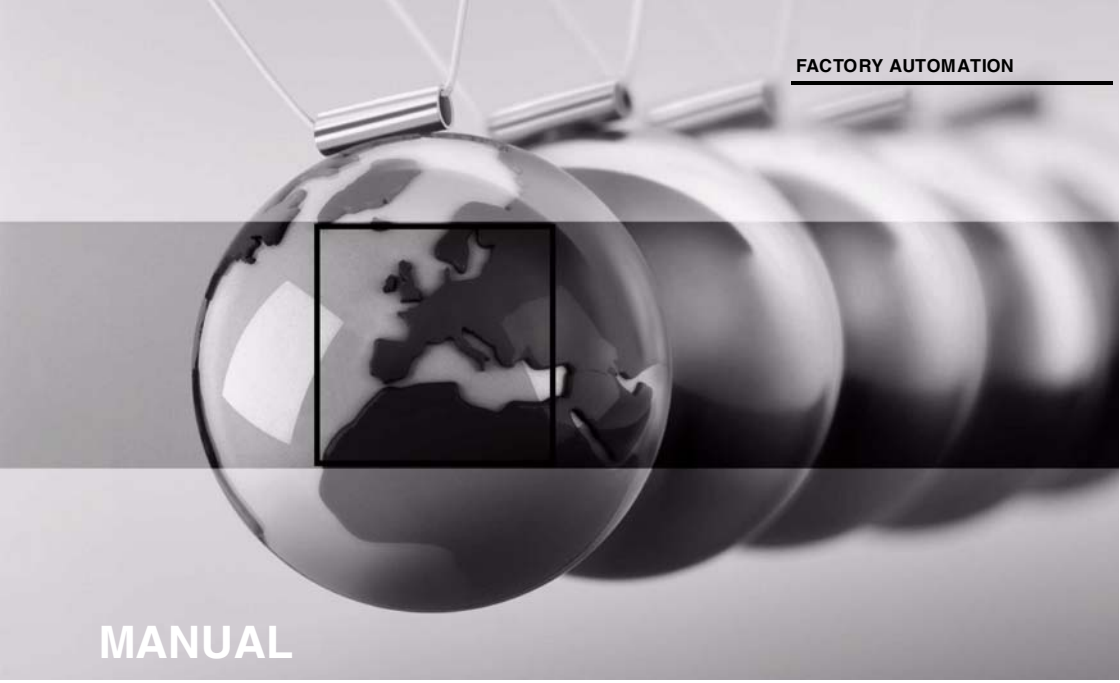

MANUAL

IC-KP-B12-V45

IDENT*Control*
with Ethernet interface

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"

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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 installing this equipment and put into operation, read this manual carefully. This manual containes instructions and notes to help you through the installation and commissioning step by step. This makes sure bring such a trouble-free use of this product. This is for your benefit, since this:

- ensures the safe operation of the device
- helps you to exploit the full functionality of the device
- avoids errors and related malfunctions
- avoids costs by disruptions and any repairs
- increases the effectiveness and efficiency of your plant

Keep this manual at hand for subsequent operations on the device.

After opening the packaging please check the integrity of the device and the number of pieces of supplied.

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:

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

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2 Declaration of conformity

2.1 Declaration of conformity

This product was 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, D-68307 Mannheim, has a certified quality assurance system that conforms to ISO 9001.

ISO**9001**

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 IDENTControl IC-KP-B12-V45 is a control interface including an Ethernet interface for identification systems. The device can be used as a control cabinet module or for field applications. Besides the Ethernet connection, suitable inductive R/W heads, microwave antennas or trigger sensors can be connected. Wiring suitable for the system design must be used.

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.

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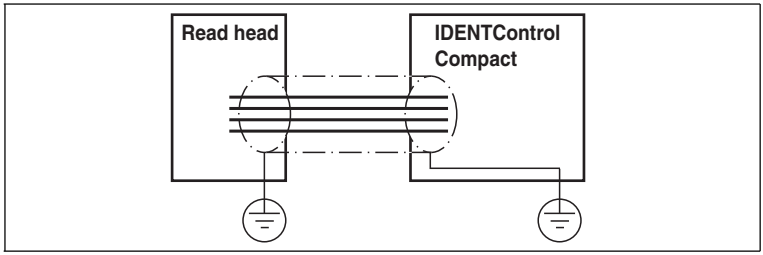
3.4 Contact protection

Our housings are manufactured using components made partly or completely from metal to improve noise immunity.



Danger!

Electric shock

The metallic housing components are connected to ground to protect against dangerous voltages that may occur in the event of a fault in the SELV power supply!

4 Product Description

4.1 Range of application

The system is suited for the following applications:

- Automation
- Material flow control in production
- Acquisition of operating data
- Access control
- Identification of storage vessels, pallets, work piece carriers, refuse containers, tanks, containers, etc.

4.2 Device characteristics

- Up to 4 R/W heads can be connected
- Alternatively up to 2 R/W heads and 2 trigger sensors can be connected
- LCD indicator with background illumination
- Direct operation using 4 function keys
- LED status indicator for bus communication and R/W heads

4.3 Product family

The IDENTControl brand name represents a complete identification system. The system consists of an IDENTControl interface including bus interface, inductive R/W heads (125 kHz and 13.56 MHz) and accompanying code and data carriers in many different designs. The IDENTControl can be connected to other identification systems.

The system is equally well suited for use in the switching cabinet and for field use in IP67. The interface to the controlling fieldbus is integrated into the enclosure and all connections are implemented as plugs. This enables simple installation and quick, correct replacement in case of device failure. The consistent EMC design (metal enclosure, grounding, shielded wires) offers a high degree of noise immunity. Function buttons are available for parameterization and entering commands directly into the IDENTControl.

4.3.1 R/W heads

There are different R/W heads available for the IDENTControl in different designs. You can connect inductive R/W heads (125 kHz and 13.56 MHz) depending on your particular application.

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4.3.2 Code / Data carrier

Read only / read/write tag 125 kHz (inductive)

A wide range of read only and read/write tag designs are available for this frequency range, from a 3 mm thin glass tube to a transponder 50 mm in diameter. Read/write tags are available for temperatures up to 300 °C (max. 5 min) in chemical-resistant housings for installation in metal and in degree of protection IP68/IP69K. IPC02-... read only tags offer 40-bit read only codes. IPC03-... read/write tags have a 928-bit freely programmable memory bank and an unmodifiable 32-bit read only code. You can define 40-bit read only codes with IPC11-... read only tags. You can use these as permanent read only codes or continually redefine them.

Read/write tag 13.56 MHz (inductive)

Read/write tags in this frequency range save larger quantities of data and offer a considerably higher reading speed than read/write tags of the 125 kHz system. IQH-* and IQH1-* read/write heads from Pepperl+Fuchs are compatible with most existing read/write tags that comply with standard ISO 15693. With the IQH2-* read/write heads you can use read/write tags that comply with standard ISO 14443A.

The 13.56 MHz technology even allows smart labels (read/write tags in the form of adhesive labels with printed barcode). Currently available read/write tags have a memory capacity of 64 bits of read only code and a maximum 2 KB of programmable memory.

4.3.3 Handhelds

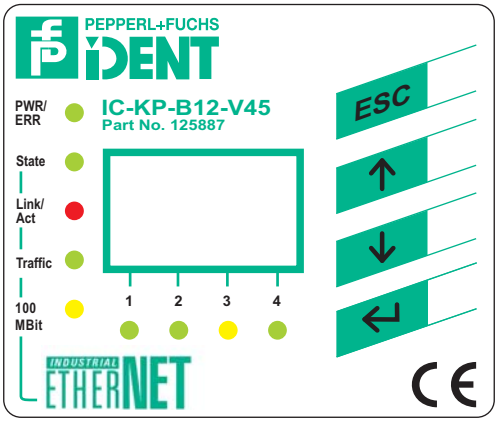
There are various handheld read/write devices available for controlling processes (write/read functions, initialization of data carriers).

Figure 4.1

Handheld	Frequency range
IPT-HH20	125 kHz
IST-HH20	250 kHz
IQT1-HH20	13.56 MHz
IC-HH20-V1	depending on the read/write head

4.4 Displays and controls

The following displays and controls are located on the control interface.



LED indicators		
PWR/ERR	Power on Hardware error	green red
1, 2, 3, 4	Status display for R/W heads Command on R/W head is active Command executed successfully (approx. 1 second)	green yellow
State	Interface ready for operation	green
Link/Act	Connection/Network activity	green
Traffic	Device sends data	green
100 MBit	Off: 10 MBit / Off: 100 MBit	Yellow

Display
Two-line multifunction display with 12 characters per line for displaying different status and operating information and four pictograms for displaying connected reading heads.

Push buttons	
Push buttons are used for controlling the display and selecting commands when programming the control interface.	
ESC	Return to higher level
↑	Up menu item
↓	Down menu item
↵	RETURN (confirm input)

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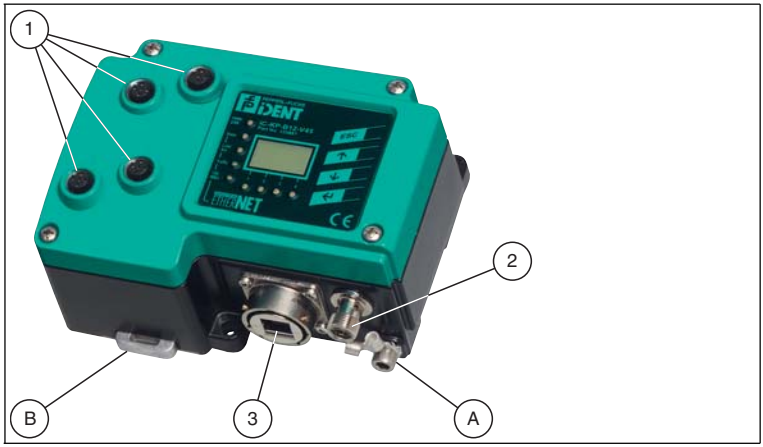
4.5 Interfaces and connections

The following interfaces and connections are located on the control interface IC-KP-B12-V45.



Connections

1 M12 connector for R/W heads (sockets) - V1

2 M12 connector for power supply (plug) - V1

3 RJ45 network connection (socket)

Other accessories

A Screw for ground

B Metal latches for mounting the DIN rail

Accessories

Accessories see chapter 4.7.

4.6 Delivery package

The delivery package contains:

- 1 IDENTControl control interface
- 1 quick start guide
- 1 grounding screw (already fitted)
- 1 serrated lock washer (already fitted)
- 2 crimp connectors (already fitted)

4.7 Connection accessories

4.7.1 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.

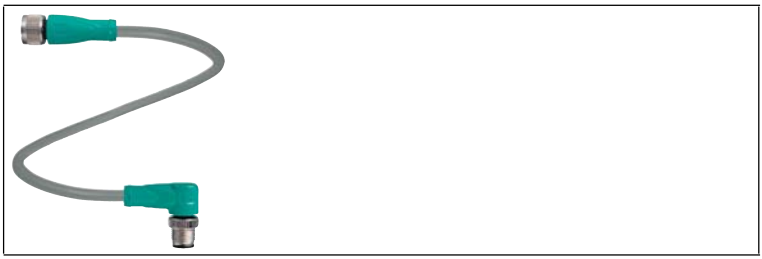


Figure 4.2

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

4.7.2 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 4.3

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

4.7.3 Network cable to the Ethernet interface

The IDENTControl IC-KP-B12-V45 is connected to the network via an RJ45 socket. An RJ45 connector seal compatible with the Ethernet network cable is available for mobile applications in accordance with IP67.

Figure 4.4

Accessories	Designation
IP67 network connector seal	ICZ-V45
Network cable RJ45, category 5, up to 100 MHz, 10 m	V45-G-10M-V45-G

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 with your purchase order and the shipping documents for:

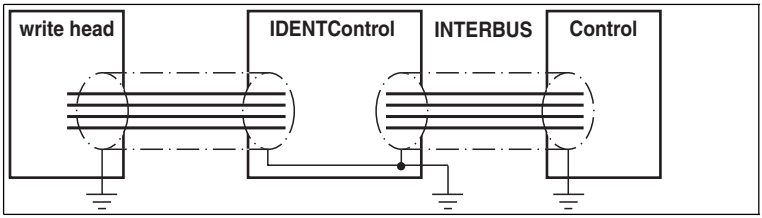
- Delivery quantity
- Device type and version in accordance with the type plate
- Accessories
- Quick start guide

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 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.

The metal enclosure of the IDENTControl and the metal enclosure of the R/W heads complete the consistent shielding concept.

The most important issue here is that the shields are connected to ground with low resistance and low inductance. The metal enclosure ensures that the shielding is not interrupted, i.e. the complete electronics system and all routed cables are located within a Faraday cage.

Caution!

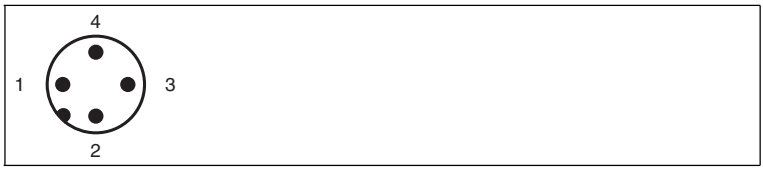
If you operate the device on an Ethernet/IP network,see chapter 5.4.5.

5.4 Device connection

Electrical connection using plug connectors makes installation simple.

5.4.1 Power supply

Connect the power supply via an M12 connector with integrated voltage and reverse polarity protection indicator (green: correct polarity, red: reverse polarity). A plug with the following pin assignment is located on the housing:



1 + 24 V

2 NC

3 GND

4 NC

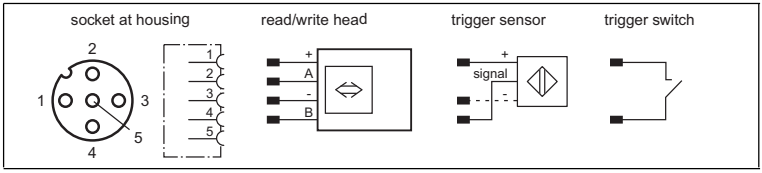
Compatible connecting cable see chapter 4.7.2.

5.4.2 Read/Write Head and Trigger Sensors

A maximum of 4 read/write heads can be connected to the IDENTControl.

Instead of the read/write heads, a maximum of 2 trigger sensors can be connected to sockets 3 and 4. A trigger sensor can be assigned to only one read/write head. The trigger sensors must be PNP.

Connect the read/write heads and trigger sensors to the sockets on the top of the enclosure using M12 connectors.



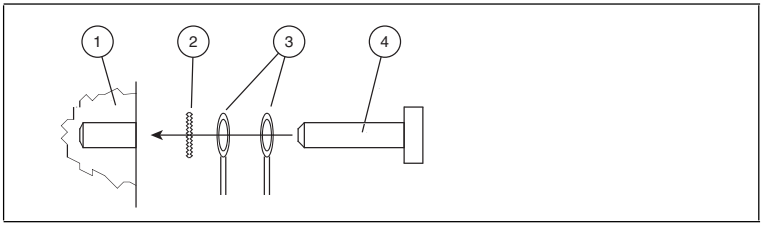
For details of compatible read/write heads, and of compatible connecting cables, see chapter 4.7.1.

5.4.3 Cable length between control interface and R/W heads

The maximum cable length between the control interface and a connected R/W head is 1000 meters. If you wish to attain the maximum possible cable length, select a suitably large cable cross-section. See chapter 4.7.1

5.4.4 Ground connection

The ground connection of the IDENTControl is located at the lower right of the connector array. The ground conductor is screwed to the housing with a crimp connector. In order to guarantee safe grounding, the serrated washer must be mounted between the crimp connector and the housing.



1 Housing

2 Serrated lock washer

3 Crimp connector

4 Lock screw

A cross-section of at least 4 mm^2 is recommended for the ground conductor lead.

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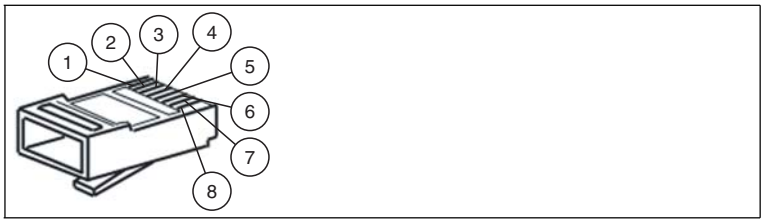
5.4.5 Ethernet connection guide

Network connection

The network is connected via an RJ45 connector. The following illustration shows the pin assignment:



1 TD+

2 TD-

3 RD+

4 Not used

5 Not used

6 RD-

7 Not used

8 Not used

Caution!

The RJ-45 network socket is connected galvanically to the grounded housing. The Ethernet/IP specification does NOT require the use of Ethernet cables with a shield connected to the RJ-45 plug at both ends. However, we recommend using cables with a continuous shield only, in order to avoid EMC issues.

Transfer rates, line lengths and line types

The device can be operated in 10 Base-T or 100 Base-TX networks.
The maximum total line length is 100 m in both cases and only shielded network cables from category 5 or above can be used.
Compatible connecting cablessee chapter 4.7.3.

6 Commissioning

6.1 Connection

Warning!

Before commissioning, check once again that the connections are correct.

Before commissioning, familiarize yourself with the system of communication between your Ethernet controller and the read/write station (see chapter 7). Commissioning requires accurate knowledge of TCP/IP communication.

After the supply voltage is connected, the green LED in the voltage connector and the PWR State LED (after a few seconds) on the display panel must light up. If the LED in the connector lights up red, the polarity of the power supply is reversed.

6.2 Preliminary considerations

Due to the different programming options on an Ethernet network, it is very difficult to make generally valid statements about commissioning.

One very important aspect of the operation of an extended identification system on the Ethernet is the time response of the overall system. The question "How long after the positioning of a data carrier in front of a read/write station will the read data be available in the computer or PLC?" cannot be answered universally.

The most important factors that determine the response time are:

- Nature of the higher-level host system, e.g. PLC or PC
- TCP/IP client type
- Communication between the client and server
- Network utilization
- Number and nature of connected read/write stations
- Type of code/data carrier used
- Nature of access to the communication objects of the read/write station
- Nature of the commands to the read/write station
- Structure of the user program

For this reason, on large projects, or if you have little experience programming an Ethernet-based system, you should construct a laboratory setup of your application and test the data transfer to the identification system before installing the system in the plant.

6.3 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.

You must set the various parameters prior to commissioning.

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The parameters are volatile and non-volatile parameters. Volatile parameters are reset to their default setting when the system is switched off and on again.

Non-volatile parameters

Parameter	Default setting	Value range
General		
LCD contrast	50	36 ... 71
LCD light	On	On / off
Language	English	English / German
Multiplex mode	off	On / off
R/W head		
Trigger mode	off	On / off
Tag type	99	00 ... FF
Ethernet interface		
MAC address	00:0D:81:xx:xx:xx	00:0D:81:xx:xx:xx
DHCP	off	On / off
IP address	172.16.177.0	yyy.yyy.yyy.yyy
Standard gateway	172.16.11.222	yyy.yyy.yyy.yyy
Subnet mask	255.255.0.0	yyy.yyy.yyy.yyy
Assembly inst. Out	100d	100d ... 112d
Data hold time	50d x 10 ms	0d ... 255d x 10 ms

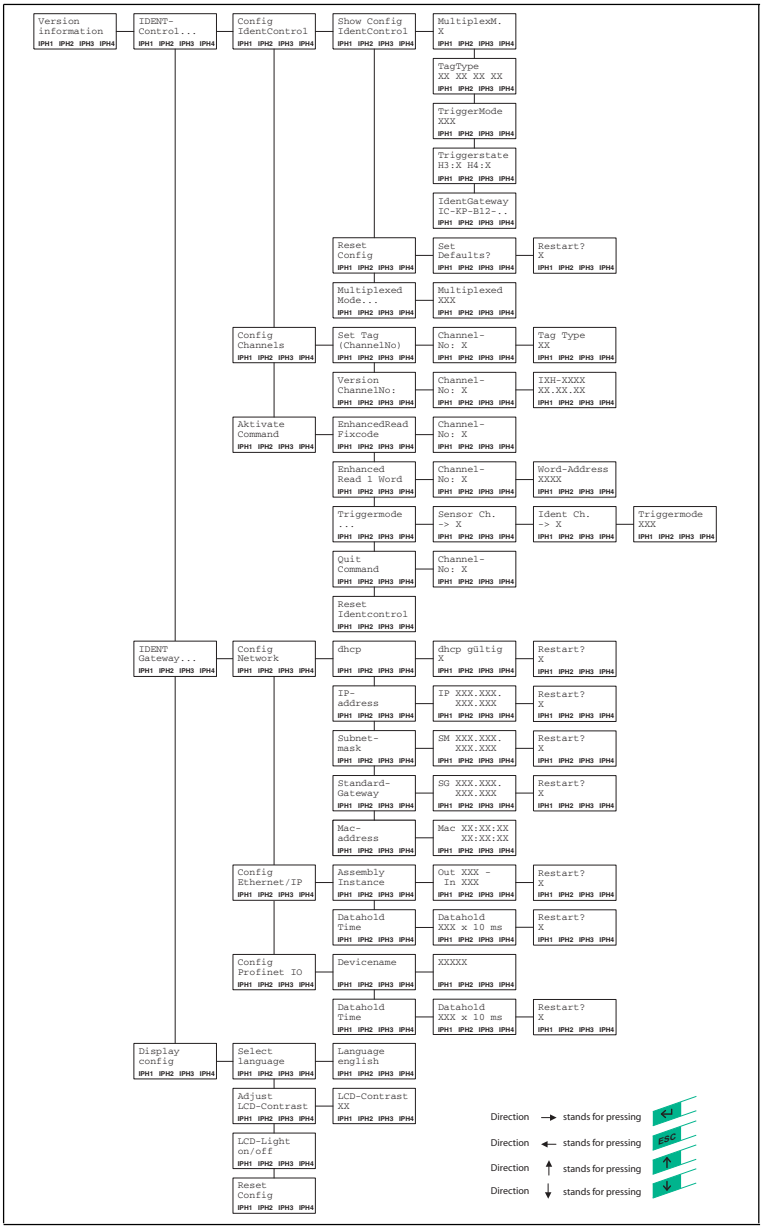
Volatile parameters

Parameter	Default setting	Value range
R/W head		
Password mode	Off	on / off
Password	00000000	00000000 ... FFFFFFFF

Configure the read/write station with the described system commands (). "99" is preset as the tag type.

