Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth
Bosch Group

Rexroth GDS/GDM01.2 Leading Axis Encoder

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Edition 01

Project Planning Manual

Title Rexroth GDS/GDM01.2
Leading Axis Encoder

Type of Documentation Project Planning Manual

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Purpose of Documentation This documentation describes …

- explains the features of the product, possibilities for use, conditions for use and operational limits
- contains technical data
- provides information regarding product selection, handling and operation

Record of Revisions

Description	Release Date	Notes
DOK-ENCODR-GDS*GDM01.2-PR01-EN-P	2005-11	1st edition

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Note This document has been printed on chlorine-free bleached paper.

Contents

1 Introduction to the Product

1.1 Rexroth GDM/GDS01.2 Leading Axis Encoder

Rexroth GDM/GDS01.2 leading axis encoder systems work according to the principle of photoelectric scanning. The photoelectric scanning happens contact-free and therewith wearless.

At **singleturn-rotary encoders**, the absolute position information repeats with every revolution. **Multiturn-rotary encoders** are able to distinguish additional revolutions.

GDS1.1 suspends one motor revolution; GDM1.2 suspends 4,096 motor revolutions.

About this Documentation

Structure of this Document Edition

This document contains safety regulations, technical data, and operating instructions for encoders. The individual chapters can be subdivided into the following focal points:

Chapter	Title	Contents
1	Introduction to the Product	General Information
2	Important Instructions on Use	**Safety**
3	Notes Regarding Safety	
4	Technical Data	**Product Description** (for planners and machine constructors)
5	Dimensional Data	
6	Type Codes	
7	Connection Techniques	
8	Handling, Transport and Storage	**In practice** (for operating and maintenance personnel)
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Fig. 1-1: Document Structure

Additional Documentation

Note: If this documentation contains references to supplementary documentation, the version is always represented in bold and underlined type (e.g. **xx**). If documentation is ordered, its version may be a higher one!

Standards

This documentation refers to German, European and international technical standards. Documents and sheets on standards are subject to copyright protection and may not be passed on to third parties by Rexroth. If necessary, please address the authorized sales outlets or, in Germany, directly to:

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Foreign Systems

Documentation for external systems which are connected to Rexroth components are not included in the scope of delivery and must be ordered directly from the particular manufacturers.

Feedback

Your experiences are an essential part of the process of improving both the product and the documentation.

Please do not hesitate to inform us of any mistakes you detect in this documentation or of any modifications you might desire. We would appreciate your feedback.

Please send your remarks to:

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2 Important Instructions on Use

2.1 Appropriate Use

Introduction

In their design and manufacture, Rexroth products reflect state-of-the-art technology. Before they are delivered, they are inspected to ensure that they operate safely.

The products may only be used as intended. If they are not used in the proper manner, situations may arise resulting in injuries to property and persons.

Note: Rexroth, as the manufacturer, does not provide any warranty, assume any liability, or pay any damages for damage caused by products not being used as intended. Any risks resulting from the products not being used as intended are the sole responsibility of the user.

Before using Rexroth products, the following condition precedent must be fulfilled so as to ensure that they are used as intended:

- Everyone who in any way deals with one of our products must read and understand the corresponding notes regarding safety and regarding appropriate use.
- If the products are hardware, they must be kept in their original state, i.e. no constructional modifications may be made. Software products may not be decompiled; their source codes may not be modified.
- Damaged or improperly working products must not be installed or put into operation.
- It must be ensured that the products are installed, operated and serviced according to the regulations and ambient conditions specified in the documentation.

Fields of Use and Application

GDS/GDM encoders are designed for use as rotary encoders within plant engineering and mechanical engineering.

For application-specific use of the encoders, several devices with different designs are available.

Note: The encoders may only be used with the accessories specified in the documentation. Components that are not explicitly mentioned may be neither attached nor connected. The same is true for cables and lines.

Operation may be carried out only in the explicitly mentioned configurations and combinations of the component and with the software and firmware specified in the corresponding description of functions.

Any connected drive controller must be programmed before startup in order to ensure that the encoder executes the functions specific to the particular application.

The encoders may only be operated under the assembly, mounting and installation conditions, in the normal position and under the environmental conditions (temperature, degree of protection, humidity, EMC, and the like) specified in this documentation.

2.2 Inappropriate Use

Any use of the encoders outside of the fields of application mentioned above or under operating conditions and technical data other than those specified in this documentation is considered to be “inappropriate use”.

GDS/GDM01.2 may not be used if . . .

- ambient conditions at the installation location requires a higher explosion protection than indicated at the encoder name plate.
- they are subjected to operating conditions which do not comply with the ambient conditions described above. e.g. operation under water, under extreme temperature fluctuations or extreme maximum temperatures is not permitted.
- the intended fields of application have not been expressly released for the encoders. In this regard, it is required that you refer to the statements in the general notes regarding safety!

3 Safety Instructions for Electric Drives and Controls

3.1 General Information

Using the Safety Instructions and Passing them on to Others

Do not attempt to install or commission this device without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with the device. If you do not have the user documentation for the device, contact your responsible Bosch Rexroth sales representative. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the device.

If the device is resold, rented and/or passed on to others in any other form, then these safety instructions must be delivered with the device.

WARNING

Improper use of these devices, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, may result in material damage, bodily harm, electric shock or even death!

Instructions for Use

Read these instructions before the initial startup of the equipment in order to eliminate the risk of bodily harm or material damage. Follow these safety instructions at all times.

