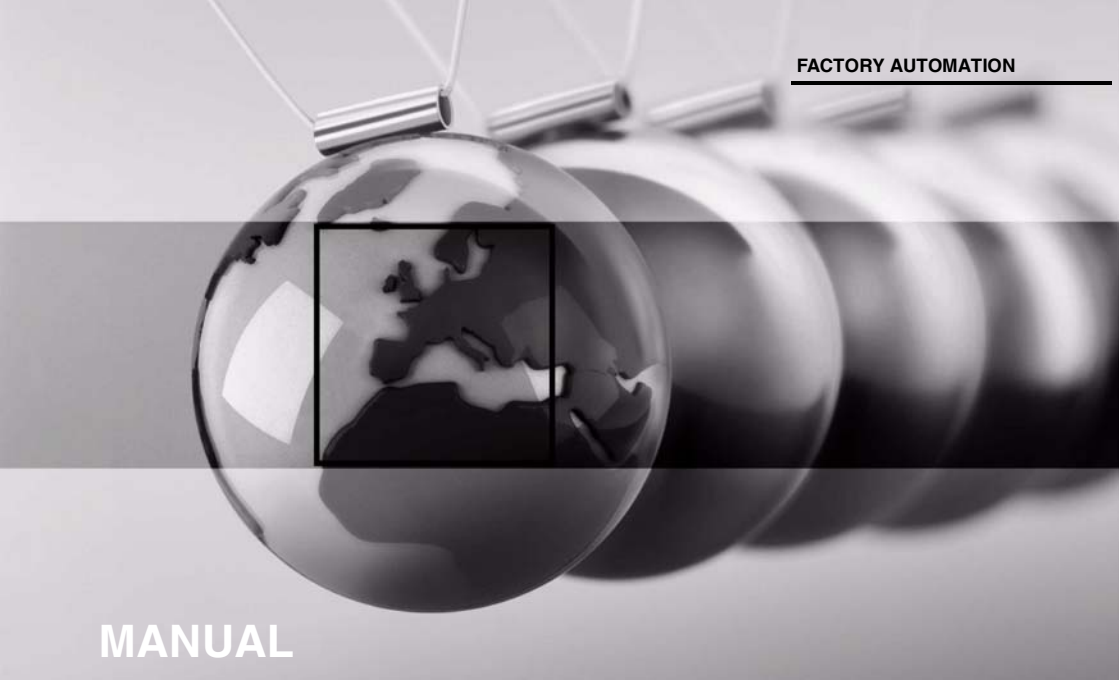


MANUAL

IUH-F117-V1-EU
IUH-F117-V1-US
IUH-F117-V1-CN

Read / Write Head for IDENT*Control*

IDENTControl

PEPPERL+FUCHS
SENSING YOUR NEEDS

With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

2013-04

2013-04

1 Introduction

Congratulations

You have chosen a device manufactured by Pepperl+Fuchs. Pepperl+Fuchs develops, produces and distributes electronic sensors and interface modules for the market of automation technology on a worldwide scale.

Before you install this device and put it into operation, please read the operating instructions thoroughly. The instructions and notes contained in this operating manual will guide you step-by-step through the installation and commissioning procedures to ensure trouble-free use of this product. By doing so, you:

- guarantee safe operation of the device
- can utilize the entire range of device functions
- avoid faulty operation and the associated errors
- reduce costs from downtimes and incidental repairs
- increase the effectiveness and operating efficiency of your plant.

Store this operating manual somewhere safe in order to have it available for future work on the device.

After opening the packaging, please ensure that the device is intact and that the package is complete.

Symbols used

The following symbols are used in this manual:

Note!

This symbol draws your attention to important information.

Handling instructions

You will find handling instructions beside this symbol

Contact

If you have any questions about the device, its functions, or accessories, please contact us at:

Pepperl+Fuchs GmbH
Lilienthalstraße 200
68307 Mannheim
Telephone: +49 621 776-4411
Fax: +49 621 776-274411
E-Mail: fa-info@pepperl-fuchs.com

2013-04

2 Declaration of Conformity

All products were developed and manufactured under observance of the applicable European standards and guidelines.

Note!

A Declaration of Conformity can be requested from the manufacturer.

The product manufacturer, Pepperl+Fuchs GmbH, 68307 Mannheim, has a certified quality assurance system that conforms to ISO 9001.

ISO**9001**

FCC ID: IREIUH-F117-V1
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Notice:
Changes or modifications made to this equipment not expressly approved by Pepperl+Fuchs GmbH may void the FCC authorization to operate this equipment.

Note:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2013-04

3 Safety

3.1 Symbols relevant to safety

Danger!
This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.

Warning!
This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.

Caution!
This symbol indicates a possible fault.

Non-observance could interrupt devices and any connected facilities or systems, or result in their complete failure.

3.2 Intended Use

The IUH-F117-V1-* is a read/write head for passive code and read/write tags.

Always operate the device as described in these instructions to ensure that the device and connected systems function correctly. The protection of operating personnel and plant is only guaranteed if the device is operated in accordance with its intended use.

Read through these instructions thoroughly. Familiarize yourself with the device before installing, mounting, or operating.

Pepperl+Fuchs GmbH provides no guarantee that the information contained in this document does not contain third-party industrial property rights. Pepperl+Fuchs GmbH does not issue any licenses to its own or third-party patents or other industrial property rights in this document.

Note!

The installation recommendations made in this document are based on favorable conditions. Pepperl+Fuchs GmbH provides no guarantee of correct function in environments belonging to other systems.

Warning!
Minimum distance

If this device is installed in areas that fall under the **US Code of Federal Regulations Part 15** , a minimum distance of 25 cm must be maintained between the antenna and personnel.

Warning!

Malfunctions with Pacemakers

This device does **not** exceed the permissible limits for electromagnetic fields. Maintain a minimum distance of 25 cm between the device and your pacemaker.

Inadequate distance from the read/write head can result in inhibitions, reprogramming, or incorrect stimulation pulses.

3.3 General notes on safety

Only instructed specialist staff may operate the device in accordance with the operating manual.

User modification and or repair are dangerous and will void the warranty and exclude the manufacturer from any liability. If serious faults occur, stop using the device. Secure the device against inadvertent operation. In the event of repairs, return the device to your local Pepperl+Fuchs representative or sales office.

The connection of the device and maintenance work when live may only be carried out by a qualified electrical specialist.

The operating company bears responsibility for observing locally applicable safety regulations.

Store the not used device in the original packaging. This offers the device optimal protection against impact and moisture.

Ensure that the ambient conditions comply with regulations.

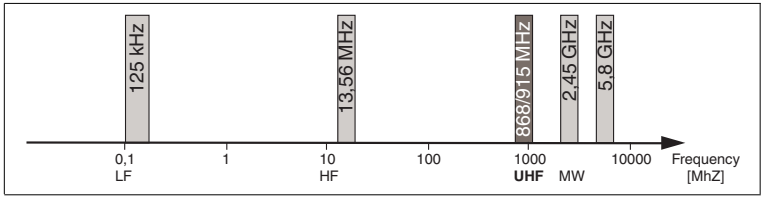
Note!

Disposal

Electronic waste is hazardous waste. When disposing of the equipment, observe the current statutory requirements in the respective country of use, as well as local regulations.

4 Product Description

4.1 RFID Frequency Bands



- 100–135 kHz: Low frequency LF
- 13.56 MHz: High frequency HF
- 865–868 MHz (Europe),
  902–928 MHz (USA),
  920–925 MHz (China): Ultra-high frequency UHF
- 2.45 GHz and 5.8 GHz: Microwave MW

4.2 UHF general

4.2.1 Advantages of UHF

- Long detection range
- UHF tags are available as cheap and space-saving adhesive labels
- High transfer rates
- Tag is available with a large working memory (user memory)
- Bulk detection

4.2.2 Permissible Transmitting Power of UHF

In Europe, a maximum of 2 W_{erp} are allowed (+33 dBm erp in accordance with EN 302208).

In the USA, a maximum of 4 W_{eirp} are allowed.

In China, a maximum of 2 W_{erp} are allowed.

4.2.3 Permissible Frequency Range of UHF

The frequency range for UHF, in which the IUH-F117-V1-* read/write head operates, is:

- 865 MHz to 868 MHz in Europe in accordance with DIN EN 302208-1
- 902 MHz to 928 MHz in the USA
- 920 MHz to 925 MHz in China

4.2.4 Applications for UHF systems

- Identification in galvanic coating or painting systems used in automotive production,
- Identification of automotive superstructures in automotive production,
- Pallet identification and measurement of goods movements in the logistics sector, and
- Access control at unloading stations with HGV identification.

