

# Network-specific properties

of the IO-Link master for PROFINET S67E-PN-IOL8-DI4-M12-6P

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of the IO-Link master for PROFINET S67E-PN-IOL8-DI4-M12-6P

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**Editorial department** Engineering automation systems control hardware

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# 1 Use of the safety instructions

## 1.1 Structure of the safety instructions

The safety instructions are structured as follows:

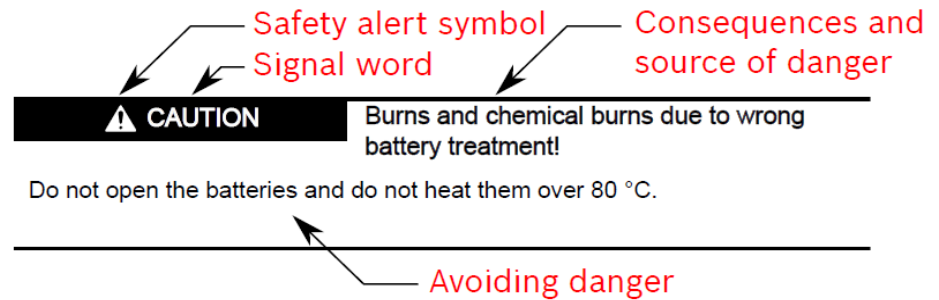





Abb. 1-1 Structure of the safety instructions

## 1.2 Explaining signal words and safety alert symbol

The safety instructions in this documentation contain specific signal words (danger, warning, caution, notice) and, if necessary, a safety alert symbol (according to ANSI Z535.6-2006).

The signal word is used to draw attention to the safety instruction and also provides information on the severity of the hazard.

The safety alert symbol (a triangle with an exclamation point), which precedes the signal words danger, warning and caution is used to alert the reader to personal injury hazards.

 <b>GEFAHR</b>	In case of non-compliance with this safety instruction, death or serious injury <b>will</b> occur.
 <b>WARNUNG</b>	In case of non-compliance with this safety instruction, death or serious injury <b>can</b> occur.
 <b>VORSICHT</b>	In case of non-compliance with this safety instruction, minor or moderate injury can occur.
<b>HINWEIS</b>	In case of non-compliance with this safety instruction, material damage can occur.

Use of the safety instructions

## 1.3 Symbols used

Hints are represented as follows:



This is an information.

---

Tips are represented as follows:



This is a tip for the user.

---

## 1.4 Signal graphic explanation on the device



Prior to the installation and commissioning of the device, refer to the device documentation.

## 2 PROFINET data model



In addition to this document, note the information given below.

- Device-specific datasheet
- Application description:  
 „Rexroth IndraControl S67E: system and installation“  
 DOK-CONTRL-S67E\*SYSINS-AP01-EN-P,  
 MNR R911379700

They can be downloaded under [www.boschrexroth.com/electrics](http://www.boschrexroth.com/electrics).

The S67E device is modular. The first slot 1.1 (slot 1 and subslot 1) always contains the “Status/control module” with 4 bytes each of IN and OUT process data. In slots 1.2 to 1.9 the operating mode and the process data length for the respective IO-Link port are parameterized.

### 2.1 Status/control module

#### IN process data

Byte	Byte 0			Byte 1			Byte 2			Byte 3					
Bit	0	...	7	8	...	15	16	...	23	24	...	27	28	...	31
Function	Port status (COM status)			PD VALID state			DI state on pin 4			DI state on pin 2			Reserved		
Connection	X01	...	X08	X01	...	X08	X01	...	X08	X01	...	X04	-	-	-
Pin	4	...	4	4	...	4	4	...	4	2	...	2	-	-	-
Port	1	...	8	1	...	8	1	...	8	1	...	4	-	-	-



The **COM state** indicates whether the corresponding port has established communication with the IO-Link device.



The **PD Valid state** indicates whether the IO-Link process data of the corresponding port is valid.



The **DI state on pin 4** indicates the state of the corresponding IO-Link port in the DI operating mode.



The **DI state on pin 2** indicates the state of the hardwired digital inputs on pin 2.

