IQH3-FP-V1

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

Manual

IDENTControl

Your automation, our passion.

PEPPERL+FUCHS

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2023-11

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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.

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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 **Id**entifier
DSFID	**D**ata **S**torage **F**ormat **I**dentifier

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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.

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2.3 IC Information

This device complies with Industry Canada license-exempt RSS standard(s) and with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie 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'utilisateur de 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 UL Information

Technical Data and Environmental Conditions

This device is for indoor use only.

This device may be operated in altitudes up to 5000 m.

The ambient temperature range is from -20 °C ... +70 °C for operation with non-transmission periods, or -25 °C ... +55 °C for continuous transmission mode. The Pollution degree is 2.

The maximum relative humidity is 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C.

Nominal power supply voltage is 24 V_{DC}, voltage range is 20 V ... 30 V_{DC}. Supply must be LEC (Limited Energy Circuit), LPS (Limited Power Source) or CLASS 2. The Overvoltage Category II is applied. This is ensured, when a Pepperl+Fuchs IDENTControl control interface is used.

Protection class IP67 is not included in the UL approval. The protection class is tested by Pepperl+Fuchs SE.

The enclosure type is 1.
The products are intended for use in or with industrial machinery applications as defined in the Electrical Standard for Industrial Machinery, NFPA 79.

The ext. circuits are intended to be connected to this unit shall be galv. separated from mains supply or hazardous live voltage by reinforced or double insulation and meet the limits of clauses 6.3 and 9.4 of UL 61010-1.

2.5 Other Country-Specific Approvals

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

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3 Product Description

3.1 Product Description

Use and Application

The IQH3-FP-V1 read/write device is designed for writing and reading passive tags in the 13.56 MHz frequency range in accordance with the ISO15693 standard. The read/write device must be operated with an IDENTControl control interface from Pepperl+Fuchs.

Figure 3.1   IQH3-FP-V1

3.2 Dimensions
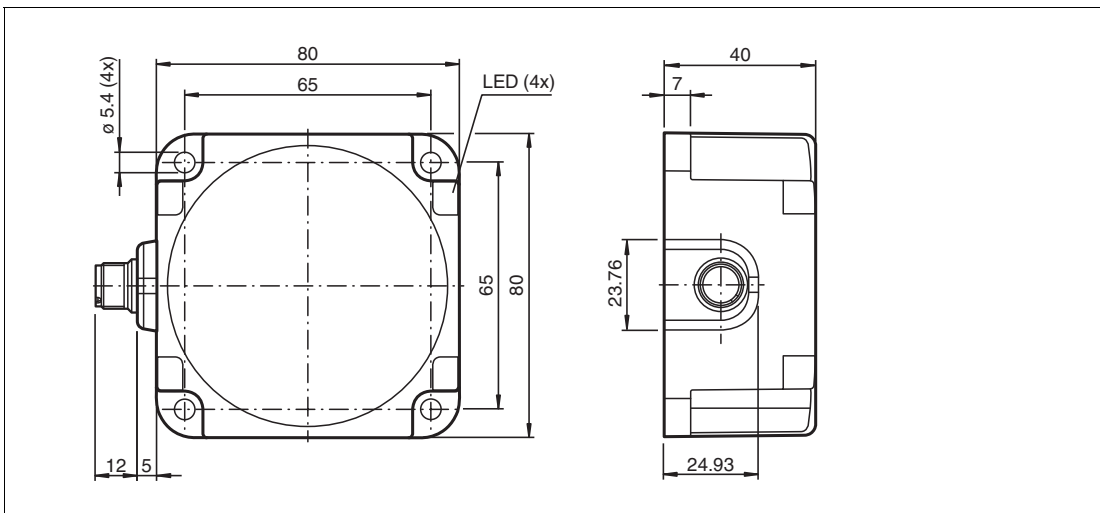
Figure 3.2   IQH3-FP-V1

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2023-11

3.3 Indicators

The RFID read/write device has four LEDs to indicate the operating state. The various indicators denote:

LED	Description
Green	On: Device is ready for operation
Blue	On: Write/read attempt is being performed
Yellow	On: Write/read attempt was successful
Red	On: Interference from external signals in the usage spectrum, range may be limited Slow flashing (1 Hz): Metal interference Fast flashing (10 Hz): Excess temperature

3.4 Electrical Connection

Caution!