4.2.5 Memory Structure of a Tag in Accordance with EPC Gen 2 (ISO/IEC 18000-63)

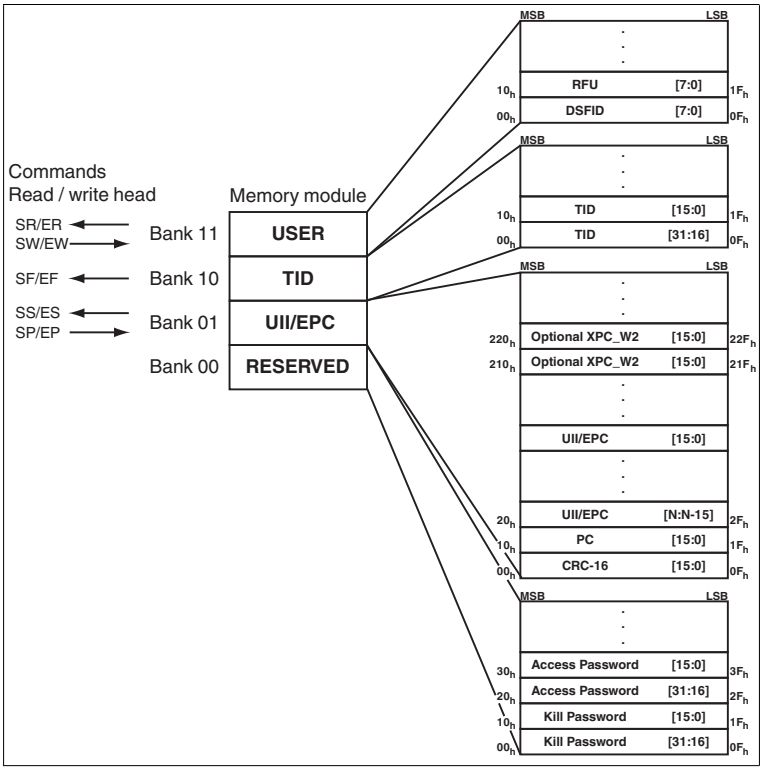


Figure 4.1

The memory module of an EPC Gen 2 (ISO/IEC 18000-63) tag is split into four segments. The main contents of these segments are:

Segment	Function	Length
Bank 00	Password management	Depending on the tag type, see table "Tag Types UHF 868 MHz" on page 36/column "Bank 00"
Bank 01	Unique Item Identifier (UII) Electronic Product Code (EPC)	Depending on the tag type, see table "Tag Types UHF 868 MHz" on page 36/column "UII/EPC"
Bank 10	Tag ID (TID)	4 bytes (MDID, TMN) + 0, 4, or 8 bytes
Bank 11	User memory	Depending on the tag type, see table "Tag Types UHF 868 MHz" on page 36/column "User Data"

Bank 00: Password Management

The segment **Bank 00** contains the password management information, comprising the access password and the kill password. The read/write head manages the kill password with the standard read/write commands SW and SR. The access password is not supported. see "Single Read Words SR" on page 33 and see "Single Write Words SW" on page 34.

Bank 01: UII/EPC

In addition to the Unique Item Identifier (UII), the segment **Bank 01** contains a calculated checksum CRC (Cyclic Redundancy Check) for verifying data on the tag and the protocol control (PC) area. The PC area contains:

- The length of the UII
- The Application Family Identifier (AFI) box
- A bit switch that shows whether the UII contains an EPC sequence of numbers in accordance with ISO (see chapter 4.2.6)
- A bit switch that shows whether data is stored in segment bank 11 (if present)

The data is addressed via the following commands: single read special read-only code (SS), single write special read-only code (SP), enhanced read special read-only code (ES), and enhanced write special read-only code (EP). (see "Single Read Special Read-Only Code SS" on page 31, see "Single Write Special Read-Only Code SP" on page 32, see "Enhanced Read Special Read-Only Code ES" on page 32, and see "Enhanced Write Special Read-Only Code EP" on page 33)

Bank 10: TID

The segment **Bank 10** contains the tag identifier (TID), consisting of the part number and serial number of the tag. This data is permanently stored without being changed. The first byte denotes the class of the tag with $E0_{hex}$, $E2_{hex}$, or $E3_{hex}$. The rest of the TID depends on the class, and can be derived from standard ISO/IEC 18000-63.

Example:

All tags with the class EPC Gen 2 (ISO/IEC 18000-63) are marked with $E2_{hex}$. The TID is comprised as follows:

- 4 bytes: part number of the tag
  - 1 byte: identifier
  - 12 bits: tag mask designer identifier (MDID)
  - 12 bits: tag model number (TMN), defined by the manufacturer:
- 4 or 8 bytes: serial number of the tag

  Depending on the manufacturer, the serial numbers do not have to be unique or may even be omitted.

The data in segment **Bank 10** can be output via the single read read-only code (SF) and enhanced read read-only code (EF) commands. (see "Single Read Read-Only Code SF" on page 31 and see "Enhanced Read Read-Only Code EF" on page 31)

Bank 11: User Memory

Segment **Bank 11** contains an area to which the user has free access. This size of this area depends on the chip type, or the area may not be present.

The data in segment **Bank 11** is addressed via the single read words (SR), single write words (SW), enhanced read words (ER), and enhanced write words (EW) commands. (see "Single Read Words SR" on page 33, see "Single Write Words SW" on page 34, see "Enhanced Read Words ER" on page 34, and see "Enhanced Write Words EW" on page 35)

4.2.6 Electronic Product Code (EPC)

The electronic product code is a unique identifier in the form of a sequence of numbers. The number sequence has a set structure and a length of 64 bits, 80 bits, 96 bits, or longer (depending on the EPC Ident number used). This number sequence is saved to the RFID tag, offering worldwide unique identification of the tagged object.

The system of Electronic Product Codes (EPC) was defined by GS1/EPCglobal for use in inventory management. Tags with memory banks for EPC codes must be programmed by the user. The memory of new tags must not contain any valid EPC codes. The EPC numbers are managed and assigned by GS1. To obtain EPC numbers, please contact the GS1 branch in your country (http://www.gs1.com/contact).

The electronic product code is defined by EPCglobal with at present 13 different encryptions. SGTIN-96 (serialized global trade item number) is given here as an example of a frequently used encryption. SGTIN-96 has a defined format, and is structured as follows:

1. **Header**: The header specifies the EPC standard used, and denotes the number sequence.
2. **Filter value**: Denotes the unit of the product, for example, end product, additional packaging, pallet.
3. **Partition**: Denotes the point at which the following company prefix ends and the object data begins.
4. **Company Prefix**: Assigned sequence of numbers that identifies the producer.
5. **Object class**: Sequence of numbers that describes the object, e.g., item number.

   The company prefix and the object class are each of variable length, but together are always 44 bits long.
6. **Serial number**: Sequence of numbers that identifies the item, for example, the sequential serial number of the item.

	Header	Filter value	Partition	Company Prefix	Object class	Serial number
Length	8 Bit	3 Bit	3 Bit	20 - 40 Bit	4 - 24 Bit	38 Bit
Value	0011 0000	011	5_{dez}	0614141_{dez}	000734_{dez}	203886_{dez}

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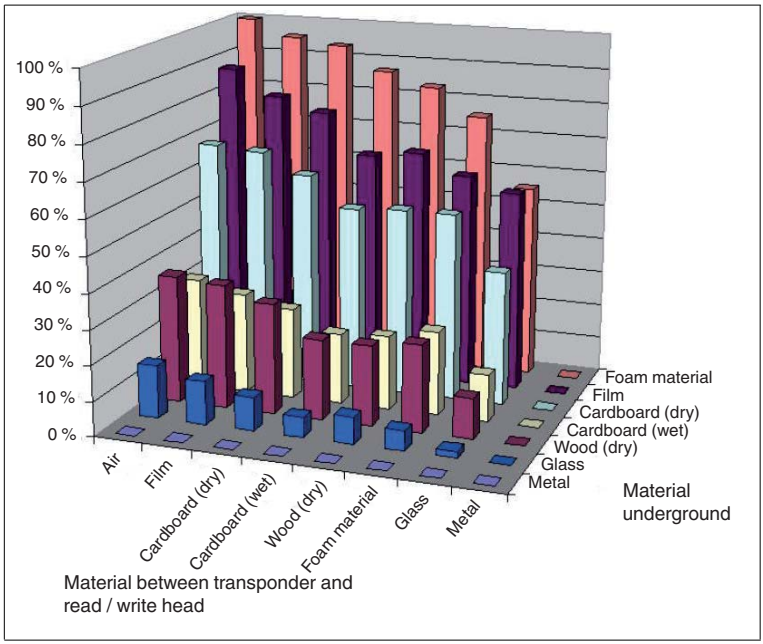
To work with unique number sequences without having to use sometimes expensive EPC codes, we recommend using the TID of the tag, which is programmed into the tag chips by the semiconductor manufacturer.

4.2.7 Influence of various materials on the sensing range

In the UHF range, the nature of the surrounding area and the surface to which the transponder is secured have a serious influence on the range that the system can attain. The UHF transponder cannot be mounted on metal without requiring adaptations. Glass has a negative influence on the sensing range when used as a mounting surface. If a UHF transponder is mounted on damp material, the sensing range is much poorer than the range of a transponder mounted on dry material. The mounting surface often affects the read range much more than the material between the transponder and the read/write head. The graph shows the effect of different materials on the sensing range.



4.2.8 Dense Reader Mode (DRM)

A special operating mode for read/write tags in accordance with the specification EPC Gen 2 (ISO/IEC 18000-63) allows several read/write heads to be operated close to each other simultaneously without interference.

Europe

In accordance with EN 302208, only channels 4, 7, 10, and 13 are used in this mode for transmission with the read/write head (read/write head -> read/write tag communication path). The transmitting power is a maximum of 2 W_{erp}.

