IQH1-*-V1

RFID read/write devices for IDENTControl, 13.56 MHz, ISO 15693

Manual

IDENTControl

Your automation, our passion.

PEPPERL+FUCHS

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2025-01

1 Introduction

1.1 Content of this Document

This document contains information required to use the product in the relevant phases of the product life cycle. This may include information on the following:

- Product identification
- Delivery, transport, and storage
- Mounting and installation
- Commissioning and operation
- Maintenance and repair
- Troubleshooting
- Dismounting
- Disposal

Note

For full information on the product, refer to the further documentation on the Internet at www.pepperl-fuchs.com.

Note

For specific device information such as the year of construction, scan the QR code on the device. As an alternative, enter the serial number in the serial number search at www.pepperl-fuchs.com.

The documentation comprises the following parts:

- This document
- Datasheet

In addition, the documentation may comprise the following parts, if applicable:

- EU-type examination certificate
- EU declaration of conformity
- Attestation of conformity
- Certificates
- Control drawings
- Instruction manual
- Functional safety manual
- Other documents

1.2 Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismounting lies with the plant operator.

Only appropriately trained and qualified personnel may carry out mounting, installation, commissioning, operation, maintenance, and dismounting of the product. The personnel must have read and understood the instruction manual and the further documentation.

Prior to using the product make yourself familiar with it. Read the document carefully.

1.3 Intended Use

Always operate the device as described in these instructions. Only in this way, the safe function of the device and the connected systems is guaranteed.

The protection of operating personnel and plant is only given if the device is used in accordance with its intended use.

1.4 Symbols Used

This document contains symbols for the identification of warning messages and of informative messages.

Warning Messages

You will find warning messages, whenever dangers may arise from your actions. It is mandatory that you observe these warning messages for your personal safety and in order to avoid property damage.

Depending on the risk level, the warning messages are displayed in descending order as follows:

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 the device and any connected systems and plants, or result in their complete failure.

Informative Symbols

Note

This symbol brings important information to your attention.

Action

1. This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.

2025-01

1.5 Terms and Abbreviations

Terms

Read/write tags	Mobile data memory with user data and unique number
Read-only code	Unique and unchangeable number of a read/write tag
IDENTControl	RFID control interface from Pepperl+Fuchs; interface to the higher-level controller; controls communication of the connected read/write devices
IQC	Pepperl+Fuchs-specific designation of read/write tags with 13.56 MHz
ISO/IEC 15693	Standard for data transfer for a 13.56 MHz RFID system
Tag	Read/write tag; tag
AFI	Identifier for the application family; represents the application type that is replaced by the tag; enables only the relevant ones to be addressed from a variety of tags
DSFI	Identifier for the data format; indicates how the data is structured in the tag memory

Abbreviations

AFI	**A**pplication **F**amily **I**dentifier
FCC	**F**ederal **C**ommunications **C**ommission
HF	**H**igh **F**requency
IC	**I**ndustry **C**anada
ISO	**I**nternational **S**tandardisation **O**rganisation
RFID	**R**adio **F**requency **Id**entification
RSSI	**R**eceived **S**ignal **S**trength **I**ndicator
PLC	**P**rogrammable**L**ogic **C**ontroller
UID	**U**nique **I**tem I**d**entifier
DSFID	**D**ata **S**torage **F**ormat **I**dentifier

2 Certificates and approvals

2.1 Declaration of Conformity (RE Directive 2014/53/EU)

This product was developed and manufactured in line with the applicable European standards and directives.

Note

A Declaration of Conformity can be requested from the manufacturer or downloaded from www.pepperl-fuchs.com.

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

ISO**9001**

2.2 FCC Information

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.

Attention:
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the 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 their own expense.

FCC Notice

To comply with FCC Part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

FCC Exposure Information

To comply with FCC RF exposure compliance requirements, the antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operated in conjunction with any other antenna or transmitter.

2025-01

2.3 IC Information

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC Exposure Information

To comply with IC RF exposure compliance requirements, the antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operated in conjunction with any other antenna or transmitter.

2.4 Other Country-Specific Approvals

All currently valid approvals can be found in the datasheet for your device at www.pepperl-fuchs.com.

