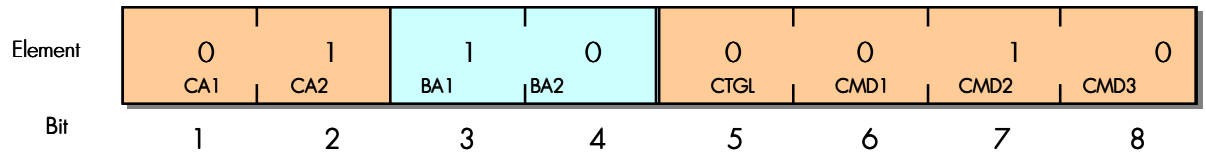



*Fig. 7.5: Example for ACK*

This results in the following individual values for the individual Bit Elements:

CA = CMD_ACK (01b)
BA = BL_ERR (10b)
CMD = CMD_WRITE (0010b)

The remaining elements of the Response Package are:

**BS** — In this element the Slave supplies the index of the required Data Block. Consequently the value is a copy of the element BR of the appertaining Request package.

**RS** — In this element the Slave supplies the Register index of the executed Register function. Consequently the value is a copy of the element RR of the appertaining Request package.

**VS** — In this element the Slave saves Register values. If the Master reads a Register successfully (CMD equals CMD_READ and Bit section CA in the element ACK equals CMD_ACK), the Slave saves the momentary value of the Register requested by the Master in the element VS. But if the Master writes onto a Register, the value written into the Slave will be copied into element VS.
In all other cases VS contains a copy of element VR from the appertaining Request package.
The data format of element VS depends on the required Register RS. Details can be found in the Appendix.

**Dx** — The elements DA to DF contain the data of one block as supplied by the Slave. DA-DF will only contain valid values if the Slave has been able to supply the required data block (Bit section BA in Element ACK equal to BL_ACK)
The data format of the elements DA-DF depends on the required Block BS. Details can be found in the Appendix.

### 7.1.2 Error handling:

Special attention should be paid to those Response packages where the sections BA and CA signal faults in the ACK element. In detail, these cases mean:

| Bit-Element | Error status | Meaning: |
|---|---|---|
| BA | 10b (BL_ERR) | For some reason, the Slave was unable to supply the required Data Block. In this case the elements DA to DF contain invalid values which must not be used for evaluation. |
| CA | 10b (CMD_ERR) | Register access was denied for some reason. In this case the element VS4 of the Response package contains more detailed information about the cause for the error. In such a case the elements VS1 to VS3 are set to 00h by the Slave. |

*Table 7.6:*

Detailed list of the error code (when CA is equal to CMD_ERR):
The error code E supplied in element VS4 in case of an error is bit-coded. In detail it should be interpreted like in Fig. 7.6.

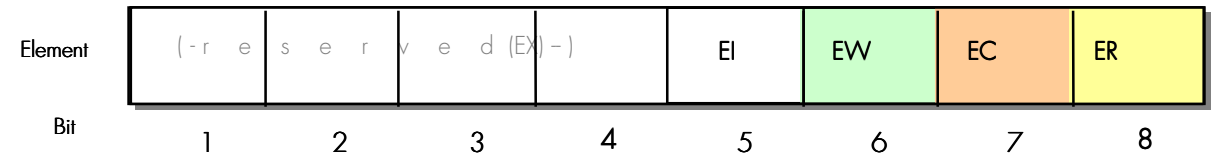



*Fig. 7.6: Bit Structure of Element VS4 with Errorcode E*

| Error code E | |
|---|---|
| Bit-Element | a set Bit means |
| EX | is reserved for future extensions. The Master must not evaluate the respective Bits at this time. |
| EI | ERROR_INT: The Slave was unable to process a command on account of an internal error. |
| EW | ERROR_WRITE: The Master has tried to describe a "read only" Register. Since the respective Register can only be read, the writing process was not carried out. |
| EC | ERROR_CMD: The Master has sent a Request package with an undefined Command to the Slave |
| ER | ERROR_REG: The Master has entered a command for a Register not contained in the Slave. The Slave has not processed this command for this reason. |

*Table 7.7: Error code E*

Practical examples for using the Protocol from the Master's view:

1. The Master wants to read a Data Block. It sends a Request Package with BR equalling 01h. Since the Master does not want to carry out a Register Command, it uses the value 0h for CR (== ZERO_CMD).