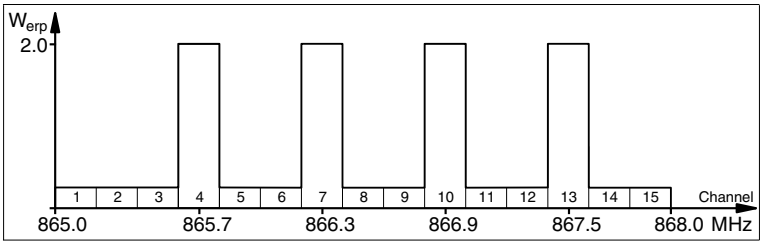


Figure 4.2

The response from the read/write tag appears via the frequency offset, which is achieved by the modulation used in this mode on the two adjacent channels. Due to the high level difference between the transmission channels and the response channels, this technology offers major benefits for reusing frequencies.

Other countries in which the device can be used

The IUH-F117-V1-EU read/write head has a transmission license in accordance with DIN EN 302208-2.

Note!

If you wish to use a device in a country in which this standard is not effective, make sure that the relevant values for the device are consistent with the local conditions.

4.2.9 Frequency Hopping Method

China

In China, the frequency ranges 840–845 MHz and 920–925 MHz are available for UHF-RFID readers. This read/write head uses the 920–925 MHz range. The range is split into 20 channels, each with a bandwidth of 250 kHz. On channels 0, 1, 18, and 19, only 100 mW_{erp} of transmission power are permitted at the edge of the spectrum. On channels 2–17, 2 W are$_{erp}$ permitted. The transmission power can be set. It is stated in W_{erp} . FHSS with a maximum 2 seconds retention time is used.

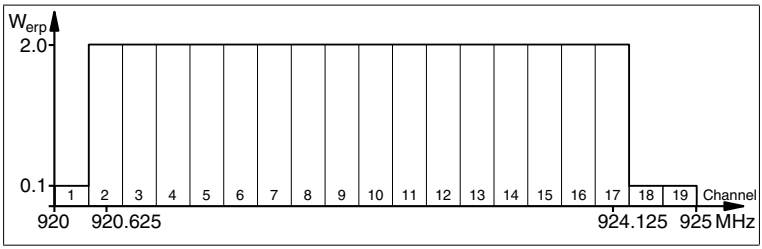


Figure 4.3

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USA

The ISM band from 902 to 928 MHz is available in the USA. The band is split into 50 channels, each with a 500 kHz bandwidth. FHSS with a maximum retention time of 4 seconds is employed. All channels must be used. Channel restriction is not permitted.

In contrast to the read/write heads for Europe and China, the transmission power is stated in W_{eirp} .

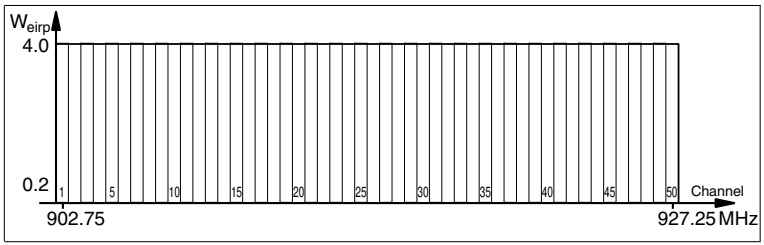


Figure 4.4

4.2.10 Relevant Standards for UHF

European radio standards: EN 300220 and EN 302208

Usage recommendations for RFID type labels, information about recycling, installation of readers and antennae: ISO/IEC TR 24729 parts 1-4

Installation and commissioning of UHF-RFID systems: ETSI TR 102436

Description of air interface: EPC Gen 2 (ISO/IEC 18000-63)

4.3 General Functions and Features

Figure 4.5

Functions

The read/write head was developed for reading and writing passive read/write tags with an ultra-high operating frequency.

Measurement Range

The measurement range is normally 6 meters. Tags that comply with EPC Gen 2 (ISO/IEC 18000-63) are supported.

Features

The IUH-F117-V1-* read/write head is equipped with the following features:

- Two dual LEDs for function display
- Industrial housing
- Connects to the IDENT*Control* via connector V1 (M12 x 1)
- Protects against failures (such as antenna short-circuiting) and electrostatic discharge

4.4 Indicators and Controls

The IUH-F117-V1-* read/write head has two dual LEDs (green/yellow). The two LEDs are located on opposite sides and are clearly visible. The various indicators mean:

- Green: power on
- Flashing green: attempting to read/write
- Yellow: command executed

4.5 Connection

The read/write head is connected to the IDENT*Control* control interface via the M12 x 1 connector.

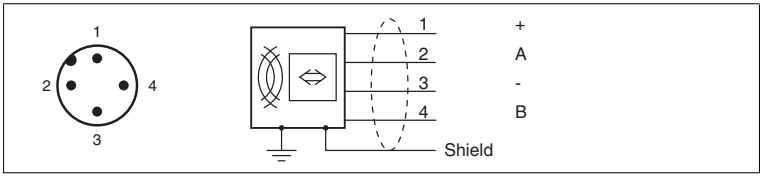


Figure 4.6

4.6 Scope of Delivery

- Read/write head
- Quick start guide

4.7 Accessories

4.7.1 IDENTControl

The read/write head can be connected to Pepperl+Fuchs IDENT*Control* control interfaces.

Interface	Designation
4 read/write heads:	
Ethernet	IC-KP-B17-AIDA1
2 read/write heads:	
PROFIBUS	IC-KP2-2HB6-V15B
Ethernet	IC-KP2-2HB17-2V1D
Serial	IC-KP2-2HRX-2V1
1 read/write head:	
PROFIBUS	IC-KP2-1HB6-V15B IC-KP2-1HB6-2V15B
Ethernet	IC-KP2-1HB17-2V1D
Serial	IC-KP2-1HRX-2V1

Table 4.1

4.7.2 Read/Write Tags

Type	Designation
EPC Gen 2 (ISO/IEC 18000-63)	IUC72-C8-T14 IUC72-F151-M IUC72-F152-M IUC73-F153 IUC76-50-M

Table 4.2

4.7.3 Connection cable for R/W heads and trigger sensors

Compatible connection cables with shielding are available for connecting the R/W heads and trigger sensors.

Figure 4.7

Accessories	Description
2 m long (straight female, angled male)	V1-G-2M-PUR-ABG-V1-W
5 m long (straight female, angled male)	V1-G-5M-PUR-ABG-V1-W
10 m long (straight female, angled male)	V1-G-10M-PUR-ABG-V1-W
20 m long (straight female, angled male)	V1-G-20M-PUR-ABG-V1-W
Field connector female, straight, shielded	V1-G-ABG-PG9
Field connector male, straight, shielded	V1S-G-ABG-PG9
Field connector female, angled, shielded	V1-W-ABG-PG9
Field connector male, angled, shielded	V1S-W-ABG-PG9
Dummy plug M12x1	VAZ-V1-B3

4.7.4 Cable connectors for the power supply

Compatible M12 sockets with an open cable end for connecting the IDENTControl to a power supply are available in different lengths.

Figure 4.8

Accessories	Designation
Length 2 m (straight socket)	V1-G-2M-PUR
Length 5 m (straight socket)	V1-G-5M-PUR
Length 10 m (straight socket)	V1-G-10M-PUR

4.7.5 Installation accessories

Two different mounting brackets are available to mount the read/write head on a wall or pole.

Figure 4.9 IUZ-MH10

Accessories	Designation
Mounting bracket for wall attachment	IUZ-MH10
Mounting bracket for pipe installation (pipe with maximum diameter of 40 mm)	IUZ-MH11

5 Installation

5.1 Storage and transport

For storage and transport purposes, package the unit using shockproof packaging material and protect it against moisture. The best method of protection is to package the unit using the original packaging. Furthermore, ensure that the ambient conditions are within allowable range.

5.2 Unpacking

Check the product for damage while unpacking. In the event of damage to the product, inform the post office or parcel service and notify the supplier.

Check the package contents against your purchase order and the shipping documents for:

- Delivery quantity
- Device type and version in accordance with the type label
- Any accessories ordered

Retain the original packaging in case you have to store or ship the device again at a later date.

Should you have any questions, please contact Pepperl+Fuchs.

5.3 Mounting

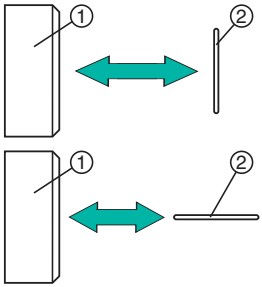
The read/write head is intended for wall mounting or mounting on brackets in internal areas. Please mount the read/write head using only the holes provided in the housing. The preferred mounting direction is with the cable connection facing vertically downwards.

Note!

Do not lay the connection cable in the main beam direction of the antenna.

5.3.1 Room Orientation

The alignment of the read/write tag antennae in relation to the antennae of the read/write head influences the detection range of the system. Make sure the antennae are aligned parallel to each other.



Optimum alignment of the tag
- Good communication between the read/write head and tag

Poor alignment of the tag
- Insufficient communication between the read/write head and tag

(1) Read/write head
(2) Tag

5.3.2 Minimum Distances

When positioning the read/write head, please observe the minimum distances. The lateral distance between the read/write head and metals or liquids should be at least 50 cm. The distance between the read/write head and the ground should be at least 50 cm.