3 Product Description

3.1 Product Description

Use and Application

The read/write devices are designed for writing and reading passive tags in the 13.56 MHz frequency range in accordance with the ISO15693 standard. The read/write devices must be operated with an IDENTControl control interface from Pepperl+Fuchs.

Figure 3.1 IQH1-FP-V1

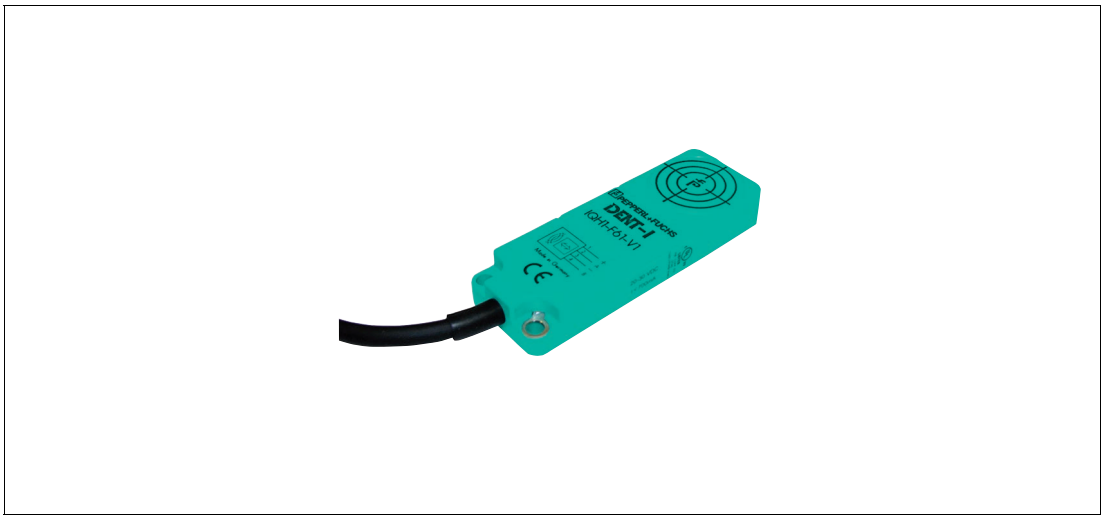


Figure 3.2 IQH1-F61-V1

Figure 3.3 IQH1-18GM-V1

3.2 Dimensions

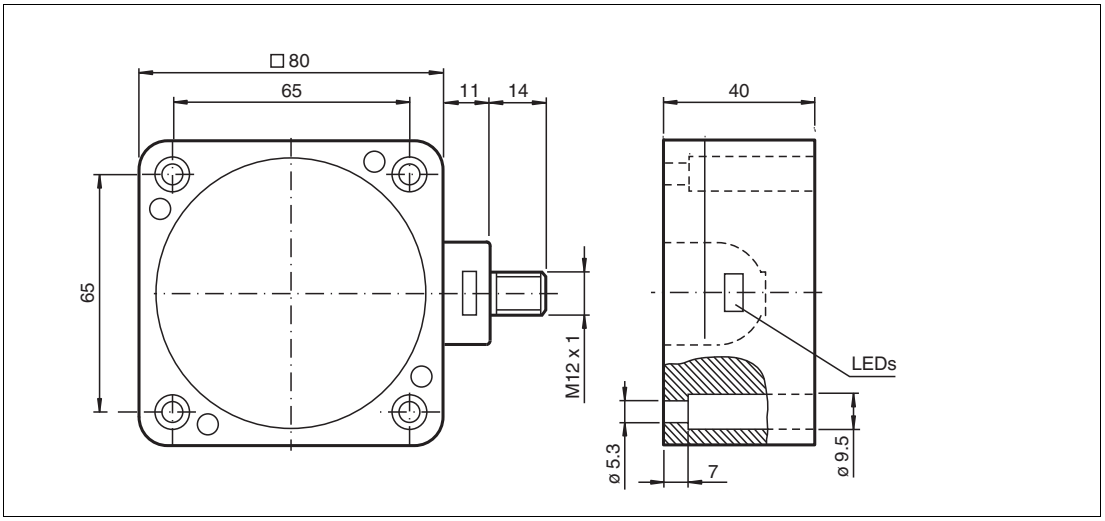