- Bosch Rexroth AG is not liable for damages resulting from failure to observe the warnings provided in this documentation.
- Read the operating, maintenance and safety instructions in your language before starting up the machine. If you find that you cannot completely understand the documentation for your product, please ask your supplier to clarify.
- Proper and correct transport, storage, assembly and installation as well as care in operation and maintenance are prerequisites for optimal and safe operation of this device.
- Only assign trained and qualified persons to work with electrical installations:
  - Only persons who are trained and qualified for the use and operation of the device may work on this device or within its proximity. The persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the equipment as well as an understanding of all warnings and precautionary measures noted in these instructions.
  - Furthermore, they must be trained, instructed and qualified to switch electrical circuits and devices on and off in accordance with technical safety regulations, to ground them and to mark them according to the requirements of safe work practices. They must have adequate safety equipment and be trained in first aid.
- Only use spare parts and accessories approved by the manufacturer.

- Follow all safety regulations and requirements for the specific application as practiced in the country of use.
- The devices have been designed for installation in industrial machinery.
- The ambient conditions given in the product documentation must be observed.
- Only use safety-relevant applications that are clearly and explicitly approved in the Project Planning Manual. If this is not the case, they are excluded.
  Safety-relevant are all such applications which can cause danger to persons and material damage.
- The information given in the documentation of the product with regard to the use of the delivered components contains only examples of applications and suggestions.

  The machine and installation manufacturer must

  - make sure that the delivered components are suited for his individual application and check the information given in this documentation with regard to the use of the components,
  - make sure that his application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.
- Startup of the delivered components is only permitted once it is sure that the machine or installation in which they are installed complies with the national regulations, safety specifications and standards of the application.
- Operation is only permitted if the national EMC regulations for the application are met.
- The instructions for installation in accordance with EMC requirements can be found in the documentation "EMC in Drive and Control Systems".

  The machine or installation manufacturer is responsible for compliance with the limiting values as prescribed in the national regulations.
- Technical data, connections and operational conditions are specified in the product documentation and must be followed at all times.

Explanation of Warning Symbols and Degrees of Hazard Seriousness

The safety instructions describe the following degrees of hazard seriousness. The degree of hazard seriousness informs about the consequences resulting from non-compliance with the safety instructions:

Warning symbol with signal word	Degree of hazard seriousness according to ANSI Z 535
 **DANGER**	Death or severe bodily harm will occur.
 **WARNING**	Death or severe bodily harm may occur.
 **CAUTION**	Bodily harm or material damage may occur.

Fig. 3-1: Hazard classification (according to ANSI Z 535)

Hazards by Improper Use

DANGER

High electric voltage and high working current! Risk of death or severe bodily injury by electric shock!

DANGER

Dangerous movements! Danger to life, severe bodily harm or material damage by unintentional motor movements!

WARNING

High electric voltage because of incorrect connection! Risk of death or bodily injury by electric shock!

WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

CAUTION

Hot surfaces on device housing! Danger of injury! Danger of burns!

CAUTION

Risk of injury by improper handling! Risk of bodily injury by bruising, shearing, cutting, hitting, or improper handling of pressurized lines!

CAUTION

Risk of injury by improper handling of batteries!

3.2 Instructions with Regard to Specific Dangers

Protection Against Contact with Electrical Parts

Note: This section only concerns devices and drive components with voltages of more than 50 Volt.

Contact with parts conducting voltages above 50 Volts can cause personal danger and electric shock. When operating electrical equipment, it is unavoidable that some parts of the devices conduct dangerous voltage.

DANGER

High electrical voltage! Danger to life, electric shock and severe bodily injury!

⇒ Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain and repair this equipment.

⇒ Follow general construction and safety regulations when working on electrical power installations.

⇒ Before switching on the device, the equipment grounding conductor must have been non-detachably connected to all electrical equipment in accordance with the connection diagram.

⇒ Do not operate electrical equipment at any time, even for brief measurements or tests, if the equipment grounding conductor is not permanently connected to the mounting points of the components provided for this purpose.

⇒ Before working with electrical parts with voltage potentials higher than 50 V, the device must be disconnected from the mains voltage or power supply unit. Provide a safeguard to prevent reconnection.

⇒ With electrical drive and filter components, observe the following:

Wait 30 minutes after switching off power to allow capacitors to discharge before beginning to work. Measure the voltage on the capacitors before beginning to work to make sure that the equipment is safe to touch.

⇒ Never touch the electrical connection points of a component while power is turned on.

⇒ Install the covers and guards provided with the equipment properly before switching the device on. Before switching the equipment on, cover and safeguard live parts safely to prevent contact with those parts.

⇒ A residual-current-operated circuit-breaker or r.c.d. cannot be used for electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protective device according to the relevant standards.

⇒ Secure built-in devices from direct touching of

electrical parts by providing an external housing, for example a control cabinet.

European countries: according to EN 50178/ 1998, section 5.3.2.3.

USA: See National Electrical Code (NEC), National Electrical Manufacturers' Association (NEMA), as well as local engineering regulations. The operator must observe all the above regulations at any time.

With electrical drive and filter components, observe the following:

DANGER

High housing voltage and large leakage current!
Risk of death or bodily injury by electric shock!

⇒ Before switching on, the housings of all electrical equipment and motors must be connected or grounded with the equipment grounding conductor to the grounding points. This is also applicable before short tests.

⇒ The equipment grounding conductor of the electrical equipment and the units must be non-detachably and permanently connected to the power supply unit at all times. The leakage current is greater than 3.5 mA.

⇒ Over the total length, use copper wire of a cross section of a minimum of 10 mm^2 for this equipment grounding connection!

⇒ Before start-up, also in trial runs, always attach the equipment grounding conductor or connect with the ground wire. Otherwise, high voltages may occur at the housing causing electric shock.

