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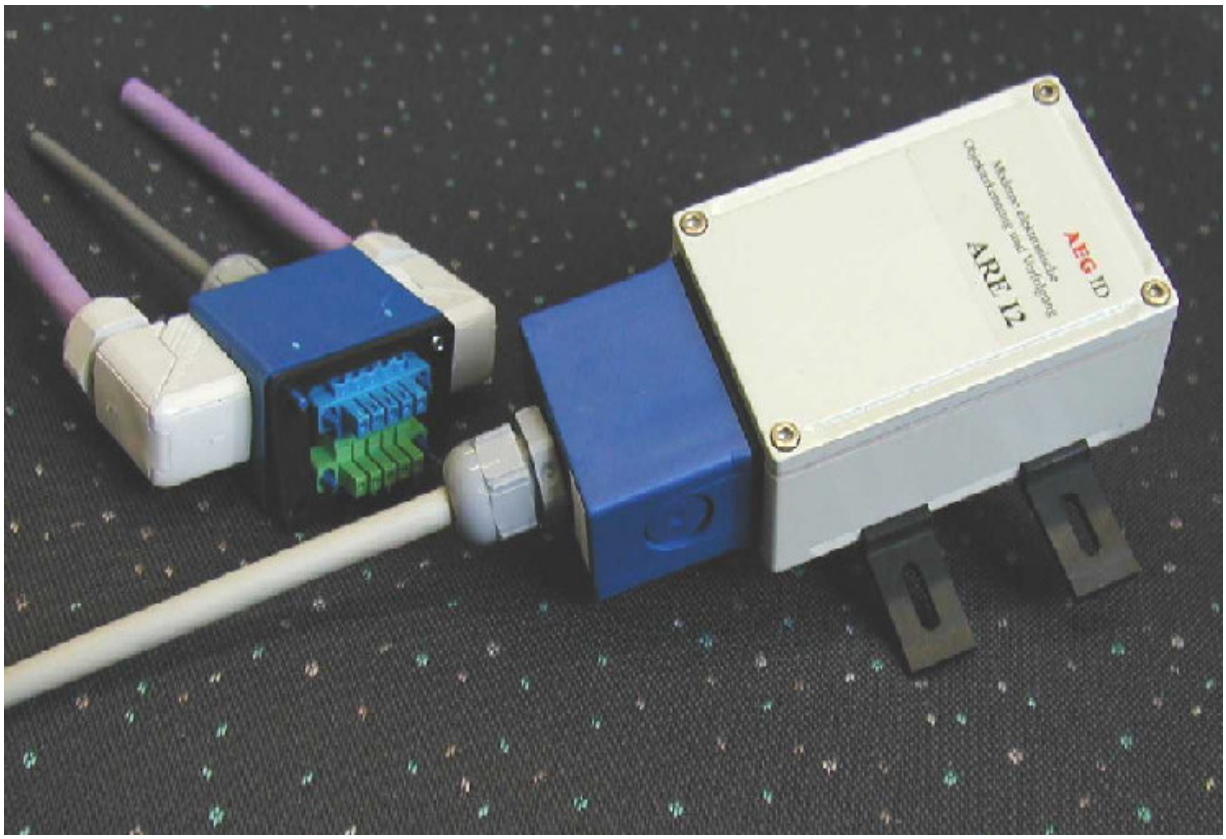
Compact Reader ARE I2

Installation and user manual for systems with the Profibus – DP comms interface



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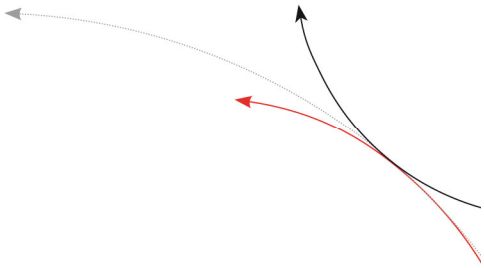
CONTENT



1 Introduction

This document describes the construction and installation of the transponder reader ARE I2 equipped with Profibus DP interface. The ARE I2 features:

- Complete transponder reader with integrated antenna.
- Algorithms for nearly all commercially available 125kHz Transponders
- Integrated, galvanically separated Profibus DP interface with up to 12MBit/s
- Client addresses from 2 to 99 per coms interface
- integrated RS232 Service interface with configurable baud rate to 19200 Bit/s
- Power supply 9 to 30V_{DC} via DC/DC converter
- Low power requirement of maximally 3 Watts
- High read reliability and functional reliability even in industrial environments.
- Compact housing with a range of attachment possibilities
- Readers can be quickly switched out via detachable cable glands, without extensive cable reworking.
- Protection grade IP65
- A selection of external antenna are available.

2. Equipment overview

All electronic components of the ARE I2 are inside a single, compact housing.

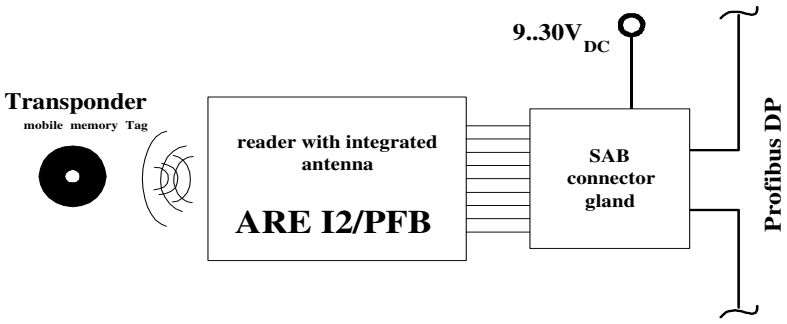


Image 1: Structure of the reader system

External cabling is done in the corresponding connector gland (subsequently called SAB connector gland), which, if done according to the instructions, will yield compliance with protective grade IP65.

The reader effects an electromagnetic field via it's integrated transmission antenna, which is used to excite the transponder. The signal returned by the transponder is detected by the reader. The Profibus server can control the reading process and access the data via the integrated profibus interface.

In addition to the AREI2 with integrated antenna, a version ARE I2 – Xn – is available which does not feature an internal antenna. This model allows attachment of an external antenna.

Due to electromagnetic operational principles, care must be taken so that the integrated antenna is not short circuited over metal structures, and to ensure that ambient EMI in the reader's reception frequency is kept to a minimum. More information is in the section on recommendations for planning purposes.

3 Guidelines for operation

The steps for putting the reader into operation are as follows:

- Configuration of the profibus client settings (node address, termination)\
- Assembly, cabling. See chapter 4
- Put into operation
- In order to become familiar with the reader it is helpful to activate the reader initially only over the service interface and to activate the profibus interface only as a second step.

4 Installation

In order to ensure reliable operation of the reader, the steps described in the following sub chapters most be accomplished carefully and in the correct order by qualified personnel.

4.1 Attachment of the reader housing

The reader can be mounted on any surfacce. It is recommended that the reader be installed in a location where dripping fluids are not present. Also, care should be taken that it is not stepped on or kicked.

Caution!

The antenna is located in the upper portions of the reader – at the interfaces opposite the SAB gland. This area should not touch metal directly as it can significantly reduce the read range.

The reader can be attached using the selection of accompanying attachment screws and rivets. The housing need not be opened in order to effect attachment. In the event the cables are already mounted in the SAB connector gland, the gland should be removed during mounting.