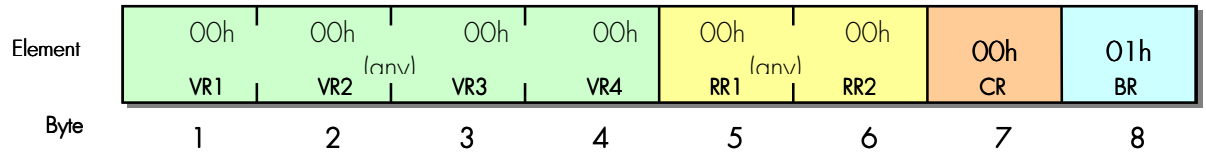



*Fig.Fig 7.1 Package Example 1*

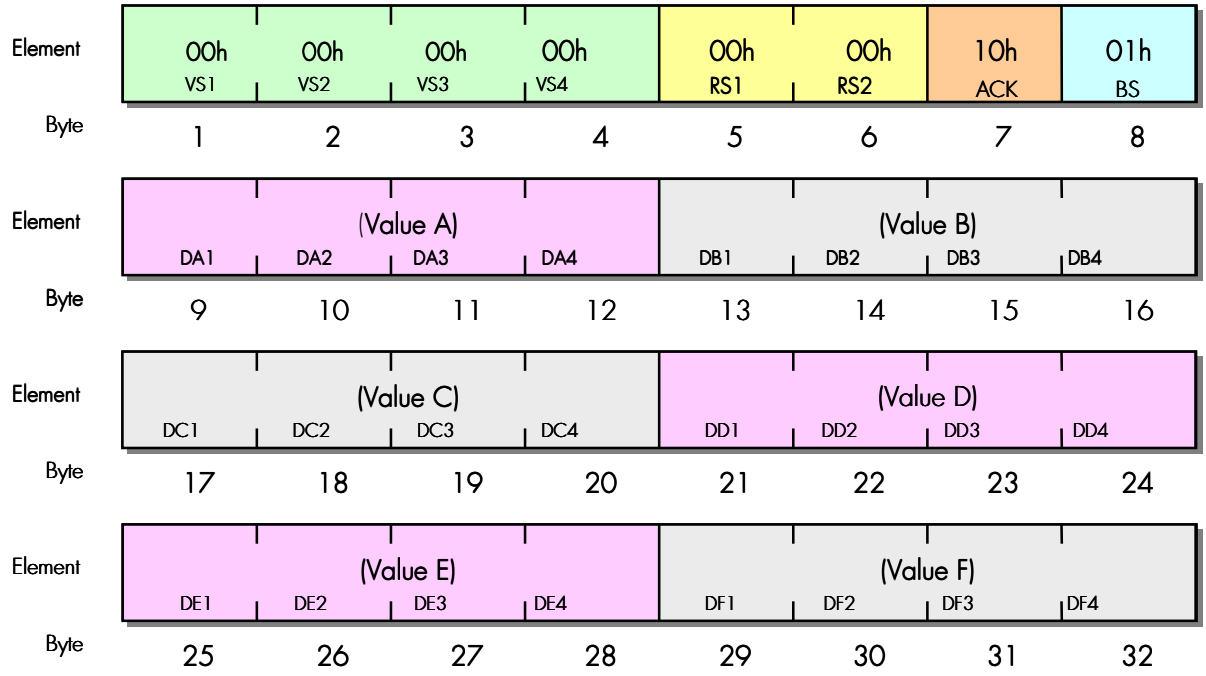



*Fig. 7.8: Response Package Example 1*

In the above example the meaning of Element ACK is as follows:

| Element ACK | | | |
|---|---|---|---|
| Bit Element | Value | Explanation | |
| CA | 00b | CMD_ZERO | no command execution |
| BA | 01b | BL_ACK: | Block was delivered |
| CMD | 0000b | CMD_ZERO: | copy from CR |

*Table 7.8:*

The Master wants to read Register 1234h. It is not interested in any special Data Block, so it uses the ZERO Block (00h).

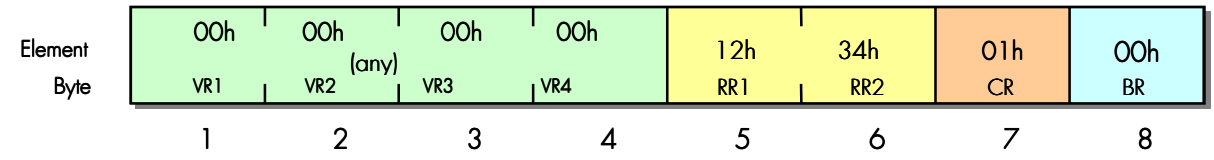
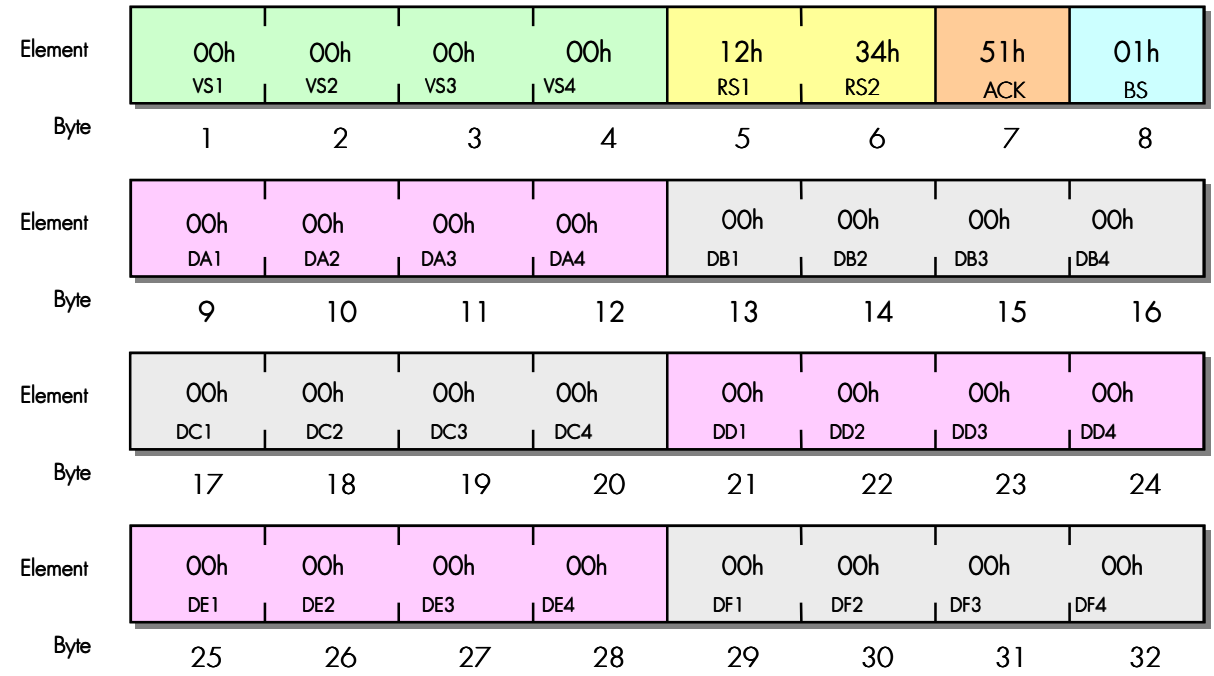



*Fig. 7.9: Request Package Example 2*

The Slave replies with the following Response Package:




The meaning of Element ACK in the above example is as follows:

| Element ACK | | | |
|---|---|---|---|
| Bit-Element | Value | Explanation | |
| CA | 01b | CMD_ACK | no command execution |
| BA | 01b | BL_ACK: | Block was delivered |
| CMD | 0001b | CMD_READ: | Copy from CR |

The Master wants to write the value 0x12345678 in Register 4218h and simultaneously read Data Block 02h.