Protection Against Electric Shock by Protective Low Voltage (PELV)

All connections and terminals with voltages between 5 and 50 Volt at Rexroth products are protective extra-low voltage systems which are provided with touch guard according to the product standards.

WARNING

High electric voltage by incorrect connection!
Risk of death or bodily injury by electric shock!

⇒ To all connections and terminals with voltages between 0 and 50 Volt, only devices, electrical components, and conductors may be connected which are equipped with a PELV (Protective Extra-Low Voltage) system.

⇒ Connect only voltages and circuits which are safely isolated from dangerous voltages. Safe isolation is achieved for example by isolating transformers, safe optocouplers or battery operation without mains connection.

Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of connected motors. Some common examples are:

- improper or wrong wiring of cable connections
- incorrect operation of the equipment components
- wrong input of parameters before operation
- malfunction of sensors, encoders and monitoring devices
- defective components
- software or firmware errors

Dangerous movements can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring in the drive components will normally be sufficient to avoid faulty operation in the connected drives. Regarding personal safety, especially the danger of bodily harm and material damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

DANGER

Dangerous movements! Danger to life, risk of injury, severe bodily harm or material damage!

⇒ For the above reasons, ensure personal safety by means of qualified and tested higher-level monitoring devices or measures integrated in the installation.

They have to be provided for by the user according to the specific conditions within the installation and a hazard and fault analysis. The safety regulations applicable for the installation have to be taken into consideration. Unintended machine motion or other malfunction is possible if safety devices are disabled, bypassed or not activated.

To avoid accidents, bodily harm and/or material damage:

⇒ Keep free and clear of the machine's range of motion and moving parts. Possible measures to prevent people from accidentally entering the machine's range of motion:

- use safety fences
- use safety guards
- use protective coverings
- install light curtains or light barriers

⇒ Fences and coverings must be strong enough to resist maximum possible momentum.

⇒ Mount the emergency stop switch in the immediate reach of the operator. Verify that the emergency stop works before startup. Don't operate the device if the emergency stop is not working.

⇒ Isolate the drive power connection by means of an emergency stop circuit or use a safety related starting lockout to prevent unintentional start.

⇒ Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone.

⇒ Additionally secure vertical axes against falling or dropping after switching off the motor power by, for example:

- mechanically securing the vertical axes,
- adding an external braking/ arrester/ clamping mechanism or
- ensuring sufficient equilibration of the vertical axes.

The standard equipment motor brake or an external brake controlled directly by the drive controller are not sufficient to guarantee personal safety!

⇒ Disconnect electrical power to the equipment using a master switch and secure the switch against reconnection for:

- maintenance and repair work
- cleaning of equipment
- long periods of discontinued equipment use

⇒ Prevent the operation of high-frequency, remote control and radio equipment near electronics circuits and supply leads. If the use of such devices cannot be avoided, verify the system and the installation for possible malfunctions in all possible positions of normal use before initial startup. If necessary, perform a special electromagnetic compatibility (EMC) test on the installation.

Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors and permanent magnets in motors represent a serious personal danger to those with heart pacemakers, metal implants and hearing aids.

WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

⇒ Persons with heart pacemakers and metal implants are not permitted to enter following areas:

- Areas in which electrical equipment and parts are mounted, being operated or commissioned.
- Areas in which parts of motors with permanent magnets are being stored, repaired or mounted.

⇒ If it is necessary for somebody with a pacemaker to enter such an area, a doctor must be consulted prior to doing so. The interference immunity of present or future implanted heart pacemakers differs greatly, so that no general rules can be given.

⇒ Those with metal implants or metal pieces, as well as with hearing aids must consult a doctor before they enter the areas described above. Otherwise health hazards may occur.

Protection Against Contact with Hot Parts

CAUTION

Hot surfaces at motor housings, on drive controllers or chokes! Danger of injury! Danger of burns!

⇒ Do not touch surfaces of device housings and chokes in the proximity of heat sources! Danger of burns!

⇒ Do not touch housing surfaces of motors! Danger of burns!

⇒ According to operating conditions, temperatures can be **higher than 60 °C, 140 °F** during or after operation.

⇒ Before accessing motors after having switched them off, let them cool down for a sufficiently long time. Cooling down can require **up to 140 minutes**! Roughly estimated, the time required for cooling down is five times the thermal time constant specified in the Technical Data.

⇒ After switching drive controllers or chokes off, wait 15 minutes to allow them to cool down before touching them.

⇒ Wear safety gloves or do not work at hot surfaces.

⇒ For certain applications, the manufacturer of the end product, machine or installation, according to the respective safety regulations, has to take measures to avoid injuries caused by burns in the end application. These measures can be, for example: warnings, guards (shielding or barrier), technical documentation.

Protection During Handling and Mounting

In unfavorable conditions, handling and assembling certain parts and components in an improper way can cause injuries.

CAUTION

Risk of injury by improper handling! Bodily injury by bruising, shearing, cutting, hitting!

- ⇒ Observe the general construction and safety regulations on handling and assembly.
- ⇒ Use suitable devices for assembly and transport.
- ⇒ Avoid jamming and bruising by appropriate measures.
- ⇒ Always use suitable tools. Use special tools if specified.
- ⇒ Use lifting equipment and tools in the correct manner.
- ⇒ If necessary, use suitable protective equipment (for example safety goggles, safety shoes, safety gloves).
- ⇒ Do not stand under hanging loads.
- ⇒ Immediately clean up any spilled liquids because of the danger of skidding.