4.2 Earthing the evaluation unit

The evaulation unit is to be installed grounded to earth potential. To that end, the reader must be earthed. For this purpose, the AREI2 has a 6,35mm flat plug on the outside of the housing. Due to EMI reasons, the unit must be earthed on as large a surface as possible (chassis, base plate) using a short, low-impedance cable.

Caution!

In order to avoid performance reduction, the earthing cables of a network should be organised in a star-shaped fashion.

4.3 Effecting cable connections

Cable connections for the AREI2 family are generally effected via SAB connector glands. The attachment of these connector glands to the cables is discussed in detail in the following sub chapters.

The connector glands of the ARE I2/PFB serve the following connectors:

Power supply

Profibus DP

Service interface

Order numbers for availabel SAB connector glands are as follow:

ID 70214	SAB connector gland with 3 preinstalled PG9 cable attachments (standard gland)
ID 70215	SAB connector with 2 preinstalled PG9 cable attachments (gland for attaching a terminal device to a sole profibus cable)
ID 70219	SAB connector without preinstalled PG9 cable attachments - for self-manufacture

4.4 Maximum cable diameter

The SAB gland and feed-through sleeves can securely wedge cables having a diameter from ∅3,5 to ∅8mm, thereby effecting protective grade IP65.

4.5 Attachment of the feed-through sleeve

In the event the SAB gland is not already equipped with pre-attached feedthrough sleeves (Order No. ID 70214), these must be attached as a first step, as follows:

In the SAB gland, break the opening for the cable feedthrough with a screw driver. The cables can be introduced from the side or straight in the center.

Please ensure that the O-ring (3) is well-seated in the feedthrough sleeve (4) .

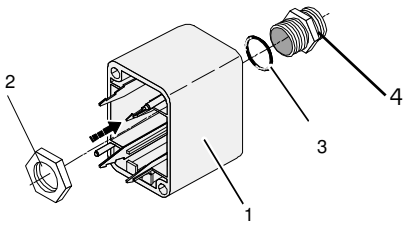


Image 2: Attachment of the feedthrough sleeve.

Place the six-sided nut (2) of the PG screw-on attachment into the indentation on the connector gland. (1).

Tighten the screw attachment by twisting the feedtrhough sleeve with an open-ended adjustable wrench (17mm) all the way.

4.6 Attaching the mains power cable

The mains power cable is to be attached as follows:

Twist the cap (5), tube ring (4) and strain relief (3) off the feedthrough sleeve on the cable gland (1)

Push the cap (5), tube ring (4), strain relief (3) as well as the cable gland with the feedthrough sleeve (1 bis 4) onto the cable.

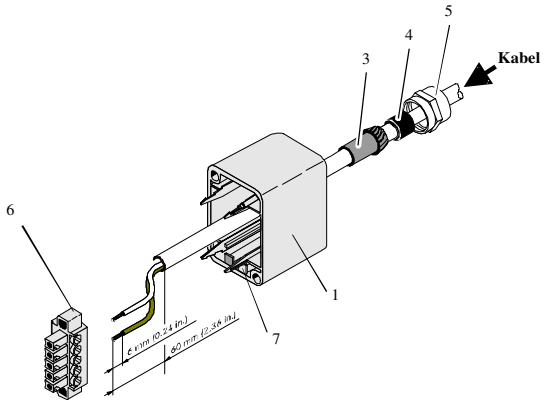


Image 3-: Order of components on the connector gland

Strip the external coat off the cable for a length of 6 cm

Strip 6 [mm] off the cable ends and attach the cable terminators

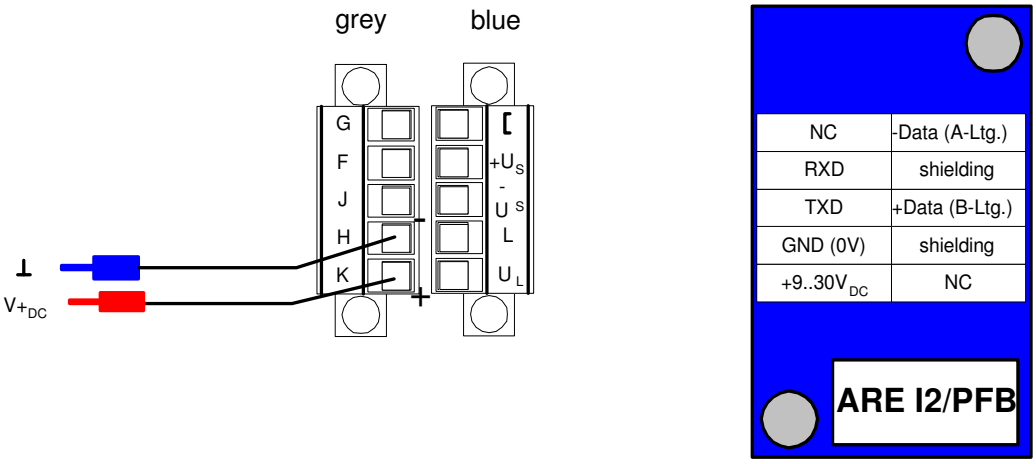
Insert the cable into the feedthrough sleeve in the SAB-connector gland from the outside. Pull it through for a sufficient distance to be able to effect the following steps.

Push the tube ring (4) into the strain relief (3).

Push the strain relief (3) into the feedthrough sleeve.

Effect cabling attachments for the mains power cable to the corresponding MINI-COMBICON plug (compare parts (6)).

Please refer to corresponding image 4 to determine the correct pin connection.



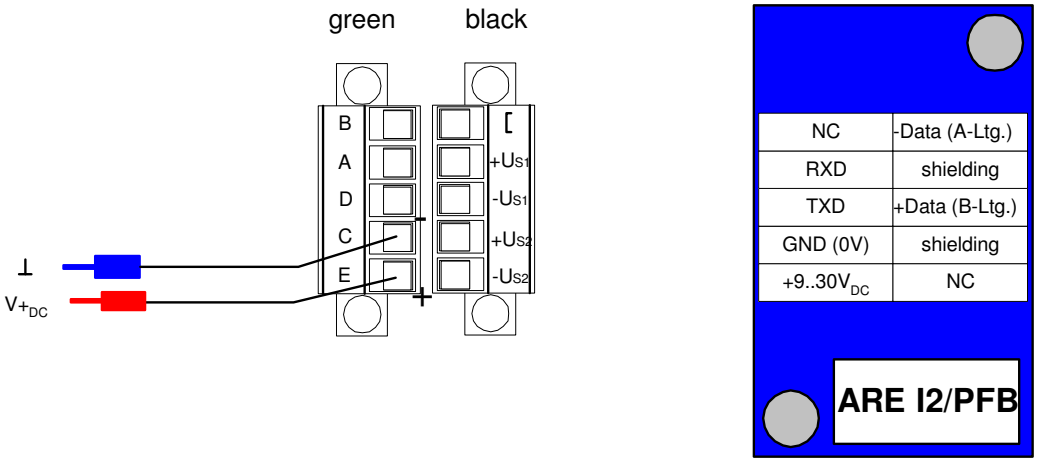


Image 4: Pin-out of the power supply

4.7 Attaching the service or monitor cable

The service or monitor cable is also attached to the SAB connector gland. In lieu of the 2-wire power supply cable, a preferrably 5-wire data cable is to be used. When selecting the type of cable to be used, take care to select an appropriate wire diameter for the given power supply.