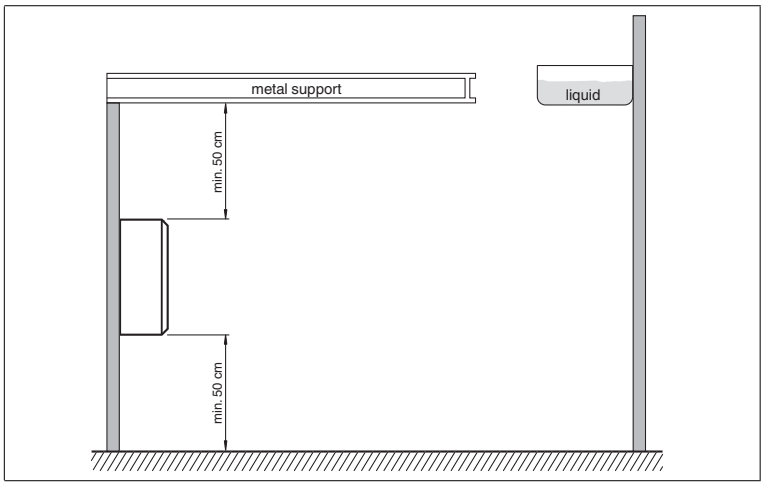


Figure 5.1

During simultaneous operation of several read/write heads, only one read/write head may ever communicate with a tag at any given time. When arranging the read/write heads, make sure that the measurement ranges do not overlap. You can enlarge or reduce the size of the measurement range by changing the transmitting power. Determine the measurement range of each read/write head at the mounting location.

Note!

During mounting, take into account how the read/write heads may cause interference with each other. The further the transmission channels of the read/write heads are from each other, the lower the risk of interference.

If you want to transmit with just one read/write head at any given time, use the multiplex mode of the IDENTControl control interface. Multiplex operating mode allows chronologically exclusive access to tags, and prevents mutual interference from read/write heads. For a precise description, see the manual for your control interface.

5.3.3 Polarization

The polarization of an electromagnetic wave emitted from an antenna depends on the electromagnetic field component and the spatial position of the antenna. A fundamental distinction is drawn between linear and circular polarization. The polarization of the read/write head must be adapted to the polarization of the transponder in order for a UHF system to utilize the full sensing range. Refer to the corresponding data sheet for details on the polarization of the transponder.

- Linear polarization: the direction of the vector of an electromagnetic field component that generates an electromagnetic wave with linear polarization is always constant. Linear polarization is available in a vertical and horizontal configuration, which is dependent on the spatial position of the antenna.
- Circular polarization: the vector of an electromagnetic field component that generates an electromagnetic wave with circular polarization rotates around an axis parallel with the beam direction. The rotation of the antenna around the communication axis has no influence.

The IUH-F117-V1 read/write head is supplied with circular polarization. Polarization can be changed from circular to linear using the software on the IDENTControl interface. With linear polarization, the polarization level is aligned horizontally when the read/write head is mounted in the preferred installation direction with the cable connection vertical facing downwards.

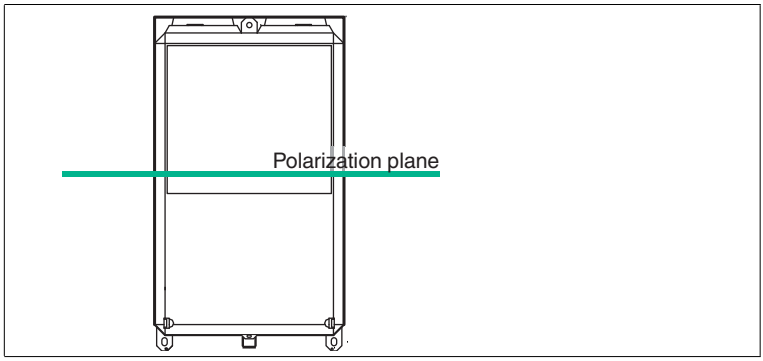


Figure 5.2 Polarization plane IUH-F117-V1-* with linear polarization

5.4 Connection

Connect the read/write head to the IDENTControl control interface using a shielded connection cable (see chapter 4.7.2). Ensure that the shield fully encapsulates the connection cable to avoid EMC interference. (see chapter 5.5)

Warning!
Incorrect electrical connection

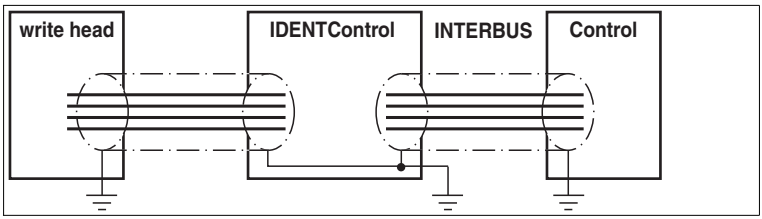
Damage to the device or plant caused by incorrect electrical connection.

Check all connections in the plant before commissioning the device.

After you connect the supply voltage to the control interface, the PWR/ERR ED lights up green on the device. If the LED does not light up on the device, the power supply is not connected correctly. If the LED lights up red, a device error has occurred. If the PWR/ERR LED flashes red and green alternately once you have connected the read/write head, the power supply does not have sufficient power. If the LED on the read/write head slowly flashes green, the control interface is configured incorrectly.

5.5 EMC Concept

The outstanding noise immunity of the IDENTControl against emission and immission is based on its consistent shielding design, which uses the principle of the Faraday cage. Interference is caught in the shield and safely diverted via the ground connections.



The cable shielding is used to discharge electromagnetic interference. When shielding a cable, you must connect both sides of the shield to ground with low resistance and low inductance.

Note!

If cables with double shields are used, e.g. wire mesh and metalized foil, the both shields must be connected together, with low resistance, at the ends when making up the cable.

Power supply cables are the source of much interference, e.g. from the supply lines of 3-phase electric motors. For this reason, the parallel laying of power supply cables with data and signal cables should be avoided, particularly in the same cable duct.

Note!

The circuit ground is conductively connected to the housing of the write/read head and to the protective ground. (Connection image → see Figure 4.6 on page 16)

6 Commissioning

6.1 Definitions

6.1.1 Display

Angle brackets contain the abbreviated meaning of a command structure, e.g., <Data>

The index $_{hex}$ or .xx denotes a hexadecimal number.

hex_{ASCII} denotes a value in the hexadecimal system, specified in ASCII characters.

Example: 10_{dec} corresponds to A_{hex}; A_{ASCII} corresponds to 41_{hex}. see chapter 10

6.1.2 Legend

<ChanNo>:	IDENT*Control* channel
<CHCK>:	1 byte, 8-bit check sum with the addition of all preceding characters, without overflow
<Data>:	Data with the size <WordNum> multiplied by 4 bytes
<DataLength>:	Length of the data specified to a command, 2 characters binary, HighByte, LowByte
eirp:	equivalent isotropically radiated power
erp:	effective radiated power
<ETX>:	1 byte = 03_{hex}
<read-only code>:	TID, 4 bytes + an optional 4 or 8 bytes
<Ldata>:	Length of the data in bytes, 2 bytes Use in multiframe protocol
<Length>	1 character hex_{ASCII} = number of data bytes Permitted values in the read/write head IUH*: 2, 4, 6, 8, A, C, E
<Luii>:	Length of the UII in bytes, 2 bytes Use in multiframe protocol
<LogicalOperation>:	Links several filters; OR = 0; AND = 1 If one filter only is used, this value is ignored
<MaskData>:	Mask specification
<MaskLength>:	Mask length in bits, values: 00…FF
<MemBank>:	Number of the memory bank (see parameter MB)
<ParamTyp>:	Parameter type, 2 bytes, or 2 ASCII characters
<Negate>:	Negates the mask comparison; not negated = 0; negated = 1
<PC>:	Protocol control word according to EPC Gen 2 (ISO/IEC 18000-63), 2 bytes, describes characteristics such as the length of the UI/EPC
<SpecialFixcode>:	<PC> & <UII/EPC>
<Status>:	1 ASCII character ()
<StartAddress>:	Start address in the selected memory bank in bits, values: 0000…FFFF

<SystemCode>:	= U (for read/write head IUH*)
<TagType>:	2 ASCII characters
<UII/EPC>:	Unique Item Identifier, memory area of a tag in accordance with EPC Gen 2 (ISO/IEC 18000-63), in which the EPC code is stored
<WordAddr>:	Word start address in the read/write tag, 4 hex_{ASCII} characters, range from "0000h" to "FFFF", depending on tag type
<WordNum>:	Number of words to be read or written, 2 hex_{ASCII} characters. Range from "01" through "20" depending on the tag type, word lengths are 4 bytes

6.2 Device Settings

Warning!
Device not configured or configured incorrectly

Configure the device prior to commissioning. A device that has not been configured or configured incorrectly may lead to faults in the plant.

Before commissioning the read/write head, the control interface must first be configured. To do so, refer to the "Commissioning" chapter of the manual for your control interface.

Configure the read/write heads with the described system commands (see chapter 7.5.2). For a parameterization example, see see chapter 6.3.