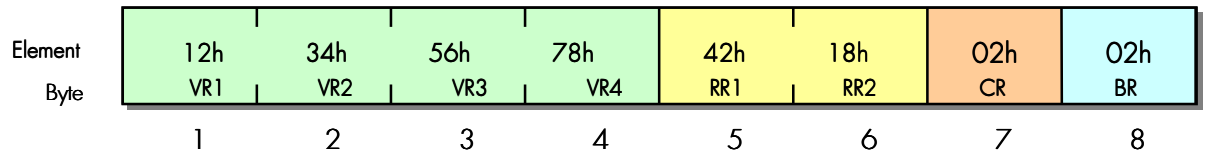



*Fig. 7.10: Request Package Example 3*

The Slave replies with the following Response Package:

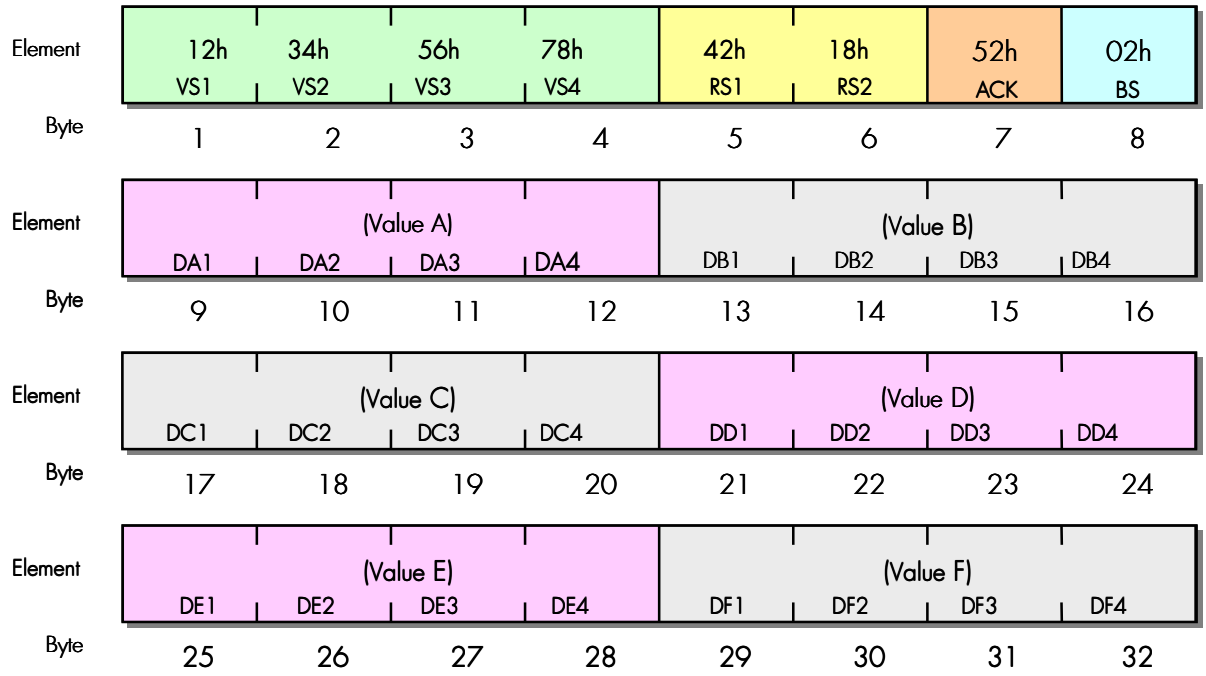



*Fig. 7.11: Response-Package Example 3*

The meaning of Element ACK in the above example is as follows:

| Element ACK | | | |
|---|---|---|---|
| Bit-Element | Value | Explanation | |
| CA | 01b | CMD_ACK | no command execution |
| BA | 01b | BL_ACK: | block was delivered |
| CMD | 0010b | CMD_WRITE: | copy from CR |

*Table 7.9:*

# 8 Appendix

*Register and Block-Map of the CSP Feeder*

The following Appendix lists the Registers and Block required for transmission (CSP-/ Automation system).

## 8.1 Block-Map

The Block Map of the CSP-Fx is assigned the following values:
The data format of the measuring values and of the statistical measuring values (Block 01h to 08h) is designed as REAL (floating point figure) in accordance with IEEE.

| Block 01h | Measured values Currents | | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | Current IL1 | REAL | A | |
| DB | Current IL2 | REAL | A | |
| DC | Current IL3 | REAL | A | |
| DD | Earth current IE | REAL | A | |
| DE | Load unbalance current 12 | REAL | A | |
| DF | Thermal capacity | REAL | % | |

| Block 02h | Measured values Voltage | | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | Voltage L1N | REAL | V | |
| DB | Voltage L2N | REAL | V | |
| DC | Voltage L3N | REAL | V | |
| DD | Voltage L12 | REAL | V | |
| DE | Voltage L23 | REAL | V | |
| DF | Voltage L31 | REAL | V | |

| Block 03h | Measured values Frequency, Capacity | | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | Residual voltage | REAL | V | |
| DB | Frequency | REAL | Hz | |
| DC | | | | (not assigned) |
| DD | Active power | REAL | kW | |
| DE | Reactive power | REAL | kVAR | |
| DF | Power factor | REAL | | Cos φ |

| Block 04h | Measured values Energy | | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | Pos. active energy | REAL | kWh | |
| DB | Neg. active energy | REAL | kWh | |
| DC | Pos. reactive energy | REAL | kVARh | |
| DD | Neg. reactive energy | REAL | kVARh | |
| DE | | | | |
| DF | | | | |

| Block 05h | Average values and maximum values Current | | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | Current IL1 avg. | REAL | A | |
| DB | Current IL2 avg. | REAL | A | |
| DC | Current IL3 avg. | REAL | A | |
| DD | Current IL1 max. | REAL | A | |
| DE | Current IL2 max. | REAL | A | |
| DF | Current IL3 max. | REAL | A | |

| Block 06h | Average values Voltage | | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | Voltage L1N avg. | REAL | V | |
| DB | Voltage L2N avg. | REAL | V | |
| DC | Voltage L3N avg. | REAL | V | |
| DD | Voltage L12 avg. | REAL | V | |
| DE | Voltage L23 avg. | REAL | V | |
| DF | Voltage L31 avg. | REAL | V | |

| Block 07h | Maximum values Voltage | | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | Voltage L1N max. | REAL | V | |
| DB | Voltage L2N max. | REAL | V | |
| DC | Voltage L3N max. | REAL | V | |
| DD | Voltage L12 max. | REAL | V | |
| DE | Voltage L23 max. | REAL | V | |
| DF | Voltage L31 max. | REAL | V | |

| Block 08h | Average and maximum values Frequency, Positive Active Power, Positive Reactive Power | | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | Frequency f avg | REAL | Hz | |
| DB | Frequency f max | REAL | Hz | |
| DC | Active power P+ avg | REAL | kW | |
| DD | Active power P+ max | REAL | kW | |
| DE | Reactive power Q+ avg | REAL | kVAR | |
| DF | Reactive power Q+ max | REAL | kVAR | |