Cable specifications

The maximum permissible temperature of the connection cable must be at least +70 °C. The minimum diameter of the connection cable must be 22 AWG or 0.34 mm².
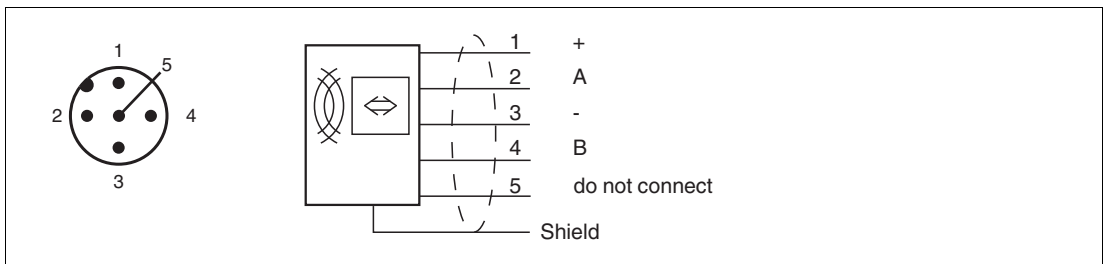
Figure 3.3

The IQH3-FP-V1 read/write device is connected to the IDENTControl control interface via an M12 x 1 connector.

3.5 Accessories

3.5.1 IDENTControl

The read/write device is connected to Pepperl+Fuchs IDENT*Control* control interfaces.

Figure 3.4

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Figure 3.5

Interface	Designation
4 read/write devices:	
Ethernet	IC-KP-B17-AIDA1
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 device 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

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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 3.6

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

3.5.4 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.
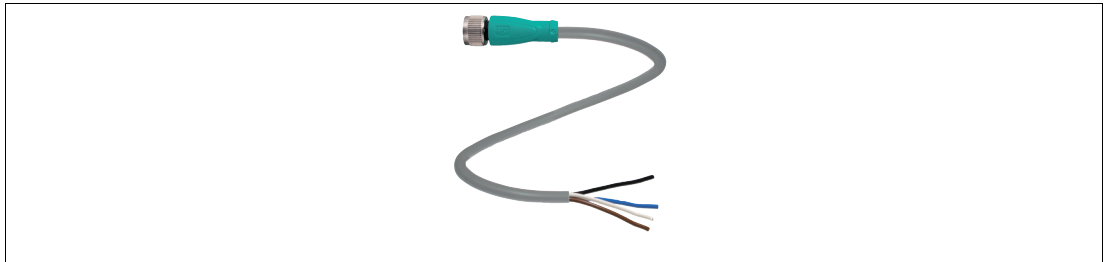
Figure 3.7

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

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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 using four screws with a diameter of 4 mm, together with flat washers and fastening material suitable for the type of mounting surface.

The tightening torque of the screws depends on the type of mounting. We recommend using a tightening torque of 1.8 Nm. Use a maximum tightening torque of 2.4 Nm to prevent damage to the plastic housing.

Note

Do not route the connection cable of the read/write device and the IDENTControl control interface into the raceway area of the read/write tag. Maintain a distance of at least 10 cm.

If the distance is too small, it can occur in rare cases that the read/write tag is incorrectly detected by inductive couplings on the connection cable.

2023-11

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4.4   Minimum Distances

During simultaneous operation of several read/write devices, only one device may ever communicate with a tag at any given time. When arranging the read/write devices, make sure that the sensing ranges do not overlap. You can change the transmit power to enlarge or reduce the size of the sensing range. Determine the sensing range of each device at the mounting location.

If you want to transmit with just one read/write device, use the multiplex mode of the IDENT-Control control interface. Multiplex mode allows chronologically exclusive access to tags, and prevents mutual interference from read/write devices. For a precise description, see the manual for your control interface.