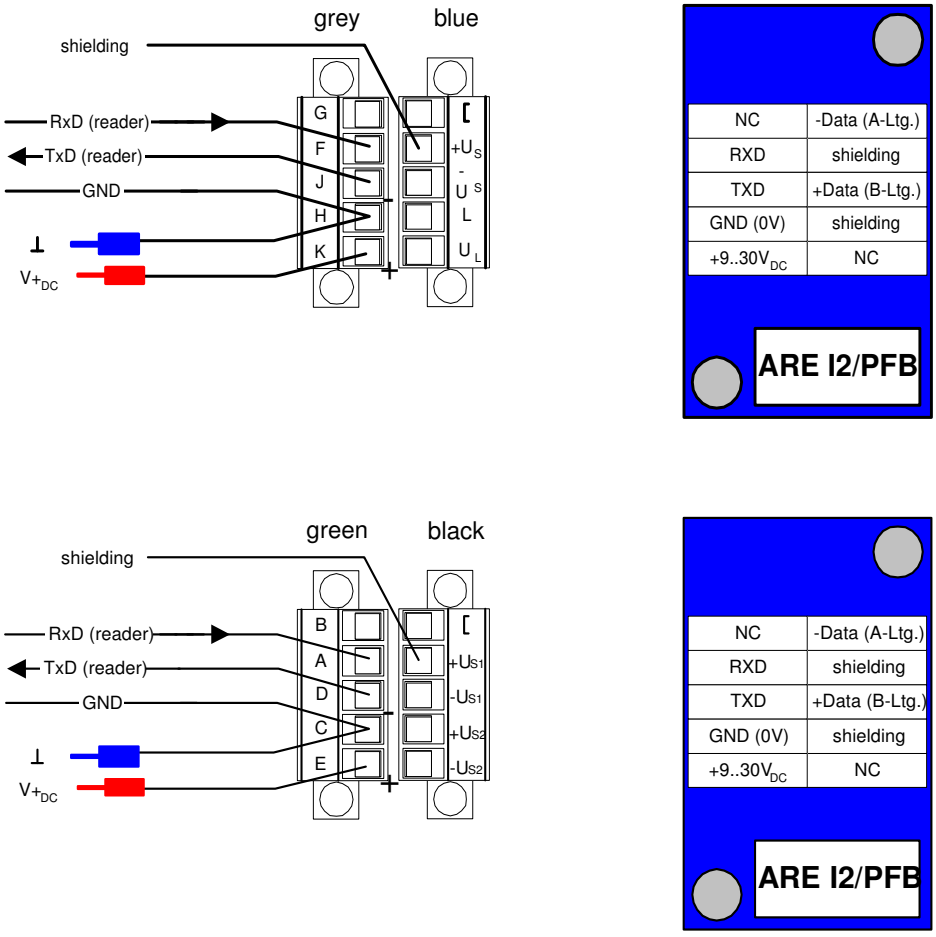


Image 5. Pin-out of the service interface

4.8 Attaching the mains power cable

The bus cable is also connected to the unit via the SAB connector gland. The procedure is as follows:

Push the cap (5), tube ring (4), strain relief (3) as well as the cable gland with the feedthrough sleeve (1 bis 4) onto the cable.

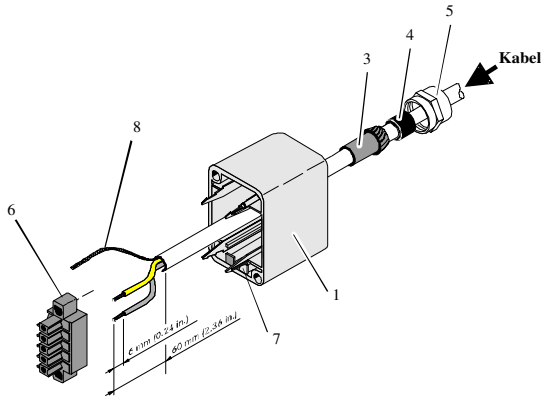


Image 6-: Assembly of the reader Profibus cable

Strip the coating of the cable for a length of 6 [cm].

Remove the schielding mesh off the wires and twist it into a single wire (7).

Twist it into an end sleeve for strands.

Insert the cable from the outside into the feedthrough sleeve in the SAB connector gland. Pull the cable through until you can comfortably complete the next few steps.

Prepare the second profibus cable in the same manner.

Strip both wires on both profibus cables to a length of 6 [mm]

Twist the two red strands of the profibus cables with each other and fit each one with end sleeves for strands.

Twist the two green strands of the profibus cables with each other and fit each one with end sleeves for strands.

Push the tube ring (4) into the strain relief (3)

Push the strain relief (3) into the feedthrough sleeve (2)

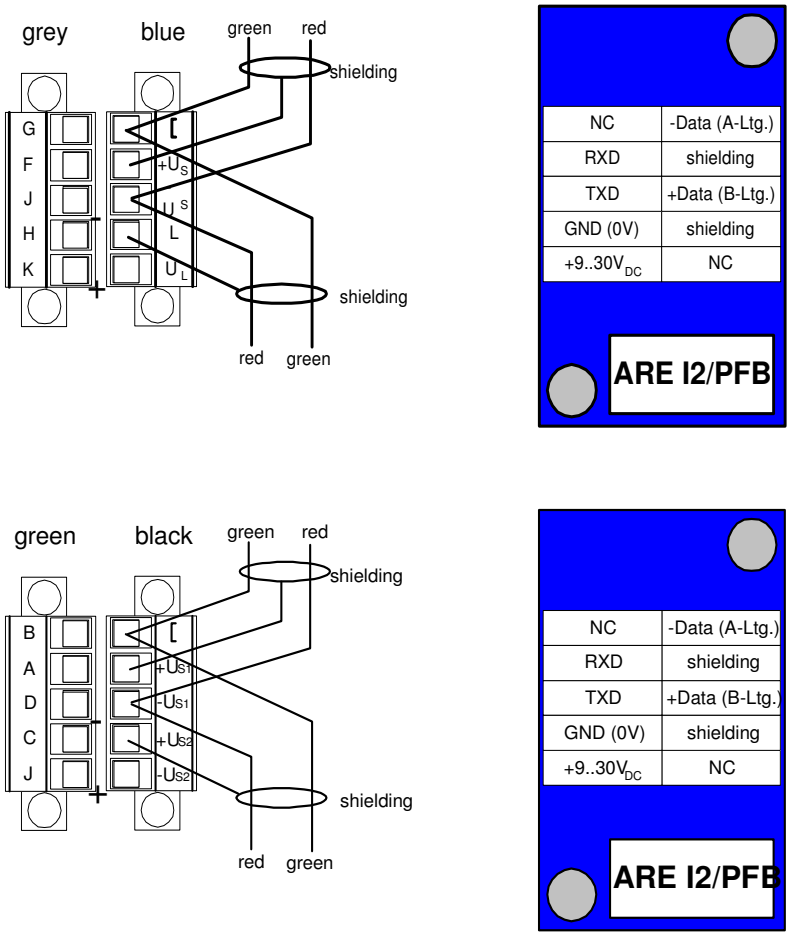


Image 7 Pin-out of the profibus cables

Clamp the profibus cable into the corresponding MINI-COMBICON plugs.

Please note:

When the ARE I2 / PFB unit is the end of the profibus line, the second Profibus connection does not need to be assembled. For this purpose, the special SAB connector gland with the lateral conduit is to be used.