Figure 3.4 IQH1-FP-V1

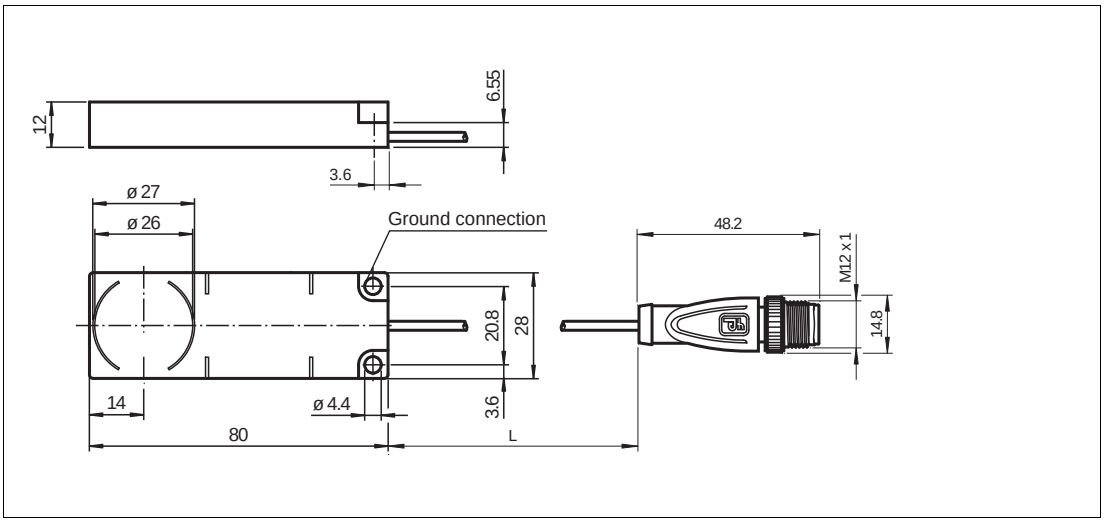


Figure 3.5 IQH1-F61-V1

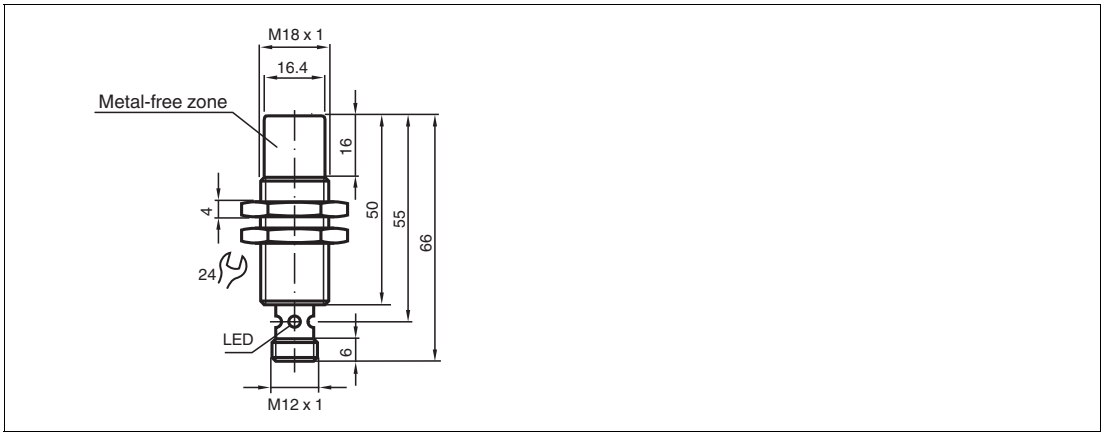


Figure 3.6 IQH1-18GM-V1

3.3 Indicators

The RFID read/write devices IQH1-FP-V1 and IQH1-18GM-V1 have one dual LED to indicate the operating state. The various indicators denote:

LED	Description
Green	On: Device is ready for operation Flashing: Write/read attempt performed
Yellow	On: Write/read attempt was successful