## OUT process data

Byte	Byte 0			Byte 1			Byte 2			Byte 3		
Bit	0	...	7	8	...	15	16	...	23	24	...	31
Function	Port configuration (COM control)			Reserved			DO state on pin 4			Reserved		
Connection	X01	...	X08	-	-	-	X01	...	X08	-	-	-
Pin	4	...	4	-	-	-	4	...	4	-	-	-
Port	1	...	8	-	-	-	1	...	8	-	-	-



Byte 0 (**COM control**) can be used to temporarily (as long as the corresponding COM control bit is set) switch one or more IO-Link ports that were previously configured in digital input mode (DI) to IO-Link mode. Cyclic and acyclic communication can therefore be established with the connected IO-Link device.



**DO state on pin 4:** the digital output on the corresponding port can be controlled via process data. The I/O-Link port must be set beforehand to function in the DO operating mode.



### Start-up parameters

The status/control module in slot 1 contains the following startup parameters, which refer to the runtime behavior of the entire device.

Parameter	Possible values (bold = default)	Description
<b>Diagnostic settings</b>		
Channel-specific diagnostics	0 = deactivated 1 = activated	The channel-related diagnosis can be deactivated/activated.
Extended channel-specific diagnostics	0 = deactivated 1 = activated	The extended channel-specific diagnostics can be deactivated.
Diagnostics status IOLM	0 = deactivated 1 = activated	The IO-Link master diagnosis can be deactivated/activated.
Diagnostics IOLD port 1 ... Diagnostics IOLD port 8	0 = deactivated 1 = activated	For each IO-Link port, the IO-Link diagnosis can be separately deactivated/activated.  When activated, the IO-Link events of the IO-Link device are acknowledged at the respective port and mapped in the PROFINET diagnostics. When deactivated, the events are only acknowledged.
<b>Substitute values</b>		
Behavior in the event of an error for status/control module	<b>0 = all zero</b>	Substitute value behavior for the IO-Link ports in DO mode (pin 4)
	1 = Set all	
	2 = hold last value	
	3 = Substitute value	
Substitute values for DO	<b>0 = zero</b>	Specification of a replacement value sample for the IO-Link ports in the DO operating mode (pin 4)
	Possible values: 0 ... 255 <sub>dec</sub>	NOTE: in order to use this parameter, the value "Replacement values" must be set beforehand in the "Behavior in the event of error for state/control module" parameter.
Behavior in the event of an error at port 1 ... behavior in the event of an error at port 8	<b>0 = all zero</b>	Substitute behavior for the OUT process data of the IO-Link port in the IO-Link operating mode
	1 = Set all	
	2 = hold last value	
	<b>4 = IO-Link master command</b>	The "IO-Link master command" option enables the use of IO-Link-specific mechanisms for valid/invalid OUT process data.

## 2.2 Flexible module configuration

Up to eight further modules can be flexibly configured in slots 1.2 to 1.9, whereby each of these represents a physical IO-Link port. The basic operating mode of the IO-Link port, as well as the process data length, is determined when selecting the module.

### Operating mode and process data of the IO-Link port

The possible submodules are shown below.

Submodule	Process data length in bytes		Description/start-up parameters
	Input	Output	
Deactivated	0	0	<b>Port mode (operating mode):</b> deactivated In this operating mode, the sensor supply voltage is also switched off.
Digital IN	0*	0	<b>Port mode (operating mode):</b> digital input * The process data are located in the status/control module.
Digital OUT	0	0*	<b>Port mode (operating mode):</b> digital output * The process data are located in the status/control module.
DI with IO-Link	0*	0	<b>Port mode (operating mode):</b> DI with IO-Link (Digital input with IO-Link communication) <b>Identification level (device check):</b> - Vendor ID (2 bytes) - Device ID (3 bytes) <b>Data Storage:</b> 0 = Disabled 1 = Download only 2 = Upload only 3 = Download and Upload 4 = Disabled and cleared * The process data are located in the status/control module.
IOL_I_nByte (+DevPrm*) ... IOL_O_nByte (+DevPrm*) ... IOL_I/O_nByte (+DevPrm*)  Key: I = Input O = Output n = Number of bytes * DevPrm = Device-Parameter	1 ... 32	1 ... 32	<b>Port mode (operating mode):</b> IO-Link <b>Identification level (device check):</b> - Vendor ID (2 bytes) - Device ID (3 bytes) <b>Data Storage:</b> 0 = Disabled 1 = Download only 2 = Upload only 3 = Download and Upload 4 = Disabled and cleared <b>* +DevPrm (deviceparameter - DPP2):</b> If such a submodule is selected, then the deviceparameter - DPP2 (byte 10 <sub>hex</sub> ... 1F <sub>hex</sub> ) can be parameterized for the port during startup. If the IO-Link process data length of the device is not available in the sub-modules, then select the next largest constellation.