Battery Safety

Batteries consist of active chemicals enclosed in a solid housing. Therefore, improper handling can cause injury or damages.

CAUTION

Risk of injury by improper handling!

- ⇒ Do not attempt to reactivate low batteries by heating or other methods (risk of explosion and cauterization).
- ⇒ Do not recharge the batteries as this may cause leakage or explosion.
- ⇒ Do not throw batteries into open flames.
- ⇒ Do not dismantle batteries.
- ⇒ Do not damage electrical parts installed in the devices.

Note: Environmental protection and disposal! The batteries installed in the product are considered dangerous goods during land, air, and sea transport (risk of explosion) in the sense of the legal regulations. Dispose of used batteries separate from other waste. Observe the local regulations in the country of assembly.

Protection Against Pressurized Systems

According to the information given in the Project Planning Manuals, motors cooled with liquid and compressed air, as well as drive controllers, can be partially supplied with externally fed, pressurized media, such as compressed air, hydraulics oil, cooling liquids, and cooling lubricating agents. In these cases, improper handling of external supply systems, supply lines, or connections can cause injuries or damages.

CAUTION

Risk of injury by improper handling of pressurized lines!

⇒ Do not attempt to disconnect, open, or cut pressurized lines (risk of explosion).

⇒ Observe the respective manufacturer's operating instructions.

⇒ Before dismounting lines, relieve pressure and empty medium.

⇒ Use suitable protective equipment (for example safety goggles, safety shoes, safety gloves).

⇒ Immediately clean up any spilled liquids from the floor.

Note: Environmental protection and disposal! The agents used to operate the product might not be economically friendly. Dispose of ecologically harmful agents separate from other waste. Observe the local regulations in the country of assembly.