3.4 Electrical Connection

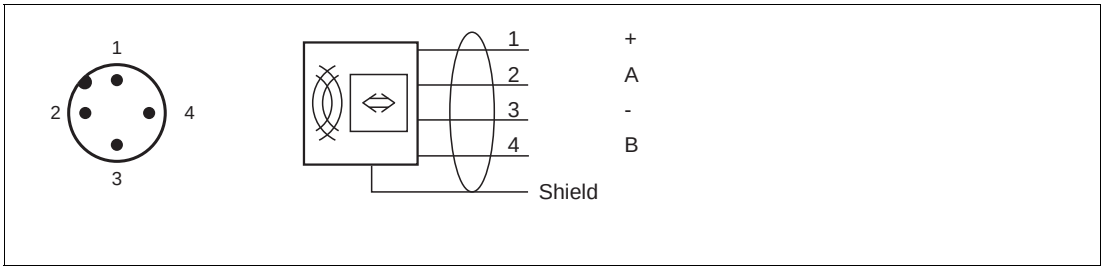


Figure 3.7

The read/write devices are connected to the IDENTControl control interface via an M12 x 1 connector.

3.5 Accessories

3.5.1 IDENTControl

The read/write devices are connected to Pepperl+Fuchs IDENT*Control* control interfaces.

Figure 3.8

Figure 3.9

Interface	Designation
4 read/write devices:	
Ethernet	IC-KP-B17-AIDA1
PROFIBUS	IC-KP-B6-V15B
Serial	IC-KP-R2-V1
Devicenet	IC-KP-B7-V95
2 read/write devices:	
PROFIBUS	IC-KP2-2HB6-V15B
Ethernet	IC-KP2-2HB17-2V1D
EtherCAT	IC-KP2-2HB21-2V1D
Serial	IC-KP2-2HRX-2V1
1 read/write device:	
PROFIBUS	IC-KP2-1HB6-V15B IC-KP2-1HB6-2V15B
Ethernet	IC-KP2-1HB17-2V1D
Serial	IC-KP2-1HRX-2V1

Table 3.1

3.5.2 Read/Write Tags

The read/write devices can access any read/write tag that is compliant with the ISO15693 standard. For an overview of possible read/write tags see chapter 6.1. The following read/write tags from Pepperl+Fuchs can be used, for example:

Type	Designation
ISO15693	IQC21-16 50pcs IQC21-30 25pcs IQC21-50 25pcs IQC33-30 25pcs IQC33-50 25pcs IQC22-C1 10pcs

Table 3.2

3.5.3 Connection Cable for Read/Write Devices and Trigger Sensors

Compatible connection cables with shielding are available to connect the read/write devices and trigger sensors.

Figure 3.10

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 attachable female connector, straight, shielded	V1-G-ABG-PG9
Field attachable male connector, straight, shielded	V1S-G-ABG-PG9
Field attachable female connector, angled, shielded	V1-W-ABG-PG9
Field attachable male connector, angled, shielded	V1S-W-ABG-PG9
Dummy plug M12x1	VAZ-V1-B3

4 Installation

4.1 Storage and Transportation

Keep the original packaging. Always store and transport the device in the original packaging.

Store the device in a clean and dry environment. The permitted ambient conditions must be considered, see datasheet.

4.2 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.

4.3 Mounting

Note

The read/write device is intended for wall mounting or mounting on brackets in indoor spaces. Mount the device on a flat surface.

Attach the device using the existing mounting holes in the housing only.

Caution!

Hot surfaces

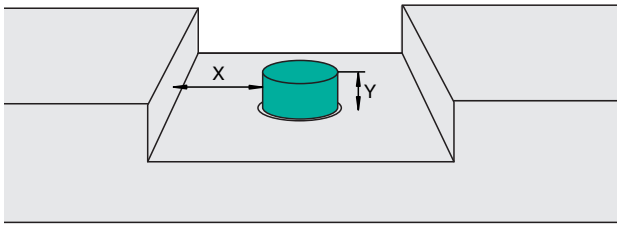
Risk of burns when handling the read/write device! Allow the device to cool for at least half an hour after it has been switched off before touching it.