6.3.1 Operating the device

The following illustration shows how the device is operated directly:



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6.4 Output of the contents of read data carriers on the display

In the first menu level, the IDENTControl shows the contents of read data carriers on the display. Information messages of this kind are marked with a bell icon ( ) in the top right corner of the display to distinguish them from menu items.

A maximum of the first 12 characters of the read data set can be displayed. The following characters may be excluded.

The view on the display can be toggled by pressing the arrow buttons. The following display variants are available:

- HEX (hexadecimal with decimal delimiter)
- HEX2 (hexadecimal without decimal delimiter)
- ASCII (ASC)

Note!

Data carrier content from commands that are activated manually on the IDENTControl are always displayed, irrespective of the menu level that was just displayed.

6.4.1 Using the identification system without a DHCP server

The following parameters must be set manually via the display.

- DHCP-OFF
- IP address
- Subnet mask
- Gateway address

Caution!

Always use parameters that you know are compatible with your network.

Setting parameters

Set the parameters as follows:

1. Press return (confirm input).
2. Select IDENT gateway (down arrow button, return).
3. Press return to confirm the option Config Ethernet.
4. Press return to confirm DHCP.
5. Switch DHCP to off (select using arrow buttons and press return).
6. Press the down arrow button to select the IP address menu item.
7. Enter the IP address.
8. When the cursor is positioned over the final digit, press return to exit the submenu item.
9. Proceed with the subnet mask and the gateway address in exactly the same way.
10. Initiate a reset (menu) or disconnect the power supply to restart the device.

    ↳ The settings only take effect after the reset.

6.4.2 Using the identification system in conjunction with a DHCP server

In this case, the parameters of a DHCP server are assigned to the identification system. However, if an IP address is not assigned to the device, the corresponding settings on the DCHP server must be configured accordingly.

Viewing the MAC address of the device

You can view the MAC address of the device on the display:

1. Press return (confirm input).
2. Select IDENT gateway (down arrow button, return).
3. Press return to confirm the option Config Ethernet.
4. Press the down arrow button until the MAC address option appears.
5. Press return to view the MAC address

Note!

We recommend working exclusively with fixed IP addresses.

Activating the DHCP function

The DHCP function on the identification system must be activated as follows:

1. Press return (confirm input).
2. Select IDENT gateway (down arrow button, return).
3. Press return to confirm the option Config Ethernet.
4. Press return to confirm DHCP.
5. Switch DHCP to on (select using arrow buttons and press return).
6. Press the ESC button repeatedly to exit the menu.
7. Initiate a reset (menu) or disconnect the power supply to restart the device.

   ↳ The settings only take effect after the reset.

The identification system ignores the permanent IP address, subnet mask and gateway address parameters preset in the device.

7 Commands

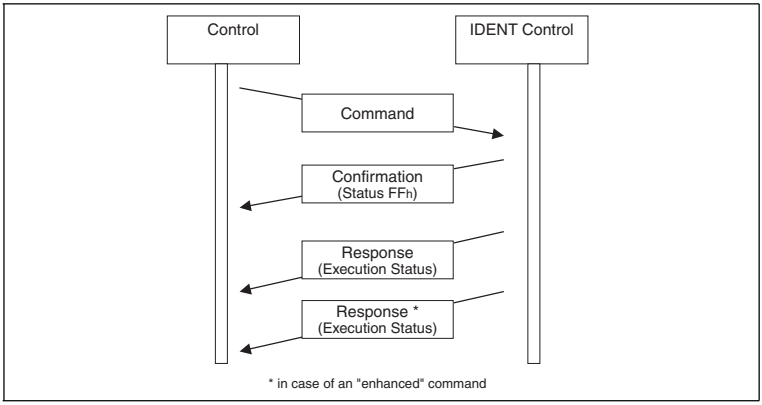
7.1 General information on the device

The device can be used both in 10 Base-T and 100 Base-TX networks and adapts automatically to the corresponding network speed. The device is fully duplex-compatible.

Communication is possible either via TCP/IP, Modbus/TCP, Ethernet/IP or PROFINET IO. If the device is addressed via a protocol, a protocol change is only possible after a reset.

7.2 General information for data exchanges

The data exchange consists of command, confirmation and response telegrams.



To execute a command, the control software (client) sends a command to the identification system. The server then sends confirmation of receipt (TCP/IP and Ethernet/IP only). The server sends the response after the command is processed.

Multiple responses can be sent depending on the command (enhanced commands and triggered mode). A confirmation is always sent, but only once, however.

A command consists of the telegram length (TCP/IP und Modbus TCP/IP only), the command code, the ident channel, a specified number of parameters, and data associated with the command.

The confirmation consists of the telegram length (TCP/IP only), the echo of the command code, the echo of the ident channel, the status FFh, and the reply counter.

The response consists of the telegram length (TCP/IP and Modbus TCP/IP only), the echo of the command code, the ident channel, the status, the reply counter, and any requested data.

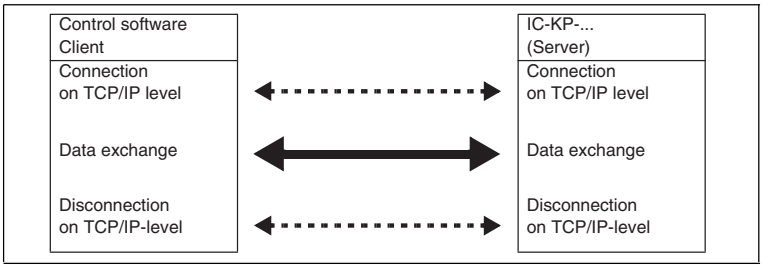
7.3 Communication via TCP/IP

7.3.1 General information on data communication via TCP/IP

The IC-KP-B12-V45 device was designed to act as a TCP/IP server, which means that the so-called client must send a command to actuate each function.

Communication is established via the TCP port 10000. Programming control software requires accurate knowledge of TCP/IP sockets.

The following illustration shows the basic communication flow:



A connection must be established on the TCP/IP level before data can be exchanged. From this point onwards, commands can be sent from the client to the IC-KP-B12-V45 device.

Command:

Byte 0	Telegram length, high byte [(N+1) div 256]
Byte 1	Telegram length, low byte [(N+1) mod 256]
Byte 2	Command code
Byte 3	Channel / Toggle bit = 0
Byte 4	Parameter
Byte 5	Parameter
Byte 6	Write data
...	...
Byte N	Write data

Confirmation:

Byte 0	Telegram length, high byte 0
Byte 1	Telegram length, low byte 6
Byte 2	Command code (Echo)
Byte 3	Channel / Toggle bit (echo) = 0
Byte 4	Status FFh
Byte 5	Reply counter

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Response:

Byte 0	Telegram length, high byte [(N+1) div 256]
Byte 1	Telegram length, low byte [(N+1) mod 256]
Byte 2	Command code (Echo)
Byte 3	Channel / Toggle bit = 0
Byte 4	Status
Byte 5	Reply counter
Byte 6	Read data
...	...
Byte N	Read data

Note!

The toggle bit is not required for TCP/IP.

7.3.2 Command examples TCP/IP

1st example: Preset data carrier type using the change tag command (see "Change tag (CT)" on page 59)

Command: Change data carrier type on channel 1 to IPC03.

00:06:04:02:30:33 (hexadecimal format)	
00:06	Telegram length (6 bytes)
04	Command code (CT)
02	Reserved/Channel (I), toggle bit (0)
30:33	Data carrier type (IPC03)

Confirmation

00:06:04:02:FF:01	
00:06	Telegram length (5 bytes)
04	Repeat command code (CT)
02	Reserved/Channel (I), toggle bit (0)
FF	Status FFh (processing command)
01	Reply counter

Response: There is a type IPH-... R/W head on channel 1.

00:06:04:02:00:02	
00:06	Telegram length (6 bytes)
04	Repeat command code (CT)
02	Reserved/Channel (I), toggle bit (0)
00	Status 0 (command was executed without error)
02	Reply counter

Alternative response: There is no R/W head on channel 1.

00:06:04:02:06:02	
00:06	Telegram length (6 bytes)
04	Repeat command code (CT)
02	Reserved/Channel (l), toggle bit (0)
06	Status 6 (hardware error)
02	Reply counter

2. Example: Read data carrier using the single read command (see "Single read words (SR)" on page 69)

For this command example, it is assumed that

- the data carrier type IPC03 is set.
- one type IPH-... read head is connected to channel 1.

Command: Read two words from address 0 on channel 1.

00:06:10:22:00:00	
00:06	Telegram length (6 bytes)
10	Command code (SR)
22	Word number (2) / Channel (1), toggle bit (0)
00:00	Word address (0000)

Confirmation

00:06:10:22:FF:01	
00:06	Telegram length (6 bytes)
10	Repeat command code (SR)
22	Word number (2) / Channel (1), toggle bit (0)
FF	Status FFh (processing command)
01	Reply counter

Response: A type IPC03 data carrier is located in front of the read head. The highlighted part is the content of the data carrier.

00:0E:10:22:00:02:**31:32:33:34:35:36:37:38**	
00:0E	Telegram length (14 bytes)
10	Repeat command code (SR)
22	Word number (2) / Channel (1), toggle bit (0)
00	Status 0 (command was executed without error)
02	Reply counter
31:32:33:34:35:36:37:38	**Data**

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Alternative response: No data carrier in front of the read head.

00:06:10:02:05:02	
00:06	Telegram length (6 bytes)
10	Repeat command code (SR)
02	Word number (2) / Channel (1), toggle bit (0)
05	Status 5 (no data carrier in the detection range)
02	Reply counter

7.4 Communication via MODBUS TCP/IP

7.4.1 General Information on Data Communication via MODBUS/TCP

Data is exchanged between a MODBUS master (controller) and a MODBUS slave (identification system) by reading and writing registers. The slave contains read and write registers. Data exchange is always initiated by the master. The master initiates an identification system function by transferring an identification command to the write register. The master can then retrieve the response via the read registers. The functions **read holding registers**, **write multiple registers** and **read/write multiple registers** are available for this purpose on the IC-KP-B17-AIDA1 device. MODBUS communication occurs via port 502. The terms "input register" and "output register" are defined from a PLC perspective.

7.4.2 Overview of the characteristics of the integrated MODBUS slave

- Multimaster capability
- Data exchange using the commands **read multiple registers**, **write multiple registers** and **read/write multiple registers** (see "MODBUS commands" on page 29 and see chapter 7.4.3).
- Each channel is assigned a separate register area so that different controllers can each adopt a R/W head. Only one master has write permissions for each register area (see "Division of the register" on page 30).
- The output register data is stored temporarily in a FIFO memory (see "FIFO memory" on page 34).
- A monitor master can also read the data from the identification system.
- The same identification commands used with TCP/IP are also used here.

Multimaster capability

The device can communicate with several masters. An ident channel can be addressed by two masters. The first master is the control master and addresses the device using device ID 1. This master possesses both write and read permissions. Another master can be used to read the data and is a protocolling master. This master then addresses the device using device ID 2. The device can therefore be addressed on each channel once using device ID 1 and once using device ID 2. If another master attempts to address the device on the same channel, access to this channel is denied. A maximum of ten masters can communicate with the device at any one time.

MODBUS commands

The device supports the commands **read holding registers**, **write multiple registers** and **read/write multiple registers**.

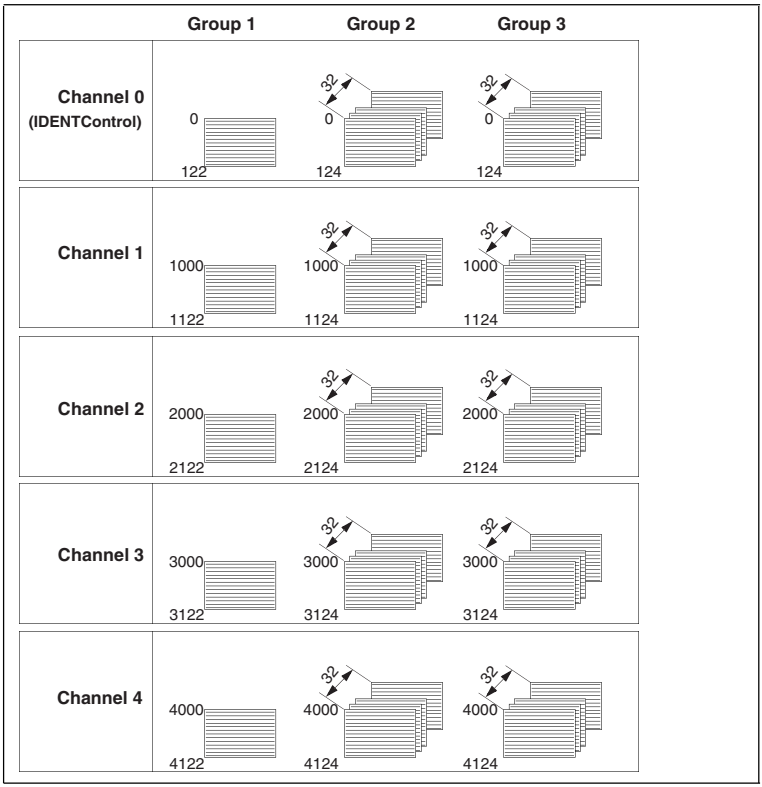
Division of the register

The device contains four ident channels and a configuration channel. Each channel is assigned a separate register area

so that a single master addresses all channels or a separate master addresses each individual channel.

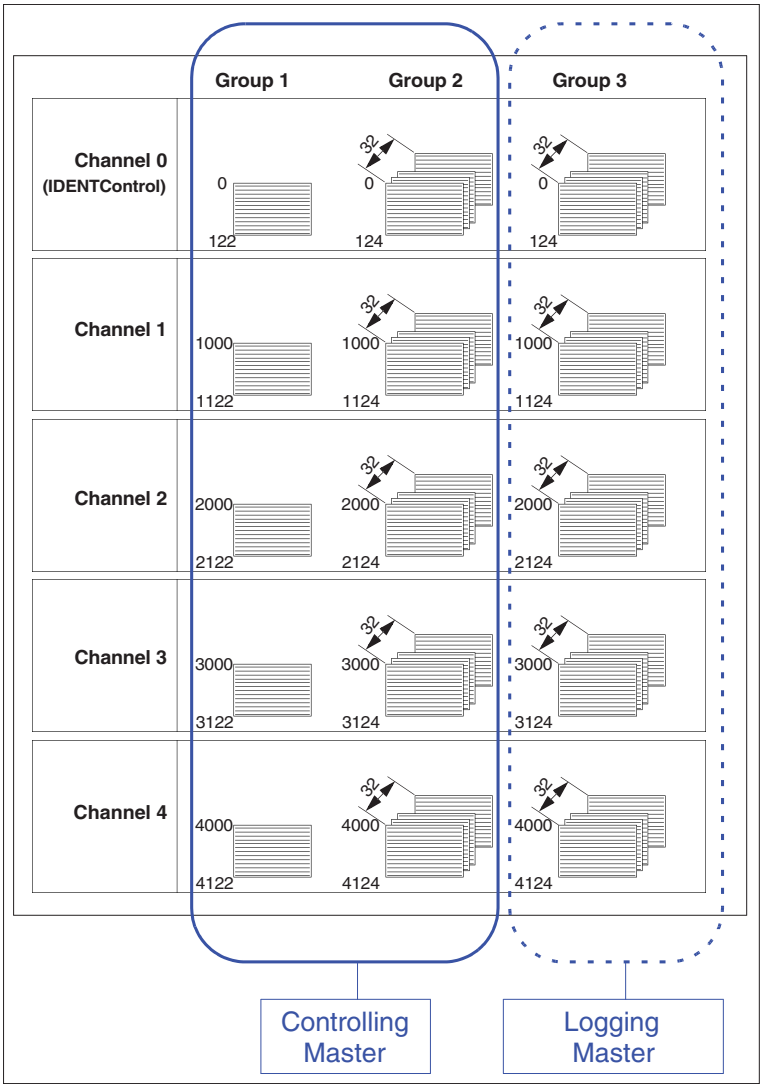
The following three register groups are assigned to each channel:

1. Group 1: Output register (device ID 1)
2. Group 2: FIFO input register (device ID 1)
3. Group 3: FIFO monitor register (device ID 2)



Application example

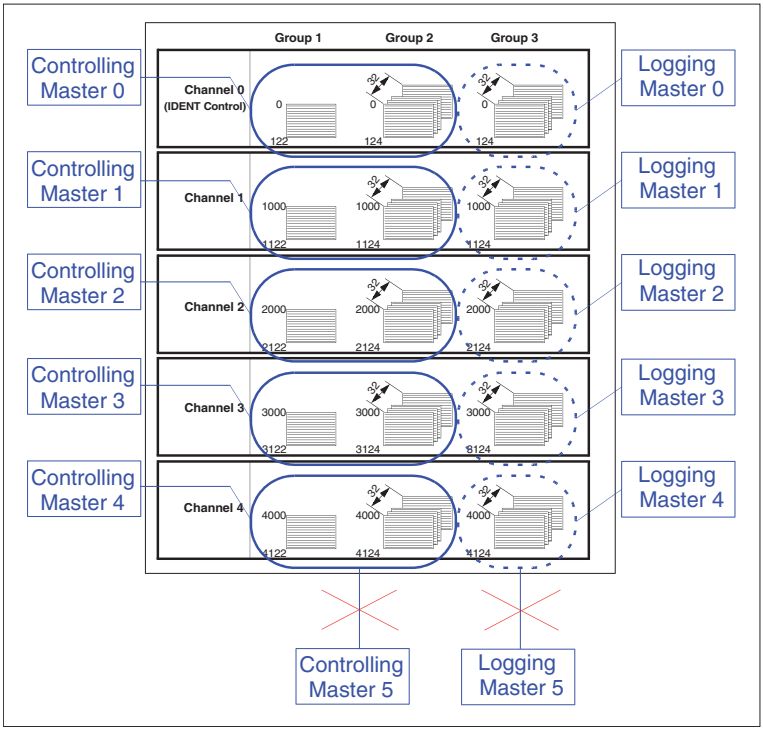
1st example:



Description:

A master communicates with all channels. Optionally, an additional master can be used to log data communication between the controlling master and the identification system.

2nd example:



Description:

One controlling and one protocolling master are used for each channel. A protocolling master can also access channels here.

Dual access to a register group within one channel is never permitted.

Group 1: Output register

Each area of this group is divided as follows:

Address (0-based, decimal)	Byte number of the identification telegram	Use
0 + K	-	Reserved
	-	Reserved/Deletion bit (LSB)
1 + K	Byte 0	Telegram length, high byte [(N+1) div 256]
	Byte 1	Telegram length, low byte [(N+1) mod 256]
2 + K	Byte 2	Command code
	Byte 3	Reserved/Toggle bit
I + K	Byte N-1	Parameter
	Byte N	Parameter

K = 0, 1000, 2000, 3000, 4000
I = 3, 4, 5...

If the deletion bit is set, all data stored in the FIFO of the relevant channel (defined by K) is deleted. The delete operation only starts if the status of the deletion bit changes from 0 to 1.

Groups 2 and 3: FIFO input register and FIFO monitor input register

Each area of these groups is divided as follows:

Address (0-based, decimal)	Byte number of the identification telegram	Use
0 + K	-	Reserved
	-	Utilization A
1 + K	Byte 0	Telegram length, high byte [(N+1) div 256]
	Byte 1	Telegram length, low byte [(N+1) mod 256]
2 + K	Byte 2	Command code (Echo)
	Byte 3	Reserved/Channel/Toggle bit
3 + K	Byte 4	Status
	Byte 5	Reply counter
I + K	Byte N-1	Data
	Byte N	Data

K = 0, 1000, 2000, 3000, 4000
I = 4, 5, 6...

Utilization indicates the percentage of the FIFO memory occupied by data that has not been retrieved. If the response data of the device is retrieved at a lower rate than the response data is generated, the FIFO memory overflows, which results in a loss of data. Therefore, make sure that a sufficiently high polling rate is set to ensure that the utilization value remains as far below 15 % as possible.

Utilization value	Meaning
0	No data available
1 .. 100	Data available
101	Data available, but data lost due to FIFO overflow

FIFO memory

The input data of each channel is stored in two FIFO memories with identical structures. Each FIFO memory is composed of 32 elements.

The utilization of a FIFO memory is indicated in the first register of the relevant channel. When registers are read from the memory, the channel content in the memory is shifted along one memory element. A master can therefore read data from the memory only once.

A protocolling master addresses the device using device ID 2. The protocolling master only has read permissions for the third group.

7.4.3 Supported MODBUS commands

write multiple register (16h)

System commands (see chapter 7.9.1) and read/write commands (see chapter 7.9.2) can be started using this MODBUS command (request). The device sends a response to a **write multiple** command as outlined in the MODBUS specification. In the event of a fault, a corresponding response is issued with an exception code.

Process:

1. A request is issued. The following parameters must be known here:

Start address (depending on channel)	Channel 0	0d
	Channel 1	1000d
	Channel 2	2000d
	Channel 3	3000d
	Channel 4	4000d
Number of registers to be written	Maximum 123d	

2. The identification system sends a response to the MODBUS master. If an error occurs, the response contains an exception code (see chapter 7.4.5). A write command must be executed from the first address from the respective channel. If an identification command is initiated several times (e.g. if you wish to execute a read command several times in succession), the first four bytes of the identification telegram must be modified accordingly. The toggle bit can be used for this.