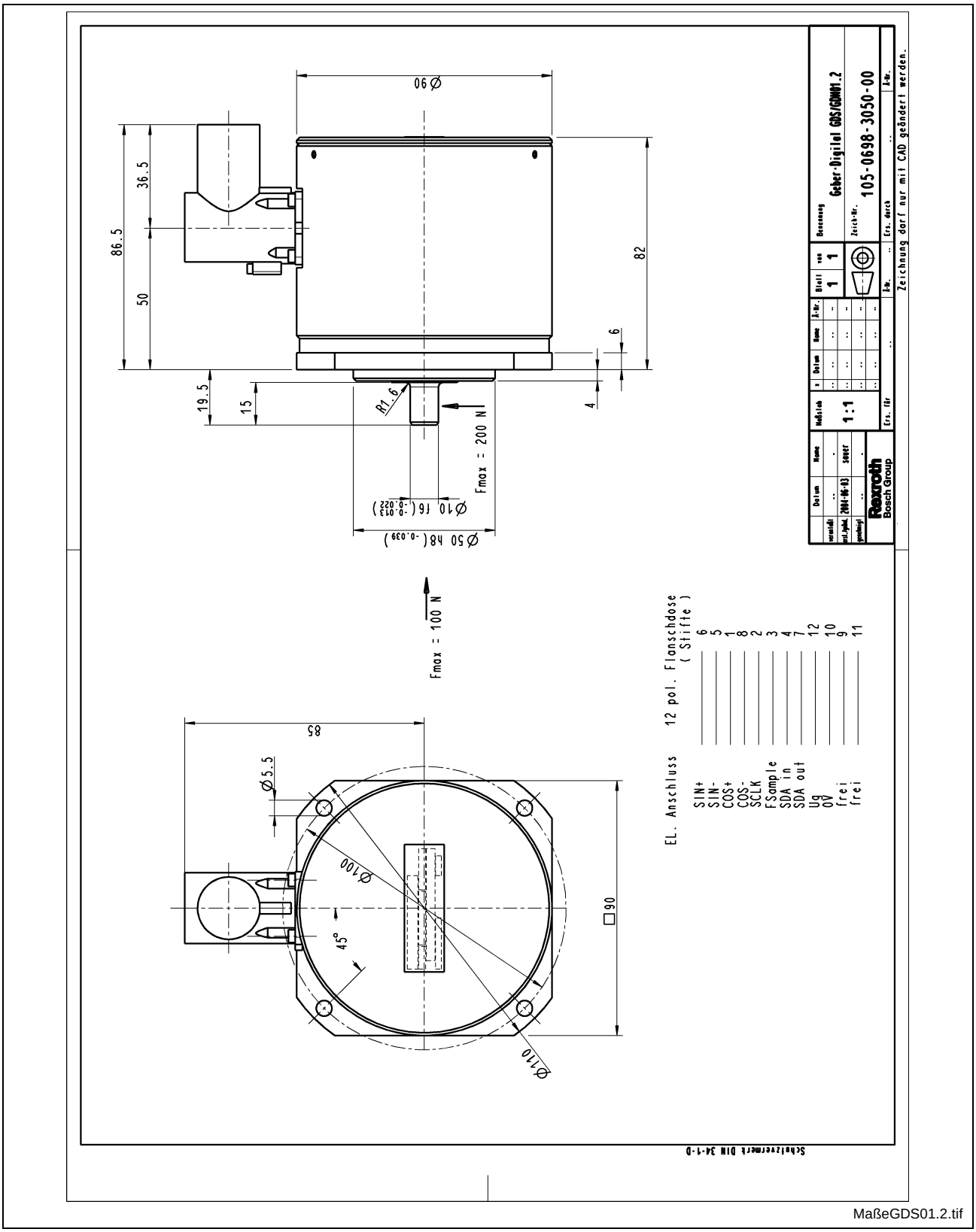
4 Technical Data

	Singleturn GDS01.2	**Multiturn GDM01.2**
Absolute position values	I²C	I²C
Positions / U	8,192 (13bit)	
Distinguishable revolutions	---	4,096 (12bit)
Electric permitted speed at system accuracy	512 lines 6,000 min-1 /±1LSB 12,000 min-1 / ±50 LSB	
Incremental signals	1 Vss	
Increments	512	512
Typical limit frequency - 3 dB	7100kHz	7100kHz
Power supply	8V ±5%	
Max. current consumption	250mA	
Electrical Connection	Flange socket INS0613	
Max. Cable length	75m	75m
Drive shaft	Ø10 ^{f6}	
Axial shaft load	max. 100N	
Radial shaft load	max. 200N	
Mechanical permitted speed	max. 12,000 min -1	max. 10,000 min -1
Starting torque	0.01 Nm	0.02Nm
Moment of inertia of rotor	100.6 x 10^{-6} kgm²	100.6 x 10^{-6} kgm²
Permitted axial movement of drive shaft	± 0.5 mm	
Vibration 55 up to 2,000 Hz	100 m/s² (EN60068-2-6)	
Shock 6ms	1,000 m/s² (EN60068-2-27)	
Ambient temperature (in operation)	0 – 40 °C	
Degree of protection EN 60529	IP 65 housing	
Mass	1,120 g	