When mounting multiple read/write devices, keep to the following minimum distances:

Multiplex mode	Minimum distance
On	≥ 100 mm
Off	≥ 750 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 IDENTControl owes its outstanding immunity against emission and immission to its consistent shielding design. It uses the principle of the Faraday cage. Interference is intercepted by the shielding.
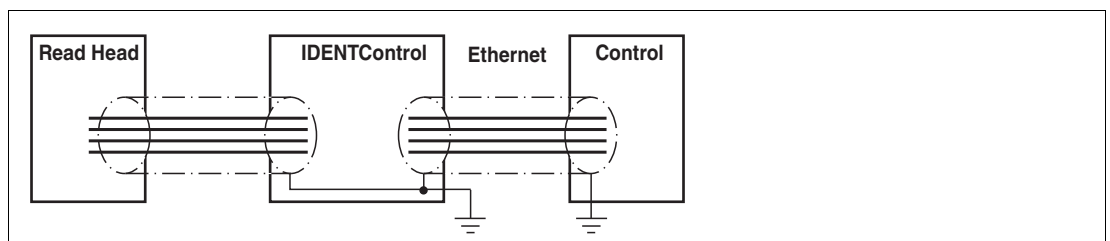
Figure 4.1

The cable shielding is used to discharge electromagnetic interference.

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.

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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 • `∅`: 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 examples below, the read/write device is connected to channel 1 of the control interface.

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Reading tags

enhanced buffered read read-only code

Send the enhanced buffered read read-only code command to the read/write device. The blue LED on the read/write device lights up.

	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

Parameterizing the Read/Write Device

Requesting and Setting the Transmit Power

Read out the read/write device's transmission power using the read parameter PT command:

	Serial	Ethernet	PROFIBUS/PROFINET
Command:	RP1QPT.00.00	.00.0A.BE.02.00.51.50.54. 00.00	.BE.03.00.51.50.54.00.00
Confirmation:	-	.00.06.BE.02.FF.33	.BE.02.FF.33
Response:	.30.31.00.04	.00.0A.BE.02.00.34.00.02. 00.04	.BE.02.00.34.00.02.00.04

Table 5.4   read parameter, **Power** mode

The transmit power of the read/write device is set to **Power** mode.

Change the transmit power of the read/write device to **Eco** mode using the write parameter PT command:

	Serial	Ethernet	PROFIBUS/PROFINET
Command:	WP1QPT.00.02.0 0.02	.00.0C.BF.02.00.51.50.54. 00.02.00.02	.BF.02.00.51.50.54.04.00. 02.00.02
Confirmation:	-	.00.06.BF.02.FF.35	.BF.02.FF.35
Response:	.30.31	.00.06.BF.02.00.36	.BF.02.00.36

Table 5.5   write parameter, **Eco** mode

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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
IQC50	I-Code SLI-X2	NXP	8	316	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

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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 Sensing Range

The read/write device is classified with a sensing range of up to 30 cm. The range of the device depends on the tags to be identified and may therefore vary. You can increase or decrease the sensing range by changing the transmit power accordingly.

Note

To comply with the limit value of the magnetic field strength of max. 10 A/m in accordance with ISO 15693-1, a minimum distance of 50 mm must be maintained between the tag and the read/write device at a transmit power PT > 1. Otherwise, there is a risk that a tag will be damaged in the close range. Reduce the transmit power of the read/write device to PT = 1 to meet the limit value at small minimum distances.

6.4 Multiple Tags in Sensing Range

Each read or write command can access one, several, or all tags in the sensing range. To respond to specific tags in the sensing range, you can set a filter to the tag UIDs via the **TI** parameter. See "Tag ID Filter TI" on page 34.

Note

For applications in the multi-frame protocol, always use tags of the same tag type.