Example:

In the following example, the tag type IPC03 is set to channel 2 and then a read command is executed. The following prerequisites must be fulfilled:

- One type IPH-XX reading head is connected to channel 2.
- The IP address is configured (see chapter 6.3).
- A network connection is established (see chapter 6).
- A MODBUS master is available (PC-based or PLC).

1. Step

The following parameter settings must be configured in the MODBUS master:

Slave IP address:	Identification system IP address
Timeout time:	1000 ms
Device ID:	1
Start address:	2000d
Number of registers to be written.	4d

2. Step

The identification command **Change tag** must be sent to the identification system to set the tag type. For more information, see see "Change tag (CT)" on page 59.

Address (0-based)	Register division Byte number of the identification telegram	Use	Con-tents	Meaning
2000d	High byte	Reserved	00h	-
	Low byte	Reserved/Deletion bit (LSB)	00h	No delete operation
2001d	High byte Byte 0	Length of the identification telegram from this byte onwards	00h	-
	Low byte Byte 1	Length of the identification telegram	06h	6 bytes long
2002d	High byte Byte 2	Command code	04h	**Change tag** Command
	Low byte Byte 3	Reserved/Channel/ Toggle bit	00h	No channel specification required
2003d	High byte Byte 4	Tag type High byte	30h	IPC03
	Low byte Byte 5	Tag type Low byte	33h	IPC03

The slave must confirm that the executed MODBUS transaction was successful. If this is not the case, the master generates an error message. For more information, see chapter 7.4.5.

3. Step

In this example, the read command is initiated by the identification command **Enhanced read** . For more information, see "Enhanced buffered read words (ER)" on page 70.

Address (0-based)	Register division Byte number of the identification telegram	Use	Con-tents	Meaning
2000d	High byte	Reserved	00h	-
	Low byte	Reserved/Deletion bit (LSB)	00h	No delete operation
2001d	High byte Byte 0	Length of the identification telegram from this byte onwards	00h	-
	Low byte Byte 1	Length of the identification telegram	06h	6 bytes long
2002d	High byte Byte 2	Command code	19h	**Enhanced read** command
	Low byte Byte 3	Word number/Channel/ Toggle bit	40h	Read 4 words, no channel specification required
2003d	High byte Byte 4	Word address High byte	00h	Read from data carrier address 0
	Low byte Byte 5	Word address Low byte	00h	Same as previous byte

Note!

When all 3 steps have been completed successfully, LED 2 under the display must light up green. If you then hold a type IPC03 data carrier in front of the reading head, the LEDs should light up orange. If you wish to transfer an identification command to the identification system a second time, the toggle bit must be inverted to enable the transfer of cyclic data to a PLC.

Read multiple register (03h)

This MODBUS command (request) can be used to export the input register from the identification system. When data becomes available, the device writes it to the input register. If the data is not retrieved immediately, up to 32 responses can be stored temporarily before data is lost. If no response data is available, the content of the register is 0.

Process:

1. A request is issued. The following parameters must be known here:

Start address (depending on channel)	Channel 0	0d
	Channel 1	1000d
	Channel 2	2000d
	Channel 3	3000d
	Channel 4	4000d
Number of registers to be read:	Maximum 125d	

2. The identification system sends a response to the MODBUS master. This response includes the content of the requested register. If an error occurs, the response contains an exception code (see chapter 7.4.5). A read/write command must be executed from the first address of the relevant channel.

Example:

In this example, the responses generated in the previous example are retrieved. The following prerequisite must be fulfilled:

- The example of the “write multiple register” was executed successfully.

1. Step

The MODBUS master parameters must be configured:

Slave IP address:	Identification system IP address
Timeout time:	1000 ms
Device ID:	1
Start address:	2000d
Number of registers to be read:	12d

2nd step

A **read multiple register** MODBUS command must be executed. The contents of the register indicate the response to the executed identification command **Change tag**.

Address (0-based)	Register division Byte number of the identification telegram	Use	Contents	Meaning
2000d	High byte	Reserved	00h	-
	Low byte	Utilization register	06h	6% of the FIFO memory is utilized
2001d	High byte Byte 0	Length of the identification telegram from this byte onwards	00h	-
	Low byte Byte 1	Length of the identification telegram	06h	6 bytes long
2002d	High byte Byte 2	Command code	04h	**Change tag** command
	Low byte Byte 3	Reserved/Channel/ Toggle bit	04h	4 corresponds to channel 2. Channel number shifted 1 bit to the left.
2003d	High byte Byte 4	Status	00h	00h = command executed (meaning of the identification statuses see chapter 7.11)
	Low byte Byte 5	Reply counter	01h	Increases by 1 after each additional response.
2004d - 2011d	High byte	-	00h	-
	Low byte	-	00h	-

3rd step

A **read multiple register** - MODBUS command must be executed. The registers contain the response to the executed identification command **Enhanced read**.

Address (0-based)	Register division Byte number of the identification telegram	Use	Con-tents	Meaning
2000d	High byte	Reserved	00h	-
	Low byte	Utilization register	03h	3% of the FIFO memory is utilized
2001d	High byte Byte 0	Length of the identification telegram from this byte onwards	00h	-
	Low byte Byte 1	Length of the identification telegram	06h	6 bytes long
2002d	High byte Byte 2	Command code	19h	**Enhanced read** Command
	Low byte Byte 3	Word number/Channel/ Toggle bit	04h	Word count = 0. 4 corresponds to channel 2. Channel number shifted 1 bit to the left.
2003d	High byte Byte 4	Status	05h	05h = identification read error (meaning of the identification statuses see chapter 7.11)
	Low byte Byte 5	Reply counter	02h	Increases by 1 after each additional response.
2004d - 2011d	High byte	Data	00h	No data read because no data carrier in front of the reading head.
	Low byte	Data	00h	No data read because no data carrier in front of the reading head.

Note!

If a type IPC03 data carrier is held in front of the reading head, the data can be viewed if a **read multiple register** command is executed repeatedly.

Read/write multiple register (17h)

This MODBUS command combines the functionality of the **read multiple register**command with the **write multiple register**command. This command should always be used when data is exchanged cyclically via a control unit. The following should be noted:

If an identification command is initiated via this MODBUS command (for example, a read command), the answer to this command is not included in the response associated with this request. The data is only available after the time required to process the command has elapsed.

If an identification command is initiated several times (e.g. if you wish to execute a read command several times in succession), the first four bytes of the identification telegram must be modified accordingly. The toggle bit can be used for this.

Process:

1. A request is issued. The following parameters must be known here:

Writing:

Start address (depending on channel)	Channel 0	0d
	Channel 1	1000d
	Channel 2	2000d
	Channel 3	3000d
	Channel 4	4000d
Number of registers to be written:	Maximum 121d	

Reading:

Start address	Writing start address
Number of registers to be read:	Maximum 125d

2. The identification system sends a response to the MODBUS master. If an error occurs, the response contains an exception code (see chapter 7.4.5).

7.4.4 General notes on creating the control program

TCP connection:

Many MODBUS masters enable the use of transactions accompanied by a TCP link connection and disconnection. As outlined in the MODBUS specification, we recommend maintaining as opposed to terminating the connection following a transaction.

Transaction timeout:

The timeout time heavily influences the load on the network you are using. 1000 ms can be accepted as a guide value.

Transaction cycle time:

The repeat rate must be higher than the number of data carriers read per time unit (per channel). A correspondingly short cycle time must be selected. The FIFO load register can be monitored to determine whether the refresh rate of the controller is sufficiently high.

Cyclic reading and writing of registers:

Writing:

An identical identification command can only be executed again in succession if the first four telegram bytes change. The toggle bit can be used for this. In this way, the controller can transfer a register set several times during a cyclic data exchange without issuing a second identification command unintentionally.
All identification commands contain a channel number. This is ignored when MODBUS/TCP is used. The channel is defined using the register address only. The ident channel is still included in the telegram when the register is read.

Reading:

The identification system only transfers a response to an identification command once. Note therefore that the controller evaluates each telegram transferred via the bus. When using **enhanced**commands, the following procedure for distinguishing between old and new data is recommended because the controller CPU cycle is usually quicker than the bus cycle:

1. Check whether a telegram is available: Telegram length > 0?
2. Is the reply counter for this telegram different to the previous one?
3. If the status set to 0?

Can all three cases be answered with "YES", is a new, valid answer available?

Note!

Visit www.pepperl-fuchs.com to view a PLC example program.

7.4.5 MODBUS exception codes

The device issues a response for each MODBUS transaction. The following table contains a list of possible exception codes:

Code	Name	Description
01	Illegal function	The function code is not: 03h, 16h, 17h.
02	Illegal data address	The registers to be written or read are outside of the defined range.
03	Illegal data value	The number of data sets to be read or written is invalid.
04	Slave device failure	Internal error
06	Slave device busy	An attempt is made to access a channel that is already being used by another client.
0A	Gateway path unavailable	The device ID is not 1 or 2.

7.5 Communication via Ethernet/IP

7.5.1 General information on communication via Ethernet/IP

Ethernet/IP is an open fieldbus standard, which enables the exchange of data between programmable logic controllers (PLCs), PCs, control systems, monitoring systems, sensors and actuators.
Please visit the ODVA website at www.odva.org for more information about Ethernet/IP.

7.5.2 Performance spectrum

- Implicit message
- Explicit message
- PCCC

7.5.3 PLC settings for implicit communication

The following parameters must be configured in addition to the IP address:

	Assembly instance	Size (32 bits)
Input	150 - 162 (output + 50d)	2-15*
Output	100 - 112	2-15*
Configuration	112	0

* (see chapter 7.5.9)

The lower limit of the RPI is 10 ms.

7.5.4 Electronic data sheet (EDS)

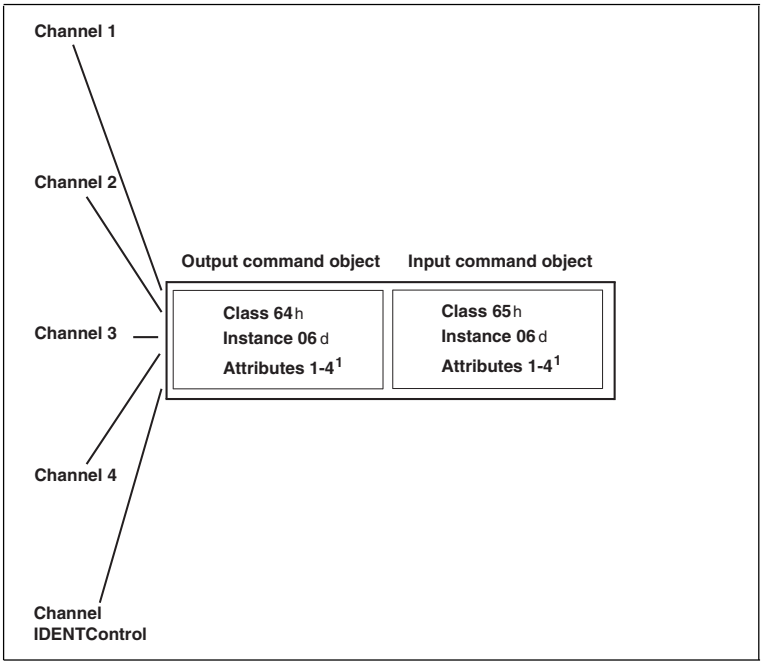
The device is supplied with an EDS file.

7.5.5 Data/Command transfer

Data is exchanged with the IC-KP-B12-V45 device using commands that the device recognizes. There is an important difference between these commands and commands used for TCP/IP and MODBUS protocols: Ethernet/IP commands do not contain parameters for the command length.

The commands are transferred via Ethernet/IP objects, i.e. objects from classes 04h, 64h, and 65h. There are always two different modes available, which may not be confused: "Mixed mode" and "Separated mode".

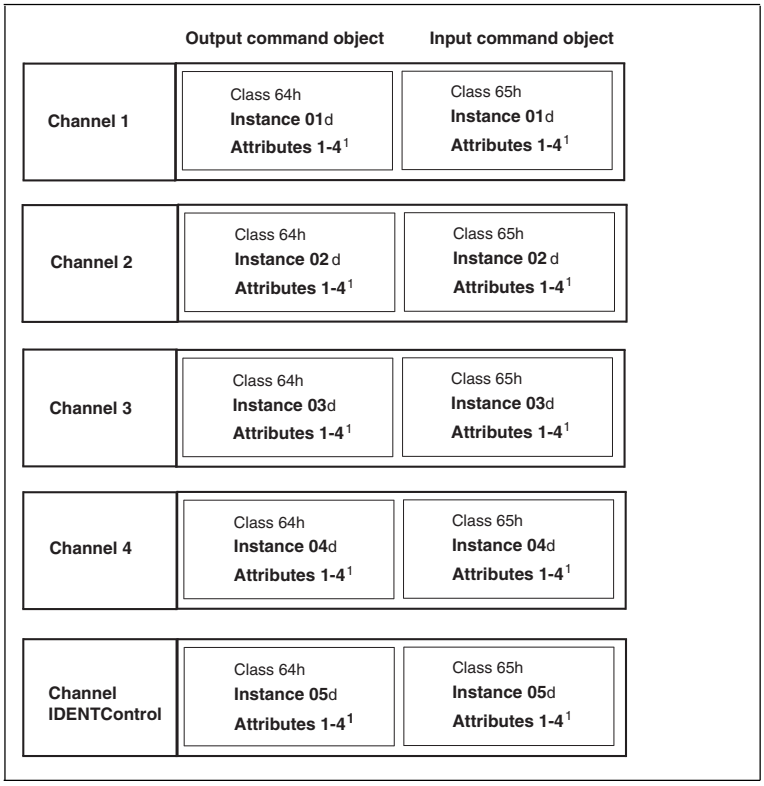
7.5.6 Mixed mode



The five IDENT channels (four R/W heads, one configuration channel) are addressed using an input and an output instance, with the advantage that the controller requires less memory.

The different parameters of the IDENT telegram distinguish the channels.

7.5.7 Separated mode



Each IDENT channel is addressed using a separate input and separate output instance. The advantage here is that data processing is simplified because different IDENT channels do not have to process the data in the same memory area.

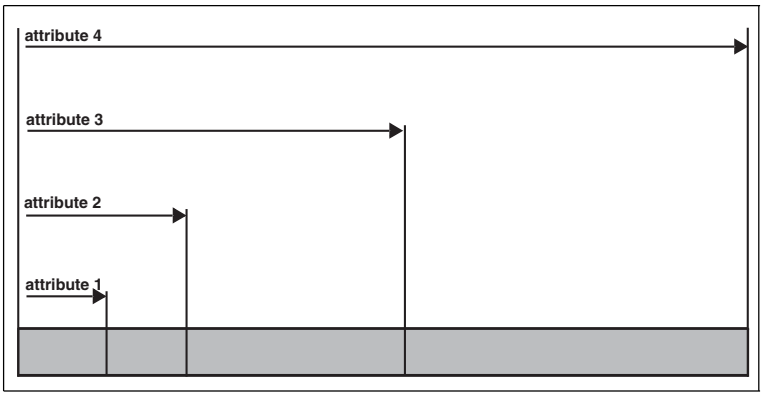
7.5.8 Data length

Depending on the data length required, four different attributes with different lengths are available for each input/output instance.

Class 64h and 65h, instance 1-6

Attribute ID	Data length	Maximum number of double words (4 bytes) that can be read/written at any one time
1	8	1
2	12	2
3	32	7
4	60	14

Attributes 1-3 require fewer data bytes than attribute 4.



7.5.9 Assembly attributes

The attributes of the output object (class 64h) and the input objects (class 65h) appear in different combinations in the assembly object. 26 assembly instances can be used in pairs for implicit communication and so there are 13 possible combinations. These combinations can be selected either via the device display, the attribute 100 from instance 0 of the assembly object or by specifying the combination on the PLC (Forward Open).

	Output instance	Input instance	Channel size					Required/ Generated size Output/ Input byte
			1	2	3	4	5 (conf.)	
Mixed mode	100d	150d	8*					8 / 8
	101d	151d	12*					12 / 12
	102d	152d	32*					32 / 32
	103d	153d	60*					60 / 60
Sepa-rated mode	104d	154d	8	8	8	8		32 / 32
	105d	155d	12	12	12	12		48 / 48
	106d	156d	32	32	32	32		128 / 128
	107d	157d	60	60	60	60		240 / 240
	108d	158d	8	8	8	8	8	40 / 40
	109d	159d	12	12	12	12	8	56 / 56
	110d	160d	32	32	32	32	8	136 / 136
	111d	161d	60	60	60	60	8	248 / 248
	112d	162d	0 / 10					0 / 10

* access to mixed mode instance for input/output command object

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The following comparison shows the relationship between input and output instances: Input instance = output instance + 50d.

A combination of the "heartbeat" and the ident status forms the output instance 112 and input instance 162. Refer to appendix B for a more detailed view of the object model.

7.5.10 Access administration

The assembly object is a collection of attributes from classes 64h and 65h (input and output). Both implicit and explicit access to these objects is possible (via the assembly object). Simultaneous access is regulated as follows to prevent the attributes from overwriting one another.

	Implicit data exchange		Explicit access Instances from input/output commands					
	Output instance	Input instance	1	2	3	4	5 (conf.)	6
Mixed mode	100d	150d	x	x	x	x	x	x
	101d	151d	x	x	x	x	x	x
	102d	152d	x	x	x	x	x	x
	103d	153d	x	x	x	x	x	x
Sepa-rated mode	104d	154d	x	x	x	x	✓	x
	105d	155d	x	x	x	x	✓	x
	106d	156d	x	x	x	x	✓	x
	107d	157d	x	x	x	x	✓	x
	108d	158d	x	x	x	x	x	x
	109d	159d	x	x	x	x	x	x
	110d	160d	x	x	x	x	x	x
	111d	161d	x	x	x	x	x	x
	112d	162d	✓	✓	✓	✓	✓	x

7.5.11 Heartbeat and ident status

If instance 112d and 162d of the assembly object are selected, the size of the output field is 0 bytes and the size of the input that contains the status and reply counter is 10 bytes.

Byte status	Description
00	Status of the IDENTControl
01	Reply counter of the IDENTControl
02	Status of channel 1
03	Reply counter from channel 1
04	Status of channel 2
05	Reply counter from channel 2

Byte status	Description
06	Status of channel 3
07	Reply counter from channel 3
08	Status of channel 4
09	Reply counter from channel 4

The advantage of this procedure is that only a few data bytes are transferred via the bus. Ident commands are transferred as the ident system as explicit commands. A new ident response can be read as soon as the value on the reply counter changes.

7.5.12 Data hold time

All responses from the device are present in the input field for a specific time. Make sure that the controller reads all responses before they are overwritten by a new response. The data hold time indicates how long an IDENT telegram of this kind remains in the input field. The data hold time can be adjusted via the display or the boot-up object (see chapter 13.1). Values between 0 and 2.55 seconds can be preset in 10 ms increments. The default value is 100 ms. Make sure that the data hold time is greater than the maximum cycle time of the whole system (including data storage to the PLC). However, the data hold time should not be much longer than necessary for the following reasons:

1. The reaction time of the device will increase if several responses arrive in quick succession.
2. The maximum possible number of response telegrams per time unit decreases when the data hold time is increased. A memory overflow may occur. The State LED then flashes green.

7.5.13 PCCC

PLC5 and SLC500 PLCs use PCCC messaging. The identification system also supports PCCC. The data telegrams receive the output and input data from the selected assembly object. Note the byte sequence here (see "Example: Assembly instance 104, single read command" on page 48).

Supported PCCC commands:

- Write PLC5 type point-to-point
- Read PLC5 type point-to-point

The data is always written as an integer data set starting with N14:0. The data is read as an integer data set starting with N7:0. The length is determined by the assembly instance selected via the display on the IDENTControl.

Example: Assembly instance 104, single read command

Configure output instance 104d first via the display.

	102d	152d	32*					32 / 32
	103d	153d	60*					60 / 60
Separated Mode	104d	154d	8	8	8	8		32 / 32
	105d	155d	12	12	12	12		48 / 48

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Write PLC5 type:

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
N14:0	<WordNum>							<T>	<command>							
N14:1	<WordAddr> (low byte)								<WordAddr>(high byte)							
N14:2	Write data DW 1 (if not used, please set to 0)															
N14:3	Write data DW 1 (if not used, please set to 0)															
N14:4	<WordNum>							<T>	<command>							
N14:5	<WordAddr> (low byte)								<WordAddr>(high byte)							
N14:6	Write data DW 1 (if not used, please set to 0)															
N14:7	Write data DW 1 (if not used, please set to 0)															
N14:8	<WordNum>							<T>	<command>							
N14:9	<WordAddr> (low byte)								<WordAddr>(high byte)							
N14:10	Write data DW 1 (if not used, please set to 0)															
N14:11	Write data DW 1 (if not used, please set to 0)															
N14:12	<WordNum>							<T>	<command>							
N14:13	<WordAddr> (low byte)								<WordAddr>(high byte)							
N14:14	Write data DW 1 (if not used, please set to 0)															
N14:15	Write data DW 1 (if not used, please set to 0)															

Read PLC5 type:

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
N7:0	<WordNum>				0	0	1	<T>	<command>							
N7:1	<ReplyCounter>								<Status>							
N7:2	Read data DW 1															
N7:3	Read data DW 1															
N7:4	<WordNum>				0	1	0	<T>	<command>							
N7:5	<ReplyCounter>								<Status>							
N7:6	Read data DW 1															
N7:7	Read data DW 1															
N7:8	<WordNum>				0	1	1	<T>	<command>							
N7:9	<ReplyCounter>								<Status>							
N7:10	Read data DW 1															
N7:11	Read data DW 1															
N7:12	<WordNum>				1	0	0	<T>	<command>							
N7:13	<ReplyCounter>								<Status>							
N7:14	Read data DW 1															
N7:15	Read data DW 1															

Some restrictions apply to assembly instances 107d/157d and 111d/161d:

The IC-KP-B12-V45 device does not support fragmentation protocols. It is, therefore, not possible to send or receive more than 114 words simultaneously. The whole data set must be divided into two separate PCC commands because instances 107d/157d and 111d/161d use more than 114 registers.