Fig. 4-1: Technical data GDS/GDM01.2

5 Dimensional Data

5.1 Encoder Dimensions



MaßeGDS01.2.tif

Fig. 5-1: GDS/GDM01.2 specification

6 Type Codes

6.1 GDS01.2

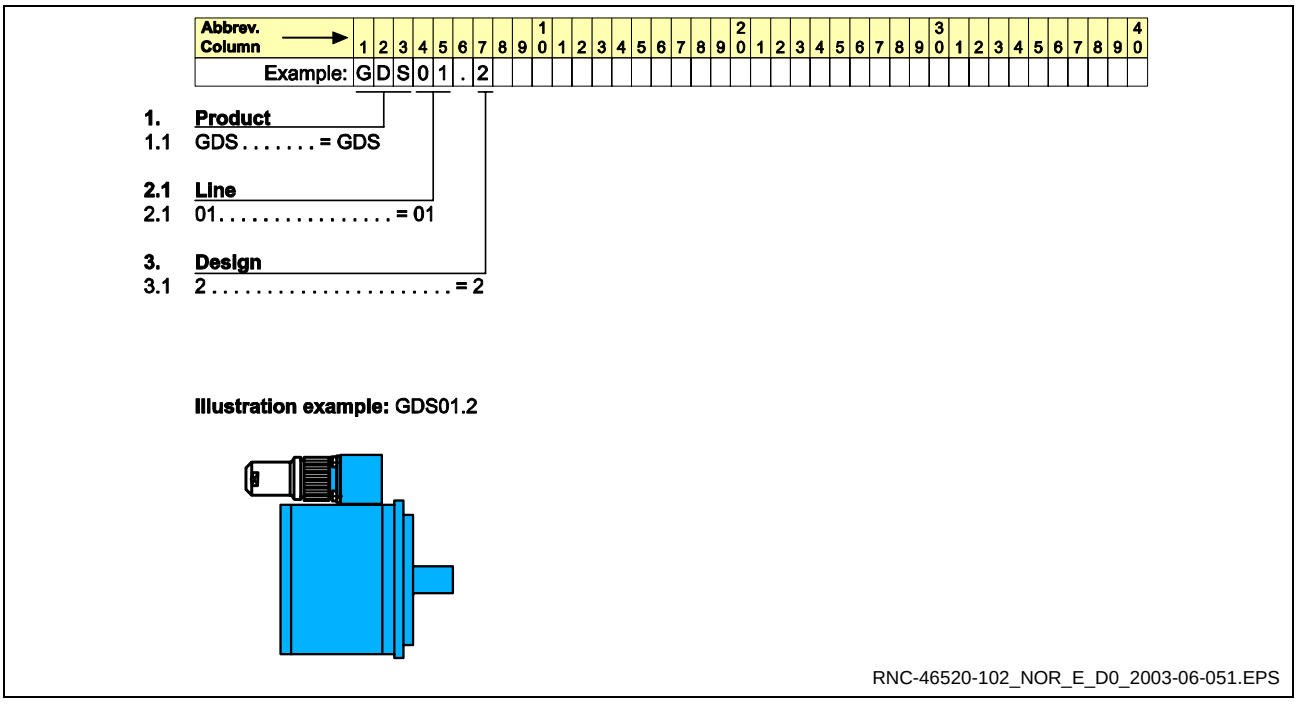


Fig. 6-1: Type code GDS01.2

6.2 GDM01.2

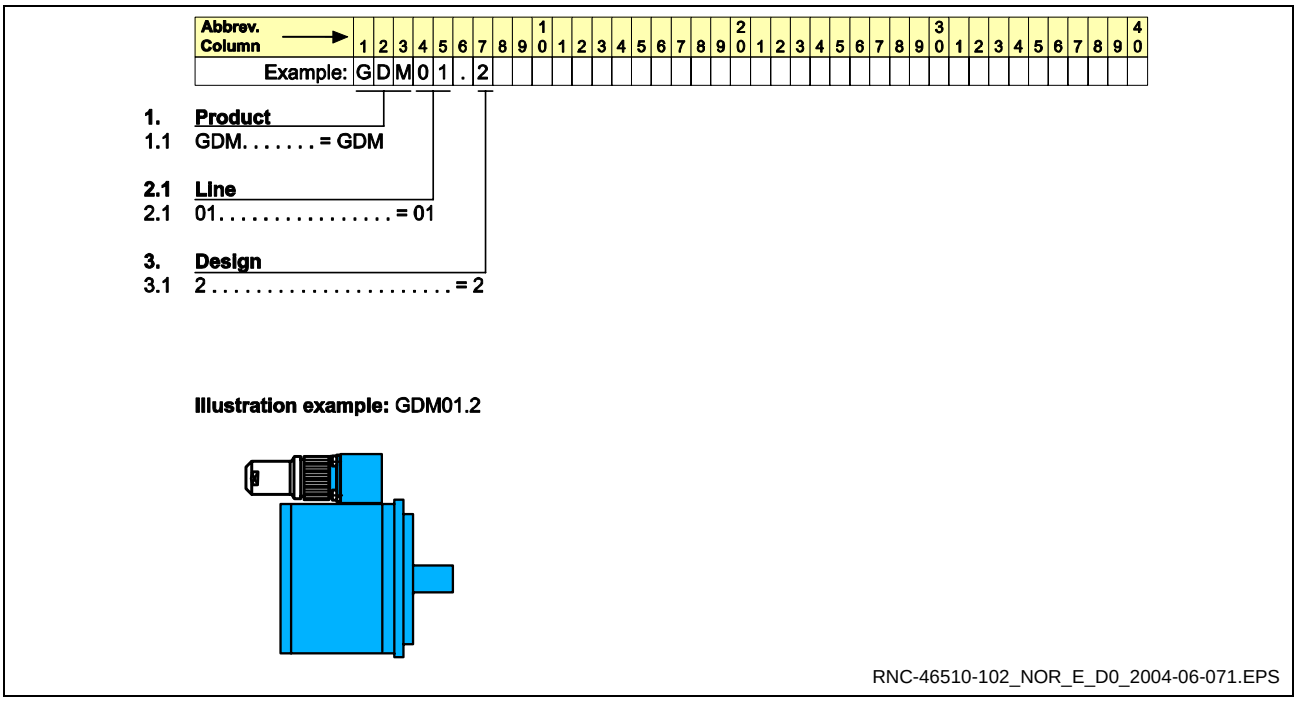


Fig. 6-2: Type code GDM01.2

7 Connection Techniques

Encoder Connection GDS/GDM01.2

The encoder connection is done via a 12-pin flange socket.

Graphical representation

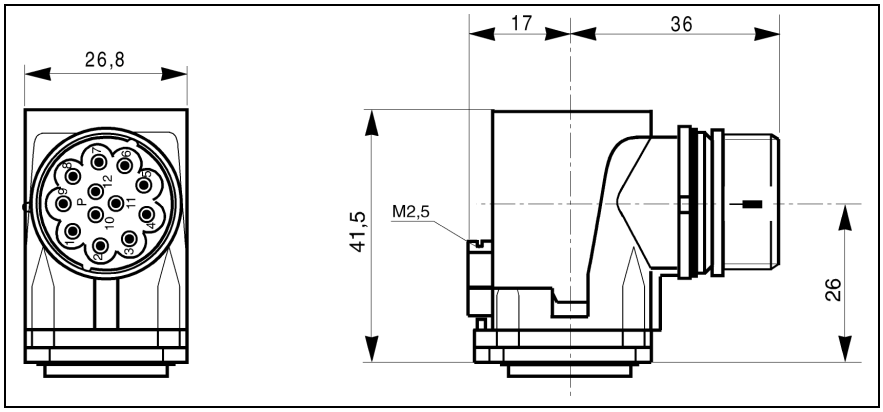


Fig. 7-1: GDS/GDM01.2 connection with INS0613

Mechanical data

Protection class	Number of pins	Temperature range	Contact type
IP67 connected	12	-40 °C to +125 °C	Pins

Fig. 7-2: Mechanical data

Contact assignment

Pin	GDS/GDM01.2
1	cos+
2	SCLK
3	Fsample
4	SDA in
5	sin -
6	sin +
7	SDA out
8	cos-
9	n.c.
10	0V
11	n.c.
12	+8V Ug

Fig. 7-3: Contact assignment GDS/GDM01.2

Shield lies on the housing; Ug = power supply

Note: Do not lie voltage on non-used pins!

Appropriate Connector

Graphical representation

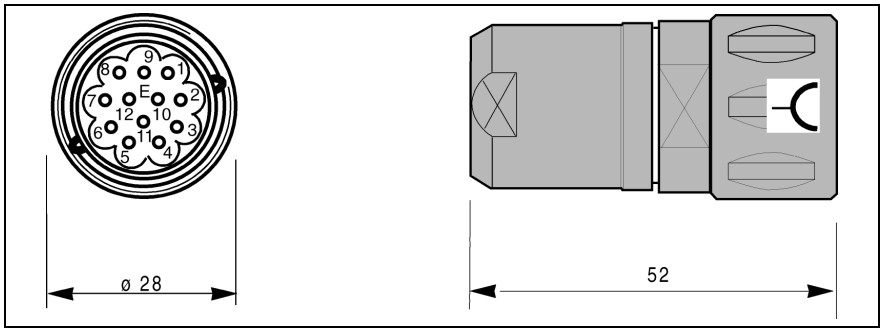


Fig. 7-4: Connector INS0713/C01

Mechanical data

Protection class	Number of pins	Temperature range	Contact type
IP66 / IP67 connected	12	-40 °C to +125 °C	Socket

Fig. 7-5: Mechanical data

Electrical data

Degree of pollution	Overvoltage category
3	III (according to DIN VDE 0110)