Attach the read/write device IQH1-F61-V1 with two screws and IQH1-FP-V1 with four screws that are inserted into the housing through the mounting holes provided. Attach the read/write device IQH1-18GM-V1 using suitable mounting material, for example nuts or mounting aids.

4.4 Minimum Distances

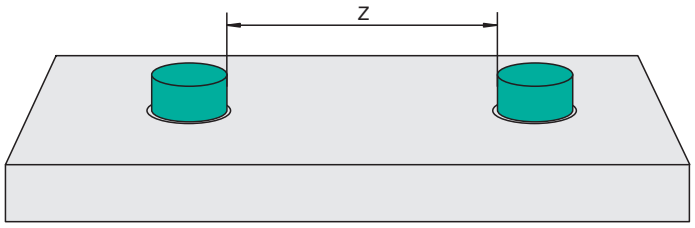
For flush-mounting in metal surfaces, a lateral minimum distance X to metal must be observed.

For flush-mounting in metal, a protrusion Y above the mounting surface must be observed.



Read/write device	X	Y
IQH1-18GM-V1	50 mm	16 mm
IQH1-F61-V1	50 mm	12 mm
IQH1-FP-V1	50 mm	40 mm

When mounting several RFID read/write devices next to each other, a minimum distance Z must be observed. This distance prevents the read/write heads from interfering with each other.



Read/write device	Z
IQH1-18GM-V1	Multiplex on: ≥ 30 mm, Multiplex off: ≥ 80 mm
IQH1-F61-V1	Multiplex on: ≥ 100 mm, Multiplex off: ≥ 150 mm
IQH1-FP-V1	Multiplex on: ≥ 100 mm, Multiplex off: ≥ 150 mm

4.5 Connection

Connect the read/write device to the IDENTControl control interface using a shielded connection cable (see chapter 3.5.3). Ensure that the shield fully encapsulates the connection cable to avoid EMC interference. See chapter 4.6.

Warning!

Incorrect electrical connection

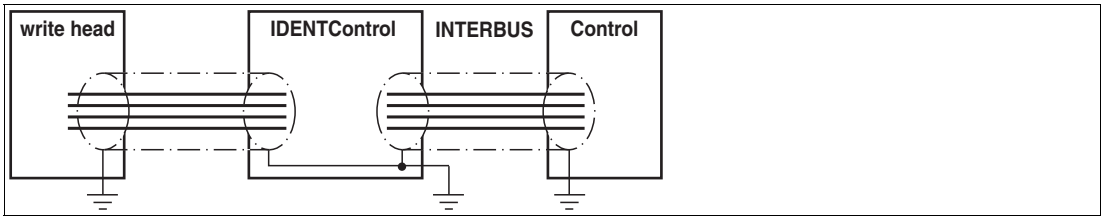
Damage to the device or plant caused by incorrect electrical connection.

Check all connections in the plant before commissioning the device.

After connecting the supply voltage, the POWER LED on the device lights up green. If the LED does not light up on the device, the power supply is not connected correctly.

4.6 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 3.7 on page 12)

5 Commissioning

5.1 Definitions

5.1.1 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 7.2

5.1.2 Legend

Name	Meaning
<ChanNo>	IDENT*Control* channel
<CHCK>	1 byte, 8-bit check sum with the addition of all preceding characters, without overflow
<CR>	1 ASCII character
<Data>	Data with the size <WordNum> multiplied by 4 bytes
<DeviceNo>	2 ASCII characters
<ExecCounter>	• `-`: no command active • `Ø`: Command active, no new read/write tag has been read or written since the last reading operation • `1`: Read/write tag successfully read or written • `2 ... n`: Since the last reading operation, several read/write tags have been detected in the sensing range. There is a risk that the data read has not been transferred.
<ETX>	1 byte = 03_{hex}
<Status>	1 ASCII character, see chapter 7.1
<TagType>	2 ASCII characters
<WordAddr>	Word start address in the read/write tag, 4 hex_{ASCII} characters, range from "0000" 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

Table 5.1

5.2 Operation via the Command Interface

This section shows you how to operate the read/write device 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/PROFINET interfaces. Further details about these codes and the factory settings for your IDENTControl control interface can be found in the corresponding manual.