Example of reading/writing operations involving more than 114 registers:

Output instance	Input instance	Channel size					Size needed/ generated Output/ input bytes
		1	2	3	4	5 (conf.)	
111d	161d	60	60	60	60	8	248 / 248

1. Command:

Message type	Start register	Number of registers
Write PLC5 type	N14:0	60

2. Command:

Message type	Start register	Number of registers
Write PLC5 type	N14:60	64 (128 bytes / 2)

3. Command:

Message type	Start register	Number of registers
Read PLC5 type	N7:0	60

4. Command:

Message type	Start register	Number of registers
Read PLC5 type	N7:60	64 (128 bytes / 2)

7.6 Communication via PROFINET

7.6.1 General information on communication via PROFINET

PROFINET is an open standard for industrial automation based on industrial Ethernet. PROFINET integrates information technology with established standards such as TCP/IP and XML into automation technology.

The communication concept for setting up decentralized applications within PROFINET is PROFINET IO, i.e. decentralized field devices are installed by PROFINET IO. The familiar IO view of PROFIBUS DP is used where the usable data of the field devices is cyclically transferred to the controller process image. PROFINET IO is a device model consisting of slots and channels, which is based on the main features of PROFIBUS DP. The field device properties are described in GSDML (General Station Description Markup Language) in XML format. PROFINET IO is engineered in the same way as system integrators from PROFIBUS DP have been for years. Here, the decentralized field devices are assigned in the settings of a controller.

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PROFINET IO draws a distinction between three device types: IO controller, IO device, and IO supervisor:

IO controller: Controller that executes the automation program.

IO device: Decentrally assigned field device that is assigned to an IO controller.

IO supervisor: Programming unit/PC with commissioning and diagnostic function.

7.6.2 Overview of the characteristics of the integrated PROFINET IO device

In the network, the IDENTControl IC-KP-B12 is a PROFINET IO device that communicates cyclically with the assigned PROFINET IO controller during operation.

7.6.3 Project planning using device description (GSD)

As with PROFIBUS DP, the PROFINET IO device is integrated in the configuration tool by way of a device description. The characteristics of an IO device are described in a GSD (General Station Description), which contains all the relevant data related to a field device (technical properties and information for communication) that is required to address and operate the device in a PROFINET network. PROFINET uses the XML-based language GSDML (General Station Description Markup Language) to describe the device.

The description files for the IO devices are imported into the configuration tool. Peripheral addresses are assigned to the individual IO channels of the field devices. The peripheral input addresses incorporate the received data. The user program evaluates and processes this data. The user program generates the peripheral output values and sends them to the IDENTControl.

Once programming is complete, the programming and configuration data is uploaded to the IO controller. The IO controller programs and configures the IO devices automatically.

The following data field sizes (modules) are predefined in the GSD file:

For read/write operation:

"In/Out 8 bytes"	Corresponds to	1 word (32 bits)	Input and output data
"In/Out 12 bytes"	"	2 words	"
"In/Out 16 bytes"	"	3 words	"
"In/Out 20 bytes"	"	4 words	"
"In/Out 24 bytes"	"	5 words	"
"In/Out 28 bytes"	"	6 words	"
"In/Out 32 bytes"	"	7 words	"
"In/Out 64 bytes"	"	15 words	"

For read only operation:

"8 In/4 Out bytes"	Corresponds to	1 word (32 bits)	Input data
"12 In/4 Out bytes"	"	2 words	"
"16 In/4 Out bytes"	"	3 words	"
"20 In/4 Out bytes"	"	4 words	"
"24 In/4 Out bytes"	"	5 words	"
"28 In/4 Out bytes"	"	6 words	"
"32 In/4 Out bytes"	"	7 words	"
"64 In/4 Out bytes"	"	15 words	"

Select one of the predefined modules. In doing so, make sure that the data field size for the read/write commands used is sufficient, depending on the parameter word count.

Note!

The data hold time is stored in the GSD file. This value can be changed via the properties of the PROFINET device.

The data hold time is the time after which the identification system may overwrite the input data field. This time should be chosen so that it is longer than the cycle time of the controller attached to the IO controller. If two data carriers are read directly after one other, the code of the one read first remains in the input data field for the specified time before the next one is entered.

7.6.4 Start-up: Assignment of device name, LED flashes

Unique device names must be assigned to the IO devices within a PROFINET IO system. The IO devices are identified in the network by their name and IP address.

Names are assigned using the configuration tool ("Device creator"). Select a unique name for the IO device (object in the programming) and then assign this name to the actual device (-> assign device name). Select the required IO device from the list of available devices with reference to the MAC address.

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Many configuration tools offer the option of making a specific LED flash so that the device can be identified more easily. Select a IO device with reference to the MAC address and then activate the flashing function / flash test. The State LED on the IO device IC-KP-B12 then flashes.

Refer to the documentation accompanying the configuration tool you intend to use for a more detailed description of the procedure for allocating device names and starting the flash test.

Once the device names are selected and assigned, the modified configuration must be loaded into the PROFINET IO controller. The IO controller then automatically assigns an IP address to the IO device.

7.7 Command Execution

The controller initiates an identification command. If the data has changed since the last read-out, the control interface executes the new command If the control interface is scheduled to execute a command a number of times, the toggle bit must be inverted. Only then does the device detect that the command has to be executed again.

If the control interface detects a new command, it sets the status in the input field to FFh. The reply counter value increases by 1. The status is displayed () after the control interface has executed the commands.

The toggle bit of the response is the same as the toggle bit of the command.

When new data becomes available, the previous data is overwritten. The reply counter value increases by 1. In the event of an overflow, the reply counter is reset to its start value (01h).

New commands may only be sent to an output field after the response from the previous command is read.

For an overview of supported commands, .

Command:

Byte 0*	Telegram length, high byte
Byte 1*	Telegram length, low byte
Byte 2	Command code
Byte 3	Channel/toggle bit = 0
Byte 4	Parameters
Byte 5	Parameters
Byte 6	Data to be written
...	...
Byte N	Data to be written

Table 7.1 * This byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

Confirmation (with MODBUS/TCP, no confirmation is sent)

Byte 0*	Telegram length, high byte
Byte 1*	Telegram length, low byte
Byte 2	Command code (echo)
Byte 3	Channel/toggle bit (echo) = 0
Byte 4	Status FFh
Byte 5	Reply counter
...	00h
Byte N	00h

Table 7.2 * This byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

Response:

Byte 0*	Telegram length, high byte
Byte 1*	Telegram length, low byte
Byte 2	Command code (echo)
Byte 3	Channel/toggle bit (echo) = 0
Byte 4	Status
Byte 5	Reply counter
Byte 6	Read data
...	...
Byte N	Read data

Table 7.3 * This byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

7.7.1 Command examples

Example: Define tag type

Command: Change tag type on channel 1 to IPC03

04:02:30:33 (hexadecimal format)	
04	Command code **CT** (change tag)
02	Reserved/Channel (1), toggle bit 0b
30:33	tag type (IPC03)

Confirmation

04:02:FF:01	
04	Repeat command code **CT** (change tag)
02	Reserved/Channel (1), toggle bit 0b
FF	Status FFh (processing command)
01	Reply counter

Response: Type IPH-... read/write head on channel 1

04:02:00:02	
04	Repeat command code **CT** (change tag)
02	Reserved/Channel (1), toggle bit 0b
00	Status 0 (command executed without error)
02	Reply counter

Alternative response: No read/write head on channel 1

04:02:06:02	
04	Repeat command code **CT** (change tag)
02	Reserved/Channel (1), toggle bit 0b
06	Status 6 (hardware error)
02	Reply counter

Example: Read tag

Prerequisites:

- The tag type IPC03 is set.
- One type IPH-... read/write head is connected to channel 1.

Command: Read two double words starting from address 0 on channel 1

10:22:00:00	
10	Command code **SR** (single read words)
22	Number of double words (2) / channel (1), toggle bit
00:00	Address of double words (0000)

Confirmation

10:22:FF:01	
10	Repeat command code **SR** (single read words)
22	Number of double words (2) / channel (1), toggle bit
FF	Status FFh (processing command)
01	Reply counter

Response: Type IPC03 tag is located in front of the read/write head, the highlighted part depends on the content of the tag

10:22:00:02:**31:32:33:34:35:36:37:38**	
10	Repeat command code **SR** (single read words)
22	Number of double words (2) / channel (1), toggle bit
00	Status 0 (command executed without error)
02	Reply counter
31:32:33:34:35:36:37:38	**Data**

Alternative response: No tag in front of read/write head

10:02:05:02	
10	Repeat command code **SR** (single read words)
02	Number of double words (0) / channel (1), toggle bit
05	Status 5 (no tag in the detection range)
02	Reply counter

7.8 Command types

When using commands, a distinction is always made between the two command types **single mode** and **enhanced mode**.

Single mode

The command is executed once. A response is issued immediately.

Enhanced mode

The command remains permanently active until it is interrupted by the user or by an error message. A response is issued immediately.

The command remains active after the response is issued. Data is only transferred if read/write tags change. Read/write tags are not read twice. If a read/write tag leaves the read range, the status '5' is output.

7.9 Command overview

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

System commands

Command code		Command description	Abbre-viation
4d	04h	See "Change tag (CT)" on page 59	**CT**
2d	02h	See "Quit (QU)" on page 62	**QU**
23d	17h	See "Configuration store (CS)" on page 63	**CS**
22d	16h	See "Reset (RS)" on page 64	**RS**
155d	9Bh	See "Set multiplexed mode (MM)" on page 65	**MM**
156d	9Ch	See "set trigger mode (TM):" on page 66	**TM**

Standard read/write commands

Fixcode

Command code		Command description	Abbre-viation
1d	01h	See "Single read fixcode (SF)" on page 67	**SF**
29d	1Dh	See "Enhanced buffered fixcode (EF)" on page 68	**EF**

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Read data

Command code		Command description	Abbre-viation
16d	10h	See "Single read words (SR)" on page 69	**SR**
25d	19h	See "Enhanced buffered read words (ER)" on page 70	**ER**

Write data

Command code		Command description	Abbre-viation
64d	40h	See "Single write words (SW)" on page 71	**SW**
26d	1Ah	See "Enhanced buffered write words (EW)" on page 72	**EW**

Special command modes

Password mode with IPC03

Command code		Command description	Abbre-viation
24d	18h	See "Set password mode (PM)" on page 75	**PM**
65d	41h	See "Change password (PC)" on page 76	**PC**
66d	42h	See "Set password (PS)" on page 77	**PS**

Configuration IPC03

Command code		Command description	Abbre-viation
97d	61h	See "Single get configuration (SG)" on page 78	**SG**
104d	68h	See "Enhanced buffered get configuration (EG):" on page 79	**EG**
18d	12h	See "Single write configuration (SC)" on page 80	**SC**
102d	66h	See "Enhanced buffered write configuration (EC)" on page 81	**EC**

Write fixcode IPC11 and IDC-...-1K

Command code		Command description	Abbre-viation
31d	1Fh	See "Single write fixcode (SX)" on page 82	**SX**
36d	24h	See "Enhanced buffered write fixcode (EX)" on page 83	**EX**
188d	BCh	See "Set tag ID code (TI)" on page 85	**TI**
170d	AAh	See "Fill tag (S#)" on page 86	**S#**

Extended commands for type IDC-...-1K read / write tags

Command code		Command description	Abbre-viation
10d	0Ah	See "Single read special fixcode (SS)" on page 87	**SS**
113d	71h	See "Enhanced read special fixcode (ES)" on page 88	**ES**

Command code		Command description	Abbre-viation
13d	0Dh	See "Single program special fixcode (SP)" on page 89	**SP**
117d	75h	See "Enhanced program special fixcode (EP)" on page 90	**EP**
107d	6Bh	See "Initialize tag (SI)" on page 91	**SI**

Extended commands for type IDC-...-1K and IQC... read / write tags

Command code		Command description	Abbre-viation
71d	47h	See "Single write words with lock (SL)" on page 92	**SL**
72d	48h	See "Enhanced write words with lock (EL)" on page 93	**EL**

Extended commands for IQH2-... read/write heads

Command code		Command description	Abbre-viation
190d	BEh	See "read param (RP)" on page 94	**RP**
191d	BFh	See "write param (WP)" on page 95	**WP**

7.9.1 System commands

Change tag (CT)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (04h)	0	0	0	0	0	1	0	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Tag type in ASCII	<TagType> (high byte)							
Byte 5	Tag type in ASCII	<TagType> (low byte)							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (04h)	0	0	0	0	0	1	0	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.4 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

This command tells the read/write head on the relevant channel which tag type to communicate with. This setting is stored in the non-volatile memory on the unit.

Supported Tag Types

Tag type		P+F designation	Chip type	Access	Writable memory [bytes]	Read only code length [byte]	Frequency range
High byte	Low byte						
'0'	'2'	IPC02	Unique, EM4102 (EM microelectronic)	Read only code	5	5	125 kHz
'0'	'3'	IPC03	EM4450 (EM microelectronic), Titan	Read/write read only code	116	4	125 kHz
'1'	'1'	IPC11	Q5 (Sokymat)	Read/write	5	-	125 kHz
'1'	'2'	IPC12	P+F FRAM	Read/write read only code	8k	4	125 kHz
'2'	'0'	IQC20[1)]	All ISO 15693 compliant read/write tags	Read/write read only code	8	8	13.56 MHz
'2'	'1'	IQC21	I-Code SLI (NXP)	Read/write read only code	112	8	13.56 MHz

Tag type		P+F designation	Chip type	Access	Writable memory [bytes]	Read only code length [byte]	Frequency range
High byte	Low byte						
'2'	'2'	IQC22	Tag-it HF-I Plus (Texas Instruments)	Read/write read only code	250	8	13.56 MHz
'2'	'3'	IQC23	my-D SRF55V02P (Infinion)	Read/write read only code	224	8	13.56 MHz
'2'	'4'	IQC24	my-D SRF55V10P (Infinion)	Read/write read only code	928	8	13.56 MHz
'3'	'1'	IQC31	Tag-it HF-I Standard (Texas Instruments)	Read/write read only code	32	8	13.56 MHz
'3'	'3'	IQC33[2)]	FRAM MB89R118 (Fujitsu)	Read/write read only code	2k	8	13.56 MHz
'3'	'4'	IQC34	FRAM MB89R119 (Fujitsu)	Read/write read only code	29	8	13.56 MHz
'3'	'5'	IQC35	I-Code SLI-S (NXP)	Read/write read only code	160	8	13.56 MHz
'4'	'0'	IQC40	All ISO 14443A compliant read/write tags	Read only code	-	4/7[6)]	13.56 MHz
'4'	'1'	IQC41	Mifare UltraLight MF0 IC U1 (NXP)	Read/write read only code	48	7	13.56 MHz
'4'	'2'	IQC42[3)]	Mifare Classic MF1 IC S50 (NXP)	Read/write read only code	752	4/7[6)]	13.56 MHz
'4'	'3'	IQC43[3)]	Mifare Classic MF1 IC S70 (NXP)	Read/write read only code	3440	4/7[6)]	13.56 MHz
'5'	'0'	IDC-...-1K	P+F	Read/write read only code	125	4	250 kHz
'5'	'2'	ICC-...	P+F	Read only code	28	7	250 kHz
'7'	'2'	IUC72[4)]	UCode-EPC-G2XM (NXP)	Read/write read only code	64	8	868 MHz
'7'	'3'	IUC73[4)]	Higgs-2 (Alien)	Read only code	-	96	868 MHz
'7'	'4'	IUC74[4)]	UCode-EPC-G2 (NXP)	Read/write read only code	28	96	868 MHz
'7'	'5'	IUC75[4)]	Monza 2.0 (Impinj)	Read only code	-	96	868 MHz
'7'	'6'	IUC76[4)]	Higgs-3 (Alien)	Read/write read only code	56	240	868 MHz
'8'	'0'	All Class 1 Gen 2 compliant read/write tags		-	-	Max. 96	868 MHz
'9'	'9'	Depends on the reader [5)]		-	-	-	-

1) IQC20 is not an actual tag type as such, but is used to read the UID (read only code) of all ISO 15693 compliant read/write tags.

2) Read/write tag IQC33 can only be used in combination with a IQH1-... read/write head. The memory is divided into 8-byte blocks (instead of 4-byte blocks). You must enter a continuous initial address for write commands SR, ER, SW and EW.
<WordNum> specifies the number of 8-byte blocks (here, max. 7) and must be an even number.

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3) Read/write tags IQC40–IQC43 can only be used in combination with a IQH2-... read/write head.
<WordNum> specifies the number of 16-byte blocks and must be a multiple of 4.
The memory can be encrypted for each sector (1 sector = 4 blocks of 16 bytes).
The default key in the tag and reader is `FF FF FF FF FF FF`$_{ASCII}$. The key in the reader can be read using the `Read param` command and written using the `Write param` command (see System Commands). The key is only changed in the reader during this process and not in the tag!
The key in the reader is stored in the non-volatile memory.

4) IUC7* type read/write tags can only be used with read/write head IUH-F117-V1 in combination with certain control interfaces.

5) The tag type configured in the read/write head as the default is selected.

6) Read/write tags can have 4-byte (older versions) or 7-byte UIDs. IQC42 and IQC43 type read/write tags from Pepperl+Fuchs generally have 7-byte UIDs.

Note!

In a plant where only one tag type is used, it is advantageous to permanently configure that tag type so that the read/write head detects the tag quicker.

Default tag type:

In the factory default condition, the tag type 99 is preset in the IDENTControl (depending on the reading head type), thus the tag type preset on the reading head is used.

Recommendation:

For operation in an automated plant, permanently preset the data carrier type in use via a command.

Quit (QU)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	0
Byte 2	Command code (02h)	0	0	0	0	0	0	1	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (02h)	0	0	0	0	0	0	1	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.5 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The command running on this channel is interrupted.

Configuration store (CS)

Command:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 2	Command code (17h)	0	0	0	1	0	1	1	1
Byte 3	Reserved/Ident channel/Toggle bit	-	-	-	-	<Channel>			<T>
Byte 4	Mode	0	0	0	0	0	0	0	<Mode>
Byte 5	not used	-	-	-	-	-	-	-	-
Byte 6	not used	-	-	-	-	-	-	-	-
Byte 7	not used	-	-	-	-	-	-	-	-
Byte 8	not used	-	-	-	-	-	-	-	-
Byte 9	not used	-	-	-	-	-	-	-	-

Response:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 2	Command code (17h)	0	0	0	1	0	1	1	1
Byte 3	Reserved/Ident channel/Toggle bit	-	-	-	-	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	not used	-	-	-	-	-	-	-	-
Byte 7	not used	-	-	-	-	-	-	-	-
Byte 8	not used	-	-	-	-	-	-	-	-
Byte 9	not used	-	-	-	-	-	-	-	-

The configuration store (CS) command allows you to store the last command sent to the R/W head in the non-volatile memory of the IDENTControl Compact. The R/W head executes the command automatically again if the power supply is interrupted or the IDENTControl Compact is reset.

<Mode>='1' activates the mode.
<Mode>='0' deactivates the mode.

Configuration store is deactivated by default.

Reset (RS)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	0
Byte 2	Command code (16h)	0	0	0	1	0	1	1	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	0	0	0	<T>

Table 7.6 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

This command terminates all active commands. The device settings are reloaded from the non-volatile memory.

This confirmation is issued for this command (status FFh) instead of a response. The device resets the hardware and then restarts.

Set multiplexed mode (MM)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	1
Byte 2	Command code (9Bh)	1	0	0	1	1	0	1	1
Byte 3	Reserved/Toggle bit	0	0	0	0	0	0	0	<T>
Byte 4	Multiplex mode	0	0	0	0	0	0	0	<T>

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (9Bh)	1	0	0	1	1	0	1	1
Byte 3	Reserved/Toggle bit	0	0	0	0	0	0	0	<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.7 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

This command switches multiplex mode on and off. In multiplex mode, the R/W heads are controlled according to the time multiplex process, i.e. only one R/W head is active. The procedure minimizes mutual interference between R/W heads, allowing two R/W heads to be mounted side by side.

Each IDENT channel sends a response in reply to an MM command.

Multiplex mode <F>='0': Mode off
<F>='1': Mode on

If a R/W head is not connected to a channel, the response telegram receives the status "06h" (hardware fault) from this channel.

set trigger mode (TM):

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0[1)]	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1[1)]	Telegram length, low byte	0	0	0	0	0	1	0	1
Byte 2	Command code (9Ch)	1	0	0	1	1	1	0	0
Byte 3	Ident channel/Sensor channel/Toggle bit	0	<Identchannel>			<Sensorchannel>			<T>
Byte 4	Trigger mode	<Triggermode>							

1) This byte is not used for the Ethernet/IP and PROFINET protocol.

Response:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0[1)]	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1[1)]	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (9Ch)	1	0	0	1	1	1	0	0
Byte 3	Reserved/Sensor channel/Toggle bit	0	0	0	0	<Sensorchannel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

1) This byte is not used for the Ethernet/IP and PROFINET protocol.

Permitted parameters:

<Sensorchannel>	3 (011b), 4 (100b)
<Identchannel>	0 (000b), 1 (001b), 2 (010b), 3 (011b), 4 (100b) (but not <Sensorchannel>)
<Triggermode>	0 (00000000b): Trigger mode off 1 (00000001b): Trigger mode on 2 (00000010b): Trigger mode inverted

If a read/write command is sent to the triggered channel <Channel> after the TM command, it is always activated when the message 0 is sent by the <Sensorchannel>.