4.9 Final assembly of the cable feed through

Pull all the cables back out, one by one, so that the external cable coat can just barely be seen from inside the connector gland.

Tighten the caps (5) on the feedthrough sleeve using the open-jawed spanner (17mm).

Please pay special care to the tightness of the cable feedthrough, to ensure the unit's compliance with protection grade IP 65.

Lock the wired-up MINI-COMBICON connectors according to their correct colorcoding ((7) in) onto the snap hooks inside the connector gland

4.10 Mounting the housing

The reader can be mounted on the surface of your choice. The distance between the reader and the transponder must be coordinated according to the magnetic coupling characteristics of each. Also keep in mind the optimal orientation of the transponder and the reader.

It is advisable to mount the unit in an area where dripping fluids will not impact it. Furthermore, the unit should be mounted in such a way that it will not be stepped on or kicked.

Caution!

The integrated antenna is in the upper part of the housing, toward the front. This area should not directly touch metal. The effect of the ferrous environment on the antenna can substantially reduce the read range.

The reader can be mounted using the included mounting brackets, on level surfaces. The housing need not be opened. In the event the cables are already mounted in the SAB connector gland, the connector gland should be removed in order to facilitate the mounting procedure.

4.10.1 Attaching the connector gland

Note:

Before beginning work on this step, ensure that the unit is correctly earhed. Otherwise the electronic components may be destroyed by electrostatic discharge once the connector glandd is attached.

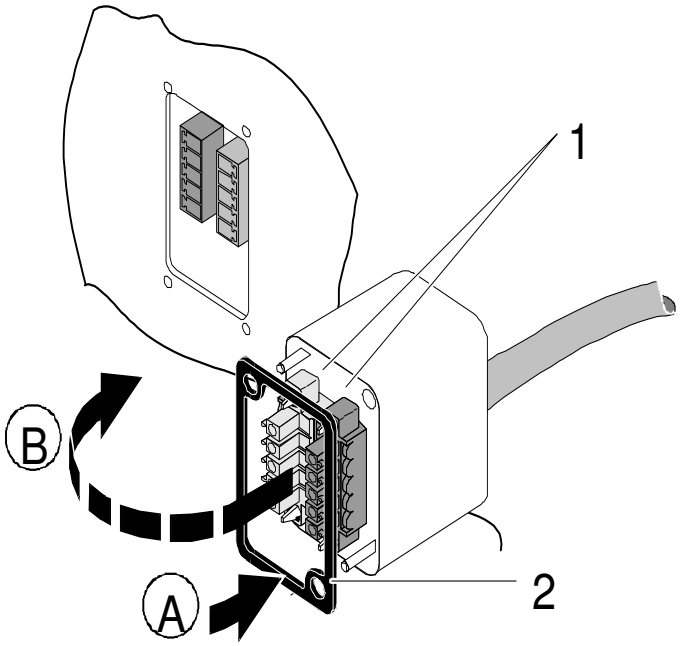


Image 8: Attaching the connector gland

Place seal 2 onto the connector gland (A).

Place the connector gland onto the cutout in the housing (B).

An inadvertent reversal of the battery leads is thereby precluded.

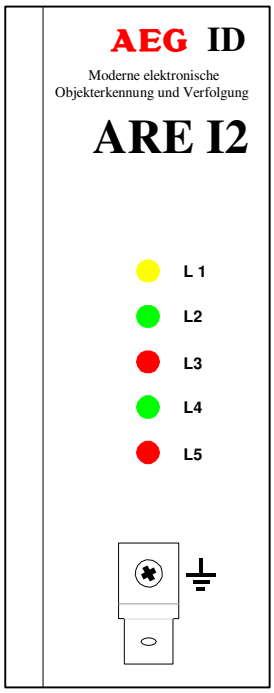
Use the screws provided in order to firmly attach the connector gland.

To meet the protection class of IP 65, it's necessary to apply a turning moment of 0.5 Nm to the screws.

5 Display (LEDs)

In order to provide visual feedback of reader operations, five LEDs are provided on the ARE I2.

In the ARE I2 / PFB their functions are as follows:



L1: blinks when power is being supplied to the unit and the processor functions properly.

L2: lights up when the last reading attempt was successfully concluded.

L3: lights up when the last reading attempt was not successful.

L4: is constantly lit when the Profi bus client is not terminated and is in the data_exchange state (Profibus Run) and blinks when the Profibus client is terminated and is in the data_exchange state (Profibus Run)

L5: lights up when the Profibus client is not in the data_exchange state (Profibus Fail)

L4 u. L5: blinks alternatingly when the termination is activated.

Image 9: LEDs

6 Service or Monitor interface

The following client characteristics of the ARE I2/PFB can be configured via the service or monitor interface:

- selection of the client address
- activation of the Bus termination
- activation of the monitor function.

When the monitor function is acctivated, data traffic between the profi bus server and the reader can be monitored and recorded on a separate monitor or display via the RS 232 interface.

Furthermore the reader can be tested with respect to ist reading characteristics, bypassing the profibus interface in order to become acquainted with it's functionalities and features.

By means of the service interface, the suitability of various potential mounting locations can be checked (metal present in the immediate vicinity, high EMI emissions from drives or monitors).

Reader parameters (ie. TOR time, continuous read mode etc.) entered via the service set-up are not permanently stored if the safety command (VSAVE) is entered.

Caution!

If commands are sent to the reader via the RS232 interface during profibus operation, the profibus operation is automatically interrupted. For pure monitoring, therefore, we recommend use of only the TxD channel.

6.1 Activation of the reader via the service interface

Use service cable ID 70212 in order to access the service interface of the ARE I2 / PBF:

The connector gland of the cable must be mounted onto the reader housing.

The reader requires a 9..30Vdc / 3Watt power supply

Caution: Make sure poles are not reversed:

brown = + 9 .. 30V_{DC}
white = GND

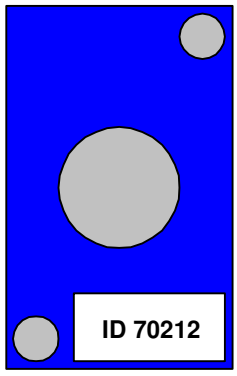


Image 10-: Connector gland for initial activation of the ARE I2 reader

Start power supply. The yellow LED „L1" should be blinking. In ist current Stand-By mode, the reader requires a power supply of about 75 mA at 24 V.

Connect the reader via a 9-pin SUB-D plug to the comm port of a notebook or other PC.

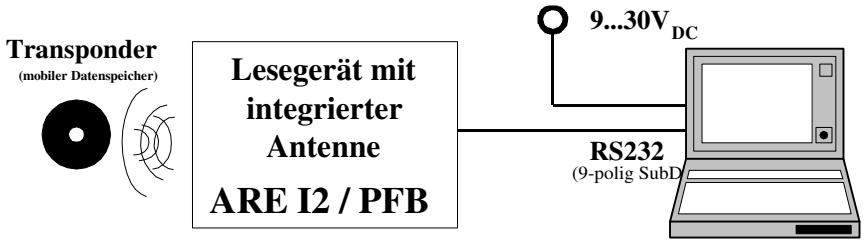


Image 11-: Suggested set up for initial operation of the ARE I2 reader

Launch terminal comms program and set to the following data transfer parameters: Data bits, 1 Start and 1 Stop bit, no parity (this setting is frequently referred to as 8N1), Baud rate 19200 baud, no data flow control (z.B. XOFF/XON.