| Block 09h | | | Service data (1)<br>Switching cycles<br>Switching cycles are transmitted in 16-Bit values | | |
|---|---|---|---|---|---|
| | Service data | | Data format | Unit | Remark |
| DA | Switching cycles by AR switching device | | WORD | | Number of switching cycles by the automatic AR switching device |
| | $2^0$ to $2^{15}$ | No. of switching cycles by the AR switch.device 1 | WORD | | Number of switching cycles Switching device 1 |
| | $2^{16}$ to $2^{31}$ | | | | (not assigned) |
| DB | | | | | (not assigned) |
| DC | Switching cycles switch.device 1+2 | | | | Number of switching cycles |
| | $2^0$ to $2^{15}$ | No. of switching cycles switching device 1 | WORD | | Number of switching cycles switching device 1 |
| | $2^{16}$ to $2^{31}$ | No. of switching cycles switching device 2 | WORD | | Number of switching cycles switching device 2 |
| DD | Switching cycles switching device 3 and 4 | | | | Number of switching cycles |
| | $2^0$ to $2^{15}$ | No. of switching cycles switching device 3 | WORD | | Number of switching cycles Switching device 3 |
| | $2^{16}$ to $2^{31}$ | No. of switching cycles switching device 4 | WORD | | Number of switching cycles Switching device 4 |
| DE | Switching cycles switching device 5 | | | | Number of switching cycles |
| | $2^0$ to $2^{15}$ | No. of switching cycles switching device 5 | WORD | | Number of switching cycles Switching device 5 |
| | $2^{16}$ to $2^{31}$ | | | | (reserved) |
| DF | | | | | (reserved) |

| Block 0Ah | | Service data (2) | | |
|---|---|---|---|---|
| | Service data | Data format | Unit | Remark |
| DA | Operating hours | DWORD | h | |
| DB | Accumulaion of switched short-circuit currents Switching device 1 | REAL | kA | |
| DC | Accumulation of switched short-circuit currents Switching device 2 | REAL | kA | |
| DD | | | | (not assigned) |
| DE | | | | (not assigned) |
| DF | | | | (not assigned) |

| Block 0Bh | | | Switching device status<br>The status of each individual switch is transmitted in identical form as bit-coded WORD | | |
|---|---|---|---|---|---|
| | Switching device status | | Data format | Unit | Remark |
| DA | free (global info) | | DWORD | | |
| DB | Switching device 1 and 2 | | DWORD | | |
| | Switching device 1: | | bit-coded | | |
| | $2^0$ | Pos. Switching device 1 | | | 01b : Off 10b: On<br>00b : Differential pos. 11b: Disturbance pos. |
| | $2^1$ | | | | |
| | $2^2$ | | | | not assigned |
| | $2^3$ | Switching device 1 removed | | | 1: CB1 removed |
| | $2^4$ | Disturbance Switching device 1 | | | 1: Disturbance Switching device 1 |
| | $2^5$ | Control time Switching device 1 | | | 1: Control time Switching device 1 exceeded |
| | $2^6$ | | | | (not assigned) |
| | $2^7$ | | | | (not assigned) |
| | $2^8$ to $2^{15}$ | | | | (not assigned) |
| | Switching device 2: | | bit-coded | | |
| | $2^{16}$ | Pos. Switching device 2 | | | 01b: Off 10b: On<br>00b: Differential pos. 11b: Disturbance pos. |
| | $2^{17}$ | | | | |
| | $2^{18}$ | | | | not assigned |
| | $2^{19}$ | Switching device 2 removed | | | 1: CB 2 removed |
| | $2^{20}$ | Disturbance switching device 2 | | | 1: Disturbance Switching device 2 |

| Block 0Bh | | | Switching device status<br>The status of each individual switch is transmitted in identical form as bit-coded WORD | | |
|---|---|---|---|---|---|
| | $2^{21}$ | Control time Switching device 2 | | | 1: Control time Switching device 2 exceeded |
| | $2^{22}$ | | | | (not assigned) |
| | $2^{23}$ | | | | (not assigned) |
| | $2^{24}$ to $2^{31}$ | | | | (not assigned) |
| DC | Switching device 3 and 4 | | DWORD | | |
| | $2^{0}$ to $2^{15}$ | Switching device 3: | bit-coded | | see Switching device 1 |
| | $2^{16}$ to $2^{31}$ | Switching device 4: | bit-coded | | see Switching device 2 |
| DD | Switching device 5 | | DWORD | | |
| | $2^{0}$ to $2^{15}$ | Switching device 5: | bit coded | | see Switching device 1 |
| | $2^{16}$ to $2^{31}$ | | | | (reserved) |
| DE | reserved | | | | |
| DF | reserved | | | | |

| Block 0Ch | | Line differential protection<br>Differential current Id,<br>Stabilizing current Is | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | Id_L1 | REAL | A | not CSP-F |
| DB | Id_L2 | REAL | A | not CSP-F |
| DC | Id_L3 | REAL | A | not CSP-F |
| DD | Is_L1 | REAL | A | not CSP-F |
| DE | Is_L2 | REAL | A | not CSP-F |
| DF | Is_L3 | REAL | A | not CSP-F |

| Block 0Dh | | Line differential protection grad stabilisation m | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | m_L1 | REAL | 1 | not CSP-F |
| DB | m_L2 | REAL | 1 | not CSP-F |
| DC | m_L3 | REAL | 1 | not CSP-F |
| DD | - | REAL | - | |
| DE | - | REAL | - | |
| DF | - | REAL | - | |

| Block 0Eh | Mean and maximum value of frequency, neg. active power, neg. reactive power | | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | reserved | | | |
| DB | reserved | | | |
| DC | neg. acive power P-avg | REAL | kW | |
| DD | neg. active power P-max | REAL | kW | |
| DE | neg. reactive power Q-avg | REAL | kVAR | |
| DF | neg. reactive power Q-max | REAL | kVAR | |

| Block 0Fh | Reading time | | | |
|---|---|---|---|---|
| | Measured value | Data format | Unit | Remark |
| DA | Time | DWORD | ms | ms of the day from 0:00h |
| DB | Date. | | | |
| | $2^0$ to $2^{15}$ Date | Word | days | days from 01.01.1990 |
| | $2^{16}$ to $2^{31}$ | | | (reserved) |
| DC | | | | (reserved) |
| DD | | | | (reserved) |
| DE | | | | (reserved) |
| DF | | | | (reserved) |

| Block 10h | (not assigned) |
|---|---|

## 8.2 Register-Map

The *CSP* provides the following register-based functionality:

| Device Information | | | | | |
|---|---|---|---|---|---|
| Register | Meaning | | Data format | Unit | Remark |
| 0000h R | Instrumentation | | DWORD | | |
| | $2^0$ bis $2^7$ | Device type | Byte | | 0:-<br>1: *CSP1-F1*<br>2: *CSP1-F3*<br>3: *CSP1-F5*<br>4: *CSP1-L*<br>5: *CSP1-B* |
| | $2^8$ bis $2^{15}$ | Language | Byte | | 0:-<br>1: English<br>2: German<br>3: Spanish<br>4: Portuguese |
| | $2^{16}$ bis $2^{23}$ | | Byte | | (not assigned) |
| | $2^{24}$ bis $2^{31}$ | | Byte | | (not assigned) |

| Device Information | | | | | |
|---|---|---|---|---|---|
| Register | Meaning | | Data format | Unit | Remark |
| 0001h R | | | | | reserved |

| Device Information | | | | | |
|---|---|---|---|---|---|
| Register | Meaning | | Data format | Unit | Remark |
| 0002h R | Software Version | | DWORD | | |
| | $2^0$ bis $2^7$ | Main Major | Byte | | Major version number |
| | $2^8$ bis $2^{15}$ | Main Minor | Byte | | Minor version number |
| | $2^{16}$ bis $2^{23}$ | DSP Major | Byte | | Major version number DSP Programme |
| | $2^{24}$ bis $2^{31}$ | DSP Minor | Byte | | Minor version number DSP Programme |

| Device Information | | | | | |
|---|---|---|---|---|---|
| Register | Meaning | | Data format | Unit | Remark |
| 0003h R | Hardware version | | DWORD | | planned |
| | $2^0$ bis $2^7$ | Main Major | Byte | | Major version number |
| | $2^8$ bis $2^{15}$ | Main Minor | Byte | | Minor version number |
| | $2^{16}$ bis $2^{23}$ | | Byte | | (not assigned) |
| | $2^{24}$ bis $2^{31}$ | | Byte | | (not assigned) |

| Device Status | | | | | |
|---|---|---|---|---|---|
| Register | Meaning | | Data format | Unit | Remark |
| 0100h R | System status | | DWORD, bit-coded | | |
| | $2^0$ | System OK | | | 0: System faulty<br>1: System OK |
| | $2^1$ | Self super-vision OK | | | 0: Fault in self-supervision<br>1: Self-supervision OK |
| | $2^2$ | Key Switch Local/ Remote | | | 0: Switching allowed locally only<br>1: Switching allowed only by way of control system or digital inputs |
| | $2^3$ | Operating mode | | | 0: inactive<br>1: active |
| | $2^4$ | Calibration mode | | | 0: inactive<br>1: active |
| | $2^5$ | Commission-ing mode | | | 0: inactive<br>1: active |
| | $2^6$ | Parameter setting mode | | | 0: inactive<br>1: active |
| | $2^7$ | Information blocking | | | 0: Information readable<br>1: Information not readable, blocked |
| | $2^8$ | Protection ready | | | 0: Protection not ready<br>1: Protection ready |
| | $2^9$-$2^{12}$ | Active protec-tion para-meter set | | | 0000b = reserved,<br>0001b = Protection parameter set 1 active,<br>0010b = Protection parameter set 2 active,<br>0011b = Protection parameter set 3 active,<br>0100b = Protection parameter set 4 active,<br>0101b – 1111b = reserved |
| | $2^{13}$ | Acknow-ledgement | | | 0: Acknowledgement not necessary<br>1: Acknowledgement necessary (with trip for release of control system) |
| | $2^{14}$ | Self-super-vision current-measuring | | | (planned)<br>0: Current recording o.k.<br>1: Current recording defective |

| | | | | | |
|---|---|---|---|---|---|
| | $2^{15}$ | Self-supervision voltage measuring | | | (planned)<br>0: Voltage recording o.k.<br>1: Voltage recording defective |
| | $2^{16}$ | Self-supervision field of rotation | | | (planned)<br>0: r.h. field of rotation<br>1: l.h. field of rotation |
| | $2^{17}$ | Device Start | | | 0: Device not yet ready for operation<br>1: Device ready for operation |
| | $2^{18}$ | LED Test | | | 0: LED Test inactive<br>1: LED Test active |
| | $2^{19}$ | Signal relay test | | | 0: Relay test inactive<br>1: Relay test active |
| | $2^{20}$ | Overflow pos. active energy | | | 1: Energy meter overflow |
| | $2^{21}$ | Overflow neg. active energy | | | 1: Energy meter overflow |
| | $2^{22}$ | Overflow pos. reactive energy | | | 1: Energy meter overflow |
| | $2^{23}$ | Overflow neg. reactive energy | | | 1: Energy meter overflow |
| | $2^{24}$ to $2^{31}$ | | | | (not assigned) |
| | | | | | |

| Register | Meaning | | Data format | Unit | Remark |
|---|---|---|---|---|---|
| 0101h R | Protection and control status | | DWORD, bit-coded | | |
| | $2^0$ | General Protective Akarm | | | 0: no alarm<br>1: protection alarm |
| | $2^1$ | General protection trip | | | 0: no trip<br>1: protection trip |
| | $2^2$ | Phase fault forward | | | 0: no phase fault in forward direction<br>1: phase fault in forward direction |
| | $2^3$ | Phase fault backwards | | | 0: no phase fault in backward direction<br>1: phase fault in backward direction |
| | $2^4$ | Earth fault forward | | | 0: no earth fault in forward direction<br>1: earth fault in forward direction |
| | $2^5$ | Earth fault backwards | | | 0: no earth fault in backward direction<br>1: earth fault in backward direction |
| | $2^6$ | SCI-FO Fault | | | only Line differential protection<br>0: No Fibre Optic fault<br>1: Fibre Optic fault |
| | $2^7$ | Protection signal transmission received | | | (planned)<br>0: no rear interlocking received<br>1: rear interlocking received |
| | $2^8$ | Alarm in L1 | | | 0: no protection alarm by Phase L1<br>1: protection by Phase L1 |
| | $2^9$ | Alarm in L2 | | | 0: no protection alarm by Phase L2<br>1: protection alarm by Phase L2 |
| | $2^{10}$ | Alarm in L3 | | | 0: no protection alarm by Phase L3<br>1: protection alarm by Phase L3 |
| | $2^{11}$ | Alarm in N | | | 0: no protection alarm by earth current<br>1: protection alarm by earth current |
| | $2^{12}$ | Alarm in L1 | | | 0: no protection trip by Phase L1<br>1: Trip protection trip by Phase L1 |
| | $2^{13}$ | Alarm in L2 | | | 0: no protection trip by Phase L2<br>1: protection trip by Phase L2 |
| | $2^{14}$ | Trip in L3 | | | 0: no protection trip by Phase L3<br>1: protection trip by Phase L3 |
| | $2^{15}$ | Alarm in N | | | 0: no protection trip by earth current<br>1: Trip protection trip by earth current |
| | $2^{16}$ | Local CBF | | | 0: no local circuit breaker failure<br>1: local circuit breaker failure |
| | $2^{17}$ | Extern. CBF | | | 0: no external circuit breaker failure<br>1: external circuit breaker failure |
| | $2^{18}$ to $2^{22}$ | | | | (not assigned) |
| | $2^{23}$ | Switching device fail | | | 0: no defect on a switching device<br>1: one of the switching elements is defective |
| | $2^{24}$ | Interlocking fail | | | 0: switching command accepted<br>1: switching command could not be carried out, interlocking condition failed |