The read/write command activated by the trigger generates the responses as if it had been restarted by the host with each trigger.

The read command is activated using the trigger until the trigger is deactivated with trigger mode 0.

If a trigger command has assigned channel '0' (000b) for <Identchannel>, this change in the status of the trigger sensor (status 0x00 and 0x05) is transmitted to the controller via the sensor channel

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This function can be used to monitor functions via the controller if trigger signals and reading of data cannot occur simultaneously for application related reasons. Correlation must take place in the controller.

7.9.2 Standard read/write commands

Single read fixcode (SF)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	0
Byte 2	Command code (01h)	0	0	0	0	0	0	0	1
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	1[1)]
Byte 2	Command code (01h)	0	0	0	0	0	0	0	1
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	ID code 00h ... FFh	<ID code>							
Byte 7	ID code 00h ... FFh	<ID code>							
...	ID code 00h ... FFh	<ID code>							
Byte N[2)]	ID code 00h ... FFh	<ID code>							

Table 7.8

* this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.
1) The telegram length depends on length of the read only code from the tag.
2) N = <FixLen> + 6; Ethernet/IP: N = <FixLen> + 4

The R/W head makes only one attempt to read a read only code.

The length of the read only code that is output depends on the tag type. See table "Supported Tag Types" on page 59.

Enhanced buffered fixcode (EF)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	0
Byte 2	Command code (1Dh)	0	0	0	1	1	1	0	1
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	1[1]
Byte 2	Command code (1Dh)	0	0	0	1	1	1	0	1
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	ID code 00h ... FFh	<ID code>							
Byte 7	ID code 00h ... FFh	<ID code>							
...	ID code 00h ... FFh	<ID code>							
Byte N[2)]	ID code 00h ... FFh	<ID code>							

Table 7.9

* this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.
1) The telegram length depends on length of the read only code from the tag.
2) N = <FixLen> + 6; Ethernet/IP: N = <FixLen> + 4

The R/W head makes attempts until successful to read a read only code. Only data that changes is transferred via the interface, i.e. the R/W head transfers data whenever it reads a new read/write tag or whenever it reads a read/write tag where there was previously no read/write head within the detection range.

The status '05h' (read command) is output whenever a read/write tag leaves the detection range.

The length of the read only code that is output depends on the tag type. See table "Supported Tag Types" on page 59.

Single read words (SR)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (10h)	0	0	0	1	0	0	0	0
Byte 3	Word number/Channel/Toggle bit	<WordNum>				<Channel>			<T>
Byte 4	Word address	<WordAddr> (high byte)							
Byte 5	Word address	<WordAddr> (low byte)							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	<TelegramLenH>							
Byte 1*	Telegram length, low byte	<TelegramLenL>							
Byte 2	Command code (10h)	0	0	0	1	0	0	0	0
Byte 3	Word number/Channel/Toggle bit	<WordNum>				<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	Data 00h ... FFh	<Data>							
Byte 7	Data 00h ... FFh	<Data>							
Byte 8	Data 00h ... FFh	<Data>							
Byte 9	Data 00h ... FFh	<Data>							
...	Data 00h ... FFh	<Data>							
Byte N[1)]	Data 00h ... FFh	<Data>							

Table 7.10 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.
1) N = 4 x <WordNum> + 5; Ethernet/IP: N = 4 x <WordNum> + 3

The R/W head makes one attempt to read <WordNum> 32-bit words from the address<WordAddr>.

Enhanced buffered read words (ER)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (19h)	0	0	0	1	1	0	0	1
Byte 3	Word number/Channel/Toggle bit	<WordNum>				<Channel>			<T>
Byte 4	Word address	<WordAddr> (high byte)							
Byte 5	Word address	<WordAddr> (low byte)							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	<TelegramLenH>							
Byte 1*	Telegram length, low byte	<TelegramLenL>							
Byte 2	Command code (19h)	0	0	0	1	1	0	0	1
Byte 3	Word number/Channel/Toggle bit	<WordNum>				<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	Data 00h ... FFh	<Data>							
Byte 7	Data 00h ... FFh	<Data>							
Byte 8	Data 00h ... FFh	<Data>							
Byte 9	Data 00h ... FFh	<Data>							
...	Data 00h ... FFh	<Data>							
Byte N[1)]	Data 00h ... FFh	<Data>							

Table 7.11 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.
1) N = 4 x <WordNum> + 5; Ethernet/IP: N = 4 x <WordNum> + 3

The R/W head makes attempts until successful, to read <WordNum> 32-bit words from the address <WordAddr>. Only modified data is transferred via the interface.

When a read/write tag leaves the detection range, the status '05h' (read command) is output.

Single write words (SW)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	<TelegramLenH>							
Byte 1*	Telegram length, low byte	<TelegramLenL>							
Byte 2	Command code (40h)	0	1	0	0	0	0	0	0
Byte 3	Word number/Channel/Toggle bit	<WordNum>				<Channel>			<T>
Byte 4	Word address	<WordAddr> (high byte)							
Byte 5	Word address	<WordAddr> (low byte)							
Byte 6	Data 00h ... FFh	<Data>							
...	Data 00h ... FFh	<Data>							
Byte N[1)]	Data 00h ... FFh	<Data>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (40h)	0	1	0	0	0	0	0	0
Byte 3	Word number/Channel/Toggle bit	0				<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.12 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.
1) N = 4 x <WordNum> + 5; Ethernet/IP: N = 4 x <WordNum> + 3

The R/W head makes one attempt to write <WordNum> 32-bit words from the address<WordAddr>.

Within the reply from the read/write head, <WordNum> is always 0, because the answer does not contain any user data.

Enhanced buffered write words (EW)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	<TelegramLenH>							
Byte 1*	Telegram length, low byte	<TelegramLenL>							
Byte 2	Command code (1Ah)	0	0	0	1	1	0	1	0
Byte 3	Word number/Channel/Toggle bit	<WordNum>				<Channel>			<T>
Byte 4	Word address	<WordAddr> (high byte)							
Byte 5	Word address	<WordAddr> (low byte)							
Byte 6	Data 00h ... FFh	<Data>							
...	Data 00h ... FFh	<Data>							
Byte N[1)]	Data 00h ... FFh	<Data>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (1Ah)	0	0	0	1	1	0	1	0
Byte 3	Word number/Channel/Toggle bit	0				<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.13 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.
1) N = 4 x <WordNum> + 5; Ethernet/IP: N = 4 x <WordNum> + 3

Within the reply from the read/write head, <WordNum> is always 0, because the answer does not contain any user data.

The read/write head repeatedly attempts to write <WordNum> 32-bit words from the address <WordAddr> until successful. After each successful write, the head sends the response and then switches to continuous read. The read/write head then reads the same tag until the tag has left the detection range or a new tag appears within the detection range. At this point, the read/write head again starts write attempts.

The status '05h' is only output when a tag leaves the detection range or is not yet within the detection range.

If two tags enter the read range one immediately after the other, the status '05h' is not issued between the two readings.

7.9.3 Special commands

Note!

You can only use the commands in this section for the data carrier type '03' (IPC03).

IPC03 Configuration

The storage of a data carrier IPC03 is organized by word. A data word is defined with a length of 32 bits. For the normal data range, 29 words from addresses 3 through 31 (<WordAddr> = 00h ... 1Ch) are available.

Address	Meaning	<WordAddr>	<ConfAddr>	Note
Word 0	Password	-	-	Write only
Word 1	Protection word	-	1	Read/write
Word 2	Control word	-	2	Read/write
Word 3 ...31	Data range	00h ... 1Ch	-	Read/write
Word 32	Device Serial Number	1Dh	-	Read only
Word 33	Device identification	1Eh	-	Read only

Word 0 contains the password. The password can only be written.

With word 1, the "Protection Word", you can define a read-protected and a write-protected range. The "Protection Word" can only be read and written with the correct password.

With word 2, the "Control Word", you can set various operating modes and the read range for the operating mode "Default Read". The "Control Word" can only be read and written with the correct password.

If you would like to use the "Protection Word" and the "Control Word", you must first activate the password mode.

The individual bits have the following meanings:

Protection word		
Bit	Meaning	Byte
0 ... 7	First read-protected word	0
8 ... 15	Last read-protected word	1
16 ... 23	First write-protected word	2
24 ... 31	Last write-protected word	3

Control word		
Bit	Meaning	Byte
0 ... 7	Read range start	0
8 ... 15	Read range end	1
16	Password mode on/off	2
17	"Read after write" operating mode on/off	
18 ... 23	Open	
24 ... 31	Open	3

IPC03 password mode

If the password mode in the data carrier is activated, the data range of the data carrier is read and write-protected and can only be read or written if the R/W head sends the correct password to the data carrier.

If the password mode in the data carrier is deactivated, every data word on the data carrier can be read or written.

The default password of the R/W heads and the data carrier is 00000000h. In the R/W head, the password is stored in the volatile memory and in the data carrier, the password is stored in the non-volatile memory.

To read or write the "Protection Word" and the "Control Word", you must first enter the password in the password mode (see the commands **SC** or **EC**).

You can also limit access to the data carriers by defining the start and end of a read-protected and a write-protected range in the Protection Word.

Setting the password

1. Enter the correct password once with the command **PS** (set password).
2. Activate the password mode with the command **PM** (set password mode).

The password in the R/W head and on the read/write tag can be changed with the command **PC**.

If the password mode is deactivated, every data word on the read/write tag can be read and written as necessary.

To read and write the words 1 “Protection Word” and 2 “Control Word”, the correct password is always required and therefore the password mode must be active (see the commands **SC** or **EC**).

In addition, the access to the read/write tag can be limited via read- and write-protected ranges. To achieve this, each mutually independent start and end of a read-protected and a write-protected range can be defined in the "Protection Word".

In the factory default condition of the reading heads and the read/write tag IPC03, the password is 00000000h. In the reading head, the password is stored in a volatile manner and in the read/write tag IPC03 in a non-volatile manner.

Set password mode (PM)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	1
Byte 2	Command code (18h)	0	0	0	1	1	0	0	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Password mode	0	0	0	0	0	0	0	<P>

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	1
Byte 2	Command code (18h)	0	0	0	1	1	0	0	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							

Table 7.14 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The command **PM** activates and deactivates the password mode of the relevant channel. In the password mode, the password is transferred to the data carrier before each read/write access. If a data carrier is addressed with the wrong password, then even the other data areas on the data carrier can no longer be accessed.

Password mode "off":	<P>=0 (0b)	(deactivated)
Password mode "on":	<P>=1 (1b)	(activated)

Change password (PC)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	1	0	0
Byte 2	Command code (41h)	0	1	0	0	0	0	0	1
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Old password 00h ... FFh	<PSW> (byte 3)							
Byte 5	Old password 00h ... FFh	<PSW> (byte 2)							
Byte 6	Old password 00h ... FFh	<PSW> (byte 1)							
Byte 7	Old password 00h ... FFh	<PSW> (byte 0)							
Byte 8	New password 00h ... FFh	<PSW> (byte 3)							
Byte 9	New password 00h ... FFh	<PSW> (byte 2)							
Byte 10	New password 00h ... FFh	<PSW> (byte 1)							
byte 11	New password 00h ... FFh	<PSW> (byte 0)							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	1
Byte 2	Command code (41h)	0	1	0	0	0	0	0	1
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							

Table 7.15 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The command **PC** changes the password in a tag. Enter the old and then the new password <PSW> here. If the password has been successfully written, the password in the read/write head also changes and the **set password** command is no longer required. The password of the IPC03 can also be changed if the password mode is deactivated.

Set password (PS)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (42h)	0	1	0	0	0	0	1	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Reserved	0	0	0	0	0	0	0	0
Byte 5	Reserved	0	0	0	0	0	0	0	0
Byte 6	Password 00h ... FFh	<PSW> (byte 3)							
Byte 7	Password 00h ... FFh	<PSW> (byte 2)							
Byte 8	Password 00h ... FFh	<PSW> (byte 1)							
Byte 9	Password 00h ... FFh	<PSW> (byte 0)							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	1
Byte 2	Command code (42h)	0	1	0	0	0	0	1	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							

Table 7.16 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The command **PS**sets the password, which the R/W head communicates to the data carrier in password mode.

Operating mode “Default Read”

In "default read" operating mode, 1 or 2 words are read extremely quickly. The area of memory earmarked for reading is already specified on the tag. The R/W head does not have to identify the memory area for the tag.

The start and end of the read range are stored in the bytes 0 and 1 of the control word. As soon as power is supplied to the tag, it sends data from the data range defined by the start and end of the read range. The data range between read range start and end is read with the read commands **SR** (Single read words) and **ER** (enhanced buffered read words) when <WordAddr> is set to 0000h and <WordNum> to 00h.

The advantage of "default read" operating mode is the readout speed. The readout of one data word (4 bytes) is twice as fast in this mode as the other modes. The readout of two words takes approx. 1/3 less time. No more time

advantages can be gained after three data words because "default read" mode is designed to read a maximum of two words (= 8 bytes). Reading larger data ranges can lead to error messages if the reading head does not respond within the planned reaction time.

Setting "Default Read"

1. Activate the password mode.
2. Write the read range start and end into the "Control Word".
3. Deactivate the password mode.
4. Read the data range with address designation 0000h and word count 0h.

IPC03 configuration

Single get configuration (SG)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (61h)	0	1	1	0	0	0	0	1
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Reserved	0	0	0	0	0	0	0	0
Byte 5	Address in the configuration range	<ConfAddr>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (61h)	0	1	1	0	0	0	0	1
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	Data 00h ... FFh	<Data>							
Byte 7	Data 00h ... FFh	<Data>							
Byte 8	Data 00h ... FFh	<Data>							
Byte 9	Data 00h ... FFh	<Data>							

Table 7.17 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The R/W head makes exactly one attempt to read a word in the configuration range ("Protection Word" or "Control Word") from the address <ConfAddr>.

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Enhanced buffered get configuration (EG):

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	1
Byte 2	Command code (68h)	0	1	1	0	1	0	0	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Reserved	0	0	0	0	0	0	0	0
Byte 5	Address in the configuration range	<ConfAddr>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (68h)	0	1	1	0	1	0	0	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	Data 00h ... FFh	<Data>							
Byte 7	Data 00h ... FFh	<Data>							
Byte 8	Data 00h ... FFh	<Data>							
Byte 9	Data 00h ... FFh	<Data>							

Table 7.18 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The R/W head attempts to read a word in the configuration range from the address <ConfAddr> until successful. Only data that changes is transferred via the interface, i.e. the R/W head transfers data whenever it reads a new data carrier or whenever it reads a data carrier where there was previously no R/W head within the detection range.

The status '05h' (read/write command) is output when the data carrier leaves the detection range or if the data carrier is not yet within the detection range when the command is executed.

If two data carriers enter the read range one immediately after the other, the status '05h' is not issued between the two readings.

Single write configuration (SC)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (12h)	0	0	0	1	0	0	1	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Reserved	0	0	0	0	0	0	0	0
Byte 5	Address in the configuration range	<ConfAddr>							
Byte 6	Data 00h ... FFh	<Data byte 3>							
Byte 7	Data 00h ... FFh	<Data byte 2>							
Byte 8	Data 00h ... FFh	<Data byte 1>							
Byte 9	Data 00h ... FFh	<Data byte 0>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (12h)	0	0	0	1	0	0	1	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.19 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The R/W head makes exactly one attempt to write a word to the configuration range ("Protection Word" or "Control Word") from the address <ConfAddr>.

The password mode must be active so that the R/W head can write to the configuration range.

If the password mode is deactivated, every data word outside of the write-protected range can be written to. If you would like to modify the write-protected range, you must modify the "Protection Word" accordingly.

Enhanced buffered write configuration (EC)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (66h)	0	1	1	0	0	1	1	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Reserved	0	0	0	0	0	0	0	0
Byte 5	Address in the configuration range	<ConfAddr>							
Byte 6	Data 00h ... FFh	<Data byte 3>							
Byte 7	Data 00h ... FFh	<Data byte 2>							
Byte 8	Data 00h ... FFh	<Data byte 1>							
Byte 9	Data 00h ... FFh	<Data byte 0>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (66h)	0	1	1	0	0	1	1	0
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.20 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The R/W head attempts to write a word in the configuration range to the address <ConfAddr> until successful. After each write, the status is evaluated and the system waits until a new data carrier is within the detection range. The command then starts again from the beginning. In order to write in the configuration range, the password mode must be active.

The status '05h' (read/write command) is only output when a data carrier leaves the detection range or is not yet within the detection range when the command is executed.

If two data carriers enter the read range one immediately after the other, the status '05h' is not issued between the two readings.

Write read only code IPC11 and IDC-..-1K

"Read-after-write" operating mode is not used.

Tags IPC11 can be programmed to behave like the IPC02 read only tag. To do this, use the commands **SX** and **EX**. The code is read when tag type '02' or '11' is set with the commands **SF** and **EF**.

Tags IDC-...- 1K can be programmed to behave like the ICC read only tag. This programming occupies the first 8 bytes in the tag and occurs when the tag type '50' is set with the commands **SX** or **EX**.
This code is read when tag type '52' is set with the commands **SF** or **EF**. If you use the command **SF** or **EF** when tag type '50' is selected, the 4-byte read only code of the tag is issued.

Single write fixcode (SX)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	1
Byte 2	Command code (1Fh)	0	0	0	1	1	1	1	1
Byte 3	FixLen/Channel/Toggle bit	<FixLen>				<Channel>			<T>
Byte 4	FixType	<FixType> (high byte)							
Byte 5	FixType	<FixType> (low byte)							
Byte 6	Data 00h ... FFh	<Data>							
Byte 7	Data 00h ... FFh	<Data>							
Byte 8	Data 00h ... FFh	<Data>							
Byte 9	Data 00h ... FFh	<Data>							
Byte 10	Data 00h ... FFh	<Data>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (1Fh)	0	0	0	1	1	1	1	1
Byte 3	FixLen/Channel/Toggle bit	0	1	0	1	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.21 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The R/W head makes only one attempt to write a read only code.

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IPC11:	<FixLen>	=	5
	<FixType>	=	'02' ASCII (30h 32h), the read only code cannot be changed '11' ASCII (31h 31h), the read only code can be overwritten
IDC-...-1K:	<FixLen>	=	7 The first 3 bytes are hexadecimal (0h ... Fh), the last 4 bytes are decimal (0d ... 9d).
	<FixType>	=	'52' ASCII (35h 32h), the read only code can be overwritten
	<Data>	=	(Byte 1 to 3): 0x30 ... 0x39; 0x41...0x46 (Byte 4 to 7): 0x30...0x39

Type IDC-...-1K tags can be programmed in such a way that they are compatible with the type ICC-... read only carriers. This programming occupies the first 8 bytes in the tag. The read/write commands can be used to access the remaining memory.

You must set the tag type '50' in order to program type IDC-...-1K tags. To do this, transmit the command **SX** or **EX**.

The value range contains 7 characters:

- the first 3 characters contain the values 0 ... F (hexadecimal code)
- the last 4 characters contain the values 0 ... 9 (decimal code)

You must select the tag type '50' (ICC-...) beforehand in order to read out this code. If a "read only code" command is executed when the tag type '50' (IDC-...-1K) is set, the 4-byte read only code for this tag is issued.

Enhanced buffered write fixcode (EX)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	1
Byte 2	Command code (24h)	0	0	1	0	0	1	0	0
Byte 3	FixLen/Channel/Toggle bit	<FixLen>				<Channel>			<T>
Byte 4	FixType	<FixType> (high byte)							
Byte 5	FixType	<FixType> (low byte)							
Byte 6	Data 00h ... FFh	<Data>							
Byte 7	Data 00h ... FFh	<Data>							
Byte 8	Data 00h ... FFh	<Data>							
Byte 9	Data 00h ... FFh	<Data>							
Byte 10	Data 00h ... FFh	<Data>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (24h)	0	0	1	0	0	1	0	0
Byte 3	FixLen/Channel/Toggle bit	0	1	0	1	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.22 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The R/W head constantly attempts to write a read only code. After each successful write, the response is sent and the system waits until a new tag is within the detection range. The command then starts again from the beginning.

IPC11:

<FixLen> = 5

<FixType> = '02' ASCII (30h 32h), the read only code cannot be changed
'11' ASCII (31h 31h), the read only code can be overwritten

IDC-...-1K:

<FixLen> = 7
The first 3 bytes are hexadecimal (0h ... Fh), the last 4 bytes are decimal (0d ... 9d).

<FixType> = '52' ASCII (35h 32h), the read only code can be overwritten

<Data> = (Byte 1 to 3): 0x30 ... 0x39; 0x41...0x46
(Byte 4 to 7): 0x30...0x39

Type IDC-...-1K tags can be programmed in such a way that they are compatible with the type ICC-... read only carriers. This programming occupies the first 8 bytes in the tag. The read/write commands can be used to access the remaining memory.

You must set the tag type '50' in order to program type IDC-...-1K tags. To do this, transmit the command **SX** or **EX**.

The value range contains 7 characters:

- the first 3 characters contain the values 0 ... F (hexadecimal code)
- the last 4 characters contain the values 0 ... 9 (decimal code)

You must select the tag type '50' (ICC-...) beforehand in order to read out this code. If a "read only code" command is executed when the tag type '50' (IDC-...-1K) is set, the 4-byte read only code for this tag is issued.

Set tag ID code (TI)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	1
Byte 2	Command code (BCh)	1	0	1	1	1	1	0	0
Byte 3	ID length/Channel/Toggle bit	<ByteNum>				<Channel>			<T>
Byte 4	Data	<ID code>							
Byte 5	Data	<ID code>							
Byte 6	Data	<ID code>							
Byte 7	Data	<ID code>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (BCh)	1	0	1	1	1	1	0	0
Byte 3	Reserved/Channel/Toggle bit	<ByteNum>				<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.23 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

This command restricts the execution of all other read/write commands to the read/write tag with the specified ID code. This also applies if another read/write tag is located within the detection range. A targeted response is achieved from the read/write tag as a result.