6.5 Overview of Commands

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

The following uses the command syntax for the IQH3-FP-V1 read/write device 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 20
EF	See "Enhanced Buffered Read Read-Only Code EF" on page 20
SR	See "Single Read Words SR" on page 21
ER	See "Enhanced Buffered Read Words ER" on page 21
SW	See "Single Write Words SW" on page 21
EW	See "Enhanced Buffered Write Words EW" on page 21
SL	See "Single Write Words with Lock SL" on page 21
EL	See "Enhanced Write Words with Lock EL" on page 22
S#	See "Fill Datacarrier S#" on page 25
SG	See "Single Get Configuration SG" on page 22
EG	See "Enhanced Get Configuration EG" on page 23
SC	See "Single Set Configuration SC" on page 24
EC	See "Enhanced Set Configuration EC" on page 24

Configuration commands

Abbreviation	Command description
RP	See "Read Parameters" on page 26
WP	See "Write Parameters" on page 26

6.6 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>

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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.

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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]

---

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.

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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)

<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}

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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.

6.7 Configuration Commands

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

6.7.1 Read and Write Parameters

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

Parameter

Abbreviation	Page	Parameter	Default value
AF	See "AFI to request AF" on page 27	Readable/writeable	0 = all tags
CT	See "Change Tag CT" on page 27	Readable/writeable	20 = mixed operation
DR	See "Data Rate DR" on page 28	Readable/writeable	0 = normal
E5	See "Enhanced Status 5 E5" on page 28	Readable/writeable	5
IF	See "IF Information" on page 28	Readable/writeable	0 = off
NT	See "Number of Tags to Find NT" on page 29	Readable/writeable	255 = off
OH	See "Operating Hours OH" on page 29	Readable	-
PT	See "Power Transmit PT" on page 30	Readable/writeable	4 = Maximum
QV	See "Protocol Mode QV" on page 30	Readable/writeable	S = single-frame protocol
QW	See "Q Value QW" on page 31	Readable/writeable	0 = one tag
RD	See "Reset to Default RD" on page 31	Writeable	-
ST	See "Status Frontend ST" on page 32	Readable	-
TA	See "Tries Allowed TA" on page 33	Readable/writeable	2 = two attempts
TE	See "Temperature TE" on page 33	Readable	-

PEPPERL+FUCHS

Abbrevi-ation	Page	Parameter	Default value
TI	See "Tag ID Filter TI" on page 34	Readable/writeable	-
TO	See "Excess Temperature Handling TO" on page 34	Readable/writeable	0 = off

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

Read Parameters

The RP command reads configuration parameters from the read/write device.

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

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

<SystemCode> = Q$_{ASCII}$ for IQH3-*

<ParamTyp> = 2 bytes ASCII

<DataLength> = Length of <Data> in command, 2 bytes binary

<Data> = Optional additional information

Example

RP1QE5.00.00 outputs the number of unsuccessful read attempts until status 5.

Write Parameters

The WP command writes configuration parameters to the read/write device.

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

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

<SystemCode> = Q$_{ASCII}$ for IQH3-*

<ParamTyp> = 2 bytes ASCII

<DataLength> = Length of <Data>, 2 bytes binary

<Data> = Optional additional information

Example

WP1QE5.00.01.05 sets the number of unsuccessful read attempts until status 5 to five attempts.

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6.7.2 Parameters

AFI to request AF

The AF parameter can be used to filter tags based on the AFI value. Read/write commands are only executed for tags whose AFI value corresponds to the value of the filter.

ParamTyp: AF

Default: AF = 0 = all tags respond

Value range: 0 – 255

Example

WP1QAF.00.01.39 sets the value of the AFI filter to 39 (57_{dez}).

WP1QAF.00.01.00 resets the filter so that all tags respond again.

RP1QAF.00.00 reads out the value of parameter AF.

Change Tag CT

This parameter sets the tag type with which the read/write device communicates.

ParamTyp: CT

Default: CT = 20_{dec}

Value range: 20_{dec} to 39_{dec}, 50_{dec}

For details of supported read/write tags, please see see chapter 3.5.2 and see chapter 6.1.

With the tag type "20", mixed operation of different read-only / read/write tags is possible. Only the read-only code UID is read out with this tag type.

Example

WP1QCT.00.01.15 sets the tag type to 21_{dec}[1].