| | | | | | |
|---|---|---|---|---|---|
| | $2^{25}$ | Emergency-OFF | | | 0: no CB-Off by Emergency-Off<br>1: CB-Off by Emergency-Off |
| | $2^{26}$ to $2^{31}$ | | | | (not assigned) |
| | | | | | |

| Register | Meaning | | Data format | Unit | Remark |
|---|---|---|---|---|---|
| 0102h R | Status of digital inputs and command output for signal relays | | DWORD, bit-coded | | |
| | $2^0$ | Digital input 11 | | | 0: inactive<br>1: active |
| | $2^1$ | Digital input 12 | | | 0: inactive<br>1: active |
| | $2^2$ | Digital input 13 | | | 0: inactive<br>1: active |
| | $2^3$ | Digital input 14 | | | 0: inactive<br>1: active |
| | $2^4$ | Digital input 15 | | | 0: inactive<br>1: active |
| | $2^5$ | Digital input 16 | | | 0: inactive<br>1: active |
| | $2^6$ | Digital input 17 | | | 0: inactive<br>1: active |
| | $2^7$ | Digital input 18 | | | 0: inactive<br>1: active |
| | $2^8$ | Digital input 19 | | | 0: inactive<br>1: active |
| | $2^9$ | Digital input 20 | | | 0: inactive<br>1: active |
| | $2^{10}$ | Digital input 21 | | | 0: inactive<br>1: active |
| | $2^{11}$ | Digital input 22 | | | 0: inactive<br>1: active |
| | $2^{12}$ | Digital input 23 | | | 0: inactive<br>1: active |
| | $2^{13}$ | Digital input 24 | | | 0: inactive<br>1: active |
| | $2^{14}$ | Digital input 25 | | | 0: inactive<br>1: active |
| | $2^{15}$ | Digital input 26 | | | 0: inactive<br>1: active |
| | $2^{16}$ to $2^{23}$ | | | | (not assigned) |
| | $2^{24}$ | Status command output 1 | | | 0: not set<br>1: set |
| | $2^{25}$ | Status command output 2 | | | 0: not set<br>1: set |
| | $2^{26}$ | Status command output 3 | | | 0: not set<br>1: set |
| | $2^{27}$ | Status command output 4 | | | 0: not set<br>1: set |
| | $2^{28}$ | Status command output 5 | | | 0: not set<br>1: set |
| | $2^{29}$ | Status command output 6 | | | 0: not set<br>1: set |

| | | | | | |
|---|---|---|---|---|---|
| | $2^{30}$ | Status com-<br>mand output *7* | | | 0: not set<br>1: set |
| | $2^{31}$ | | | | (not assigned) |

| Register | Meaning | | Data format | Unit | Remark |
|---|---|---|---|---|---|
| 0103h R | Read status bits for release of switching devices | | DWORD, bit-coded | | |
| | $2^0$ | Extern CB 1 OFF | | | 0:<br>1: CB 1 was switched off via digital input |
| | $2^1$-<br>$2^{15}$ | | | | 0:<br>1: (reserved) |
| | $2^{16}$ | Release marker CB 1 | | | 0: CB 1 not released<br>1: CB1 can be switched on via digital input. |
| | $2^{17}$-<br>$2^{31}$ | | | | 0:<br>1: |

| Register | Meaning | | Data format | Unit | Remark |
|---|---|---|---|---|---|
| 0104h R | Over-, short-circuit current steps | | DWORD, bit-coded | | |
| | $2^0$ | Function I> | | | 0: not activated<br>1: ready |
| | $2^1$ | Function I>> | | | 0: not activated<br>1: ready |
| | $2^2$ | Function I>>> | | | 0: not activated<br>1: ready |
| | $2^3$ | Alarm I> | | | 1: Alarm I> - Step |
| | $2^4$ | Alarm I>> | | | 1: Alarm I>> -Step |
| | $2^5$ | Alarm I>>> | | | 1: Alarm I>>> - Step |
| | $2^6$ | Trip I> | | | 1: Trip I> - Step |
| | $2^7$ | Trip I>> | | | 1: Trip I>> -Step |
| | $2^8$ | Trip I>>> | | | 1: Trip I>>> - Step |
| | Earth current steps | | bit-coded | | |
| | $2^9$ | Function IE> | | | 0: not activated<br>1: ready |
| | $2^{10}$ | Function IE>> | | | 0: not activated<br>1: ready |
| | $2^{11}$ | Alarm IE> | | | 1: Earth current Alarm IE> - Step |
| | $2^{12}$ | Alarm IE>> | | | 1: Earth current Alarm IE>> - Step |
| | $2^{13}$ | Trip IE> | | | 1: Earth current Trip IE> - Step |
| | $2^{14}$ | Trip IE>> | | | 1: Earth current Trip IE>> - Step |
| | Load unbalance step | | bit-coded | | |
| | $2^{15}$ | Function I2> | | | 0: not activated<br>1: ready |
| | $2^{16}$ | Function I2>> | | | 0: not activated<br>1: ready |
| | $2^{17}$ | Alarm I2> | | | 1: Alarm load unbalance I2> - Step |
| | $2^{18}$ | Alarm I2>> | | | 1: Alarm load unbalance I2>> - Step |
| | $2^{19}$ | Trip I2> | | | 1: Trip load unbalance I2> - Step |
| | $2^{20}$ | Trip I2>> | | | 1: Trip load unbalance I2>> - Step |
| | Thermal image | | bit-coded | | |
| | $2^{21}$ | Function Tabb> | | | 0: not activated<br>1: ready |
| | $2^{22}$ | Alarm TAbb> | | | 1: Alarm thermal image |
| | $2^{23}$ | Trip TAbb> | | | 1: Trip thermal image |