<ByteNum> = 0h: Do not make a selection. An ID code is not specified in the telegram.

<ByteNum> = 8h (System IQ): Make a selection. An ID code must be specified in the telegram.

<ByteNum> = 0h deletes this filter.

Note!

The TI command only adjusts a setting in the reading head. There is no HF communication with the read/write tags.

Fill tag (S#)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	0	1
Byte 2	Command code (AAh)	1	0	1	0	1	0	1	0
Byte 3	Reserved/Ident channel/Toggle bit	<Reserved>				<Channel>			<T>
Byte 4	Start address	<WordAddr> (high byte)							
Byte 5	Start address	<WordAddr> (low byte)							
Byte 6	Word count	<WordNum> (high byte)							
Byte 7	Word count	<WordNum> (low byte)							
Byte 8	Character	<Fill sign>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	1	0
Byte 2	Command code (AAh)	1	0	1	0	1	0	1	0
Byte 3	Reserved/Ident channel/Toggle bit	<Reserved>				<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

Table 7.24 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

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

Extended commands for type IDC-... and IUC... tags

Type IDC-...-1K tags can be programmed to read 24-bit information (so-called **special read only code)** very quickly. This is useful for detecting containers in automated warehouses.

Length of the **special read only code**:

- Tag of the type IDC-...-1K: 48 bit
- Tag of the type IUC: 96 ... 240 bit

To write the **special read only code** use the commands **SP** and **EP**; to read it out, use the commands **SS** and **ES**.

If **SP** or **EP** is used to write to an IDC-...-1K tag, the tag is then locked. If you wish to write to the tag again using standard commands, unlock it using the command **SI**.

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Single read special fixcode (SS)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (0Ah)	0	0	0	0	1	0	1	0
Byte 3	FixLen/Ident channel/Toggle bit	<FixLen>				<Channel>			<T>
Byte 4	not used	-	-	-	-	-	-	-	-
Byte 5	not used	-	-	-	-	-	-	-	-
Byte 6	not used	-	-	-	-	-	-	-	-
Byte 7	not used	-	-	-	-	-	-	-	-
Byte 8	not used	-	-	-	-	-	-	-	-
Byte 9	not used	-	-	-	-	-	-	-	-

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	1	0	0
Byte 2	Command code (0Ah)	0	0	0	0	1	0	1	0
Byte 3	Reserved/Ident channel/Toggle bit	-	-	-	-	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	ID code 00h ... FFh	<ID code>							
Byte 7	ID code 00h ... FFh	<ID code>							
Byte 8	ID code 00h ... FFh	<ID code>							
Byte 9	ID code 00h ... FFh	<ID code>							
Byte 10	ID code 00h ... FFh	<ID code>							
byte 11	ID code 00h ... FFh	<ID code>							

Table 7.25 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The R/W head makes only one attempt to read a **special read only code**.

Note!

The <FixLen> of IDC-...-1K read/write tags is always 6 bytes.

Enhanced read special fixcode (ES)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (71h)	0	1	1	1	0	0	0	1
Byte 3	WordNum/Ident channel/Toggle bit	<FixLen>				<Channel>			<T>
Byte 4	not used	-	-	-	-	-	-	-	-
Byte 5	not used	-	-	-	-	-	-	-	-
Byte 6	not used	-	-	-	-	-	-	-	-
Byte 7	not used	-	-	-	-	-	-	-	-
Byte 8	not used	-	-	-	-	-	-	-	-
Byte 9	not used	-	-	-	-	-	-	-	-

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	1
Byte 2	Command code (71h)	0	1	1	1	0	0	0	1
Byte 3	Reserved/Ident channel/Toggle bit	-	-	-	-	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	ID code 00h ... FFh	<ID code>							
Byte 7	ID code 00h ... FFh	<ID code>							
Byte 8	ID code 00h ... FFh	<ID code>							
Byte 9	ID code 00h ... FFh	<ID code>							
Byte 10	ID code 00h ... FFh	<ID code>							
byte 11	ID code 00h ... FFh	<ID code>							

Table 7.26 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The R/W head attempts to read a **special read only code** until successful. Only data that changes is transferred via the interface, i.e. the R/W head transfers data whenever it reads a new data carrier or whenever it reads a data carrier where there was previously no R/W head within the detection range.

The status '05h' (read command) is output whenever a data carrier leaves the detection range.

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Note!

The <FixLen> of IDC-...-1K read/write tags is always 6 bytes.

Single program special fixcode (SP)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (0Dh)	0	0	0	0	1	1	0	1
Byte 3	Word number/Ident channel/Toggle bit	<FixLen>				<Channel>			<T>
Byte 4	Reserved	0	0	0	0	0	0	0	0
Byte 5	Reserved	0	0	0	0	0	0	0	0
Byte 6	ID code 00h ... FFh	<ID code>							
Byte 7	ID code 00h ... FFh	<ID code>							
Byte 8	ID code 00h ... FFh	<ID code>							
Byte 9	ID code 00h ... FFh	<ID code>							
Byte 10	ID code 00h ... FFh	<ID code>							
byte 11	ID code 00h ... FFh	<ID code>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (0Dh)	0	0	0	0	1	1	0	1
Byte 3	FixLen/Ident channel/Toggle bit	<FixLen>				<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	not used	-	-	-	-	-	-	-	-
Byte 7	not used	-	-	-	-	-	-	-	-
Byte 8	not used	-	-	-	-	-	-	-	-
Byte 9	not used	-	-	-	-	-	-	-	-

Table 7.27 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The R/W head makes only one attempt to write a **special read only code**.

Note!

The <FixLen> of IDC-...-1K read/write tags is always 6 bytes.

Enhanced program special fixcode (EP)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (75h)	0	1	1	1	0	1	0	1
Byte 3	FixLen/Ident channel/Toggle bit	<FixLen>				<Channel>			<T>
Byte 4	Reserved	0	0	0	0	0	0	0	0
Byte 5	Reserved	0	0	0	0	0	0	0	0
Byte 6	ID code 00h ... FFh	<ID code>							
Byte 7	ID code 00h ... FFh	<ID code>							
Byte 8	ID code 00h ... FFh	<ID code>							
Byte 9	ID code 00h ... FFh	<ID code>							
Byte 10	ID code 00h ... FFh	<ID code>							
byte 11	ID code 00h ... FFh	<ID code>							

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	0
Byte 2	Command code (75h)	0	1	1	1	0	1	0	1
Byte 3	FixLen/Ident channel/Toggle bit	<FixLen>				<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	not used	-	-	-	-	-	-	-	-
Byte 7	not used	-	-	-	-	-	-	-	-
Byte 8	not used	-	-	-	-	-	-	-	-
Byte 9	not used	-	-	-	-	-	-	-	-

Table 7.28 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

The R/W head attempts to write a **special read only code** until successful. After each successful write, the head sends the response and then switches to continuous reading. Then the R/W head reads the same data carrier until it has left the detection range or a new data carrier appears within the detection range. The command then starts again with write attempts.

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The status '05h' (read/write command) is output when the data carrier leaves the detection range or if the data carrier is not yet within the detection range when the command is executed.

If two data carriers enter the read range one immediately after the other, the status '05h' is not issued between the two readings.

Note!

The <FixLen> of IDC-...-1K read/write tags is always 6 bytes.

Initialize tag (SI)

Command:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	0	1	0	0
Byte 2	Command code (6Bh)	0	1	1	0	1	0	1	1
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>

Response:

Byte	Type	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0*	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1*	Telegram length, low byte	0	0	0	0	1	0	1	1
Byte 2	Command code (6Bh)	0	1	1	0	1	0	1	1
Byte 3	Reserved/Channel/Toggle bit	0	0	0	0	<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	not used	-	-	-	-	-	-	-	-
Byte 7	not used	-	-	-	-	-	-	-	-
Byte 8	not used	-	-	-	-	-	-	-	-
Byte 9	not used	-	-	-	-	-	-	-	-
Byte 10	not used	-	-	-	-	-	-	-	-

Table 7.29 * this byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

This command allows conventional reading and writing of IDC-...-1K read/write tags that were configured using the **EP** or **SP** commands.

Extended commands for type IQC-... read/write tags.

Single write words with lock (SL)

Command:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0	Command code (47h)	0	1	0	0	0	1	1	1
Byte 1	Word number/Ident channel/Toggle bit	<WordNum>				<Channel>			<T>
Byte 2	Word address	<WordAddr>(high byte)							
Byte 3	Word address	<WordAddr> (low byte)							
Byte 4	Data 00h ... FFh	<Data>							
Byte 5	Data 00h ... FFh	<Data>							
...	Data 00h ... FFh	<Data>							
Byte N[1)]	Data 00h ... FFh	<Data>							

Table 7.30 1) N = 4 x <WordNum> + 3

Response:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0	Command code (47h)	0	1	0	0	0	1	1	1
Byte 1	Word number/Ident channel/Toggle bit	<WordNum>				<Channel>			<T>
Byte 2	Status	<Status>							
Byte 3	Reply counter	<ReplyCounter>							
Byte 4	not used	-	-	-	-	-	-	-	-
Byte 5	not used	-	-	-	-	-	-	-	-
Byte 6	not used	-	-	-	-	-	-	-	-
Byte 7	not used	-	-	-	-	-	-	-	-

This command is the same as a normal write command. The data is write-protected at the end of the write process, provided the tags offer this function.

This applies for 13.56 MHz data carriers of the type 21, 22, 24, 33, and 35 as well as for LF data carriers IDC-...-1K. Write protection is only activated for memory blocks involved in the write process. Data can continue to be written to all other memory blocks.

The R/W head makes one attempt to write <WordNum> 32-bit words from the address <WordAddr>.

Enhanced write words with lock (EL)

Command:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0	Command code (48h)	0	1	0	0	1	0	0	0
Byte 1	Word number/Ident channel/Toggle bit	<WordNum>				<Channel>			<T>
Byte 2	Word address	<WordAddr>(high byte)							
Byte 3	Word address	<WordAddr> (low byte)							
Byte 4	Data 00h ... FFh	<Data>							
Byte 5	Data 00h ... FFh	<Data>							
...	Data 00h ... FFh	<Data>							
Byte N[1)]	Data 00h ... FFh	<Data>							

Table 7.31 1) 4 x <WordNum> + 6

Response:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0	Command code (48h)	0	1	0	0	1	0	0	0
Byte 1	Word number/Ident channel/Toggle bit	<WordNum>				<Channel>			<T>
Byte 2	Status	<Status>							
Byte 3	Reply counter	<ReplyCounter>							
Byte 4	not used	-	-	-	-	-	-	-	-
Byte 5	not used	-	-	-	-	-	-	-	-
Byte 6	not used	-	-	-	-	-	-	-	-
Byte 7	not used	-	-	-	-	-	-	-	-

This command is the same as a normal write command. The data is write-protected at the end of the write process, provided the tags offer this function.

This applies for 13.56 MHz tags of the type 21, 22, 24, and 33 as well as for LF tags IDC-...-1K. Write protection is only activated for memory blocks involved in the write process. Data can continue to be written to all other memory blocks.

The R/W head repeatedly attempts to write <WordNum> 32-bit words from the address <WordAddr> until successful. After each successful write, the head sends the response and then switches to continuous reading. Then the R/W head reads the same tag until it has left the detection range or a new tag appears within the detection range. The command then starts again with write attempts.

The status '05h' is only output when a tag leaves the detection range or is not yet within the detection range. If two tags enter the read range one immediately after the other, the status '05' is not issued between the two readings.

Extended commands for IQH2-... read/write heads

read param (RP)

Command:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0[1)]	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1[1)]	Telegram length, low byte	0	0	0	0	0	1	0	0
Byte 2	Command code (BEh)	1	0	1	1	1	1	1	0
Byte 3	Reserved/Ident channel/Toggle bit	-				<Channel>			<T>
Byte 4	System code	<SystemCode> (high byte)							
Byte 5	System code	<SystemCode> (low byte)							
Byte 6	Parameter type	<ParamTyp> (high byte)							
Byte 7	Parameter type	<ParamTyp> (low byte)							

1) This byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

Response:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0[1)]	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1[1)]	Telegram length, low byte	0	0	0	0	1	0	1	1
Byte 2	Command code (BEh)	1	0	1	1	1	1	1	0
Byte 3	Reserved/Ident channel/Toggle bit	0				<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							
Byte 6	Data 00 ... FFh	<Data>							
...	Data 00 ... FFh	<Data>							
Byte N[2)]	Data 00 ... FFh	<Data>							

1) This byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

2) N = <DataLength> + 6

write param (WP)

Command:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0[1)]	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1[1)]	Telegram length, low byte	0	0	0	0	0	1	0	0
Byte 2	Command code (BFh)	1	0	1	1	1	1	1	1
Byte 3	Reserved/Ident channel/Toggle bit	-				<Channel>			<T>
Byte 4	System code	<SystemCode> (high byte)							
Byte 5	System code	<SystemCode> (low byte)							
Byte 6	Parameter type	<ParamTyp> (high byte)							
Byte 7	Parameter type	<ParamTyp> (low byte)							
Byte 8	Length 00 ... FFh	<DataLength (Byte)>							
Byte 9	Data 00 ... FFh	<Data>							
...	Data 00 ... FFh	<Data>							
Byte N[2)]	Data 00 ... FFh	<Data>							

1) This byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

2) N = <DataLength> + 6

Response:

Byte	Contents	Bit no.							
		7	6	5	4	3	2	1	0
Byte 0[1)]	Telegram length, high byte	0	0	0	0	0	0	0	0
Byte 1[1)]	Telegram length, low byte	0	0	0	0	1	0	1	1
Byte 2	Command code (BFh)	1	0	1	1	1	1	1	1
Byte 3	Reserved/Ident channel/Toggle bit	0				<Channel>			<T>
Byte 4	Status	<Status>							
Byte 5	Reply counter	<ReplyCounter>							

1) This byte is only used with the TCP/IP and MODBUS TCP/IP protocol.

IQH2-...: <SystemCode> = 'Q' ASCII (51_h)

<ParamTyp> = 'K1' ASCII ($4B_h$ 31_h)
RP: reads the key (12 characters ASCII from 0 ... F) from the transponder and the read head
WP: writes the key (12 characters ASCII from 0 ... F) into the read head
Default key = 'FF FF FF FF FF FF' ASCII
($46_h46_h46_h46_h46_h46_h46_h46_h46_h46_h46_h46_h$)

IUH-...: See handbook of the read / write head

Note!

Toggle bit

If you send two commands with the same SystemCode and same ParamTyp in succession on the bus interface, you must change the toggle bit in the second command in order for the node to detect the command.

7.10 Legend

<Battery condition 1> : 1 byte, first digit of battery status (percentage, decimal, ASCII encoded). 30h, 31h

<Battery condition 2> : 1 byte, second digit of battery status (percentage, decimal, ASCII encoded). 30h, 39h

<Battery condition 3> : 1 byte, third digit of battery status (percentage, decimal, ASCII encoded). 30h, 39h

<ByteNum> : 4 bits, length of <ID code>;
System MV: 4 characters (04h)
System IQ: 8 characters (08h)

<Channel> : 3 bits, channel
Channel 1 (001b), channel 2 (010b),
channel 3 (011b), channel 4 (100b), all channels (111b)

<ConfAddr> : 1 ASCII character, word starting address in configuration area of data carrier.
The following applies for IPC03:
01h = Protection word
02h = Control word

<Data> : <WordNum> times 4 bytes. When communicating a word, the highest value byte is transferred first and the lowest value byte last.

<F> : 1 bit, multiplex mode, 0 (0b): Mode off, 1 (1b): Mode on

<Fill Sign> : 1 ASCII character

<FixLen> : 4 bits, length of the read only code in bytes,

<FixType> : 2 ASCII characters, for example: '02' for IPC02

<IDCode> : 4 bytes, 6 bytes or 8 bytes (depending on the tag type)

<Ident channel> : 3 bits, channel
1 (001b), 2 (010b), 3 (011b), 4 (100b), all channels (111b)
(but not <Sensor channel> in trigger mode)

<Month>	:	2 ASCII bytes, hexadecimal encoding, 01 ... 0C (01=January, 0C=December)
<P>	:	1 bit, password mode, 0 (0b): Mode off, 1 (1b): Mode on
<PSW>	:	4 bytes HEX, password
<ReplyCounter>	:	1 byte, increases by 1 after each response and confirmation. The reply counter starts from 0 after the system is switched on. When the maximum value is reached, the counter skips the value 0 (from 255 to 1).
<Sensor channel>	:	3 bits, channel 3 (011b) or 4 (100b)
<Status>	:	1 byte (see chapter 7.11)
<T>	:	1 bit, toggle bit
<TagType>	:	2 ASCII characters, for example: '02' for IPC02
<TelegramLenH>	:	1 byte, high byte or 16-bit telegram length = (N+1) div 256
<TelegramLenL>	:	1 byte, low byte of 16-bit telegram length = (N+1) mod 256
<Trigger mode>	:	8 bits 0 (00000000b): Trigger mode off 1 (00000001b): Trigger mode on 2 (00000010b): Trigger mode inverted
<WordAddr>	:	2 bytes, word start address in the data carrier, range from 0000h to FFFFh, depending on tag type.
<WordNum>	:	4 bits, number of words to be read or written, range from 0h to Fh, depending on tag type. The following applies for IPC03: The word count 0h is used with the word address 0000h to read the preset data range on the data carrier ("Default Read").
<Year>	:	2 bytes ASCII, hexadecimal encoding, 00h ... 63h

7.11 Fault/Status messages

Status	Meaning
00h	The command has been executed without error.
FFh	The command is processing.

Error messages which triggered the identification system

Status	Meaning
01h	The battery of the read/write tag is weak.
02h	Reserved
03h	Reserved
04h	Incorrect or incomplete command or parameter not in the valid range.
05h	No data carrier in the detection range.
06h	Hardware error, e.g. error during self-test or R/W head defect.
07h	Internal device error.
08h	Reserved
09h	The parameterized tag type is not compatible with the connected reading head.
0Ah	Several tags in the detection range (UHF).
0Bh	Reserved
0Ch	Reserved
0Dh	Reserved
0Eh	Internal buffer overflow.
0Fh	Reserved

Error messages sent by the bus connection

Status	Meaning
10h	Reserved
20h	Reserved
40h	Incorrect or incomplete command or parameter not in the valid range. TCP/IP: The specified length of the message does not match the actual length.

8 Web features

8.1 Configuring the identification system via http

The identification system can also be configured using http. In order to activate the device via the network, the IP address and the subnet mask must be configured via the display as a minimum requirement (if no DHCP is used).

Websites can be viewed using an internet browser.

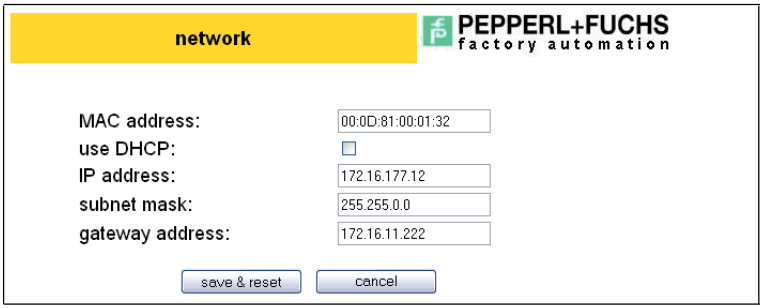
The following functions are supported:

- Network settings (network)
- Email function settings (email)
- Security settings (security)
- Exchanging identification data (send command)
- Viewing the firmware versions (firmware version)
- Short documentation (documentation)

8.2 Network settings

The following settings can be configured on this page:

- DHCP activation
- IP address
- Subnet mask
- Gateway address

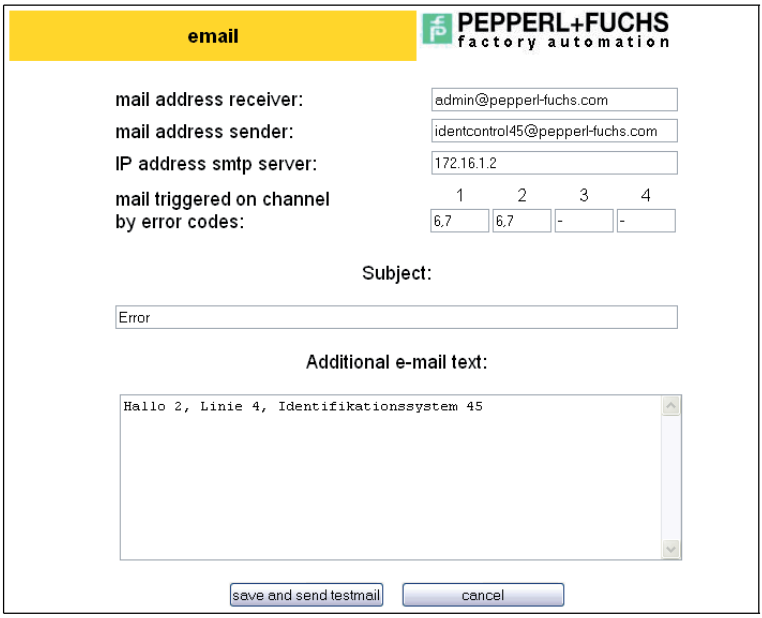


8.3 Email function settings

Note!

The email function can only be used if you integrate an SMTP server in your network.

The device is capable of sending an email when a certain preset error status is active. The following parameters must be configured here.



Mail address receive

Enter the recipient address here.

Mail address sender

Enter an email address associated with the device here. The email server may have to recognize the address, depending on the SMTP server.

IP address smtp server

IP address of the SMTP server

Mail triggered on channel by error codes:

Status information is allocated to each response telegram. If this value does not match the error code entered for the relevant channel, an email is issued. An error code should not be entered for channels that are not connected to a R/W head. The field should also remain empty if a trigger sensor is connected to a channel. If more than one error code is entered, the codes must be separated with a comma. A maximum of 5 different codes is permitted.