### Start-up parameters

There is the option of carrying out start-up parameterization for the IO-Link submodules.  
The following parameters can be set:

Parameter	Possible values	Description
<b>Operating mode</b>		
Port mode	Deactivated	In this operating mode, the sensor supply voltage is also switched off.
	Digital IN	In this operating mode, the IO-Link port functions as a standard digital input.
	Digital OUT	In this operating mode, the IO-Link port functions as a standard digital output.
	DI with IO-Link	The operating mode can be used if an IO-Link device is to be acquired as quickly as possible. The device can be parameterized via IO-Link (C/Q state is IO-Link). After parameterization, the IO-Link master switches to the DI mode (C/Q state is DI). The switching state of the device is now acquired as a digital signal rather than via IO-Link communication.
	IO-Link	Use this operating mode to communicate with IO-Link sensors and actuators.
<b>Identification level (device check)</b>		
Vendor ID	0000 <sub>hex</sub> ... FFFF <sub>hex</sub>	<b>Vendor ID, identification level 1</b> The vendor ID of the connected IO-Link device for the respective port can be parameterized via this. The vendor ID can be found in the data sheet of the IO-Link device.
Device ID	000000 <sub>hex</sub> ... FFFFFFFF <sub>hex</sub>	<b>Device ID, identification level 2</b> The device ID of the connected IO-Link device for the respective port can be parameterized via this. The device ID can be found in the data sheet of the IO-Link device. To check the device ID, a vendor ID check must be carried out first of all.
As soon as the content of the vendor ID and/or device ID is not equal to "0", the IO-Link "Type Compatible" inspection level is activated. It is only if the vendor ID parameterized as well as the device ID correspond with the information read out (in the device) that communication to the device is established (COM-State Bit of the corresponding port = 1), otherwise this is rejected (IO-Link LED is red).		
<b>Data storage</b>		
Data storage	Deactivated	The data storage mechanism is deactivated.
	Download only	The parameter data are sent to the device from the IO-Link master. In the event of an inconsistency between the parameter data of the IO-Link device and the master, the data from the IO-Link master is taken as the default. As such it is possible to exchange the IO-Link device.
	Upload only	The parameter data are sent from the IO-Link device to the master. In the event of an inconsistency between the parameter data of the IO-Link device and the master, the data from the device is taken as the default. As such it is possible to exchange the IO-Link master.
	Download and Upload	The parameter data are saved in both the IO-Link master as well as the device. In the event of an inconsistency between the parameter data of the IO-Link device or the master, the data from both is used as the default. As such it is possible to exchange the IO-Link device or the IO-Link master.
	Disabled and cleared	The Data Storage mechanism is deactivated and the master deletes all stored parameters for the respective port.
<b>The data storage mechanism is only supported by the IO-Link specification v1.1. Both the IO-Link master and device must support at least IO-Link v1.1.</b>		
<b>Device parameters</b>		
DevPrm	00 <sub>hex</sub> ... FF <sub>hex</sub>	The device parameter page 2 describes the area between the IO-Link objects 10 <sub>hex</sub> ... 1F <sub>hex</sub> . This relates to the manufacturer-specific area of the IO-Link device data. This is optionally made available by IO-Link devices and can be read as well as written from the master.

### 3 I&M functions

The PROFINET device supports Identification & Maintenance functions (I&M). The general Identification & Maintenance functions 0 to 4 can be read out via slot 0. IO-Link-specific Identification & Maintenance functions 0, 16 ... 23, and 99 can be read via slot 1 and subslot 1.