Transmit command VER <CR> to the reader and reader should reply with the version number of the installed reader firmware (z.B. AEG ID A4 /PFB V1.04E).

6.2 Configuration of profibus client settings.

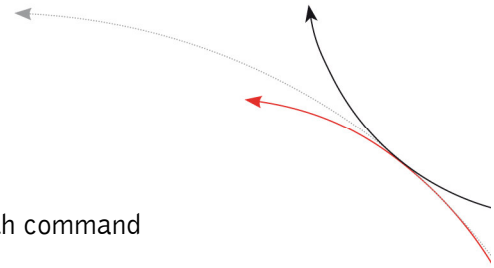
Prior to operation of the ARE I2 / PFB on the Profibus, the client address of the unit on the Profibus must be set. In the event an ARE I2/PFB reader terminates the string, the termination must also be activated.

Suggestion

When termination is activated, the profibus cable must be terminated in the standardized on the ARE I2 to minimize reflections.

Caution:

In order to configure the client address and the termination, power must be supplied to the reader as indicated . The power supply must be isolated from the profibus. The reader is in the correct condition when the yellow LED „L1" blinks amd the red LED „L5" remains lit.



The current client address can be determined by querying the reader with command

ADR<CR>.

The reader will respond with the previously fixed client address, for instance „12", in decimal form. The desired client address, for instance 96 can be programmed into the reader using comand

ADR<SP> 96<CR>.

When the change was successful, the reader will reply with the new client address.

Command **TERM** sets the termination of the reader.

TERM<SP>1<CR>

turns termination on,

TERM<SP>0<CR>

turns termination off.

In order to make the new settings active, the reader must be reset. This can be done by briefly interrupting the power supply to the reader.

6.3 Testing reader functions

Entering command GT<CR> tests the read capability of the reader. On the screen either the NoRead response (z.B. „FFFFFFFFF" or „XXXXXXXXX") appears, or, if a transponder is in range of the antenna, the transponder's ID code. When the NoRead response appears the red LED „L3" , or the green LED „L2" must light up.

All other reader functions described in [1] or [2] can be verified via the service interface.

7 Reader command set/ structure of the commands

Process related commands are available only via the the service interfacce and have no impact on the normal operation of the ARE I2 on the Profibus-DP. The settings with these commands are not saved and are discarded upon execution of a cold start:

- Operating mode – **MD**
- Baudrate RS 232 - **BD**
- Echo function - **EC**
- Suppression of identical ID Codes – **CID**

- Suppression of No Reads – **CN**
- Securing against errors on the reader level - **NID**
- Maximal read time – **TOR**

7.1 General comments

The command set described in Chapter 5 defines the type of data exchange over the serial comms port.

Commands consist of a command code and an optional parameter value. A command is concluded with the carriage return command <CR>. The command serves to signal the end of a command line.

Commands and parameters, in other words letters and numbers are transmitted in ASCII-Code (the value 255 (decimal) is expressed as 32H,35H, 35H; the command RST as 52H, 53H, 54H).

7.1.1 Entering commands

The protocol format is as follows:

Command <SP> **Parameter** <CR>

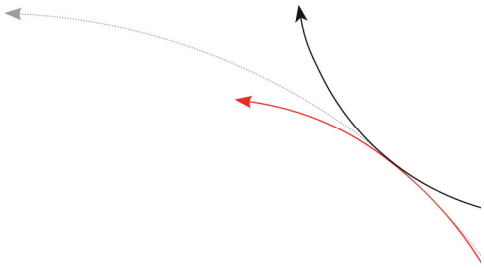
The empty sign <SP> serves as a divider between command and parameter, the <CR> sign serves to signal the end of the command line.

Commands without parameter value (ie. GT or RST) do not include the separation signal <SP> and also do not include a parameter value. The command line is limited to the following in these cases:

Command <CR>.

7.1.2 Factory settings for reader firmware

In general every entry that concludes with <CR> receives a reader response. The following response protocols are featured:



7.1.2.1 Command-specific response

Upon correct entry of a command without a parametner value, the reader responds with the command-specific response. For instance:

Command: **GT** <CR>

Response: Transponder number or NoRead <CR>

Command: **RST** <CR>

Response: in the event of an active echo [announcing a ship!?] otherwise no response.

7.1.2.2 Response when changing parameters

Upon entry of a valid parameter value, the system replies by sending the parameter value and <CR>. Example:

Command: **MD** <SP> **1** <CR>

Response: **1** <CR>

Upon entry of an invalid parameter value, the system responds with the corresponding error message:

Command: **MD** <SP> **4** <CR>

Response: **#02** <CR>

7.1.2.3 Response when querying parameter settings

Parameter settings can be queried by entering the parameter command without a parameter value. Example:

Command: **MD** <CR>

Response: **1** <CR>

7.1.3 Empty command line

When only a <CR> command is entered, the reader response is <CR>. Example:

Command:	<CR>
Response:	<CR>

Please note: when the echo function is active, entering a single <CR> will evoke the response <CR> <CR> (Echo plus Response).

7.1.4 Entry of improper commands – Error messages

When a command or parameter value has been incorrectly entered, the reader will respond with the following error codes:

Improper command:	<NAK> #00 <CR>
Improper value :	<NAK> #02 <CR>
Improper command for this type of reader	<NAK> #04 <CR>
Overflow of the interface buffer	<NAK> #05 <CR>
Antenna error :	<NAK> #10 <CR>
	(only for ASK-Algorithms)

7.1.5 Case sensitivity

The standard operating system is not case sensitive. In other words, no distinction is made between capital and lower-case letters.

7.1.6 Carriage return

A carriage return sign <LF> is never transmitted. By using a terminal software to controll the reader, the carriage return sign must be added from the software itself (Option: replace CR through CR LF if receive datas).

7.2 Parametering commands for hardware related functions

7.2.1 BD- Baudrate

The command BD allows the operator to change the baud rate. The change takes effect after a warm start with RST.

Entry format: **BD** <SP> **Parameter** <CR>

Parameter:

PARAMETER	FUNCTION
0	4800 baud
1	9600 baud
2	19200 baud
3	38400 baud

Response (example): 2 <CR>

7.2.2 EC - Echo function

The command EC serves to change the echo function.

Entry format: **EC** <SP> **Parameter** <CR>

Parameter:

PARAMETER	FUNCTION
0	Echo on
1	Echo off

Response (Example): 0 <CR>

Please note: The default value of the parameter EC depends upon the reader in question.

7.2.3 ADR – Bus address

The command ADR serves to modify the bus address. The change can be effected only via the service interface. The permissible address range is from 2 to 99. The address setting is saved in the EEPROM of the ARE I2 and takes effect upon a cold start of the reader.

Entry format: **ADR** <SP> **Parameter** <CR>

Parameter:

PARAMETER	FUNCTION
'2' - '99'	Fixes profibus-DP Adress of the ARE I2

Response (example): '16' <CR>

7.2.4 TERM – Bus termination

With this command, the ARE I2 can be terminated as the end unit in the Profibus-DP bus or it can be queried as to ist termination status. The termination setting is stored int he EEPROM of the AREI2 immediatley upon execution and becomes effective after a cold start of the reader.