RP1QCT.00.00 reads out the currently set tag type.

1. Chiptype NXP I-Code SLIX

Note

You can also set the tag type using the CT system command. This command is described in your IDENTControl control interface manual. We recommend using the CT system command because the tag type is stored in the IDENTControl control interface and sent to the read/write device at startup.

PEPPERL+FUCHS

Data Rate DR

This parameter sets the transfer rate between the read/write device and read/write tag.

ParamTyp:	DR
Default:	DR = 0
Value range:	0 = normal = 26 kBit/s
	1 = fast read mode = 53 kBit/s[1]

1. ISO/IEC 15693-2 X2

The "fast read mode" is only supported by tag types IQC21, IQC33, IQC37, and IQC50 with a memory size of two blocks or more.

Example

WP1QDR.00.01.01 puts the read/write device into "fast read mode".

RP1QDR.00.00 reads out the currently set transfer rate.

Enhanced Status 5 E5

The E5 parameter sets the number of unsuccessful write/read attempts when executing an Enhanced command before the device outputs the telegram with the status value 5. Via the telegram with the status 5, the device indicates that a tag has left the sensing range or could no longer be identified. This parameter is only used when performing enhanced commands. When executing single commands, the parameter has no significance.

Status 0 and status A do not depend on this parameter, and are output immediately.

ParamTyp:	E5
Default:	E5 = five unsuccessful read/write attempts
Value range:	0 – 10 unsuccessful read/write attempts

Example

WP1QE5.00.01.05 sets the number to five unsuccessful read/write attempts until a status 5 is output.

RP1QE5.00.00 reads out the specified number of unsuccessful read/write attempts.

Effects with reduced number of unsuccessful read/write attempts:

⊕ Faster response time in Enhanced mode.

⊖ Multiple status 5 messages in the event of unstable tag reading.

IF Information

The IF parameter allows you to output the RSSI value of the reading as additional information if the reading was successful and the multi-frame protocol is activated. See "Protocol Mode QV" on page 30.

ParamTyp:	IF
Default:	IF = 0
Value range:	0, 1

Example

WP1QIF.00.01.01 prompts the read/write device to output additional information after each successful reading.

RP1QIF.00.00 outputs the value of the IF parameter.

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The additional information is output in the following format:

```
B<ChanNo> <Info-Typ> <RSSI>
```

To distinguish the additional information from standard information, the output starts with status B as the first ASCII character, followed by the IDENTControl channel, the <InfoTyp>, which states that it is an information frame of type .01, and the RSSI value, which is between 0 and 100. 0 indicates a low RSSI value, 100 indicates a high RSSI value.

Meaning of the bytes in response .42.31.01.52

.42	Status B_{ASCII} to identify the additional information
.31	1_{ASCII}, IDENTControl channel 1
.01	InfoTyp
.52	82_{dec}, RSSI value

Number of Tags to Find NT

The NT parameter specifies the number of tags that the read/write device searches for within the sensing range. Each command is repeated according to the Number of Attempts (TA) see "Tries Allowed TA" on page 33.

If the number of tags found during the repeat operations reaches or exceeds the specified NT value, all further read attempts are canceled. The command is canceled, and the data is output.

Note

If the number of tags is set to 255 (= .FF), the function is deactivated. This parameter applies to single commands and does not impact Enhanced commands.

ParamTyp:	NT
Default:	NT = 255
Value range:	0 – 20
	255 = off

Example

WP1QNT.00.01.05 sets the number of tags that the read/write device searches for in the sensing range to five.

RP1QNT.00.00 outputs the set value.

Operating Hours OH

You can use the OH parameter to output how long the write/read device is in operation or for how long a write/read command is executed.

ParamTyp:	OH

Response to a TE command:

```
<Status> <ChanNo> <tsu><tcu> <CHCK> <ETX>
```

<tsu> Read/write device operating time in hours, 4 bytes

<tcu> Read/write command operating time in hours, 4 bytes

Example

RP1QOH.00.00 reads out the read/write device operating times.