Slot 0 and slot 1 have their own respective I&M function (I&M 0).

#### I&M 0 (slot 0)

I&M data	Access / data type	Presets
MANUFACTURER_ID	Read / 2 bytes	11F <sub>hex</sub> (Bosch Rexroth AG)
ORDER_ID	Read / 20 bytes	R911174436
SERIAL_Number	Read / 16 bytes	Stipulated in the product process
HARDWARE_Revision	Read / 2 bytes	Corresponds to the hardware version of the device
SOFTWARE_Revision	Read / 4 bytes	Corresponds to the firmware version of the device
REVISION_Counter	Read / 2 bytes	0000 <sub>hex</sub> (reserved)
PROFILE_ID	Read / 2 bytes	F600 <sub>hex</sub> (generic device)
PROFILE_SPECIFIC_TYPE	Read / 2 bytes	0003 <sub>hex</sub> (I/O modules)
IM_VERSION	Read / 2 bytes	0101 <sub>hex</sub> (Version 1.1)
IM_SUPPORTED	Read / 2 bytes	001E <sub>hex</sub> (I&M 1 ... 4)

#### I&M 1 (slot 0)

I&M data	Access / data type	Presets
TAG_FUNCTION	Read/write / 32 bytes	"20 <sub>hex</sub> " (empty)
TAG_LOCATION	Read/write / 22 bytes	"20 <sub>hex</sub> " (empty)

#### I&M 2 (slot 0)

I&M data	Access / data type	Presets
INSTALLATION_DATE	Read/write / 16 bytes	"20 <sub>hex</sub> " (empty)
RESERVED	Read/write / 38 bytes	00 <sub>hex</sub>

#### I&M 3 (slot 0)

I&M data	Access / data type	Presets
DESCRIPTOR	Read/write / 54 bytes	"20 <sub>hex</sub> " (empty)

**I&M 0 (slot 1): IO-Link-specific**

The I&M functions (I&M 0) of the IO-Link can be read out via slot 1.

They are different from the I&M functions (I&M 0) of Slot 0 in PROFILE\_ID / PROFILE\_SPECIFIC\_TYPE and IM\_SUPPORTED.

I&M data	Access / data type	Presets
MANUFACTURER_ID	Read / 2 bytes	11Fhex (Bosch Rexroth AG)
ORDER_ID	Read / 20 bytes	R911174436
SERIAL_Number	Read / 16 bytes	Stipulated in the product process
HARDWARE_Revision	Read / 2 bytes	Corresponds to the hardware version of the device
SOFTWARE_Revision	Read / 4 bytes	Corresponds to the firmware version of the device
REVISION_Counter	Read / 2 bytes	0000 <sub>hex</sub> (reserved)
PROFILE_ID	Read / 2 bytes	4E00 <sub>hex</sub> (IO-Link)
PROFILE_SPECIFIC_TYPE	Read / 2 bytes	0000 <sub>hex</sub>
IM_VERSION	Read / 2 bytes	0101 <sub>hex</sub> (Version 1.1)
IM_SUPPORTED	Read / 2 bytes	0001 <sub>hex</sub> (Profile specific)

**I&M 16 ... 23 (slot 1, subplot 1): IO-Link device directory**

For each IO-Link, an individual Identification & Maintenance Function is available in the area of I&M 16 (Index B000<sub>hex</sub>) to I&M 23 (Index B007<sub>hex</sub>).

For I&M functions 16 to 23, the structure is made up of the following parameters:



Access is only with read permission and exclusively via slot 1 and subplot 1 (status/control module).

I&M data	Access / data type	Presets
VENDOR_ID	Read / 2 bytes	Vendor ID from the connected IO-Link device. If no device is available, then 0000 <sub>hex</sub>
DEVICE_ID	Read / 4 bytes	Device ID from the connected IO-Link device. The high-order byte is always equal to zero. If no device is available, then 000000 <sub>hex</sub>
FUNCTION_ID	Read / 2 bytes	Function ID from the connected IO-Link device. If no device is available, then 0000 <sub>hex</sub>
RESERVED	Read/10 bytes	Reserved

**I&M 99 (slot 1): IO-Link master directory**

In I&M 99 (Index B063<sub>hex</sub>), other relevant IO-Link master data is available.