For example:

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

Reading tags

enhanced buffered read read-only code

Send the enhanced buffered read read-only code command to the read/write device. The green LED on the read/write device starts flashing.

	Serial	Ethernet	PROFIBUS/PROFINET
Command:	EF1	.00.04.1D.02	.1D.02
Confirmation:	-	.00.06.1D.02.FF.0E	.1D.02.FF.0E
Response:	.35.31	.00.06.1D.02.05.0F	.1D.02.05.0F

Table 5.2 enhanced buffered read read-only code, no tag in the sensing range

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

	Serial	Ethernet	PROFIBUS/PROFINET
Response:	.30.31.E0.08.01.48.82.ED.9B.AC	.00.0E.1D.02.00.10.E0.08.01.48.82.ED.9B.AC	.1D.02.00.10.E0.08.01.48.82.ED.9B.AC

Table 5.3 enhanced buffered read read-only code, tag is entering the sensing range

6 Operation

6.1 Read/Write Tags 13.56 MHz ISO15693

The read/write tags of an RFID system with 13.56 MHz offer significantly quicker access to the data than a comparable RFID system based on an operating frequency of 125 kHz. The 13.56 MHz system is standardized through ISO15693. A great variety of read/write tags from different manufacturers using different RFID chips is supported.

Parameterization of the associated tag type is recommended to set the RFID read/write device to the tag being used. On delivery of the read/write device, read/write tag type 20 is preset. This setting guarantees access to the read-only code of ISO15693-compliant read/write tags. The following table shows the read/write tag types specified and recommended for the read/write device.

13.56 MHz/ISO 15693 tag types

Pepperl+ Fuchs designation	Chip type	Manufacturer	Length of read-only code [byte]	Size of read/write memory [byte]	Size of memory block [byte]
IQC20	All read/write tags in accordance with ISO15693	-	8	Depending on the read/write tag	Depending on the read/write tag
IQC21	I-Code SLI(X)	NXP	8	112	4
IQC22	Tag-it HF-I Plus	Texas Instruments	8	256	4
IQC23	my-D SRF55V02P	Infineon	8	224	4
IQC24	my-D SRF55V10P	Infineon	8	992	4
IQC27[1]	EM4135	EM Microelectronic	8	288	8
IQC31	Tag-it HFI standard	Texas Instruments	8	32	4
IQC32	Tag-it HFI pro	Texas Instruments	8	32	4
IQC33 [1]	FRAM MB89R118	Fujitsu	8	2000	8
IQC34	FRAM MB89R119	Fujitsu	8	232	4
IQC35	I-Code SLI-S	NXP	8	160	4
IQC36	I-Code SLI-L	NXP	8	32	4
IQC37 [2]	FRAM MB89R112	Fujitsu	8	8192	32
IQC38	EM4233	EM Microelectronic	8	208	4

Table 6.1 13.56 MHz tag types in accordance with ISO 15693

1. Exception: Block size = 8 bytes
'Number of bytes' must be a multiple of 8

2. Exception: Block size = 32 bytes
'Number of bytes' must be a multiple of 32

All ISO15693-compliant read/write tags have a unique 8 byte read-only code. The read-only code is determined by the chip manufacturer. The user can only read it and it cannot be changed. In addition, the read/write tags have a memory for user data. This can be written with application-specific data and read. The size of the memory for the user data differs according to the tag type.

The memory is divided into blocks with a length of 4 bytes. There are also exceptions with a block length of 8 bytes or 32 bytes.

The read and write commands use the "Number of bytes" and "Start address" parameters. This defines how many bytes are accessed in the memory of the user data and from which memory address this starts. If the tag type used, for example, has a block length of 4 bytes, the values of the "Number of bytes" and "Start address" parameters must be a multiple of 4. In the case of a block length of 8 or 32 bytes, they are multiples of 8 or 32.

6.2 General

The information below contains details about the commands that relate to your read/write device. The commands are described using the example of an IDENTControl control interface with serial interface. All other generally applicable commands and error messages or status messages can be found in the manual for your IDENTControl control interface.

6.3 Overview of Commands

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

The following uses the command syntax for the IQH1-*-V1 read/write devices with IDENTControl serial control interface. The channel number <ChanNo> is included in the commands.