Caution!
Uncontrolled triggered processes

Before commissioning the device, make sure that all processes are running smoothly; otherwise damage may occur in the plant.

6.3 Operation via the Command Interface

This section shows you how to operate the IUH-F117-V1 read/write head using an IDENTControl control interface with serial interface. The commissioning procedure described relates to the RS 232 interface and involves a PC. The examples include the syntax for coding the commands and parameters via the Ethernet TCP/IP and PROFIBUS interface. Further details about these codes and the factory settings for your IDENTControl control interface can be found in the manual.

Note!

Hexadecimal Display

In the examples, hexadecimal values are shown in the format .xx. A decimal point is followed by 2 characters of hexadecimal code.

.03 = <ETX>

.41 = A_{ASCII}

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Example:

In the examples below, the read/write head is connected to channel 1 of the control interface.

Reading Tags

Enhanced Read Read-Only Code

Send the enhanced read read-only code command to the read/write head. The LEDs on the read/write head flash green.

	Serial	Ethernet	PROFIBUS
Command:	EF1	.00.04.1D.03	.1D.03
Confirmation:	-	.00.06.1D.03.FF.0B	.1D.03.FF.0B
Response:	.35.31	.00.06.1D.03.05.0C	.1D.03.05.0C

Table 6.1 Enhanced read read-only code, no tag in the measurement range

Move a tag into the read/write head's measurement range. When the tag has been detected and the read-only code has been read out, the LED on the read/write head turns yellow. The read-only code is displayed in the terminal program.

	Serial	Ethernet	PROFIBUS
Response:	.30.31.E2.04.26.70.18.01.00.00	.00.0E.1D.03.00.37.E2.04.26.70.18.01.00.00	.1D.03.00.37.E2.04.26.70.18.01.00.00

Table 6.2 Enhanced read read-only code, tag is entering the measurement range

Describing Tags

Single Write Special Read-Only Code

Send the single write special read-only code command to the read/write head while a tag is in the measurement range. see "Single Write Special Read-Only Code SP" on page 32.

	Serial	Ethernet	PROFIBUS
Command:	SP1E.30.00.11.22.33.44.55.66.77.88.99.AA.BB.CC	.00.14.0D.E3.00.00.30.00.11.22.33.44.55.66.77.88.99.AA.BB.CC	.0D.E3.00.00.30.00.11.22.33.44.55.66.77.88.99.AA.BB.CC
Confirmation:	-	.00.06.0D.E3.FF.2D	.0D.E3.FF.2D
Response:	.30.31	.00.06.0D.03.00.2E	.0D.03.00.2E

Table 6.3 Single write special read-only code, tag is in the measurement range

Single Read Special Read-Only Code

As confirmation, read out the read-only code of the tag within the read/write head's measurement range via the single read special read-only code command. see "Single Read Special Read-Only Code SS" on page 31.

	Serial	Ethernet	PROFIBUS
Command:	SS10	.00.04.0A.02	.0A.02
Confirmation:	-	.00.06.0A.02.FF.2F	.0A.02.FF.2F
Response:	.30.31.34.00.11.22.33.44.55.66.77.88.99.AA.BB.CC	.00.14.0A.02.00.48.34.00.11.22.33.44.55.66.77.88.99.AA.BB.CC	.0A.02.00.48.34.00.11.22.33.44.55.66.77.88.99.AA.BB.CC

Table 6.4 Single read special read-only code, tag is in the measurement range

Parameterizing the Read/Write Head

Setting and Requesting the Transmission Power

Read out the read/write head's transmission power with the read parameter PT command:

	Serial	Ethernet	PROFIBUS
Command:	RP1UPT.00.00	.00.09.BE.03.00.55.50.54.00.00	.BE.03.00.55.50.54.00.00
Confirmation:	-	.00.06.BE.03.FF.3E	.BE.03.FF.3E
Response:	.30.31.07.D0	.00.08.BE.03.00.3F.07.D0	.BE.03.00.3F.07.D0

The read/write head's set transmission power is 2000 mW ($7D0_{hex}$ corresponding to 2000_{dec}).

Change the transmission power of the read/write head to 500 mW (500_{dec} corresponding to $1F4_{hex}$) via the write parameter PT command:

	Serial	Ethernet	PROFIBUS
Command:	WP1UPT.00.02.01.F4	.00.0B.BF.03.00.55.50.54.00.02.01.F4	.BF.03.00.55.50.54.04.00.02.01.F4
Confirmation:	-	.00.06.BF.03.FF.11	.BF.03.FF.11
Response:	.30.31	.00.06.BF.03.00.12	.BF.03.00.12

7 Operation

7.1 General

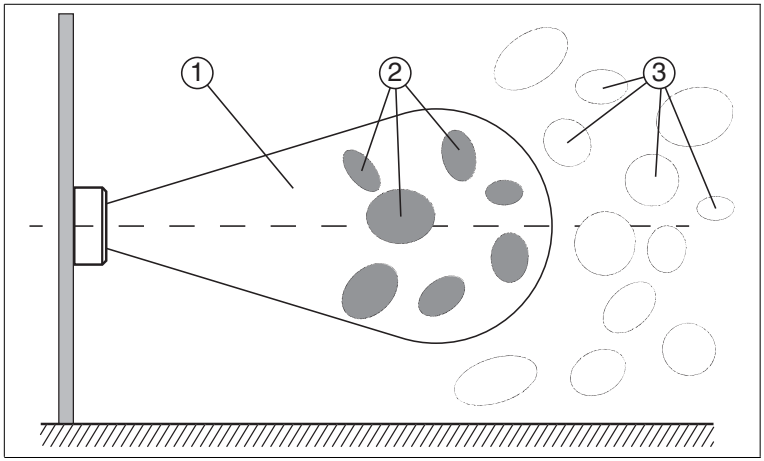
The sections below contain the details on the commands that specifically address the IUH-F117-V1-* read/write head. The commands are described using the example of an IDENT*Control* control interface with serial interface. All other generally applicable commands and error messages or status messages can be found in the manual for your IDENT*Control* control interface.

7.2 Basic Command Process

Interference Due to Multipath Propagation

The electromagnetic waves radiated by the read/write head do not just follow the direct route to the tag, but are also reflected off objects in the vicinity, meaning that multiple partial waves overlap with the waves radiated by the read/write head.

This overlap causes interference (i.e., exaggeration and dampening of the reception field strength), leading to almost complete degradation. Depending on the environment, several reflections may occur with differing intensity and distance. These different reflections lead to a field strength in the measurement range that is difficult to predict. In the areas of degradation, the prevailing field strength is weaker than the minimum detection field strength of the tag. As a result, the tag cannot be activated for communication. Exaggeration of the field strength may lead to unwanted excessive detection ranges.



1. Measurement Range
2. Degradation
3. Excessive detection ranges

The reflections and the resulting inhomogeneity of the field strength depend on the frequency used. The absolute value of the field strength depends on the transmission power. Since the tags move in the measurement range of the read/write head, and the environment can change, it is advisable to repeat the commands at different transmission frequencies. Different transmission frequencies are advisable, since the manufacturing tolerances and the immediate environment of the tag have an effect the tag's resonance frequency.

Read Algorithm

To have the best chance of communicating with tags, the read/write head uses an algorithm that varies the frequency. You can set the corresponding values for this algorithm with the parameters Channel Frequency (**CD**), and Number of Attempts (**TA**) When setting these values, the algorithm automatically selects a suitable transmission frequency from the available frequencies and performs the specified number of attempts.

Tip

If analysis of a specific application shows that a particular frequency is sufficient to execute commands successfully, the parameters can be set accordingly. This measure reduces the processing time.

7.3 Command Overview

The commands in the list are described in detail on the following pages.

Read/Write Commands

Abbre-viation	Command description
SF	See "Single Read Read-Only Code SF" on page 31
EF	See "Enhanced Read Read-Only Code EF" on page 31
SS	See "Single Read Special Read-Only Code SS" on page 31
ES	See "Enhanced Read Special Read-Only Code ES" on page 32
SP	See "Single Write Special Read-Only Code SP" on page 32
EP	See "Enhanced Write Special Read-Only Code EP" on page 33
SR	See "Single Read Words SR" on page 33
ER	See "Enhanced Read Words ER" on page 34
SW	See "Single Write Words SW" on page 34
EW	See "Enhanced Write Words EW" on page 35

Configuration Commands

Abbre-viation	Command description
RP	See "Read Parameters" on page 37
WP	See "Write Parameters" on page 37

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7.4 Read/Write Commands

Single Read Read-Only Code SF

One attempt is made to read a read-only code (TID). The read-only code is 4, 8, or 12 bytes long, and comprises a 4-byte part number, which denotes the tag type, and optionally a tag with a unique serial number of 4 or 8 byte.

Command:	SF <ChanNo> <CHCK> <ETX>
Response:	<Status> <ChanNo> <Read-Only Code> <CHCK> <ETX>

Example:

SF1 reads the read-only code to IDENT*Control* channel 1.

Enhanced Read Read-Only Code EF

This command continuously attempts to read a read-only code (TID). If a read-only code is read, this is reported once to the control interface. If there is no tag in the measurement range, or if the tag leaves the measurement range, a status 5 message is reported to the control interface.