Access is only with read permission and exclusively via slot 1 and subslot 1 (status/control module).

I&M data	Access / data type	Presets
IO-Link version	Read/1 byte	11 <sub>hex</sub> (IO-Link Version e.g., 11 <sub>hex</sub> for v1.1)
IO-Link profile version	Read/1 byte	10 <sub>hex</sub> (IO-Link profile version, e.g., 10 <sub>hex</sub> for v1.0)
IO-Link feature support	Read / 4 bytes	00000000 <sub>hex</sub>
Number of ports	Read/1 byte	08 <sub>hex</sub> (number of supported ports)
REF_Port_Config	Read/1 byte	00 <sub>hex</sub> (not supported)
REF_IO_Mapping	Read/1 byte	00 <sub>hex</sub> (not supported)
REF_iPar_Directory	Read/1 byte	00 <sub>hex</sub> (not supported)
REF_IOL_M	Read/1 byte	00 <sub>hex</sub> (not supported)
Number of CAPs	Read/1 byte	01 <sub>hex</sub> (number of Client Access Points)
Index CAP1	Read / 2 bytes	255 <sub>hex</sub> (Client Access Point for IOL_CALL's)

## 4 Startup

### Default upon delivery/default settings

By default upon delivery, the following functions and features are available:

#### PROFINET

PROFINET name:	No name assigned
IP parameters:	0.0.0.0
Subnet mask:	0.0.0.0
Default Gateway:	0.0.0.0
Device designation:	S67E-PN-IOL8-DI4-M12-6P
Vendor ID:	011F <sub>hex</sub>
Device ID:	2A07 <sub>hex</sub>

#### Firmware update

Firmware update on next restart:	deactivated
TFTP server IP address:	192.168.210.211
Firmware file name:	FIRMWARE.NXF

#### System identification

Device name:	No name assigned
Description:	No description assigned
Device location:	No location assigned
Contact:	No contact assigned

#### Web-based Management (WBM)

User name:	admin
Password:	private

#### Restoring the default settings

The default settings can be restored via WBM.

To do this, go to:

Administration web page > default settings and follow the instructions.

#### Firmware started

Once you have connected the power, the firmware is started. After completion of the firmware boot process, the BF LED either lights up or flashes.

## 5 PROFINET protocols and device functions

### 5.1 LLDP - Link Layer Discovery Protocol

The device supports LLDP according to IEEE 802.1AB and therefore enables topology detection of devices that also have LLDP activated.

Advantages of using LLDP:

- Improved error location detection
- Improved device replacement
- More efficient network configuration

The following information is received by or sent to neighbors, as long as LLDP is activated:

- The device sends its own management and connection information to neighboring devices.
- The device receives management and connection information from neighboring devices.

Engineering tools can be used to represent the LLDP information as a topology overview.

### 5.2 MRP - Media Redundancy Protocol

The device supports the role of a Media Redundancy Client (MRC) in an MRP network.

### 5.3 SNMP - Simple Network Management Protocol

The device supports SNMP v1.

#### Management Information Base - MIB



The corresponding latest MIBs are available on the Internet at [www.boschrexroth.com/electrics](http://www.boschrexroth.com/electrics).

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For the object descriptions, please refer to the ASN1 descriptions for this product. The password for read access is "public" and cannot be changed. By default upon delivery, the password for write/read access is "private" and can be modified at any time.

### 5.4 FSU - Fast Start Up

The device supports the Fast Start Up feature. This function enables the fast startup of the PROFINET device. The device is ready for operation in 3 s.



## 5.5 Shared device

The device supports the Shared Device function. This enables two controllers to simultaneously establish a cyclic connection to the device. Only one master can establish a cyclic connection to each submodule. The I/O data of another submodule, which is used by the other master in cyclic connection, cannot be accessed.

## 5.6 IO-Link master

IO-Link is an internationally standardized I/O technology (IEC 61131-9) for communicating with sensors and actuators. An IO-Link master is integrated in the PROFINET device. The IO-Link master establishes the connection between the IO-Link devices and the automation system. The device supports IO-Link specification v1.1.