Read/Write Commands

Abbreviation	Command description
SF	See "Single Read Read-Only Code SF" on page 23
EF	See "Enhanced Buffered Read Read-Only Code EF" on page 23
SR	See "Single Read Words SR" on page 23
ER	See "Enhanced Buffered Read Words ER" on page 23
SW	See "Single Write Words SW" on page 23
EW	See "Enhanced Buffered Write Words EW" on page 23
SL	See "Single Write Words with Lock SL" on page 24
EL	See "Enhanced Write Words with Lock EL" on page 24
S#	See "Fill Datacarrier S#" on page 26
SG	See "Single Get Configuration SG" on page 24
EG	See "Enhanced Get Configuration EG" on page 25
SC	See "Single Set Configuration SC" on page 25
EC	See "Enhanced Set Configuration EC" on page 26

2025-01

6.4 Read/Write Commands

Single Read Read-Only Code SF

The read/write device makes one attempt to read a read-only code.

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

Enhanced Buffered Read Read-Only Code EF

The read/write device makes continuous attempts to read a read-only code. If a read-only code is read, this is reported once.

A status 5 message is sent when a tag leaves the sensing range.

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

Single Read Words SR

The read/write device makes one attempt to read <WordNum> 32-bit words from the address <WordAddr> onward.

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

Enhanced Buffered Read Words ER

The read/write device continuously attempts to read <WordNum> 32-bit words from the address <WordAddr> onward. Only changing data is transferred via the interface.

A status 5 message is sent when a tag leaves the sensing range.

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

Single Write Words SW

The read/write device makes one attempt to write <WordNum> 32-bit words from the address <WordAddr> onward.

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

Enhanced Buffered Write Words EW

The read/write device continuously attempts to write <WordNum> 32-bit words from the address <WordAddr> onward. The device sends a response if the command is successful.

The read/write device reads the written tag until it leaves the sensing range or a new tag reaches the sensing range.

The read/write device continuously attempts to write to the new tag.

If there is no new tag in the sensing range, and if the written tag leaves the sensing range, a status 5 is reported.

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

Single Write Words with Lock SL

The read/write device makes one attempt to write <WordNum> 32-bit words from address <WordAddr> onward and to block overwriting.

The data is write-protected at the end of the write process, provided the tag offers this function. The write protection is permanent and cannot be undone.

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

Enhanced Write Words with Lock EL

The read/write device continuously attempts to write <WordNum> 32-bit words from address <WordAddr> onward and to block overwriting. The device sends a response if the command is successful.

The data is write-protected at the end of the write process, provided the tag offers this function. The write protection is permanent and cannot be undone.

The read/write device reads the written tag until it leaves the sensing range or a new tag reaches the sensing range.

The read/write device continuously attempts to write to the new tag.

If there is no new tag in the sensing range, and if the written tag leaves the sensing range, a status 5 is reported.

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

Single Get Configuration SG

The read/write head makes precisely one attempt to read the AFI or DSFID.

Command:	SG <ChanNo> <FunctionNo> <CHCK> <ETX>
Response:	<Status> <ChanNo> <Data 1> <Data 2> …<Data n> <CHCK> <ETX>

<FunctionNo> = 30_{hex} = ‘0’

<Data 1> Infoflags

<Data 2> UID (LSB)

etc.

<Data 9> UID (MSB)

[<Data 10> DSFID][1]

[<Data 11> AFI][1]

[<Data 12> VICC memory size, number of blocks -1][1]

[<Data 13> VICC memory size, block size in bytes - 1][1]

[<Data 14> IC Reference][1]

1. This data is only sent if the corresponding info flag is set in <Data 1> by the chip manufacturer. (See ISO15693-3:2019 Chapter 10.4.12). If no data is sent, any subsequent data will move forward accordingly.

Example

SG10 makes precisely one attempt to read the AFI or DSFID.