Command:	EF <ChanNo> <CHCK> <ETX>
Response:	<Status> <ChanNo> <Read Only Code> <CHCK> <ETX>

Example:

EF1 continuously reads the read-only code to IDENT*Control* channel 1

Single Read Special Read-Only Code SS

This command reads the UII segment from tags according to EPC Gen2 (ISO/IEC 18000-63).

Command:	SS <ChanNo> 0 <CHCK> <ETX>
Response:	<Status> <ChanNo> <SpecialFixcode> <CHCK> <ETX>

Example:

SS10 reads the entire UII segment.

The length of the UII/EPC can vary depending on the type of tag. The data is structured as follows:

<SpecialFixcode> = <PC> & <UII/EPC>

<PC> corresponds to the protocol control word in accordance with EPC Gen 2 (ISO/IEC 18000-63), 2 bytes long.

<UII/EPC> contains the usage data.

Enhanced Read Special Read-Only Code ES

This command continuously attempts to read the UII segment from tags according to EPC Gen2 (ISO/IEC 18000-63). If the <SpecialFixcode> of a tag is read, this is reported once to the control interface. If there is no tag in the measurement range, or if the tag leaves the measurement range, a status 5 is reported to the control interface.

Command:	ES <ChanNo> 0 <CHCK> <ETX>
Response:	<Status> <ChanNo> <SpecialFixcode> <CHCK> <ETX>

Example:

ES10 continuously reads the UII segment.

The length of the UII/EPC can vary depending on the type of tag. The data is structured as follows:

<SpecialFixcode> = <PC> & <UII/EPC>

<PC> corresponds to the protocol control word in accordance with EPC Gen 2 (ISO/IEC 18000-63), 2 bytes long.

<UII/EPC> contains the usage data.

Single Write Special Read-Only Code SP

This command writes a <Length> byte long UII/EPC code to tags according to EPC Gen 2 (ISO/IEC 18000-63).

Command:	SP <ChanNo> <Length> <SpecialFixcode> <CHCK> <ETX>
Response:	<Status> <ChanNo> <CHCK> <ETX>

<Length> = Length of the <SpecialFixcode> in $ASCII_{hex}$

The data length <Length> must be a whole number multiple of 2 bytes because in accordance with EPC Gen 2 (ISO/IEC 18000-63), <UII/EPC> must be written in 16-bit words. Only the lengths 2_{dec}, 4_{dec}, ... 14_{dec} (= 2_{ASCII}, 4_{ASCII}, ..., E_{ASCII}) are permissible. The length is shown in hexadecimal format, and includes the length of PC and UII/EPC. If a UII/EPC of 96 bits is written, this results in 2 + 12 = 14 bytes = E_{ASCII} Byte.

<SpecialFixcode> = <PC> & <UII/EPC>

<PC> corresponds to the protocol control word in accordance with EPC Gen 2 (ISO/IEC 18000-63), 2 bytes long.

<UII/EPC> contains the usage data.

Example:

SP1E.30.00.E2.00.90.51.33.02.00.92.18.20.56.12 writes the value ".30.00" for <PC>, and the UII/EPC code ".E2.00.90.51.33.02.00.92.18.20.56.12" with a length of 2 + 12 bytes = 14 bytes to IDENT*Control* channel 1.

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When using this command, make sure that the protocol control word contains the correct length of the following UII/EPC. If this is not executed correctly, the complete data is not output on the subsequent read operation because the command SS uses the length in the protocol control word for the output.

In accordance with EPC Gen 2 (ISO/IEC 18000-63), the protocol control word consists of two bytes. The five highest value bits denote the length of the <UII/EPC> in words (= 16 bit):

00000_{bin}	No word	0 bits
00001_{bin}	One word	16 bits
00010_{bin}	Two words	32 bits
...	...	...
11111_{bin}	31 words	496 bits

The meaning of the remaining bits is described in EPC Gen 2 (ISO/IEC 18000-63). If a UII/EPC has the length 12 bytes, i.e., 6 words (00110_{bin}), and all other bits are equal to 0, the protocol control word corresponds to 00110000 00000000_{bin} or 3000_{hex}. If some of the other bits are not equal to 0, this produces a different protocol control word.

Enhanced Write Special Read-Only Code EP

This command continuously attempts to write a <Length> byte long UII/EPC code to tags according to EPC Gen 2 (ISO/IEC 18000-63). If the command was executed successfully, a status 0 is reported to the control interface. If there is no tag in the measurement range, or if the tag leaves the measurement range, a status 5 is reported to the control interface.

Command: EP <ChanNo> <Length> <SpecialFixcode> <CHCK> <ETX>

Response: <Status> <ChanNo> <CHCK> <ETX>

Example:

EP1E.30.00.E2.00.90.51.33.02.00.92.18.20.56.12 continuously writes the value ".30.00" for <PC>, and the UII/EPC code ".E2.00.90.51.33.02.00.92.18.20.56.12" with a length of 2 + 12 bytes = 14 bytes to IDENT*Control* channel 1.

See "Single Write Special Read-Only Code SP" on page 32

Single Read Words SR

One attempt is made to read <WordNum> 32-bit words from address <WordAddr>.

Command: SR <ChanNo> <WordAddr> <WordNum> <CHCK> <ETX>

Response: <Status> <ChanNo> <Data> <CHCK> <ETX>

Example:

SR1000101 reads a 4-byte word from memory address "0001."

Note!

The **memory bank MB** parameter defines the bank which this command accesses. .

Enhanced Read Words ER

Continuous attempts are made to read <WordNum> 32-bit words from the address <WordAddr>. Only changing data is transferred via the interface. When a read/write tag leaves the read range, status 5 is output.

Command:	ER <ChanNo> <WordAddr> <WordNum> <CHCK> <ETX>
Response:	<Status> <ChanNo> <Data> <CHCK> <ETX>

Example:

ER1000101 continuously reads a 4-byte word from memory address "0001".

Note!

The **memory bank MB** parameter defines the bank which this command accesses. .

Single Write Words SW

One attempt is made to write <WordNum> 32-bit words from the address <WordAddr>.

Command:	SW <ChanNo> <WordAddr> <WordNum> <Data> <CHCK> <ETX>
Response:	<Status> <ChanNo> <CHCK> <ETX>

Example:

SW1000101ABCD writes the 4-byte-long word "ABCD" from memory address "0001".

Note!

The **memory bank MB** parameter defines the bank which this command accesses. .

Enhanced Write Words EW

This command continuously attempts to write <WordNum> 32-bit words from the address <WordAddr>. If the command was executed successfully, a status 0 is reported to the control interface. If there is no tag in the measurement range, or if the tag leaves the measurement range, a status 5 is reported to the control interface.

Command:	EW <ChanNo> <WordAddr> <WordNum> <Data> <CHCK> <ETX>
Response:	<Status> <<ChanNo> CHCK> <ETX>

Example:

EW1000101ABCD continuously writes the 4-byte long word "ABCD" from memory address "0001".

Note!

The **memory bank MB** parameter defines the bank which this command accesses. .

Note!

16-Bit Read/Write Commands

The read/write commands SR, ER, SW, and EW are interpreted as 16-bit versions by means of a preceding # symbol.

The 16-bit read/write commands behave in the same way as the 32-bit versions.

- 16-bit commands write or read a word with a length of 2 bytes.
- 32-bit commands write or read a word with a length of 4 bytes.

Example:
#SW1000202ABCD corresponds to SW1000101ABCD

7.5 Configuration Commands

The response to a configuration command is a status message from the read/write head. During the read operation, a status message and the corresponding data are received as the response.

7.5.1 ChangeTag Command

This command tells the R/W system with which tag type to communicate.

Command:	CT <ChanNo> <TagType> <CHCK> <ETX>
Response:	<Status> <ChanNo> <CHCK> <ETX>
Default:	80

Example:

CT180 sets the tag type for IDENT*Control* channel 1 to IUC80

CT180 sets a generally valid tag type, which allows the read-only code to be read out for each tag, and therefore provides information about the chip type of the tag.

Note!

The IUH-F117-V1-* read/write head uses only tag type 80.

Tag Types UHF 868 MHz

Tag type	Chip		Pepperl+Fuchs designation	Bank 00 [bit]	UII / EPC [bit]	TID		User data [byte]
	Type	Designation				Type	Unique?	
72	EPC Class 1 Gen 2	NXP UCode-EPC-G2XM	IUC72	32 + 32	240	$E2006003_{hex}$ + seq. no.	Yes	64
73	EPC Class 1 Gen 2	Alien Higgs-2	IUC73	32 + 32	96	$E2003411_{hex}$	No	-
74	EPC Class 1 Gen 2	NXP UCode-EPC-G2	IUC74	32 + 32	96	$E2006001_{hex}$ + seq. no.	Yes	28
75	EPC Class 1 Gen 2	Impinj Monza 2.0	IUC75	32 + 32	96	$E2001071_{hex}$	No	-
76	EPC Class 1 Gen 2	Alien Higgs-3	IUC76	32 + 32	96	$E2003412_{hex}$ + seq. no.	Yes	64
80	EPC Class 1 Gen 2	Read/write tag conforms with Class 1 Gen 2	IUC80	1)	1)	$E2xxxxxx_{hex}$ + seq. no.	1)	-

Table 7.1 Tag types 868 MHz

1) = depending on the tag type

7.5.2 Read and Write Parameters

With the read parameter (**RP**) and write parameter (**WP**) configuration commands, you can read/write the following parameters:

Abbre-viation	Page	Parameter is readable/writeable		
		IUH-F117-V1-		
		EU	CN	US
AP	See "Antenna Polarization AP" on page 38	Readable/writeable		
PT	See "Transmission Power "Power Transmit" PT" on page 38	Readable/writeable		
CD	See "Channel Dense Reader Mode CD (EU version only)" on page 39	Readable /writeable	-	-
RD	See "Reset to Default, RD" on page 39	Writeable		
TA	See "Number of Attempts "Tries Allowed" TA" on page 40	Readable/writeable		
E5	See "Number of Unsuccessful Attempts until Status 5 "Enhanced Status 5" E5" on page 40	Readable/writeable		
MB	See "Memory Module for Tag Accesses to the "Memory Bank" MB" on page 41	Readable/writeable		

The parameters are generally saved in the read/write head as nonvolatile.