The following error code entries are recommended:

- 6 - Hardware error
- 7 - Internal device error

Subject:

The comment entered in this line appears in the subject line of every email that is sent.

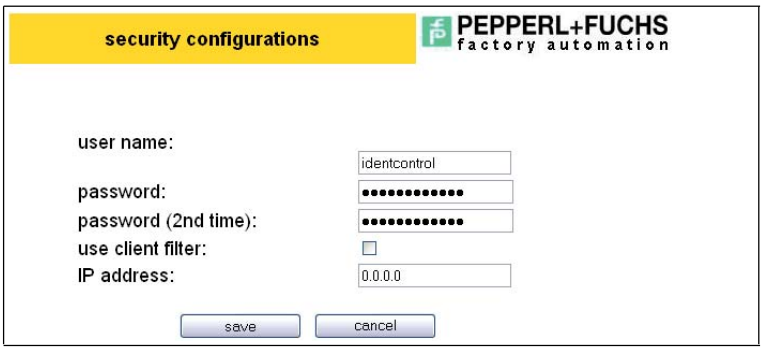
Additional e-mail text:

Enter any text here that you wish to include in each email that is sent. The device adds the channel, the type designation of the R/W head, and the cause of the error that has occurred to this text.

Note!

Use the vacant box to specify a location or enter serial information, for example.

8.4 Security settings



User name, password:

The default user name and password is: "identcontrol".

Use client filter, IP address:

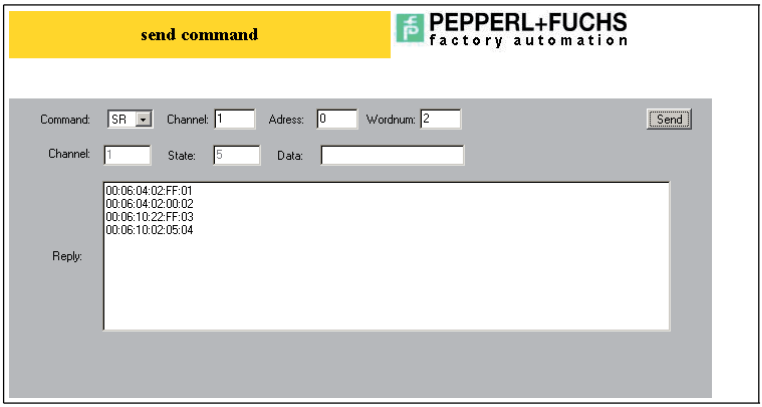
When the client filter is active, only the network client specified under IP address can exchange data with the server. Web access is still possible, however.

8.5 Exchanging identification data

For commissioning purposes, you can use this link to activate an applet for executing the following identification commands:

- CT - change tag
- EF - enhanced buffered read fixcode
- ER - enhanced buffered read words
- EW - enhanced buffered write words
- EX - enhanced buffered write fixcode
- QU - quit
- SF - single read fixcode
- SW - single write words
- SX - single write fixcode
- SR - single read words
- TM - set triggermode
- MM - set multiplexed mode

Communication with the identification system is only possible if no connection has been established between the device and a controller, for example.



Command:

Selection field for the identification commands. More input boxes may be available depending on the command. An entry is suggested for each command. Refer to the command description (Chapter 7.11) for an explanation of the meaning.

Channel (in the second line):

The channel number of the response telegram appears in this field.

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State:

The status of the response telegram appears in this field.

Data:

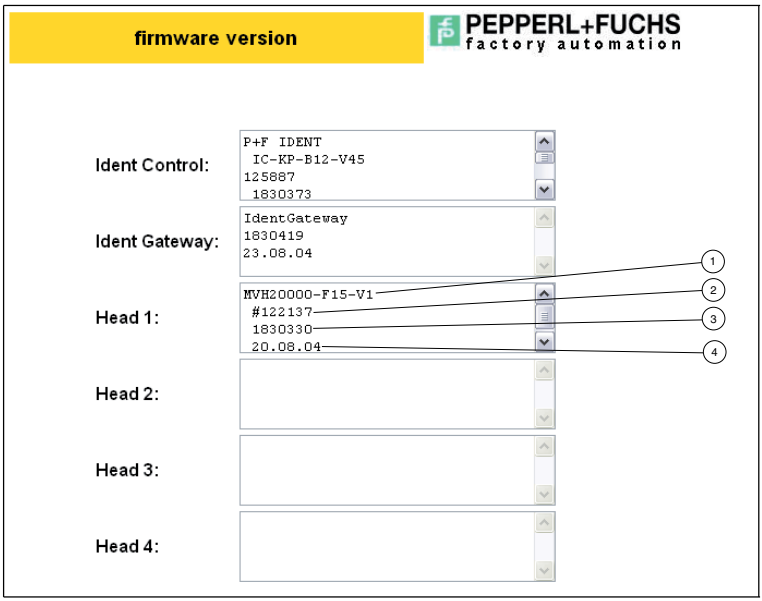
The data from the response telegram appear in this field (if available).

Reply:

A list of received response telegrams appears in this field.

8.6 Viewing the firmware versions

On this page, you can view the firmware versions of all devices already connected when the system is switched on.



1 Designation

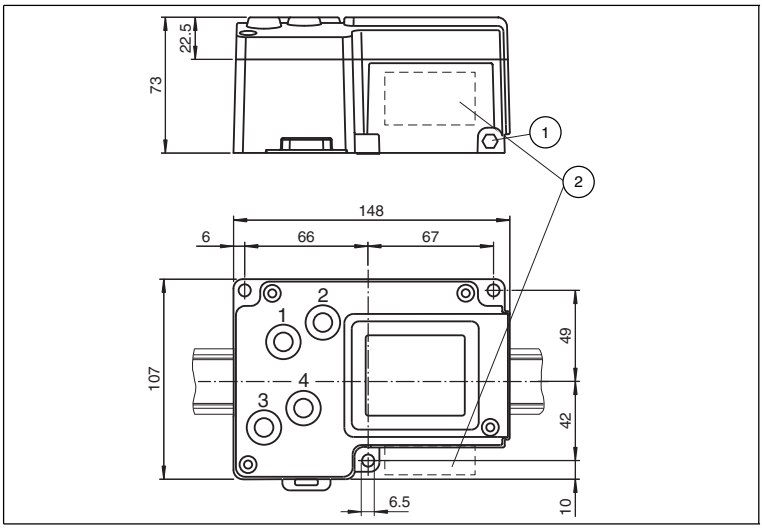
2 Item no.

3 SW no.

4 SW date

9 Technical Specifications

9.1 Dimensions



1 Ground

2 Connector array

9.2 General data

General data

Number of R/W heads	max. 4 alternatively 2 R/W heads and 2 trigger sensors

Displays/controls

LEDs 1, 2, 3, 4	Status display for R/W heads green: Command to R/W head active yellow: Approx. 1 second if command executed successfully
LED PWR/ERR	green: Power on red: Hardware error
State LED	green: Interface OK off: Not ready for operation
Link/Act LED	green: Connection to the host green flashing: Bus active
Traffic LED	green: flashes in the rhythm at which data is transmitted/received
LED 100 MBit	Yellow: Transfer rate 100 MBit/s off: Transfer rate 10 MBit/s

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LC display	Two-line multifunction display with 12 characters per line Configuration of the control interface and display of connected R/W heads as additional pictograms Simple, direct command input and addressing possible
Buttons	4 buttons: ESC, up, down and return

Electrical data

Rated operational voltage U_e	20 ... 30 V DC , PELV
Ripple	≤ 10 % at 30 V DC
Current consumption	≤ 2 A incl. R/W heads
Power consumption P_0	3.5 W without R/W heads
Galvanic isolation	Basic insulation in accordance with DIN EN 50178, rated insulation voltage 50 V_{eff}

Interface

Physical	Ethernet
Protocol	SMTP HTTP TCP/IP (Port 10000) MODBUS Ethernet/IP
Transfer rate	10 MBit/s or 100 MBit/s

Conformity

Electromagnetic compatibility	EN 61000-6-2, EN 61000-6-4,
Degree of protection	EN60529

Ambient conditions

Ambient temperature	-25 ... 70 °C (248 ... 343 K)
Storage temperature	-40 ... 80 °C (243 ... 353 K)
Climate conditions	Max. air humidity 96 % Salt spray resistant to EN 60068-2-52
Shock and impact resistance	Oscillation (sine): 5 g, 10 ... 1000 Hz to EN 60068-2-6 Shock (half-sine): 30 g, 11 ms to EN 60068-2-27

Mechanical data

Degree of protection	IP67 in accordance with EN 60529
Connection	R/W heads: Shielded, 4-pin, M12 connector Power supply M12 connector Ground: M6 grounding screw Ethernet: RJ45
Housing material	Aluminum, powder-coated
Mounting	Snap on to 35 mm DIN mounting rail or screw mounting
Weight	Approx. 1000 g

10 Troubleshooting

10.1 Fault location

Fault source	Possible cause	Remedy
The operating voltage LED (PWR/ERR) does not light up.	Power supply is interrupted.	Ensure that the power supply is connected to a 24 V DC source.
The LED on the M12 plug lights up red.	The polarity of the screw terminal type M12 socket is reversed.	Ensure that the connection layout is correct.
The icon in the display (e.g. IPH1) does not appear even though the R/W head is connected to port 1.	The cable is defective or not connected correctly.	Check the cable and repair if necessary.
	The R/W head is defective.	Check the R/W head and repair if necessary.
A read command (e.g. **SR ...**) gives the status 4 even though the syntax is correct.	An incorrect tag type is selected for the relevant channel (e.g. IPC02). The read commands only function with data carriers and not with code carriers.	Preset the correct tag type (e.g. IPC03) or "Autodetect" using the **CT...** command or via the display (IDENTControl.../ Config Channels).
The LEDs in the reading head and the IPHx icon on the IDENTControl display are flashing.	The connected reading head does not support the preset tag type.	Select a tag type that the reading head supports.
The **SG** or **EG** command (Get configuration) gives the status 4 even though the syntax is correct.	IPC03 is not selected for the relevant channel. The configuration commands only function if the data carrier IPC03 is selected and not in Autodetect mode.	Preset the tag type IPC03 using the **CT...** command or via the display (IDENTControl.../ Config Channels).
The State LED does not light up.	The device is still booting up.	Wait until the boot process is complete.
	With DHCP server: No network parameters.	Configure the DHCP server.
The State LED flashes green (only with Ethernet/IP communication).	The memory is full.	Reduce the data hold time (see chapter 7.5.12).
The Link/Act LED does not light up.	No physical network connection, e.g. due to lead breakage.	Check the cable and repair if necessary.
The website cannot be displayed.	The IP address is incorrect.	**With DHCP server:** Make sure that the IP address entered in the browser corresponds with the address allocated to the device. **Without DHCP server:** Check the IP address entered in the browser to see whether it corresponds with the fixed IP address preset in the device. Check the subnet mask in both cases.

This table will be updated and extended if necessary. Visit www.pepperl-fuchs.com to download the latest version of the manual.

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11 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**

12 Appendix A

12.1 Example 1

The following example uses assembly objects 101d/151d (mixed mode) and results in the following:

- Setting the data carrier IPC02 on channel 1 and channel 3.
- Reading the read only code from an IPC02 data carrier.
- Implicit communication.

The following prerequisites must be fulfilled:

- One type IPH-XX R/W head is connected to channel 1 and channel 3 on the IDENTControl.
- One type IPC02 data carrier is located in front of each R/W head.
- The IP address of the IDENTControl is set to a free address (see chapter 6.4.1).
- The device is connected to the network.

Setting connection parameters

These parameters are configured on the PLC:

Assembly instance	Size (32 bits)
Input: 151	3
Output: 101	3
Configuration: 112 (this value is used for all input/output instances)	0 (this value is used for all input/output instances)

Setting tag type IPC02 on channels 1 and 3

Send a Change tagcommand to channel 1 as an implicit command:

Byte no.	Use	Contents	Description
Byte 0	Command code	04h	Command **CT** (Change tag)
Byte 1	Channel/Toggle bit	02h	Channel = 1 Toggle bit = 0
Byte 2	Tag type (high byte)	30h	IPC 02
Byte 3	Tag type (low byte)	32h	IPC 02
Byte 4 ... Byte 11		00h	

A command confirmation appears in the input field:

Byte no.	Use	Contents	Description
Byte 0	Command code	04h	Command **CT** (Change tag type)
Byte 1	Number of double words/ Channel/Toggle bit	02h	Channel = 1 Toggle bit = 0
Byte 2	Status	FFh	Processing command.
Byte 3	Reply counter	01h	For every IDENT telegram, the value on the reply counter increases by 1.
Byte 4 ... Byte 11		00h	

A response appears in the input field:

Byte no.	Use	Contents	Description
Byte 0	Command code	04h	Command **CT** (Change tag)
Byte 1	Number of double words/ Channel/Toggle bit	02h	Channel = 1 Toggle bit = 0
Byte 2	Status	00h	Command executed.
Byte 3	Reply counter	02h	For every IDENT telegram, the value on the reply counter increases by 1.
Byte 4 ... Byte 11		00h	

Send a Change tagcommand to channel 3 as an implicit command:

Byte no.	Use	Contents	Description
Byte 0	Command code	04h	Command **CT** (Change tag)
Byte 1	Channel/Toggle bit	06h	Channel = 3 Toggle bit = 0
Byte 2	Tag type (high byte)	30h	IPC 02
Byte 3	Tag type (low byte)	32h	IPC 02
Byte 4 ... Byte 11		00h	

A command confirmation appears in the input field:

Byte no.	Use	Contents	Description
Byte 0	Command code	04h	Command **CT** (Change tag)
Byte 1	Number of double words/ Channel/Toggle bit	06h	Channel = 3 Toggle bit = 0
Byte 2	Status	FFh	Processing command.

Byte no.	Use	Contents	Description
Byte 3	Reply counter	03h	For every IDENT telegram, the value on the reply counter increases by 1.
Byte 4 ... Byte 11		00h	

A response appears in the input field:

Byte no.	Use	Contents	Description
Byte 0	Command code	04h	Command **CT** (Change tag)
Byte 1	Number of double words/ Channel/Toggle bit	06h	Channel = 3 Toggle bit = 0
Byte 2	Status	00h	Command executed.
Byte 3	Reply counter	04h	For every IDENT telegram, the value on the reply counter increases by 1.
Byte 4 ... Byte 11		00h	

Note!

Alternatively select the tag type by configuring the relevant setting in the boot-up object.

Reading data carriers on the R/W heads on channels 1 and 3.

Send a Single readcommand to channel 1 as an implicit command:

Byte no.	Use	Contents	Description
Byte 0	Command code	01h	Command **SF** (Single read read only code)
Byte 1	Channel/Toggle bit	02h	Channel = 1 Toggle bit = 0
Byte 2		00h	
Byte 3		00h	
Byte 4		00h	
Byte 5		00h	
Byte 6		00h	
Byte 7		00h	
Byte 8		00h	
Byte 9		00h	
Byte 10		00h	
Byte 11		00h	

A command confirmation appears in the input field:

Byte no.	Use	Contents	Description
Byte 0	Command code	01h	Command **SF** (Single read read only code)
Byte 1	Channel/Toggle bit	02h	Channel = 1 Toggle bit = 0
Byte 2	Status	FFh	Processing command.
Byte 3	Reply counter	05h	For every IDENT telegram, the value on the reply counter increases by 1.
Byte 4		00h	
Byte 5		00h	
Byte 6		00h	
Byte 7		00h	
Byte 8		00h	
Byte 9		00h	
Byte 10		00h	
Byte 11		00h	

A response appears in the input field:

Byte no.	Use	Contents	Description
Byte 0	Command code	01h	Command **SF** (Single read read only code)
Byte 1	Channel/Toggle bit	02h	Channel = 1 Toggle bit = 0
Byte 2	Status	00h	Command executed.
Byte 3	Reply counter	06h	For every IDENT telegram, the value on the reply counter increases by 1.
Byte 4	ID code 00h ... FFh	-	<ID code>
Byte 5	ID code 00h ... FFh	-	<ID code>
Byte 6	ID code 00h ... FFh	-	<ID code>
Byte 7	ID code 00h ... FFh	-	<ID code>
Byte 8	ID code 00h ... FFh	-	<ID code>[1]
Byte 9		00h	
Byte 10		00h	
Byte 11		00h	

1. only IPC02 and IPC11

Send a Single readcommand to channel 3 as an implicit command:

Byte no.	Use	Contents	Description
Byte 0	Command code	01h	Command **SF** (Single read read only code)
Byte 1	Channel/Toggle bit	06h	Channel = 3 Toggle bit = 0
Byte 2		00h	
Byte 3		00h	
Byte 4		00h	
Byte 5		00h	
Byte 6		00h	
Byte 7		00h	
Byte 8		00h	
Byte 9		00h	
Byte 10		00h	
Byte 11		00h	

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A command confirmation appears in the input field:

Byte no.	Use	Contents	Description
Byte 0	Command code	01h	Command **SF** (Single read read only code)
Byte 1	Channel/Toggle bit	06h	Channel = 3 Toggle bit = 0
Byte 2	Status	FFh	Processing command.
Byte 3	Reply counter	07h	For every IDENT telegram, the value on the reply counter increases by 1.
Byte 4		00h	
Byte 5		00h	
Byte 6		00h	
Byte 7		00h	
Byte 8		00h	
Byte 9		00h	
Byte 10		00h	
Byte 11		00h	

A response appears in the input field:

Byte no.	Use	Contents	Description
Byte 0	Command code	01h	Command **SF** (Single read read only code)
Byte 1	Channel/Toggle bit	06h	Channel = 3 Toggle bit = 0
Byte 2	Status	00h	Command executed.
Byte 3	Reply counter	08h	For every IDENT telegram, the value on the reply counter increases by 1.
Byte 4	ID code 00h ... FFh	-	<ID code>
Byte 5	ID code 00h ... FFh	-	<ID code>
Byte 6	ID code 00h ... FFh	-	<ID code>
Byte 7	ID code 00h ... FFh	-	<ID code>
Byte 8	ID code 00h ... FFh	-	<ID code>[1]
Byte 9		00h	
Byte 10		00h	
Byte 11		00h	

1. only IPC02 and IPC11

12.2 Example 2

Assembly objects 104d/154d (separated mode) are used in the example. The following functions are activated:

- Set tag type IPC03 on channel 1 and channel 2.
- Write data to a IPC03 tag.
- Read data from a IPC03 tag.

The following prerequisites must be fulfilled:

- One type IPH-XX R/W head is connected to channel 1 and channel 2 on the IDENTControl.
- One type IPC03 data carrier is located in front of each R/W head.
- The IP address of the IDENTControl is set to a free address (see chapter 6.4.1).
- The device is connected to the network.

Setting the connection parameters

Configure the parameters on the PLC as follows:

Assembly instance	Size (32 bits)
Input: 154	8
Output: 104	8
Configuration: 112 (this value is used for all input/output instances)	0 (this value is used for all input/output instances)

The selected input and output instances of the assembly object is divided as follows:

Output instance 104d - 32 bytes

Bytes	Class, instance, attribute	Description
0 - 7	64h, 01d, 01h	Channel 1 [8]
8 - 15	64h, 02d, 01h	Channel 2 [8]
16 - 23	64h, 03d, 01h	Channel 3 [8]
24 - 31	64h, 04d, 01h	Channel 4 [8]

Input instance 154d - 32 bytes

Bytes	Class, instance, attribute	Description
0 - 7	65h, 01d, 01h	Channel 1 [8]
8 - 15	65h, 02d, 01h	Channel 2 [8]
16 - 23	65h, 03d, 01h	Channel 3 [8]
24 - 31	65h, 04d, 01h	Channel 4 [8]

Additionally, the IDENTControl requires 32 bytes of input data and sends back 32 bytes of output data as a result.

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Note!

The input and output instances can be configured via the display. However, setting should be performed via the program while the plant is operating to permit easier replacement or extension to the plant.

Setting tag type IPC03 on channels 1 and 2

Send a Change tagcommand as an implicit command:

Element	Implicit telegram	Use	Contents	Description
1	Byte 0	Command code	04h	Command **CT** (Change tag)
	Byte 1	Channel/Toggle bit	00h	The element defined the channel. Toggle bit = 0
	Byte 2	Tag type (high byte)	30h	IPC 03
	Byte 3	Tag type (low byte)	33h	IPC 03
	Byte 4		00h	Not used
	Byte 5		00h	Not used
	Byte 6		00h	Not used
	Byte 7		00h	Not used
2	Byte 8	Command code	04h	Command **CT** (Change tag)
	Byte 9	Channel/Toggle bit	00h	The element defined the channel. Toggle bit = 0
	Byte 10	Tag type (high byte)	30h	IPC 03
	Byte 11	Tag type (low byte)	33h	IPC 03
	byte 12		00h	Not used
	Byte 13		00h	Not used
	Byte 14		00h	Not used
	Byte 15		00h	Not used
3	Byte 16 ... Byte 23		00h	No commands are transmitted to channel 3.
4	Byte 24 ... Byte 31		00h	No commands are transmitted to channel 4.

A command confirmation appears in the input field:

Element	Implicit telegram	Use	Contents	Description
1	Byte 0	Command code (Echo)	04h	Command **CT** (Change tag)
	Byte 1	Channel/Toggle bit	02h	Channel = element = 1 Toggle bit = 0
	Byte 2	Status	FFh	Processing command.
	Byte 3	Reply counter	01h	For every IDENT telegram, the value on the reply counter increases by 1.
	Byte 4		00h	
	Byte 5		00h	
	Byte 6		00h	
	Byte 7		00h	
2	Byte 8	Command code (Echo)	04h	Command **CT** (Change tag)
	Byte 9	Channel/Toggle bit	04h	Channel = element = 2 Toggle bit = 0
	Byte 10	Status	FFh	Processing command.
	Byte 11	Reply counter	01h	For every IDENT telegram, the value on the reply counter increases by 1.
	byte 12		00h	Not used
	Byte 13		00h	Not used
	Byte 14		00h	Not used
	Byte 15		00h	Not used
3	Byte 16 ... Byte 23		00h	No commands are transmitted to channel 3.
4	Byte 24 ... Byte 31		00h	No commands are transmitted to channel 4.