## 5.7 WBM - Web-based management

The device has a web server, which generates the required pages for web-based management and, depending on the requirements of the user, sends them to a standard web browser. Web-based management can be used to access static information (e.g., technical data, MAC address) or dynamic information (e.g., IP address, status information).

### Calling web-based management

The device web server can be addressed using the IP address if configured accordingly. The homepage (web page) of the device is accessed by entering the URL "http://ip-address". Example: http://172.16.113.38  
The default user name is "admin", the default password is "private".



If you cannot access the WBM pages, check the connection settings in your browser and deactivate the proxy, if set.

---

## 5.8 Diagnostic alarms

PROFINET enables the PROFINET device to store diagnostic information together with the error location and error type. In the default upon delivery the alarms are enabled, however, they can be disabled with parameters on startup. An incoming alarm informs the PROFINET controller that diagnostic information has been entered.

When the diagnostic information has been removed, an outgoing alarm is sent to the device. If at least one piece of diagnostic information is stored, the SF LED is on. If no diagnostic information is present, the SF LED is off.

The following PROFINET diagnostic messages are indicated by the PROFINET device:

Diagnostic messages	Status bit process data	Network-specific diagnostic mapping
Overtemperature device	-	Yes
Undervoltage $U_S$	-	Yes
Overload $U_S$	-	Yes
Overvoltage $U_S$	-	Yes
Undervoltage/Overload/ Short-circuit $U_A$	-	Yes
Overvoltage $U_A$	-	Yes
Overload/Short-circuit of an output	-	Yes
Cable break at IO-Link port	Port status/ Status module*	Yes



\* Port status = 1; the IO-Link connection is active.

\* Port status = 0; the IO-Link connection is interrupted.

The LED status can be found in the data sheet.

## 5.9 Device replacement

Devices can be replaced without having to reconfigure them within the PROFINET network. Device replacement is only then possible if the new device is in its default state. The controller must support the device replacement function.

The device name and the device address are assigned by the controller to the newly added PROFINET device with the help of the neighborhood detection function.

## 5.10 Substitute value behavior

If PROFINET communication fails, all device outputs are set to the parameterized substitute values. Please refer to the "Status/control module > startup parameters" and "Flexible module configuration > startup parameters" sections for the precise parameterization of substitute values.

## 6 Disposal

### 6.1 General information

Dispose the products according to the respective valid national standard.

### 6.2 Return

For disposal, our products can be returned free of charge. However, the products must be free of remains like oil and grease or other impurities.

Furthermore, the products returned for disposal must not contain any undue foreign substances or components.

Send the products free of charge to the following address:

Bosch Rexroth AG  
Electric Drives and Controls  
Bürgermeister-Dr.-Nebel-Straße 2  
D-97816 Lohr am Main, Germany

### 6.3 Packaging

The packaging material consists of cardboard, plastics, wood or styrofoam. Packaging material can be recycled anywhere.

For ecological reasons, please do not return empty packages.

### 6.4 Batteries and accumulators

Batteries and accumulators can be labelled with this symbol.



The symbol indicating "separate collection" for all batteries and accumulators is the crossed-out wheeled bin.

The end user within the EU is legally obligated to return used batteries. Outside the validity of the EU Directive 2006/66/EC keep the stipulated directives.

Used batteries can contain hazardous substances, which can harm the environment or the health of the individual when they are stored incorrectly or disposed of.

After use, the batteries or accumulators contained in Rexroth products have to be disposed of according to the country-specific collection system.

Disposal

## 7 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

**Service Germany** Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

Phone:	<b>+49 9352 40 5060</b>
Fax:	<b>+49 9352 18 4941</b>
E-mail:	<a href="mailto:service.svc@boschrexroth.de">service.svc@boschrexroth.de</a>
Internet:	<a href="http://www.boschrexroth.com">http://www.boschrexroth.com</a>

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

**Service worldwide** Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

**Preparing information** To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

Service and support

Notes

**Bosch Rexroth AG**

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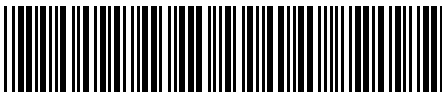
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