Read Parameters

Command RP reads configuration parameters from the read/write head.

Command: RP <ChanNo> <SystemCode> <ParamTyp> <DataLength> <CHCK> <ETX>

Response: <Status> <ChanNo> <Data> <CHCK> <ETX>

<SystemCode> = U_{ASCII} for IUH-*
<ParamTyp> = 2 bytes ASCII
<DataLength> = Length of <Data>, 2 bytes binary

Example:

RP1UE5.00.00 outputs the number of unsuccessful read attempts until status 5.

Write Parameters

Command WP writes configuration parameters to the read/write head.

Command: WP <ChanNo> <SystemCode> <ParamTyp> <DataLength> <Data> <CHCK> <ETX>

Response: <Status> <ChanNo> <CHCK> <ETX>

<SystemCode> = U_{ASCII} for IUH-*
<ParamTyp> = 2 bytes ASCII
<DataLength> = Length of <Data>, 2 bytes binary

Example:

WP1UE5.00.01.05 sets the number of unsuccessful read attempts to status 5 on 5 attempts.

For additional details on the parameters see chapter 7.5.3.

7.5.3 Parameters

Antenna Polarization AP

This parameter switches polarization to linear/circular or reads out the currently set polarization.

ParamTyp:	AP
Default	AP = C
Value range:	L, C

Example:
WP1UAP.00.01L switches the polarization to linear
WP1UAP.00.01C switches the polarization to circular
RP1UAP.00.00 reads out the set polarization

Set the polarization according to the read/write tag used (see chapter 5.3.3).

⊕ Higher sensitivity if both the read/write head and the read/write tag are polarized linearly.

⊖ There are gaps in the detection range if the read/write head is polarized linearly.

Transmission Power "Power Transmit" PT

This parameter sets the transmission power or reads out the set transmission power.

The transmission power is stated in mW_{erp} for the IUH-F117-V1-EU and IUH-F117-V1-CN read/write heads.
The transmission power is stated in mW_{eirp} for the IUH-F117-V1-US read/write head.

ParamTyp:	PT
Default:	PT = .07.D0 = 2000_{dec} mW_{erp}
Value range:	EU/CN: 300 mW_{erp} ... 2000 mW_{erp} US: 500 mW_{eirp} ... 4000 mW_{eirp}

Example:
WP1UPT.00.02.01.2C sets the transmission power to 300 mW_{erp}
WP1UPT.00.02.07.D0 sets the transmission power to 2000 mW_{erp}
RP1UPT.00.00 reads out the transmission power currently set

⊕ Higher detection range if you increase the transmission power.

⊖ Possible excessive detection ranges if you increase the transmission power.

⊖ Lower detection range in reflective environments if you increase the transmission power.

⊖ Potential interference with adjacent read/write heads due to increased detection range.

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Note!

You can operate the IUH-F117-V1-* read/write head only with internally specified transmission power. For the software, you can enter any transmission power between 300 mW_{erp} and 2000 mW_{erp} or between 500 mW_{eirp} and 4000 mW_{eirp} using the command WP1UPT.00.02.xx.xx. The read/write head automatically sets the transmission power to the next lowest value available. Any entries outside the specified value range are returned as errors. Command RP1UPT.00.00 allows you to read out the power value that is currently set.

Channel Dense Reader Mode CD (EU version only)

This parameter sets the number and sequence of transmission channels permitted in dense reader mode (DRM), or reads out the number and sequence of permitted transmission channels. Transmission channels 4, 7, 10, and 13 are available.

ParamTyp:	CD
Default:	CD = .04.0A.07.0D
Value range:	4, 7, 10, 13

Example:
WP1UCD.00.04.07.0A.04.0D defines the sequence 7, 10, 4, and 13 as the permitted transmission channels
WP1UCD.00.01.0A allows the read/write head to use only transmission channel 10
RP1UCD.00.00 reads out the sequence of permitted transmission channels

Tip

If you have parameterized several transmitting channels using the parameter CD, the read algorithm automatically selects a suitable transmitting channel from the available channels. see chapter 7.2.

Reset to Default, RD

This parameter returns all settings of the read/write head to the default configuration.

ParamTyp:	RD

Example:
WP1URD.00.00

Number of Attempts "Tries Allowed" TA

This parameter sets the permitted number of write or read attempts, or outputs the permitted number of attempts.

ParamTyp:	TA
Default:	TA = 2
Value range:	1 ... 255

Example:

WP1UTA.00.01.01 permits precisely one attempt (= no repeats)

WP1UTA.00.01.03 permits 3 attempts

RP1UTA.00.00 outputs the permitted number of attempts

If the permitted number of write or read attempts between the read/write head and the tag is increased, this results in:

⊕ More reliable reading and writing.

⊖ Increased response time.

Number of Unsuccessful Attempts until Status 5 "Enhanced Status 5" E5

This parameter sets the number of unsuccessful read/write attempts until a status 5 is output for an enhanced command, or outputs the number.

Status 0 and status A depend on this parameter, and are output immediately.

ParamTyp:	E5
Default:	E5 = 5
Value range:	0 ... 252

Example:

WP1UE5.00.01.05 sets the number to 5 unsuccessful read/write attempts until a status 5 is output

RP1UE5.00.00 outputs the number

If the number of read/write attempts is reduced:

⊕ Faster response time in enhanced mode.

⊖ Status 5 messages in the event of unstable tag reading.

Memory Module for Tag Accesses to the "Memory Bank" MB

This parameter specifies the bank accessed by the read/write commands SR, ER, SW, and EW.

ParamTyp:	MB
Default:	MB = .03 = User Memory
Value range:	.00 = reserved (password area) .01 = UII/EPC .02 = TID .03 = User Memory

Example:

WP1UMB.00.01.03 sets the bank to User Memory

7.6 Error/Status Messages

Status	Meaning
0	The command was executed correctly.
1	Reserved
2	Switch-on message, reset was executed.
3	Reserved
4	The command is incorrect or incomplete. The parameter is not in the valid area.
5	No read/write tag in the measurement range.
6	Hardware error, e.g., error during self-test or read/write head defective.
7	Internal device error.
8	Reserved
9	The parameterized tag type is not compatible with the connected read head.
A	There are several tags in the measurement range (IUH*).
B	Reserved
C	Reserved
D	Reserved
E	Internal buffer overflow; execute reset.
F	Reserved

8 Service and Maintenance

The device is designed and constructed to function stable over long periods of time. For this reason, regular cleaning or maintenance is unnecessary.

9 Troubleshooting

Problem	Solution
Interference from several read/write heads in the local vicinity	■ Change the setting of the transmission channels ■ Reduce the transmission power
Status A message	■ Check whether there are multiple tags in the measurement range: Remove the tag from the measurement range by placing the tag in a sealed metal container Repeat the read or write operation