Meaning of the bytes in response .30.31.00.00.00.93.00.00.00.03

.30	Status 0_{ASCII}, command has been executed successfully
.31	1_{ASCII}, IDENTControl channel 1
.00.00.00.93	147_{dec} hours, read/write device operating time
.00.00.00.03	3_{dec} hours, duration of the read/write command

Power Transmit PT

This parameter sets the transmit power or reads out the transmit power set. The transmit power can influence the range depending on the ambient temperature.

ParamTyp:	PT
Default:	PT = 4
Value range:	1 = Min 2 = Eco 3 = Normal 4 = Maximum

By adjusting the transmit power, you can operate the device permanently at higher ambient temperatures, since inherent heating is reduced. If the device is operated continuously with Power transmit "Maximum" with Enhanced commands, the ambient temperature must not exceed 55 °C. The ambient temperature can be a maximum of 70 °C with "Eco" transmission power.

Value	Meaning	Detection range[1]	Ambient temperature
1	Min	90 mm	-25 °C– 70 °C, -13 °F– 158 °F
2	Eco	240 mm	-25 °C– 70 °C, -13 °F– 158 °F
3	Normal	270 mm	-25 °C– 65 °C, -13 °F– 149 °F
4	Maximum	300 mm	-25 °C– 55 °C, -13 °F– 131 °F

1. With IQC21-50

Example

WP1QPT.00.02.00.02 sets the transmit power to "Eco".

RP1QPT.00.00 reads out the specified transmit power.

Protocol Mode QV

The QV parameter specifies the output protocol as a single-frame protocol or a multi-frame protocol.

The single-frame protocol complies with the P+F standard for LF systems IPH and HF systems IQH1. If there is more than one tag in the measurement range, status A is output as a warning.

In the multiframe protocol, each tag that responded is output. An output beginning with status F, containing the number of responses, and stopping the command is output.

ParamTyp:	QV
Default:	QV = .53
Value range:	.53 = S, single-frame protocol .4D = M, multi-frame protocol

PEPPERL+FUCHS

Example

WP1QQV.00.01.4D specifies the multi-frame protocol.

RP1QQV.00.00 reads out the specified protocol.

Response to a single read command in multi-frame protocol mode:

```
0<ChanNo><Luid><UID><Ldata><data><CHCK><ETX>

0<ChanNo><Luid><UID><Ldata><data><CHCK><ETX>

F<ChanNo>0002<CHCK><ETX>
```

The read command was executed, two tags responded.

For each tag, the status, the IDENTControl channel, the length of the UID, the UID, the length of the data, and the read data are output. Finally, the status F, the IDENTControl channel, and the number of tag responses are output.

<Luid>   Length of <UII> in bytes, 2 bytes

<Ldata>   Length of <data> in bytes, 2 bytes

Q Value QW

The QW parameter defines the number of tags expected in the sensing range. This setting affects the time slot when communicating with a tag to avoid collisions due to simultaneous communication between multiple tags.

ParamTyp:	QW
Default:	QW = 0
Value range:	0 = one tag
	1 = two tags
	2 = several tags
	3 = many tags
	4 = a great many tags

Note

The execution time for read/write tag access is reduced by reducing the Q value. The Q value influences the execution time of write/read commands.

Example

WP1QQW.00.01.01 sets the Q value to 1. The read/write device therefore operates with $2^1 = 2$ time frames for 2 expected tags.

RP1QQW.00.00 outputs the set Q value.

Reset to Default RD

This parameter returns all read/write device settings to the factory setting.

ParamTyp:	RD

Example

WP1QRD.00.00

Factory setting: see table "Parameter" on page 25.

PEPPERL+FUCHS

Status Frontend ST

The ST parameter can be used to check the read/write device operating status.

ParamTyp:	ST
Default:	-
Value range[1]:	.01= Interference from external signals in the usage spectrum, range may be limited.
	.02 = Detuning due to surrounding metal
	.04 = Excess temperature warning, internal device temperature 80 – 85 °C
	.08 = Excess temperature error, internal device temperature > 85 °C

1. Binary combinations are possible

Response to an RP command of the ST parameter:

`<Status> <ChanNo> <ST1><ST2> <CHCK> <ETX>`

<ST1> Current status of the read/write device, 1 byte

<ST2> Saved status since the last read-out, 1 byte

Saved status since the last read-out, 1 byte

Example

RP1QST.00.00 reads out the status of the read/write device.