Fig. 7-6: Electrical data

Contact assignment for INS0713/C01 with INK0448

Pin	Rexroth INK0448 wire colors, cross-section, construction			
1	PK	0,25 mm²	twisted	Total shield
8	GY	0,25 mm²		
2	RD	0,25 mm²	twisted	
3	BK	0,25 mm²		
4	BU	0,25 mm²		
5	BN	0,25 mm²	twisted	
6	GN	0,25 mm²		
7	VT	0,25 mm²		
9	n.c.			
10	WH	0,5 mm²		
11	n.c.			
12	BN	0,5 mm²		

Fig. 7-7: Contact assignment for INS0713/C01 with INK0448

Order designation for plug-in connectors

Ordering type	Contact cross-section [mm²]	Clamping range, outer cable diameter [mm]
INS0713/C01	0,25 – 0,5	8,5 – 9,1

Fig. 7-8: Order designation connector INS0713/C01

Ready-made cables

Encoder	Order designation of ready-made cable	Control unit / connection
GDS/GDM01.2	]----------[- IKS4374]----------[- IKS4376]----------[- IKS4374]----------[- IKS4065]--[- INS0518/A01]----------[- IKS4374	DFF01.1 M

Fig. 7-9: GDS/GDM01.2 ready-made connection cable

Notes on Ordering

The ordering type (e.g. **IKS4374/xxx,x)** consists of the cable type designation and the required cable length.

Cable are available with a maximum cable length of 75 m in steps of 0.5 m.

Ordering type of the bulk head connector:

Additional Documentation

Please refer to the documentation for more information on connection cables and connectors:

DOK-CONNEC-CABLE*STAND-AUxx**-EN-P**

For information about encoder analysis with Rexroth drive devices refer to the separate drive device documentation.

8 Handling, Transport and Storage

8.1 Supplied Condition

At delivery, GDS/GDM encoder are packed into corrugated cardboard boxes with PE pieces.

Notes for waste disposal

Corrugated cardboard:	Recycling (recovered paper treatment)
PE pieces:	Recycling (PE plastics)

8.2 Identification

The total scope of a delivery can be seen in the delivery note or waybill. However, the contents of a delivery can be distributed over several packages.

Each individual package can be identified using the shipment label attached to the outside.

8.3 Name plate

Each encoder has an individual name plate with device designation.

⇒ After receiving the goods, compare the ordered and the supplied type. Submit claims concerning deviation immediately.

8.4 Transport of the Equipment

Requirements for transport according to DIN EN 60271-3-2.

Environmental factor	Unit	Class 2K3
Low air temperature	°C	- 25
High air temperature	°C	+ 70
Max. rel. air humidity	%	95
Max. absolute air humidity	g/m³	60
Shock load	see “Technical Data”	

Fig. 8-1: Requirements for transport

8.5 Storage of the Equipment

Requirements for storage according to DIN EN 60271-3-1.

Environmental factor	Unit	Class 1K3
Low air temperature	°C	- 5
High air temperature	°C	+ 45
Low rel. air humidity	%	5
High rel. air humidity	%	95
Low absolute air humidity	g/m³	1
High absolute air humidity	g/m³	29
Shock load	see “Technical Data”	

Fig. 8-2: Requirements for storage

9 Assembly and Installation

9.1 Safety

WARNING

Injuries due to live parts!

⇒ Install the encoders only when they are de-energized and not connected electrically.

⇒ Observe the safety notes found in previous chapters.

Carry out all working steps especially carefully. Thereby, you minimize the risk of malfunction and damage.

9.2 Skilled Personnel

Any work on the system and on the encoders or in their vicinity may be carried out only by appropriately skilled personnel.

Please make sure that all persons carrying out

- installation work,
- maintenance, or
- operational activities

on the system are adequately familiar with the contents of this documentation as well as with all warnings and precautionary measures contained therein.

Qualified skilled personnel are defined as those who have been trained, instructed or are authorized to activate and deactivate, ground and mark electric circuits and equipment according to the technical safety regulations. Qualified skilled personnel must possess appropriate safety equipment and have been trained in first aid.

9.3 Mechanical Mounting – Encoder Assembly

The rotary encoders **GDS/GDM1.2** are high-precision measuring systems which have to be handled with utmost care. Observe the following instructions.

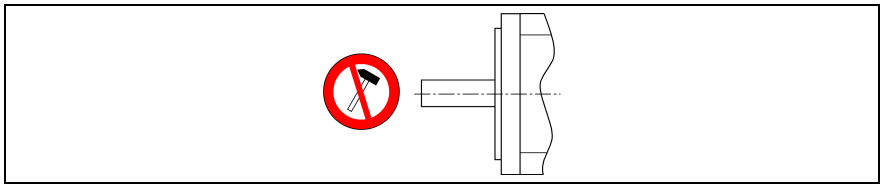


Fig. 9-1: Care of the shaft end

Do not beat onto the shaft end and avoid vibrations.

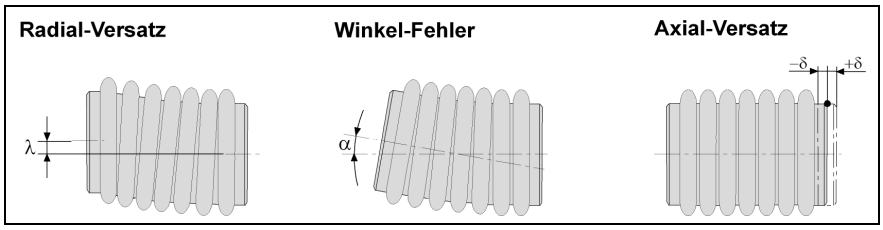


Fig. 9-2: Coupling

The rotary encoders are mounted onto the axes with couplings. Heed when selecting the couplings that they must balance the concentricity failures and misalignment as well as the radial offset, axial offset and angular failures, as shown in Fig. 9-2.