A response appears in the input field:

Element	Implicit telegram	Use	Contents	Description
1	Byte 0	Command code	04h	Command **CT** (Change tag)
	Byte 1	Number of double words/ Channel/Toggle bit	02h	Channel = element = 1 Toggle bit = 0
	Byte 2	Status	00h	Command executed.
	Byte 3	Reply counter	02h	For every IDENT telegram, the value on the reply counter increases by 1.
	Byte 4		00h	
	Byte 5		00h	
	Byte 6		00h	
	Byte 7		00h	
2	Byte 8	Command code	04h	Command **CT** (Change tag)
	Byte 9	Number of double words/ Channel/Toggle bit	04h	Channel = element = 2 Toggle bit = 0
	Byte 10	Status	00h	Processing command.
	Byte 11	Reply counter	02h	For every IDENT telegram, the value on the reply counter increases by 1.
	byte 12		00h	Not used
	Byte 13		00h	Not used
	Byte 14		00h	Not used
	Byte 15		00h	Not used
3	Byte 16 ... Byte 23		00h	No commands are transmitted to channel 3.
4	Byte 24 ... Byte 31		00h	No commands are transmitted to channel 4.

Note!

The input and output instances can be configured via the display. However, setting should be performed via the program while the plant is operating to permit easier replacement or extension to the plant.

Sending a write command as an implicit command

Element	Implicit telegram	Use	Contents	Description
1	Byte 0	Command code	40h	Command **SW** (Single write double words)
	Byte 1	Number of double words/ Channel/Toggle bit	10h	1 double word = 4 bytes Element defines the channel. Toggle bit = 0
	Byte 2	Address of double word (high byte)	00h	Start address = 0
	Byte 3	Address of double word (low byte)	00h	Start address = 0
	Byte 4	Data	00h	1. Byte data
	Byte 5	Data	01h	2. Byte data
	Byte 6	Data	02h	3. Byte data
	Byte 7	Data	03h	4. Byte data
2	Byte 8	Command code	40h	Command **SW** (Single write double words)
	Byte 9	Number of double words/ Channel/Toggle bit	10h	1 double word = 4 bytes Element defines the channel. Toggle bit = 0
	Byte 10	Address of double word (high byte)	00h	Start address = 0
	Byte 11	Address of double word (low byte)	00h	Start address = 0
	byte 12	Data	10h	1. Byte data
	Byte 13	Data	11h	2. Byte data
	Byte 14	Data	12h	3. Byte data
	Byte 15	Data	13h	4. Byte data
3	Byte 16 ... Byte 23		00h	No commands are transmitted to channel 3.
4	Byte 24 ... Byte 31		00h	No commands are transmitted to channel 4.

A command confirmation appears in the input field:

Element	Implicit telegram	Use	Contents	Description
1	Byte 0	Command code	40h	Command **SW** (Single write double words)
	Byte 1	Number of double words/ Channel/Toggle bit	12h	1 double word = 4 bytes Channel = element = 1 Toggle bit = 0
	Byte 2	Status	FFh	Processing command.
	Byte 3	Reply counter	03h	For every IDENT telegram, the value on the reply counter increases by 1.
	Byte 4	-	00h	
	Byte 5	-	00h	
	Byte 6	-	00h	
	Byte 7	-	00h	
2	Byte 8	Command code	40h	Command **SW** (Single write double words)
	Byte 9	Number of double words/ Channel/Toggle bit	14h	1 double word = 4 bytes Channel = element = 1 Toggle bit = 0
	Byte 10	Status	FFh	Processing command.
	Byte 11	Reply counter	03h	For every IDENT telegram, the value on the reply counter increases by 1.
	byte 12	-	00h	
	Byte 13	-	00h	
	Byte 14	-	00h	
	Byte 15	-	00h	
3	Byte 16 ... Byte 23		00h	No commands are transmitted to channel 3.
4	Byte 24 ... Byte 31		00h	No commands are transmitted to channel 4.

A response appears in the input field:

Element	Implicit telegram	Use	Contents	Description
1	Byte 0	Command code	40h	Command **SW** (Single write double words)
	Byte 1	Number of double words/ Channel/Toggle bit	02h	Element defines channel. Toggle bit = 0
	Byte 2	Status	00h	Command executed.
	Byte 3	Reply counter	04h	For every IDENT telegram, the value on the reply counter increases by 1.
	Byte 4	-	00h	
	Byte 5	-	00h	
	Byte 6	-	00h	
	Byte 7	-	00h	
2	Byte 8	Command code	40h	Command **SW** (Single write double words)
	Byte 9	Number of double words/ Channel/Toggle bit	04h	Element defines channel. Toggle bit = 0
	Byte 10	Status	00h	Command executed.
	Byte 11	Reply counter	04h	For every IDENT telegram, the value on the reply counter increases by 1.
	byte 12	-	00h	
	Byte 13	-	00h	
	Byte 14	-	00h	
	Byte 15	-	00h	
3	Byte 16 ... Byte 23		00h	No commands are transmitted to channel 3.
4	Byte 24 ... Byte 31		00h	No commands are transmitted to channel 4.

Sending a read command as an implicit command

Element	Implicit telegram	Use	Contents	Description
1	Byte 0	Command code	10h	Command **SR** (Single read double words)
	Byte 1	Number of double words/ Channel/Toggle bit	10h	1 double word = 4 bytes Element defines the channel. Toggle bit = 0
	Byte 2	Address of double word (high byte)	00h	Start address = 0
	Byte 3	Address of double word (low byte)	00h	Start address = 0
	Byte 4		00h	
	Byte 5		00h	
	Byte 6		00h	
	Byte 7		00h	
2	Byte 8	Command code	10h	Command **SR** (Single read double words)
	Byte 9	Number of double words/ Channel/Toggle bit	10h	1 double word = 4 bytes Element defines the channel. Toggle bit = 0
	Byte 10	Address of double word (high byte)	00h	Start address = 0
	Byte 11	Address of double word (low byte)	00h	Start address = 0
	byte 12		00h	
	Byte 13		00h	
	Byte 14		00h	
	Byte 15		00h	
3	Byte 16 ... Byte 23		00h	No commands are transmitted to channel 3.
4	Byte 24 ... Byte 31		00h	No commands are transmitted to channel 4.

A command confirmation appears in the input field:

Element	Implicit telegram	Use	Contents	Description
1	Byte 0	Command code	10h	Command **SR** (Single read words)
	Byte 1	Number of double words/ Channel/Toggle bit	12h	1 double word = 4 bytes Channel = element = 1 Toggle bit = 0
	Byte 2	Status	FFh	Processing command.
	Byte 3	Reply counter	05h	For every IDENT telegram, the value on the reply counter increases by 1.
	Byte 4	-	00h	
	Byte 5	-	00h	
	Byte 6	-	00h	
	Byte 7	-	00h	
2	Byte 8	Command code	10h	Command **SR** (Single read words)
	Byte 9	Number of double words/ Channel/Toggle bit	14h	1 double word = 4 bytes Channel = element = 1 Toggle bit = 0
	Byte 10	Status	FFh	Processing command.
	Byte 11	Reply counter	05h	For every IDENT telegram, the value on the reply counter increases by 1.
	byte 12	-	00h	
	Byte 13	-	00h	
	Byte 14	-	00h	
	Byte 15	-	00h	
3	Byte 16 ... Byte 23		00h	No commands are transmitted to channel 3.
4	Byte 24 ... Byte 31		00h	No commands are transmitted to channel 4.

A response appears in the input field:

Element	Implicit telegram	Use	Contents	Description
1	Byte 0	Command code	10h	Command **SR** (Single read words)
	Byte 1	Number of double words/ Channel/Toggle bit	12h	1 double word = 4 bytes Channel = element = 1 Toggle bit = 0
	Byte 2	Status	00h	Command executed.
	Byte 3	Reply counter	06h	For every IDENT telegram, the value on the reply counter increases by 1.
	Byte 4	Data	00h	1. Byte data
	Byte 5	Data	01h	2. Byte data
	Byte 6	Data	02h	3. Byte data
	Byte 7	Data	03h	4. Byte data
2	Byte 8	Command code	10h	Command **SR** (Single read words)
	Byte 9	Number of double words/ Channel/Toggle bit	14h	1 double word = 4 bytes Channel = element = 2 Toggle bit = 0
	Byte 10	Status	00h	Command executed.
	Byte 11	Reply counter	06h	For every IDENT telegram, the value on the reply counter increases by 1.
	byte 12	Data	10h	1. Byte data
	Byte 13	Data	11h	2. Byte data
	Byte 14	Data	12h	3. Byte data
	Byte 15	Data	13h	4. Byte data
3	Byte 16 ... Byte 23		00h	No commands are transmitted to channel 3.
4	Byte 24 ... Byte 31		00h	No commands are transmitted to channel 4.

13 Appendix B

13.1 Object model

Class	Object name	Number of instances
01h	Identity	1
04h	Assembly	25
64h	Output command for channels 1-4, IDENTControl and mixed mode	13
65h	Input command for channels 1-4, IDENTControl and mixed mode	13
66h	Boot-up parameters	4
67h	Diagnostics	4

13.1.1 Identity object (01h)

Class attribute (instance 0)

Attribute ID	Name	Data type	Data content	Access authorization
1	Revision	UINT	1	Get

Instance attributes (instance 1)

Attribute ID	Name	Data type	Data content	Access authorization
1	Vendor number	UINT	57d	Get
2	Device type	UINT	00h	Get
3	Product code number	UINT	1	Get
4	Product major revision Product minor revision	USINT USINT	01 25	Get
5	Status	WORD	see below	Get
6	Serial number	UDINT	Unique 32-bit value	Get
7	Product number	String from USINT	IC-KP-B12-V45 #125887	Get

Shared services

Service code	integrated in		service designation
	Class level	Instance level	
0Eh	Yes	Yes	Get attribute single
05h	No	Yes	Reset

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13.1.2 Assembly object (04h)

These instances are taken from classes 64h and 65h.

Class attributes (instance 0)

Attribute ID	Name	Data type	Data content	Access authorization
1	Revision	UINT	2	Get
2	Max. instance	UINT	162	Get
100	I/O output instance	USINT	100	Get / Set
101	I/O output produce length	UINT	8	Get
102	I/O input instance[1]	USINT	150	Get
103	I/O input consume length	UINT	8	Get

1. I/O input instance = I/O output instance + 50d

Output instance attributes (instances 100d-112d)

Attribute ID	Name	Data type	Data content	Access authorization
3	Output data	USINT [0-248]	0	Get

Output instance 100d - 8 bytes

Bytes	Class, instance, attribute	Description
0 - 7	64h, 06d, 01h	Mixed mode [8]

Output instance 101d - 12 bytes

Bytes	Class, instance, attribute	Description
0 - 11	64h, 06d, 02h	Mixed mode [12]

Output instance 102d - 32 bytes

Bytes	Class, instance, attribute	Description
0 - 31	64h, 06d, 03h	Mixed mode [32]

Output instance 103d - 60 bytes

Bytes	Class, instance, attribute	Description
0 - 59	64h, 06d, 04h	Mixed mode [60]

Output instance 104d - 32 bytes

Bytes	Class, instance, attribute	Description
0 - 7	64h, 01d, 01h	Channel 1 [8]
8 - 15	64h, 02d, 01h	Channel 2 [8]
16 - 23	64h, 03d, 01h	Channel 3 [8]
24 - 31	64h, 04d, 01h	Channel 4 [8]

Output instance 105d - 48 bytes

Bytes	Class, instance, attribute	Description
0 - 11	64h, 01d, 02h	Channel 1 [12]
12 - 23	64h, 02d, 02h	Channel 2 [12]
24 - 35	64h, 03d, 02h	Channel 3 [12]
36 - 47	64h, 04d, 02h	Channel 4 [12]

Output instance 106d - 128 bytes

Bytes	Class, instance, attribute	Description
0 - 31	64h, 01d, 03h	Channel 1 [32]
32 - 63	64h, 02d, 03h	Channel 2 [32]
64 - 95	64h, 03d, 03h	Channel 3 [32]
96 - 127	64h, 04d, 03h	Channel 4 [32]

Output instance 107d - 240 bytes

Bytes	Class, instance, attribute	Description
0 - 59	64h, 01d, 04h	Channel 1 [60]
60 - 119	64h, 02d, 04h	Channel 2 [60]
120 - 179	64h, 03d, 04h	Channel 3 [60]
180 - 239	64h, 04d, 04h	Channel 4 [60]

Output instance 108d - 40 bytes

Bytes	Class, instance, attribute	Description
0 - 7	64h, 01d, 01h	Channel 1 [8]
8 - 15	64h, 02d, 01h	Channel 2 [8]
16 - 23	64h, 03d, 01h	Channel 3 [8]
24 - 31	64h, 04d, 01h	Channel 4 [8]
32 - 39	64h, 05d, 01h	IDENT Control

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Output instance 109d - 56 bytes

Bytes	Class, instance, attribute	Description
0 - 11	64h, 01d, 02h	Channel 1 [12]
12 - 23	64h, 02d, 02h	Channel 2 [12]
24 - 35	64h, 03d, 02h	Channel 3 [12]
36 - 47	64h, 04d, 02h	Channel 4 [12]
48 - 55	64h, 05d, 01h	IDENT Control

Output instance 110d - 136 bytes

Bytes	Class, instance, attribute	Description
0 - 31	64h, 01d, 03h	Channel 1 [32]
32 - 63	64h, 02d, 03h	Channel 2 [32]
64 - 95	64h, 03d, 03h	Channel 3 [32]
96 - 127	64h, 04d, 03h	Channel 4 [32]
128 - 135	64h, 05d, 01h	IDENT Control

Output instance 111d - 248 bytes

Bytes	Class, instance, attribute	Description
0 - 59	64h, 01d, 04h	Channel 1 [60]
60 - 119	64h, 02d, 04h	Channel 2 [60]
120 - 179	64h, 03d, 04h	Channel 3 [60]
180 - 239	64h, 04d, 04h	Channel 4 [60]
240 - 299	64h, 05d, 01h	IDENT Control

Output instance 112d - 0 bytes

Bytes	Class, instance, attribute	Description
NONE	N/A	Heartbeat

Input instance attributes (instances 150d-162d)

Attribute ID	Name	Data type	Data content	Access authorization
3	Input data	USINT [8-248]	0	Get

Input instance 150d - 8 bytes

Bytes	Class, instance, attribute	Description
0 - 7	65h, 06d, 01h	Mixed mode [8]

Input instance 151d - 12 bytes

Bytes	Class, instance, attribute	Description
0 - 11	65h, 06d, 02h	Mixed mode [12]

Input instance 152d - 32 bytes

Bytes	Class, instance, attribute	Description
0 - 31	65h, 06d, 03h	Mixed mode [32]

Input instance 153d - 60 bytes

Bytes	Class, instance, attribute	Description
0 - 59	65h, 06d, 04h	Mixed mode [60]

Input instance 154d - 32 bytes

Bytes	Class, instance, attribute	Description
0 - 7	65h, 01d, 01h	Channel 1 [8]
8 - 15	65h, 02d, 01h	Channel 2 [8]
16 - 23	65h, 03d, 01h	Channel 3 [8]
24 - 31	65h, 04d, 01h	Channel 4 [8]

Input instance 155d - 48 bytes

Bytes	Class, instance, attribute	Description
0 - 11	65h, 01d, 02h	Channel 1 [12]
12 - 23	65h, 02d, 02h	Channel 2 [12]
24 - 35	65h, 03d, 02h	Channel 3 [12]
36 - 47	65h, 04d, 02h	Channel 4 [12]

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Input instance 156d - 128 bytes

Bytes	Class, instance, attribute	Description
0 - 31	65h, 01d, 03h	Channel 1 [32]
32 - 63	65h, 02d, 03h	Channel 2 [32]
64 - 95	65h, 03d, 03h	Channel 3 [32]
96 - 127	65h, 04d, 03h	Channel 4 [32]

Input instance 157d - 240 bytes

Bytes	Class, instance, attribute	Description
0 - 63	65h, 01d, 04h	Channel 1 [60]
64 - 127	65h, 02d, 04h	Channel 2 [60]
128 - 191	65h, 03d, 04h	Channel 3 [60]
192 - 255	65h, 04d, 04h	Channel 4 [60]

Input instance 158d - 40 bytes

Bytes	Class, instance, attribute	Description
0 - 7	65h, 01d, 01h	Channel 1 [8]
8 - 15	65h, 02d, 01h	Channel 2 [8]
16 - 23	65h, 03d, 01h	Channel 3 [8]
24 - 31	65h, 04d, 01h	Channel 4 [8]
32 - 39	65h, 05d, 01h	IDENT Control

Input instance 159d - 56 bytes

Bytes	Class, instance, attribute	Description
0 - 11	65h, 01d, 02h	Channel 1 [12]
12 - 23	65h, 02d, 02h	Channel 2 [12]
24 - 35	65h, 03d, 02h	Channel 3 [12]
36 - 47	65h, 04d, 02h	Channel 4 [12]
48 - 55	65h, 05d, 01h	IDENT Control

Input instance 160d - 136 bytes

Bytes	Class, instance, attribute	Description
0 - 31	65h, 01d, 03h	Channel 1 [32]
32 - 63	65h, 02d, 03h	Channel 2 [32]
64 - 95	65h, 03d, 03h	Channel 3 [32]
96 - 127	65h, 04d, 03h	Channel 4 [32]
128 - 135	65h, 05d, 01h	IDENT Control

Input instance 161d - 248 bytes

Bytes	Class, instance, attribute	Description
0 - 59	65h, 01d, 04h	Channel 1 [60]
60 - 119	65h, 02d, 04h	Channel 2 [60]
120 - 179	65h, 03d, 04h	Channel 3 [60]
180 - 239	65h, 04d, 04h	Channel 4 [60]
240 - 299	65h, 05d, 01h	IDENT Control

Input instance 162d - 10 bytes

Bytes	Class, instance, attribute	Description
0 - 9	65h, 00d, 64h	Status

Shared services

Service code	integrated in		service designation
	Class level	Instance level	
0Eh	Yes	Yes	Get attribute single
10h	Yes	Yes	Set attribute single

13.1.3 Output command object (instances 64h - 6)

Class attributes (instance 0)

Attribute ID	Name	Data type	Data content	Access authorization
1	Revision	UINT	1	Get

Instance attributes (instances 1-6)

- Instances 1-4: R/W heads 1-4
- Instance 5 - Ident Control
- Instance 6 - Mixed mode

Attribute ID	Name	Data type	Data content	Access authorization
1	Output data image (first 8 bytes)	USINT[8]	0	Get / Set
2	Output data image (first 12 bytes)	USINT[12]	0	Get / Set
3	Output data image (first 32 bytes)	USINT[32]	0	Get / Set
4	Output data image (first 60 bytes)	USINT[60]	0	Get / Set

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Shared services

Service code	integrated in		service designation
	Class level	Instance level	
0Eh	Yes	Yes	Get attribute single
10h	No	Yes	Set attribute single

13.1.4 Input command object (instances 65h - 6)

Class attributes (instance 0)

Attribute ID	Name	Data type	Data content	Access authorization
1	Revision	UINT	1	Get
100	Explicit status	USINT[10]	0	Get

Instance attributes (instances 1-6)

- Instances 1-4: R/W heads 1-4
- Instance 5 - Ident Control
- Instance 6 - Mixed mode

Attribute ID	Name	Data type	Data content	Access authorization
1	Input data image (first 8 bytes)	USINT[8]	0	Get
2	Input data image (first 12 bytes)	USINT[12]	0	Get
3	Input data image (first 32 bytes)	USINT[32]	0	Get
4	Input data image (first 60 bytes)	USINT[60]	0	Get

Shared services

Service code	integrated in		service designation
	Class level	Instance level	
0Eh	Yes	Yes	Get attribute single

13.1.5 Boot-up parameter object (instances 66h - 4)

Class attributes (instance 0)

Attribute ID	Name	Data type	Data content	Access authorization
1	Revision	UINT	1	Get
100	Multiplex mode	BOOL	0	Get / Set
101	Data retention time	USINT	0	Get / Set

Instance attributes (instances 1-4, channels 1-4)

Attribute ID	Name	Data type	Data content	Access authorization
1	Tag type	USINT	3	Get / Set

Shared services

Service code	integrated in		service designation
	Class level	Instance level	
0Eh	Yes	Yes	Get attribute single
10h	Yes	Yes	Get attribute single

13.1.6 Diagnostics object (instances 67h - 5)

Class attributes (instance 0)

Attribute ID	Name	Data type	Data content	Access authorization
1	Revision	UINT	1	Get
100	Refresh all	BOOL	0	Get / Set
101	Multiplex mode	BOOL	0	Get
102	Trigger condition 3	USINT	0	Get
103	Trigger condition 4	USINT	0	Get
104	Version gateway	Bytes [52]	0	Get

Instance attributes (instances 1-4, channels 1-4)

Attribute ID	Name	Data type	Data content	Access authorization
1	Tag type	USINT	0	Get
2	Version	Bytes [52]	0	Get

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Instance attributes (instance 5, IDENTControl)

Attribute ID	Name	Data type	Data content	Access authorization
1	Unused			
2	Version	Bytes [52]	0	Get

Shared services

Service code	integrated in		service designation
	Class level	Instance level	
0Eh	Yes	Yes	Get attribute single
10h	Yes	No	Set attribute single

FACTORY AUTOMATION – SENSING YOUR NEEDS

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