Entryformat: **TERM** <SP> **Parameter** <CR>

PARAMETER	FUNCTION
'1'	Termination active
'0'	Termination inactive

Response (Example): '1' <CR>

7.3 Parameter commands for readings

7.3.1 CID – Suppression of identical ID codes

Given the setting of CID=1 only the first of several identical ID numbers is transmitted via the serial interfacce. Successive identicial transponder Id numbers are suppressed until a new, valid transponder ID number is received. No Reads do not affect the data filter.

Entry format: **CID** <SP> **Parameter** <CR>

Parameter:

PARAMETER	FUNCTION
0	no Filter function
1	Suppression of multiple read IDs

Response (Example): 0 <CR>

Note:

In the operating mode MD 2 suppression of identical ID Codes is impermissible.

Example: A, B, C represent various valid transponder ID numbers, N represents NoRead:

SEQUENCE OFREAD CYCLEST	RESPONSE SERIES UPON Filtering with CN=0 and CID=1	RESPONSE SERIES UPON Filtering with CN=1 and CID=1
N, N, ……,N, A, A, A, ….A, N,N, ……	N, N, ……,N, A, N, N, …….	A
N. N, N, A, A, A, N, A, A, B, A, C, C, C, .	N. N, N, A, N, B, A, C, …..	A, B, A, C

Tabel -: Example demonstrating the effect of the filter function CID

Effect: Effect takes place immediately upon entry of correct command.

Note: Under the following circumstances the internal comparison number is erased, guaranteeing that the transponder code read immediately thereafter is transmitted:

- Upon a cold start
- Upon entry of RST <CR>
- Upon entry of the command line CID <SP> 1 <CR>

7.3.2 CN – Suppression of No Reads

By setting CN=1 all NoRead responses are suppressed via the serial comms interface.

Entry format: **CN** <SP> **Parameter** <CR>

Parameter:

PARAMETER	FUNCTION
0	NoReads are transmitted via serial interface
1	All NoReads suppressed on serial interface

Response (Example): 0 <CR>

Response: In the operational mode MD 2 suppression of NoReads is not permissible. Iss it activated anyway, a <CR> is transmitted via the interface when in the MD 2-operational mode.

7.3.3 NID- Error securing on the reader level

NID specifies the number of identical transponder numbers which must be detected in order to yield the result „reading cycle successfully completed." In the setting NID = 1 two successive readings must yield the same result

Entry format: **NID** <SP> **Parameter** <CR>

Parameter:

PARAMETER	FUNCTION
0	1 of 1 (no effect)
1	Two out of two

Response (Example): 1 <CR>

SEQUENCE OF READINGSs	LENGTH OF READING CYCLE	RESULT OF READING CYCLE
NoRead	1 Read	NoRead
0000125ED1, 0000125ED1	2 Reads	0000125ED1
0000125ED1, 000012**6**ED1	2 Reads	NoRead

Table -: Examples of reading cycles in the setting NID=1

7.3.4 TOR – maximum read duration

Time Out time constant for the reader. The time constant in operational mode 2 is the maximal goal time for a reading duration. It is reflected in the relationship TOR * TB.

The Time constant TB (TimeBase) always has the default value 100 ms.

Entry format: **TOR** <SP> **Parameter** <CR>

Parameter:

PARAMETER	FUNCTION
0	Limitation of the reading duration to exactly one reading cycle
1	Limitation of the reading duration to approx..1 time TB
2	Limitation of the reading duration to approx..2 times TB
...	
255	Limitation of the reading duration to approx..255 timesTB

Response (example): 2 <CR>

7.4 Parameter commands for memory management

7.4.1 VER – Factory settings of the reader firmware

The command VER indicates the software version of the firmware. It is firmly embedded in the programming code of the firmware.

Entry format: **VER** <CR>

Response: zzzzzzzzz <CR>; ASCII-Code, z.B. V_2.08 <CR>

Note: The same response is always made upon each system start, when the echo function is active.

7.4.2 VS – Equipment settings

The command VS lists all current parameter settings

Entry format: **VS** <CR>

Response (example): EC <SP> 0 <CR>

BD <SP> 2 <CR>

MD <SP> 2 <CR>.....

7.4.3 VSAVE – Permanently saving reader settings

All temporarily saved operational parameters are permanently stored with VSAVE and become the initial settings upon a cold start. The command is executable only via the Profibus interface.

Entry format: **VSAVE** <CR>

Response: ok <CR>

7.4.4 RST- Warm start of the reader

The command RST executes a warm start.

Entry format: **RST** <CR>

Response: Version number <CR> if EC=1, otherwise only <CR>

Process:

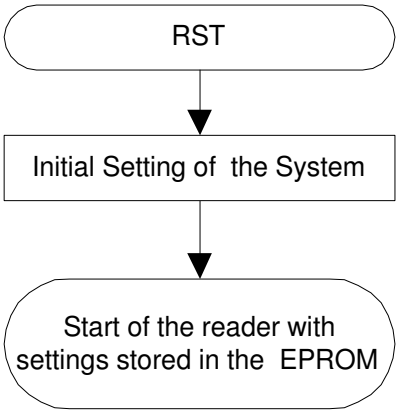


Diagram 12-: Process flowchart RST

system initialising

System launch with parameters from the EPROM.

7.4.5 INIT- Resetting to the default parameters

The INIT command executes a warm start with the default parameters.

Entry format: INIT <CR>

Response: Version number <CR> if EC=1, otherwise only <CR>

8 Reader operation

8.1 Reader operational modes

There are two basic operational modes:

- Operational mode 0 – continuous operation (MD 0)
- Operational mode 2 – operation triggered via the interface (MD 2)

The factory setting is MD 2.

The following subchapters defines the exact operational characteristics of the different operational modes.

During Profibus operation, only operational mode 2 is permissible.

8.2 MD 2 –- operation triggered via the interface.

The server transmits, via the interface, a command to execute a read or write procedure. Upon execution, the result or an error message, as applicable, are transmitted back to the erver.

In conjunction with Read/Write transponders with the read command „Get Tag" („GT <CR>") only the serial number of the transponder is read.
The read-write transponder specific commands „Selective read (RD) " and „Write (WD)" can only be applied in operational mode 2.

In operational mode 2 the exciter is always on. Triggered by the commands GT, RD or WD the exciter is activated. When a transponder number is detected, the exciter is automatically shut off.

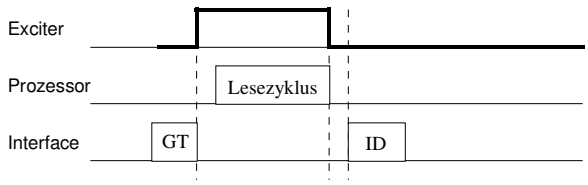


Image 13- Software triggered reader operation

When the first read cycle yields no result (NoRead), the duration of the exciter's activation is controlled by means of the TOR parameter. Read cycles are begun until a transponder is successfully detected or the TOR time frame has expired. An in-progress read cycle is not interrupted, however. If the readprocess was unsuccessful, in other words, if no transponder was read until the time period TOR has elapsed, a NoRead is transmitted.

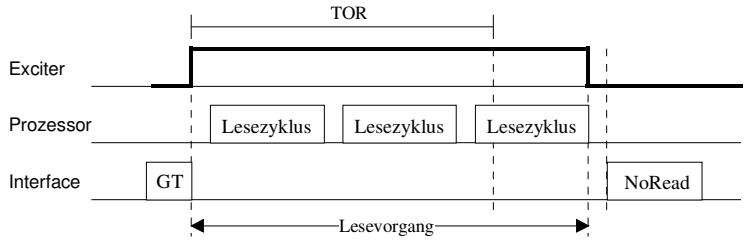


Image 14-: Software triggered reader operation with TOR>0

Note: Within the time period TOR when operational mode 2 is active there isn't any NoRead response!