| | | | | | |
|---|---|---|---|---|---|
| | Trip circuit supervision | | bit-coded | | |
| | $2^{24}$ | Function TCS | | | 0: not activated<br>1: ready |
| | $2^{25}$ | Alarm TCS | | | 1: Trip-coil supervision, defect in the trip circuit |
| | Voltage transformer supervision | | bit-coded | | |
| | $2^{26}$ | Function fuse failure | | | 0: not activated<br>1: ready |
| | $2^{27}$ | Alarm fuse failure | | | 1: Voltage transformer supervision, voltage transformer defective |
| | Line differential protection | | | | |
| | $2^{28}$ | Function Idiff> | | | 0: not activated<br>1: ready |
| | $2^{29}$ | Trip Idiff> | | | Trip Idiff>- |
| | $2^{30}$ | Function Idiff>> | | | 0: not activated<br>1: ready |
| | $2^{31}$ | Trip Idiff>> | | | Trip Idiff>> |

| Register | Meaning | | Data format | Unit | Remark |
|---|---|---|---|---|---|
| 0105h R | Under- and over-voltage steps | | | | |
| | $2^0$ | Function U< | | | 0: not activated<br>1: ready |
| | $2^1$ | Function U<< | | | 0: not activated<br>1: ready |
| | $2^2$ | Function U> | | | 0: not activated<br>1: ready |
| | $2^3$ | Function U>> | | | 0: not activated<br>1: ready |
| | $2^4$ | Alarm U< | | | 1: Alarm undervoltage U< |
| | $2^5$ | Alarm U<< | | | 1: Alarm undervoltage U<< |
| | $2^6$ | Alarm U> | | | 1: Alarm overvoltage U> |
| | $2^7$ | Alarm U>> | | | 1: Alarm overvoltage U>> |
| | $2^8$ | Trip U< | | | 1: Trip undervoltage U< |
| | $2^9$ | Trip U<< | | | 1: Trip undervoltage U<< |
| | $2^{10}$ | Trip U> | | | 1: Trip overvoltage U> |
| | $2^{11}$ | Trip U>> | | | 1: Trip overvoltage U>> |
| | Residual voltage steps | | bit-coded | | |
| | $2^{12}$ | Function UE> | | | 0: not activated<br>1: ready |
| | $2^{13}$ | Function UE>> | | | 0: not activated<br>1: ready |
| | $2^{14}$ | Alarm UE> | | | 1: Alarm residual voltage UE> |
| | $2^{15}$ | Alarm UE>> | | | 1: Alarm residual voltage UE>> |
| | $2^{16}$ | Trip UE> | | | 1: Trip residual voltage UE> |
| | $2^{17}$ | Trip UE>> | | | 1: Trip residual voltage UE>> |
| | Frequency steps | | | | |
| | $2^{18}$ | Function f1 | | | 0: not activated<br>1: ready |
| | $2^{19}$ | Function f2 | | | 0: not activated<br>1: ready |
| | $2^{20}$ | Function f3 | | | 0: not activated<br>1: ready |
| | $2^{21}$ | Function f4 | | | 0: not activated<br>1: ready |
| | $2^{22}$ | U< Freq. Block | | | 1: Frequency blocked by sep. undervoltage recording |
| | $2^{23}$ | Alarm f1 | | | 1: Alarm frequency protection 1 |
| | $2^{24}$ | Alarm f2 | | | 1: Alarm frequency protection 2 |
| | $2^{25}$ | Alarm f3 | | | 1: Alarm frequency protection 3 |
| | $2^{26}$ | Alarm f4 | | | 1: Alarm frequency protection 4 |
| | $2^{27}$ | Trip f1 | | | 1: Trip frequency protection 1 |
| | $2^{28}$ | Trip f2 | | | 1: Trip frequency protection 2 |
| | $2^{29}$ | Trip f3 | | | 1: Trip frequency protection 3 |
| | $2^{30}$ | Trip f4 | | | 1: Trip frequency protection 4 |
| | $2^{31}$ | | | | (not assigned) |

| Register | Meaning | | Data format | Unit | Remark |
|---|---|---|---|---|---|
| 0106h R | Power and reverse power steps | | | | |
| | $2^0$ | Function Pr> | | | 0: not activated<br>1: ready |
| | $2^1$ | Function Pr>> | | | 0: not activated<br>1: ready |
| | $2^2$ | Function P> | | | 0: not activated<br>1: ready |
| | $2^3$ | Function P>> | | | 0: not activated<br>1: ready |
| | $2^4$ | Alarm Pr> | | | 1: Alarm Reverse power protection Pr> |
| | $2^5$ | Alarm Pr>> | | | 1: Alarm Reverse power protection Pr>> |
| | $2^6$ | Alarm P> | | | 1: Alarm Power protection P> |
| | $2^7$ | Alarm P>> | | | 1: Alarm Power protection P>> |
| | $2^8$ | Trip Pr> | | | 1: Trip Reverse power protection Pr> |
| | $2^9$ | Trip Pr>> | | | 1: Trip Reverse power protection Pr>> |
| | $2^{10}$ | Trip P> | | | 1: Trip Power protection P> |
| | $2^{11}$ | Trip P>> | | | 1: Trip Power protection P>> |
| | Automatic reclosing | | bit-coded | | |
| | $2^{12}$ | Function AR | | | 0: not activated<br>1: ready |
| | $2^{13}$ | AR CB ON transmitted | | | 1: CB-ON transmitted by AR |
| | $2^{14}$ | Long-term AR CB ON transmitted | | | 1: CB ON transmitted by long-term AR |
| | $2^{15}$ | AR blocking | | | 1: AR was broken off |
| | $2^{16}$ | AR successful | | | 1: AR was successful |
| | $2^{17}$ | AR not successful | | | 1: AR was not successful |
| | $2^{18}$ to $2^{31}$ | | | | (not assigned) |

Command output for switching device

When this Register is read, 0 is always returned.