10 ASCII table

hex	dec	ASCII	hex	dec	ASCII	hex	dec	ASCII	hex	dec	ASCII
00	0	NUL	**20**	**32**	**Space**	40	64	@	**60**	**96**	'
01	1	SOH	**21**	**33**	**!**	41	65	A	**61**	**97**	**a**
02	2	STX	**22**	**34**	**"**	42	66	B	**62**	**98**	**b**
03	3	ETX	**23**	**35**	**#**	43	67	C	**63**	**99**	**c**
04	4	EOT	**24**	**36**	**$**	44	68	D	**64**	**100**	**d**
05	5	ENQ	**25**	**37**	**%**	45	69	E	**65**	**101**	**e**
06	6	ACK	**26**	**38**	**&**	46	70	F	**66**	**102**	**f**
07	7	BEL	**27**	**39**	**'**	47	71	G	**67**	**103**	**g**
08	8	BS	**28**	**40**	**(**	48	72	H	**68**	**104**	**h**
09	9	HT	**29**	**41**	**)**	49	73	I	**69**	**105**	**I**
0A	10	LF	**2A**	**42**	*****	4A	74	J	**6A**	**106**	**j**
0B	11	VT	**2B**	**43**	**+**	4B	75	K	**6B**	**107**	**k**
0C	12	FF	**2C**	**44**	**,**	4C	76	L	**6C**	**108**	**I**
0D	13	CR	**2D**	**45**	**-**	4D	77	M	**6D**	**109**	**m**
0E	14	SO	**2E**	**46**	**.**	4E	78	N	**6E**	**110**	**n**
0F	15	SI	**2F**	**47**	**/**	4F	79	O	**6F**	**111**	**o**
10	16	DLE	**30**	**48**	**0**	50	80	P	**70**	**112**	**p**
11	17	DC1	**31**	**49**	**1**	51	81	Q	**71**	**113**	**q**
12	18	DC2	**32**	**50**	**2**	52	82	R	**72**	**114**	**r**
13	19	DC3	**33**	**51**	**3**	53	83	S	**73**	**115**	**s**
14	20	DC4	**34**	**52**	**4**	54	84	T	**74**	**116**	**t**
15	21	NAK	**35**	**53**	**5**	55	85	U	**75**	**117**	**u**
16	22	SYN	**36**	**54**	**6**	56	86	V	**76**	**118**	**v**
17	23	ETB	**37**	**55**	**7**	57	87	W	**77**	**119**	**w**
18	24	CAN	**38**	**56**	**8**	58	88	X	**78**	**120**	**x**
19	25	EM	**39**	**57**	**9**	59	89	Y	**79**	**121**	**y**
1A	26	SUB	**3A**	**58**	**:**	5A	90	Z	**7A**	**122**	**z**
1B	27	ESC	**3B**	**59**	**;**	5B	91	[	**7B**	**123**	**{**
1C	28	FS	**3C**	**60**	**<**	5C	92	\	**7C**	**124**	**I**
1D	29	GS	**3D**	**61**	**=**	5D	93	]	**7D**	**125**	**}**
1E	30	RS	**3E**	**62**	**>**	5E	94	^	**7E**	**126**	**~**
1F	31	US	**3F**	**63**	**?**	5F	95	_	**7F**	**127**	**DEL**

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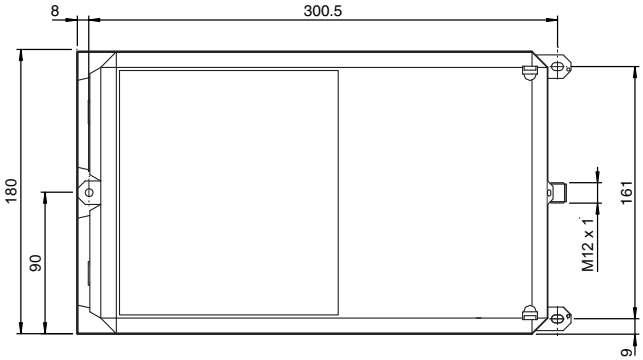
11 Appendix

11.1 Dimensions



11.2 Technical Data

General specifications

Device	IUH-F117-V1-EU	IUH-F117-V1-US	IUH-F117-V1-CN
Operating frequency	865.1 ... 867.9 MHz	902 ... 928 MHz	920.5 ... 924.5 MHz
Emitted power	ERP 2 W	EIRP 4 W	ERP 2 W
Operating distance	maximum: 6 m	maximum: 6 m	maximum: 6 m

Indicators/operating means

LED green/yellow	green: power on green flashing: read/write attempt performed Yellow: command executed

Electrical specifications

Power consumption	≤ 30 W
Supply	from the IDENTControl

Compliance with standards and directives

Device	IUH-F117-V1-EU	IUH-F117-V1-US	IUH-F117-V1-CN
Directive conformity			
R&TTE Directive 1995/5/EC	EN 301489-1 V1.9.2:2011 EN 301489-3 V1.4.1:2003 EN 302208-2 V1.4.1:2012 EN 60950-1:2006/A1:2010 EN 50364:2010	-	-

Standard conformity			
Electromagnetic compatibility	-	EN 301489-1 V1.9.2:2011 , EN 301489-3 V1.4.1:2003	EN 301489-1 V1.9.2:2011 , EN 301489-3 V1.4.1:2003
Safety	-	EN 60950-1:2006/A1:2010	EN 60950-1:2006/A1:2010
Protection degree	EN 60529:2000	EN 60529:2000	EN 60529:2000
Standards	-	EN 50364:2010	EN 50364:2010

Ambient conditions

Ambient temperature	-25 ... 55 °C (-13 ... 131 °F)
Storage temperature	-25 ... 85 °C (-13 ... 185 °F)

Mechanical specifications

Protection degree	IP54
Connection	M12 x 1 connector
Material	
Housing	aluminum / ABS
Mass	approx. 3.1 kg

11.3 Measurement Range

The maximum detection range of the read/write head in open areas is 6 m. The specified maximum operating range in industrial areas is around 3 m. This operating range represents a typical range and is determined by the tag used.

Other influencing factors include the design/installation of the specific application, interference from any materials present (in particular metal), and the ambient conditions. The read and write distances for the relevant tag, which are detailed separately, have been established in a test laboratory under ideal conditions. For this reason, the combination of read/write head and tag must be tested for the intended application under real conditions.

Please note the distance tables. The distance tables and additional information regarding your product can be found at http://www.pepperl-fuchs.com. Simply enter the product name or model number in the **Search** box and then click the **Search** key.

Select your product from the list of search results. Click on the information you require in the product information list, e.g., **Documents**.

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→ Datasheet
→ Documents
→ CAD+CAE
→ Approvals+Certificates
→ Associated Products

A list of all available documents is displayed.

Measurements produced the following far field for the IUH-F117-V1-* read/write head. This diagram shows the detection range for horizontal polarization under ideal conditions. The detection range shown is an example and varies depending on the tag types.

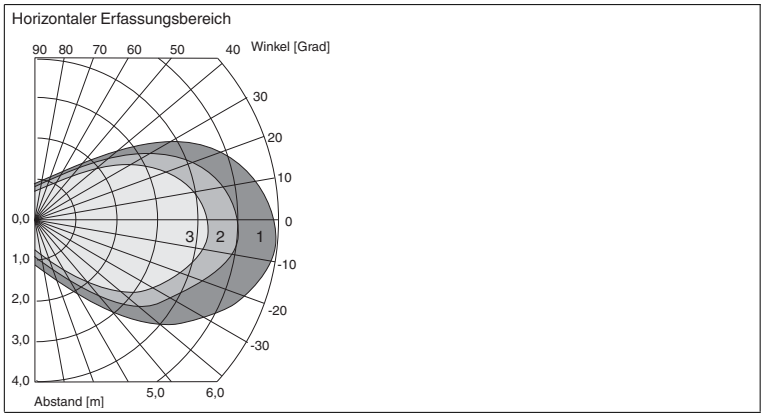

Figure 11.1 Horizontal detection range with horizontal polarization

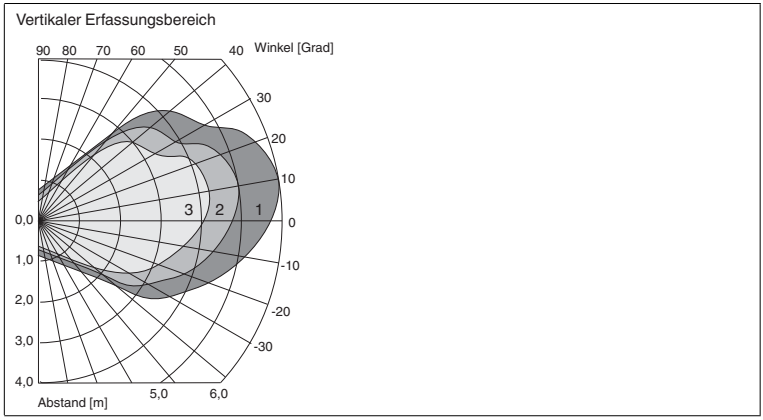

Figure 11.2 Vertical detection range with horizontal polarization

Curve 1 shows the detection range under optimum operating conditions with a transmission power of 2000 mW ERP.

Curve 2 shows the detection range under optimum operating conditions with a transmission power of 1000 mW ERP.

Curve 3 shows the detection range under optimum operating conditions with a transmission power of 500 mW ERP.

Passing Speed

The passing speed is the speed at which the tag moves through the detection range of a read/write head. The passing speed determines the time during which a tag is located within the detection range and therefore the time available for transmitting data. The passing speed depends on a number of different factors.

Example:

Write/read head with the enhanced read read-only code EF command continuously attempts to read a read-only code.

Time taken for the read-only code to be successfully read = 20 ms

Distance from the tag to the read/write head = 1.5 m for a detection range of ±30 °. The ideal distance is ≤ half the max. read distance as per the datasheet.

Therefore:

Distance covered (s) within the detection range: results from two attempts $\tan 30° = \frac{x}{1{,}5\ \text{m}}$

$s = 2x = 2 \cdot 1.5\ \text{m} \cdot \tan 30° = 1.73\ \text{m}$

Maximum tag speed: $v_{max} = \frac{1{,}73\ \text{m}}{20\ \text{ms}} = 86{,}5\ \text{m/s} \approx 300\ \text{km/h}$

Under industrial operating conditions, a read attempt may need to be repeated. The time required for this repeat is taken into account when calculating a maximum speed under real conditions. The maximum speed in this case is therefore ≈150 km/h.

Please consult Pepperl+Fuchs for specific data on read and write times, as well as passing speeds.

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