Note: **Before mounting:**

- De-energize the motor and secure it against re-energization.
- Heed the ESD instructions in DIN EN 100015–1 (e.g. manual line, shoes, clothes...)

Mount

The couplings are not in the scope of delivery. The screw length and the tightening torque must be arranged according to the mounting conditions.

10 Service & Support

10.1 Helpdesk

Unser Kundendienst-Helpdesk im Hauptwerk Lohr am Main steht Ihnen mit Rat und Tat zur Seite. Sie erreichen uns

Our service helpdesk at our headquarters in Lohr am Main, Germany can assist you in all kinds of inquiries. Contact us

- telefonisch - by phone: **+49 (0) 9352 40 50 60**
  über Service Call Entry Center - via Service Call Entry Center
  Mo-Fr 07:00-18:00 Mo-Fr 7:00 am - 6:00 pm
- per Fax - by fax: **+49 (0) 9352 40 49 41**
- per e-Mail - by e-mail: **service.svc@boschrexroth.de**

10.2 Service-Hotline

Außerhalb der Helpdesk-Zeiten ist der Service direkt ansprechbar unter

After helpdesk hours, contact our service department directly at

+49 (0) 171 333 88 26

oder - or **+49 (0) 172 660 04 06**

10.3 Internet

Unter **www.boschrexroth.com** finden Sie ergänzende Hinweise zu Service, Reparatur und Training sowie die **aktuellen** Adressen *) unserer auf den folgenden Seiten aufgeführten Vertriebs- und Servicebüros.

Verkaufsniederlassungen
Niederlassungen mit Kundendienst

Außerhalb Deutschlands nehmen Sie bitte zuerst Kontakt mit unserem für Sie nächstgelegenen Ansprechpartner auf.

*) Die Angaben in der vorliegenden Dokumentation können seit Drucklegung überholt sein.

At **www.boschrexroth.com** you may find additional notes about service, repairs and training in the Internet, as well as the **actual** addresses *) of our sales- and service facilities figuring on the following pages.

sales agencies
offices providing service

Please contact our sales / service office in your area first.

*) Data in the present documentation may have become obsolete since printing.

10.4 Vor der Kontaktaufnahme... - Before contacting us...

Wir können Ihnen schnell und effizient helfen wenn Sie folgende Informationen bereithalten:

detaillierte Beschreibung der Störung und der Umstände.

Angaben auf dem Typenschild der betreffenden Produkte, insbesondere Typenschlüssel und Seriennummern.

Tel.-/Faxnummern und e-Mail-Adresse, unter denen Sie für Rückfragen zu erreichen sind.

For quick and efficient help, please have the following information ready:

1. Detailed description of the failure and circumstances.
2. Information on the type plate of the affected products, especially type codes and serial numbers.
3. Your phone/fax numbers and e-mail address, so we can contact you in case of questions.

10.5 Kundenbetreuungsstellen - Sales & Service Facilities

Deutschland – Germany

vom Ausland: (0) nach Landeskennziffer weglassen!
from abroad: don't dial (0) after country code!

Vertriebsgebiet Mitte Germany Centre Rexroth Indramat GmbH Bgm.-Dr.-Nebel-Str. 2 / Postf. 1357 97816 Lohr am Main / 97803 Lohr **Kompetenz-Zentrum Europa** Tel.: +49 (0)9352 40-0 Fax: +49 (0)9352 40-4885	**SERVICE AUTOMATION** **CALL ENTRY CENTER** **Helpdesk** **MO – FR** **von 07:00 - 18:00 Uhr** **from 7 am – 6 pm** **Tel. +49 (0) 9352 40 50 60** **Fax +49 (0) 9352 40 49 41** service.svc@boschrexroth.de	**SERVICE AUTOMATION** **HOTLINE 24 / 7 / 365** **außerhalb der Helpdesk-Zeit** **out of helpdesk hours** **Tel.: +49 (0)172 660 04 06** oder / or **Tel.: +49 (0)171 333 88 26**	**SERVICE AUTOMATION** **ERSATZTEILE / SPARES** verlängerte Ansprechzeit - extended office time - ♦ nur an Werktagen - only on working days - ♦ von 07:00 - 18:00 Uhr - from 7 am - 6 pm - **Tel. +49 (0) 9352 40 42 22**
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Great Britain – Großbritannien Bosch Rexroth Ltd. Electric Drives & Controls Broadway Lane, South Cerney Cirencester, Glos GL7 5UH Tel.: +44 (0)1285 863000 Fax: +44 (0)1285 863030 sales@boschrexroth.co.uk service@boschrexroth.co.uk	Finland - Finnland Bosch Rexroth Oy Electric Drives & Controls Ansatie 6 017 40 Vantaa Tel.: +358 (0)9 84 91-11 Fax: +358 (0)9 84 91-13 60	France - Frankreich Bosch Rexroth SAS Electric Drives & Controls Avenue de la Trentaine (BP. 74) 77503 Chelles Cedex Tel.: +33 (0)164 72-63 22 Fax: +33 (0)164 72-63 20 **Hotline: +33 (0)608 33 43 28**	France - Frankreich Bosch Rexroth SAS Electric Drives & Controls ZI de Thibaud, 20 bd. Thibaud (BP. 1751) 31084 Toulouse Tel.: +33 (0)5 61 43 61 87 Fax: +33 (0)5 61 43 94 12
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