8.2.1 Important reader settings

These are the default settings upon delivery of the reader from the factory. It can be optimized by transmission of the following command, to meet the requirements of the application:

- **MD 2** readings triggered via comms interface

Important reader parameters:

CID 0 no suppression of multiple data transmissions.

CN 0 no suppression of error messages

TOR XYZ max. activation time of the antenna (max. read time; x 0.1 s). The time after which a no-read message is sent via the comms interface. No effect on the use read/write transponders on the Selective Read and the Write process.

TOR 5 – default value

NID X additional data security by means of comparison of sequentially read transponder codes, or, in the case of read-write transponders, of the serial code. No impact on the use of read-write transponders' selective read and write processes.

NID 1 – 2 of 2 selection
NID 0 – 1 of 1 selection (no data securing on the reader level.)

8.3 MD 0 –- continuous reader operation

This mode of operation is only possible with the RS 232 service interface.

The reader attempts to continuously excite a transponder and read ist code. No external read command via the comms interface is required.

This mode of operation can only be used without restriction with Read-only transponders.

If read-write transponders are to be used, this operational mode is not recommended, in which case as a rule only the serial number is read.

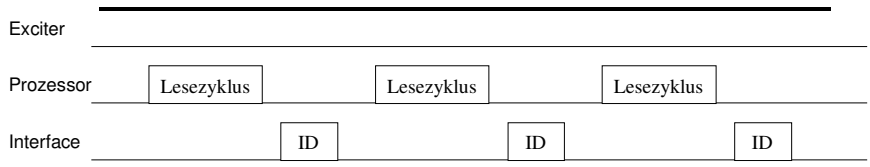


Image 15 Continuous read

8.3.1 Important reader settings

This mode of operation can be set up using the following command:

MD 0 – continuous read

Important reader parameters

CID X - Controlling output of repeat data (multiple reads of the same ID code)
CID 0 no suppression of repeat data (multiple readers)
CID 1 each transponder ID code is transmitted only once

CN X - Controlling error messages
CN 0 no suppression of error messages.
CN 1 suppression of error codes

NID X additional data security by means of comparison of sequential reads of transponder ID codes or of the serial number for read-write transpodners.
NID 0 - 1 of 1 selection
NID 1 2 of 2 selection

9 Put into operation as an Profibus-Slave

As soon as the reader is configured to the desired client adddress and the required mode of termination is set, the reader can be connected to the profibus DP. Upon successful start-up, the client enters the data_exchange state: this is indicated by the green LED „L4" which will alight in the data_exchange state. For terminated final devices, the green LED „L4" blinks in the data_exchange state.

Caution

Not more than 32 devices may be on a single string. Within a string only the two end units may be terminated.

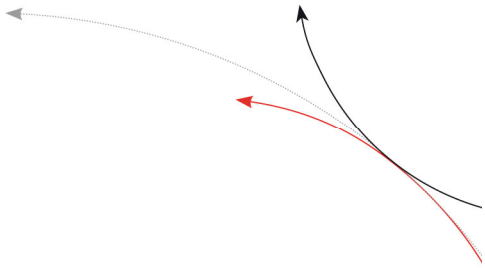
The red LED „L5" must be off in the data_exchange state. If it is lit, it indicates the presence of a failure or error.

With respect to communication between the reader and SPS via the Profibus DP, please see the separate manual [2] : Profibus DP Communication for ARE I2/PFB.

Key words: data_exchange_request, data_exchange_response, user data bytes, Telegram control, Data Hand\ Shake, Status bit for received data, Functional building blocks, S5, S7, Beckhoff TwinCAD

10 Reading process in operational mode 2

The server transmits a command via the interface to effect execution fo a read or write process. Upon execution, the response, or as the case may be, an error code, is trnasmitted to the server in response.
In conjunction with read-write tags teh command „Get Tag" („GT <CR>") elicits only the reading of the serial number.
The read-write transponder specific commands „selective read (RD) " and „write(WD)" can only be applied in operational mode 2.



10.1 Read Only-Transponders

- Trigger the reader with the command GT (plus <CR>)
- Await reply (max. time set by TOR time)
- Evaluate response: 8 or 10 characters plus <CR>

The reading process can be assesed via the LEDs as follows:

- LED L2 alights when the most recent read attempt was successful.
- LED L3 alights when the most recent read attempt was unsuccessful.

10.2 Read-write Transponder

10.2.1 Standard Reading / Reading of the serial number GT

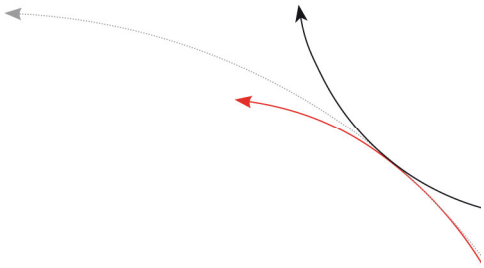
- Trigger the reader with the command GT (plus <CR>)
- Await reply (max. time set by TOR time)
- Evaluate response: 8 or 10 characters plus <CR>

The reading process can be assesed via the LEDs as follows:

- LED L2 alights when the most recent read attempt was successful.
- LED L3 alights when the most recent read attempt was unsuccessful.

10.2.2 Selective reading RD

- Trigger the reader using the command RD plus data content (plus <CR>). The address of a single block or of the area to be read 9numbers in the first and last blocks) may be indicated. Using this command the entire memory can be read.
- Await reply
- Evaluate reply: 8 characters plus <CR>. Characters ranging from 0 to F.
  In the event the transmitted data cannot be evaluated or the CRC-check yields an error, No Read is sent as a response. („XXXXXXXX“)



The reading process can be assesed via the LEDs as follows:

- LED L2 alights when the most recent read attempt was successful.
- LED L3 alights when the most recent read attempt was unsuccessful.

Example	**RD <SP> 20 <CR>**	Read Block 20
	RD <SP> 16 <SP> 33 <CR>	Read blocks 16 through 33

Permissible values (Addresses in transponder memory):

ALGO 9 (1 kBit; P4150)	**3 .... 33**
ALGO 6 (2 kBit; Hitag 1)	**16 ... 63**

10.2.3 Writing WD

The transponder's memory is divided into blocks of 32 bits each, which can only be written to individually.

- Trigger the reader with the command **WD** plus data content (plus <CR>). Der Data ccontent consists of, on the one hand, the address of the data block and the write information consisting of 8 8 ASCII characters. Between the address and the write content to be transmitted, a <CR> sign must be set.
- Await reply
- Evaluate reply: 3 characters plus <CR>.
  <ACK> <CR> Block contents in the transponder IC has been successfully altered.
  <NAK> <CR> Block contents in the Transponder-IC unaltered

<NOT> <CR> Transponder reply not understood

Attention! The Profibus firmware from version PFB 1.29 on supports a short from of the write command. This is used to transmit the entire command during one SPS-cycle to the reader.

W 20 <SP> < 0 1 2 7 A C D F > <CR> write to block 20 *)

*) short format

The writing process can be assessed via the LEDs as follows:

- LED L2 alights when the most recent write attempt was successful.
- LED L3 alights when the most recent write attempt was unsuccessful.