Meaning of the bytes in response .30.31.00.02

.30	Status 0_{ASCII}, command has been executed successfully
.31	1_{ASCII}, IDENTControl channel 1
.00	No message
.02	Coil detuning due to metal

2023-11

PEPPERL+FUCHS

Tries Allowed TA

The tries allowed (TA) parameter sets the number of access attempts during execution of a read/write operation on a read/write tag.

ParamTyp:	TA
Default:	TA = 2
Value range:	1 – 10

Example

WP1QTA.00.01.01 permits one attempt.

WP1QTA.00.01.03 permits three attempts.

RP1QTA.00.00 reads out the specified number.

Effects of increased number of read/write attempts:

⊕ More reliable reading and writing

⊖ Longer execution time of a command

Note

To limit the increase in execution time caused by increasing tries allowed, it is recommended to parameterize the NT cancellation criterion. This will stop the command execution as soon as the set number of read/write tags has been identified.

Temperature TE

The TE parameter allows you to read internal read/write device temperatures.

ParamTyp:	TE

Response to an RP command of the TE parameter:

`<Status> <ChanNo> <Tpa> <Tµc> <CHCK> <ETX>`

<Tpa> Temperature in °C at the power amplifier, 1 byte

<Tµc> Temperature in °C at the microcontroller, 1 byte

Example

RP1QTE.00.00 reads out the internal read/write device temperatures.

Meaning of the bytes in response .30.31.20.21

.30	Status 0_{ASCII}, command has been executed successfully
.31	1_{ASCII}, IDENTControl channel 1
.20	32_{dec} °C at the power amplifier
.21	33_{dec} °C at the microcontroller

Tag ID Filter TI

You can use the TI parameter to filter tags using the UID. Read/write commands are executed on tags with an UID that matches the filter. You can set the filter to the entire UID or to the leading bytes.

ParamTyp: TI

Value range: 0 – 8-byte UID

Example

WP1QTI.00.04.E0.08.01.48 sets the filter to tags with a UID beginning with the 4 bytes `E0.08.01.48`.

RP1QTI.00.00 reads out the current filter.

WP1QTI.00.00 resets the current filter.

Excess Temperature Handling TO

The TO parameter defines the behavior of the read/write device in the event of excess temperature. The parameter can be used to protect the device in the event of excess temperature.

ParamTyp: TO

Default: TO = 0

Value range: 0 = switch off
                     1 = reduce power
                     2 = reduce duty cycle

Value	Meaning	Description
0	Switch off	The read/write device switches off when the internal device temperature is over 85 °C. The device will switch back on when the internal temperature falls below 80 °C.
1	Reduce Power	The read/write device gradually reduces the transmission power when the internal device temperature is between 80 °C and 85 °C. A reduced transmission power reduces inherent heating. The read/write device switches off when the internal device temperature is over 85 °C.
2	Reduce duty cycle	The read/write device pauses for approx. 0.5 seconds after a complete pass if the internal device temperature is between 80 °C and 85 °C. This reduces inherent heating. The length of the pause varies with the internal temperature and the duration of the read/write command executed The read/write device switches off when the internal device temperature is over 85 °C.

Caution!

The read/write device cannot identify tags during a pause.

It may be possible that data is not read if tags move quickly through the sensing range.

Example

WP1QTO.00.01.02 sets the behavior to "reduce duty cycle" in the event of excess temperature.

RP1QTO.00.00 reads out the specified behavior.

PEPPERL+FUCHS

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 see "IF Information" on page 28
C	Reserved
D	Reserved
E	Internal memory overflow; execute reset
F	End of an output in the multi-frame protocol, see "Protocol Mode QV" on page 30

PEPPERL+FUCHS

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

2023-11

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- Level Measurement

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- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
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