Meaning of the bytes in response .30.31.0F.BC.59.54.E8.7E.01.08.E0.00.39.F9.07.84

.30 = Status 0_{ASCII}, command has been executed without error

.31 = 1_{ASCII}, IDENTControl channel 1

.0F = DSFID, AFI, VICC Memory Size, and IC Reference are supported

.BC.59.54.E8.7E.01.08.E0 = UID

.00 = DSFID

.39 = AFI

.F9 = 249_{dec}, number of blocks -1

.07 = 7_{dec}, block size in bytes - 1

.84 = IC Reference

Enhanced Get Configuration EG

The read/write head makes continuous attempts to read the AFI or DSFID.

Command:	EG <ChanNo> <FunctionNo> <CHCK> <ETX>
Response:	<Status> <ChanNo> <Data 1> <Data 2> …<Data n> <CHCK> <ETX>

<FunctionNo> = 30_{hex} = '0'

<Data 1> Infoflags

<Data 2> UID (LSB)

etc.

<Data 9> UID (MSB)

[<Data 10> DSFID][1]

[<Data 11> AFI][1]

[<Data 12> VICC memory size, number of blocks -1][1]

[<Data 13> VICC memory size, block size in bytes - 1][1]

[<Data 14> IC reference][1]

Single Set Configuration SC

The read/write device makes precisely one attempt to write the AFI or DSFID.

If the AFI or DSFID is already read-only, a rewrite or write-protect operation has a response with status 5.

Command:	SC <ChanNo> <ConfAddr> <Data 1> <Data 2> <Data 3> <Data 4> <CHCK> <ETX>
Response:	<Status> <ChanNo> <CHCK> <ETX>

<ConfAddr> = 30_{hex} = '0' (Write AFI and Lock AFI); 31_{hex} = '1' (Write DSFID and Lock DSFID)

1. This data is only sent if the corresponding info flag is set in <Data 1> by the chip manufacturer. (See ISO15693-3:2019 Chapter 10.4.12). If no data is sent, any subsequent data will move forward accordingly.

<Data 1> = Lock of the AFI; 00_{hex} / 30_{hex} without lock AFI, 01_{hex} / 31_{hex} with lock AFI

<Data 2> = AFI value

<Data 3> = not used; 00_{hex}

<Data 4> = not used; 00_{hex}

Example

SC100900 writes the AFI to channel 1 with 39 hex without lock.

Enhanced Set Configuration EC

The read/write head makes continuous attempts to write the AFI or DSFID.

If the AFI or DSFID is already read-only, a rewrite or write-protect operation has a response with status 5.

Command:	EC <ChanNo> <ConfAddr> <Data 1> <Data 2> <Data 3> <Data 4> <CHCK> <ETX>
Response:	<Status> <ChanNo> <CHCK> <ETX>

<ConfAddr> = 30_{hex} = '0' (Write AFI and Lock AFI); 31_{hex} = '1' (Write DSFID and Lock DSFID)

<Data 1> = Lock of the AFI; 00_{hex} / 30_{hex} without lock AFI, 01_{hex} / 31_{hex} with lock AFI

<Data 2> = AFI value

<Data 3> = not used; 00_{hex}

<Data 4> = not used; 00_{hex}

Fill Datacarrier S#

The word number <WordNum> of fill signs <Fill Sign> is written to the read/write tag from the specified start address <WordAddr>.

Command:	S# <ChanNo> <WordAddr> <NumOfWords>[1] <Fill Sign> <CHCK> <ETX>
Response:	<Status> <ChanNo> <CHCK> <ETX>

1. <NumOfWords> = 4 ASCII characters

Example

S#100050002Z fills from address 0005 to 0007 with fill sign Z_{ASCII}.

Note

If <NumOfWords> is set to 0000, the read/write tag is filled to the end of the read/write tag from <WordAddr> onward.

7 Appendix

7.1 Error and Status Messages

Status/ error	Description
0	The command has been executed without error.
1	Excess temperature
2	Switch-on message, reset has been 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 sensing range.
6	Hardware error, e.g., error during self-test or read/write device defective
7	Internal device error.
8	Reserved
9	The programmed tag type is not compatible with the read/write device.
A	Single-frame protocol: multiple tags in the sensing range Multi-frame protocol: Multiple tags in the sensing range with the same UID
B	Output of additional information
C	Reserved
D	Reserved
E	Internal memory overflow; execute reset
F	End of an output in the multi-frame protocol,

7.2 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**	**l**
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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