Example WD <SP> 20 <SP> < 0 1 2 7 A C D F > <CR> Write Block 20

Permissible values (Addresses in transponder memory):

ALGO 9 (1 kBit; P4150)	**3 .... 31**
ALGO 6 (2 kBit; Hitag 1)	**16 ... 63**

11 Reading process in operational mode 0 – Continuous read

11.1 Read Only Transponder

The reader continuously attempts to excite a transponder and read ist code. No external read command via the data interface is required.

The reading process can be gauged according to the LED display as follows:

- LED L2 lights up when a readable ID tag is within range.
- LED L3 lights up when no ID tag is being read.

11.2 Read / Write Transponder

The reader continuously attempts to excite a transponder and the ID number of R/W transponders only is read.

The reading process can be gauged according to the LED display as follows:

- LED L2 lights up when a readable ID tag is within range.
- LED L3 lights up when no ID tag is being read.

12 Recommendations for planning purposes

12.1 General Instructions

In order to achieve optimal functionality of the reader, please make sure that assemly is done according to the assembly instructions. Furthmore the assembly location and the orientation of the transponders are of great significance. Make sure that the selected antenna type (air coil or ferrite) corresponds to the desired transponder type and orientation.

Metal structures in the field may alter the geometry and size of the antenna field. IF the achievable read range of the AREI2 is exceptionally small when the antenna is turned on, possibly a large percentage of the energy may be absorbed by eddy currents in the metal structures which are in the antenna's proximity. Corrective measures:

Remove metal parts from the area, select a different mounting area, attempt to interrupt eddy currents by placing slits or effecting other isolation measures in the metal parts.

EMI (electromagnetic interference) in the operational frequency of the reader can drastically reduce the achievable read range. Sources of interference may include certain current converters, mobile telephones, computer monitors etc. Recommended countermeasures are:

When possible, relocation of the reader to a different area, until a reduction of the interference is observed. Earthing of metal structures located in the vicinity.

Identify the source of interference. Replace it with a non-interfering product or neutralize it by means of energy compensating throttles etc. and good earthing. Reroute, shield, or earth cables that are causing EMI. Note that cables conducting high frequency fields through the set-up area, the backflow is in the shielding and not in the mass.

In the event the above measures cannot be executed in cases of high levels of EMI, one must expect a reduction in the read range and/or read reliability.

The ARE I2 reader can be internally configured using various parameters. The present configuration can be verified by means of a command. The default parameters set by the manufacturer should be altered only by experienced individuals. Detailed instructions are in the command summary.

12.2 Special Instructions for Using a Read / Write System

To transfer the data to the transponder or to control the selective read process, all standard transponder types uses a 100%-pulse-gap-modulation technique.

The modulation of the magnetic field coming from the transponder and the write pattern done by the base station, shows a lot of similarities. Therefore, read write systems may interfere each other.

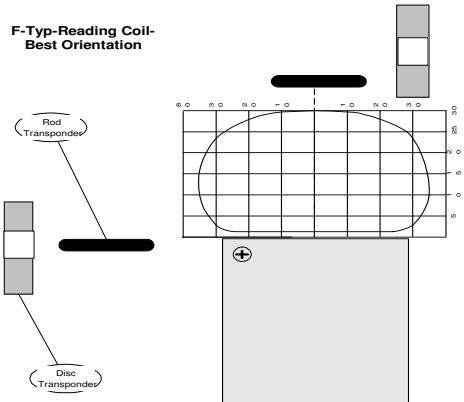
Because of the antenna cable transfers the energy for the antenna field it radiates also the gap modulation. Therefore they should keep also a minimum distance, and shouldn't lay parallel.

The minimum distance between two antennas mounted next to each other and the size of the interference must be determined for each application itself.

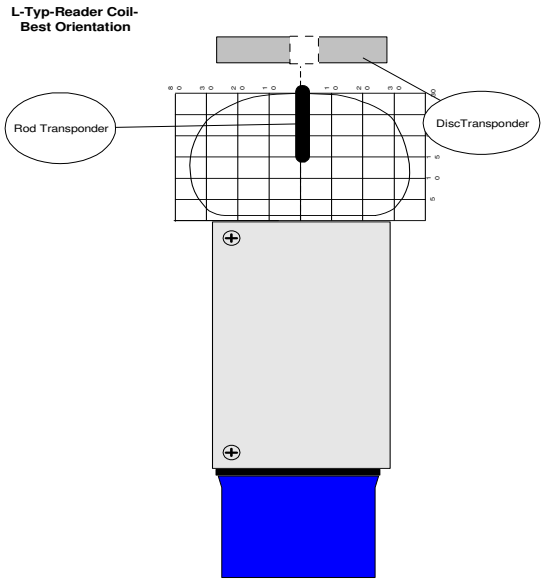
Below there are listed several parameters that will influence the size of the interaction:

- size of the antennas
- orientation of the antennas (f.e. parallel or rectangular to each other)
- size of transponder; distance between transponder and antenna
- the chronological orders for reading or writing.

13 Best orientation between Reader and Transponder



Compact Reader ARE I2
Internal Antenna F-Typ



Bauteilname
Compact Reader ARE I2
Internal Antenna L-Typ

Image 16 Relative orientation of the transponder and the reader

14 Appendix

14.1 Listing of Control Codes

CONTROL CODE	HEXCODE	FUNCTION	DESCRIPTION
SP	20H	Space	Separator between command and parameter
CR	0DH	Carriage Return	End of command line
NAK	15H	Negative Acknowledge	Error message
#	23H		Error code

Tabelle 14-1: Listing of used control codes

14.2 Listing of error codes

ERROR CODE	FUNCTION
#00	Unknown command, wrong command code
#02	Undefined org wrong parameter value
#03	EEPROM Error
#04	Function not supported
#05	Overflow in receive buffer
#09	No code read
#20	No Communication with Decoder

Tabelle 14-2: Listing of defined error codes

15 Contact addresses

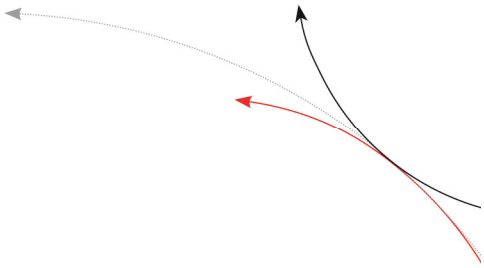
We are continuously upgrading our products and documentation. If you have questions, feedback, or would like to report errors or any other comments or ammendments, please contact us at:

Tel: ++49 (0)731-140088-0

Fax: ++49 (0)731-140088-9000

e-mail:sales@aegid.de

http:\ www.aegid.de



16 Documenatation changes

01.01.00	Edition 00:	First edition
15.10.01	Edition 01:	Expansion to include read-write transponders. Documentation of SAB-connector glands
14.06.02	Edition 02:	Addition of the command set
14.01.03	Edition 03:	Addition of the Error Codes. New translation.
09.09.03	Edition 04:	Addition of Chapter 12.2
09.12.04	Edition 05:	Turning moment of the screws (Chapter 4.10.1)
09.02.06	Edition 06:	page 39 short form write command
16.11.06	Edition 07	Chapter 14 (Appendix) added
26.09.07	Edition 08	Chapter 12.2 note for antenna cables added