| Register | Meaning | | Data format | Unit | Remark |
|---|---|---|---|---|---|
| 0200h W | Switching device control | | DWORD, bit-coded | | |
| | $2^0$-$2^1$ | Control switching device 1 | | | 00b: no action<br>01b: Switching command-Switching device 1 OFF-<br>10b: Switching command-Switching device 1 ON -<br>11b: reserved |
| | $2^2$-$2^3$ | Control switching device 2 | | | 00b: no action<br>01b: Switching command-Switching device 2 OFF<br>10b: Switching command-Switching device 2 ON -<br>11b: reserved |
| | $2^4$-$2^5$ | Control switching device 3 | | | 00b: no action<br>01b: Switching command-Switching device 3 OFF<br>10b: Switching command-Switching device 3 ON<br>11b: reserved |
| | $2^6$-$2^7$ | Control switching device 4 | | | 00b: no action<br>01b: Switching command-Switching device 4 OFF<br>10b: Switching command -Switching device 4 ON<br>11b: reserved |
| | $2^8$-$2^9$ | Control switching device 5 | | | 00b: no action<br>01b: Switching command -Switching device 5 OFF<br>10b: Switching command-Switching device 5 ON<br>11b: reserved |
| | $2^{10}$ to $2^{15}$ | | | | (not assigned) |
| | $2^{16}$ to $2^{31}$ | | | | (not assigned) |
| | | | | | |

| Release of switching devices (only with configured switching commands on digital inputs)<br>When this Register is read, 0 is always returned. | | | | | |
|---|---|---|---|---|---|
| Register | Meaning | | Data format | Unit | Remark |
| 0201h W | Release of switching devices | | DWORD, bit-coded | | |
| | $2^0$ | Release marker CB 1 ON | | | 0: not released<br>1: CB 1 may be switched on by means of digital input |
| | $2^1$-$2^{15}$ | | | | 0:<br>1: (reserved) |
| | $2^{16}$-$2^{31}$ | | | | 0:<br>1: (reserved) |

| Unprotected command output<br>When this Register is read, 0 is always returned. | | | | |
|---|---|---|---|---|
| Register | Meaning | Data format | Unit | |
| 0300h W | Unprotected command output for signal relays | DWORD, bit-coded | | |
| | $2^{0}$ - $2^{1}$ Command output 1 | | | 00b : No reaction<br>01b : Setting the command output 1<br>10b : Resetting the command output 1<br>11b : reserved |
| | $2^{2}$ - $2^{3}$ Command output 2 | | | 00b : No reaction<br>01b : Setting the command output 2<br>10b : Resetting the command output 2<br>11b : reserved |
| | $2^{4}$ - $2^{5}$ Command output 3 | | | 00b : No reaction<br>01b : Setting the command output 3<br>10b : Resetting the command output 3<br>11b : reserved |
| | $2^{6}$ - $2^{7}$ Command output 4 | | | 00b : No reaction<br>01b : Setting the command output 4<br>10b : Resetting the command output 4<br>11b : reserved |
| | $2^{8}$ - $2^{9}$ Command output 5 | | | 00b : No reaction<br>01b : Setting the command output 5<br>10b : Resetting the command output 5<br>11b : reserved |
| | $2^{10}$ - $2^{11}$ Command output 6 | | | 00b : No reaction<br>01b : Setting the command output 6<br>10b : Resetting the command output 6<br>11b : reserved |
| | $2^{12}$ - $2^{13}$ Command output 7 | | | 00b : No reaction<br>01b : Setting the command output 7<br>10b : Resetting the command output 7<br>11b : reserved |
| | $2^{14}$ to $2^{15}$ | | | (not assigned) |
| | $2^{16}$ to $2^{31}$ | | | (not assigned) |

Resetting and acknowledgement commands, parameter set switch-over
When this Register is read, 0 is always returned.

| Register | Meaning | | Data format | Unit | |
|---|---|---|---|---|---|
| 0301h W | Resetting and acknowledgement commands, parameter set switch-over | | DWORD, bit-coded | | |
| | $2^0$ | Acknowledgement | | | 0: No reaction<br>1: Resetting the display/signal relays |
| | $2^1$ | | | | (not assigned) |
| | $2^2$ to $2^5$ | Required parameter set | | | Required active parameter set:<br>0001b = Protection parameter set 1 active,<br>0010b = Protection parameter set 2 active,<br>0011b = Protection parameter set 3 active,<br>0100b = Protection parameter set 4 active, |
| | $2^6$ | | | | (not assigned) |
| | $2^7$ | | | | (not assigned) |
| | $2^8$ | Resetting the total of the short-circuit currents | | | 0: No reaction<br>1: Resetting |
| | $2^9$ | Resetting the AR switching cycles | | | 0: No reaction<br>1: Resetting |
| | $2^{10}$ | Resetting the switching cycles | | | 0: No reaction<br>1: Resetting |
| | $2^{11}$ | Resetting the energy meter | | | 0: No reaction<br>1: Resetting |
| | $2^{12}$ | Resetting the therm. image | | | 0: No reaction<br>1: Resetting |
| | $2^{13}$ | Resetting the operating hours | | | 0: No reaction<br>1: Resetting |
| | $2^{14}$ | | | | (not assigned) |
| | $2^{15}$ | | | | (not assigned) |
| | $2^{16}$ to $2^{31}$ | | | | (not assigned) |

| Transfer new time setting | | | | | |
|---|---|---|---|---|---|
| Register | Meaning | | Data format | Unit | |
| 0302h W | New time | | DWORD | ms | ms of the day from 0.00 (midnight). |

| Transfer new date setting | | | | | |
|---|---|---|---|---|---|
| 0303h W | $2^{1}$-<br>$2^{15}$ | DATE | WORD | DAY | Days from 01.01.1990 |
| | $2^{16}$-<br>$2^{31}$ | | | | reserved |

| Set clock<br>For setting the clock it is necessary to first write the date and time in the Registers 0302h and 0303h. After that this time becomes active in the device by writing the »Set clock« command. | | | | | |
|---|---|---|---|---|---|
| 0304h W | Set clock | | bit-coded | | |
| | $2^{0}$ | | | | 0: no function<br>1: set clock |
| | $2^{-31}$ | | | | reserved |

## Order Form Profibus DP Converter

| ***CSK1-*** | |
|---|---|
| *Profibus DP* converter for coupling to the *CSP* devices | P |
| Wide range power supply | |
| Automatic Baud rate recognition<br>up to 12 MBit/s | |
| Interface<br>RS 485 + CAN-Bus, wire-bonded | |

**This description is temporary. It is subject to continuous further processing (without prior notice). In case of questions please contact:**


**Schaltanlagen-Elektronik-Geräte GmbH & Co. KG**
Geschäftsfeld Elektronikgeräte/Business Segment Electronic Devices
Krefelder Weg 47 · D - 47906 Kempen (Germany)
Postfach 10 07 55 (P.O.Box.) · D - 47884 Kempen (Germany)

**Internet**
Homepage http://www.avkseg.com
Documentation http://w3.avkseg.com

**Vertriebsteam/Sales Department**
Tel.: +49 (0)21 52 1 45 - 1 · Fax.: +49 (0)21 52 1 45 - 3 54
e-mail: electronics@avkseg.com

**Service**
Tel.: +49 (0)21 52 1 45 - 2 37 · Fax.: +49 (0)21 52 1 45 - 4 55
e-mail: application@avkseg.com