your reliable partner

ROBA®-drive-checker

Multi-Gateway
Type 053.900.6

Measuring sleeve
Type 95x.xx7

Issue status 2024-10

Original operating instructions
B.0539006.EN

Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, E-Mail: public.mayr@mayr.de

Contents

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Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions may lead to malfunctions or to component failure, resulting in damage to other parts. These Operational Instructions are part of the delivery.
Please keep them handy and near to the component at all times.

Also observe the installation and operational instructions B.9.7 (ROBA®-DS with measuring sleeve) and B.0539006.WEB (ROBA®-drive-checker web interface)!

1 Safety

1.1 Safety and Guideline Signs

Symbol	Signal word	Meaning
	**DANGER**	Designates a directly pending danger. If not avoided, death or severe injuries will be the consequence.
	**WARNING**	Designates a possibly hazardous situation. If not avoided, death or severe injuries will be the consequence.
	**CAUTION**	Designates a hazardous situation. If not avoided, slight or minor injuries can be the consequence.
	ATTENTION	Possible property damage can be the consequence.
	**Please Observe**	Designates tips for application and other particularly useful information. Not a signal word for dangerous or damaging situations.
		Observe the installation and operational instructions

1.2 General Guidelines

Severe injury to people and damage to objects may result if:

❒ If the relevant standards for safety and / or installation conditions are ignored.

1.2.1 Effects on medical implants

Medical implants can be affected by electromagnetic fields.

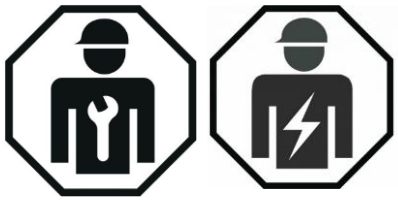
- The operator must review the valid limit values (e.g., risk assessment for workplaces) when in use
- The operator must implement appropriate safety measures

1.2.2 Personnel Requirements

To prevent injury or damage, only professionals and specialists are allowed to work on the components. They must be familiar with the dimensioning, transport, installation, initial operation, maintenance and disposal according to the relevant standards and regulations.

Before product installation and initial operation, please read the Installation and Operational Instructions carefully and observe the Safety Regulations. Incorrect operation can cause injury or damage.

❒ Technical data and specifications (Type tags and documentation) must be followed.



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1.3 Intended Use

- ❑ Not suitable for operation in areas where there is a danger of explosion

The ROBA®-drive-checker has been developed, manufactured and tested as an electronic inspection and measuring device in compliance with the DIN EN 61010 standard and in accordance with the Low-Voltage Directive. During installation, operation and maintenance of the product, the requirements for the standard must be observed. The ROBA®-drive-checker is intended for installation in machines, systems and devices indoors and must only be used for the purpose for which it has been ordered and approved.

The multi-gateway must only be used for the purpose for which it has been ordered and approved. Using them for any other purpose is not allowed.

1.4 Handling

Before installation, the coupling must be inspected and found to be in proper condition (visual inspection). The following are not considered as being representative of a proper condition:

- ❑ External damage
- ❑ External oiling
- ❑ Outer contamination

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2 Legal Provisions

2.1 Directives, Standards and Regulations Used

DIN EN 61140	Protection against electric shock - Common aspects for installation and equipment
DIN EN IEC 63000	Technical documentation for the assessment of electrical and electronic equipment regarding the restriction of hazardous substances
2011/65/EU	RoHS II - Directive
2015/863/EU	RoHS III - Directive
DIN EN 60529	Degrees of protection provided by enclosures (IP Code)
DIN EN IEC 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements
E DIN EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use
2014/53/EU	Radio Equipment Directive
ETSI EN 300 328	Wideband transmission systems; Data transmission equipment operating in the 2.4 GHz band; Harmonised Standard for access to radio spectrum
DIN EN IEC 62311	Assessment of electronic and electrical equipment in relation to human exposure restrictions for electromagnetic fields (0 Hz to 300 GHz)

2.2 Liability

The information, guidelines and technical data in these documents were up to date at the time of creation. Demands on previously delivered products are not valid. Liability for damage and operational malfunctions will not be taken if:

- ❑ the Installation and Operational Instructions are ignored or neglected,
- ❑ the application of the brakes is improper,
- ❑ the brakes are modified
- ❑ unprofessional work,
- ❑ the brakes are handled or operated incorrectly.

2.3 Guarantee

- ❑ The guarantee conditions correspond with the Chr. Mayr GmbH + Co. KG sales and delivery conditions (www.mayr.com → Service → General Terms and Conditions)
- ❑ Mistakes or deficiencies are to be reported to *mayr*® power transmission at once!

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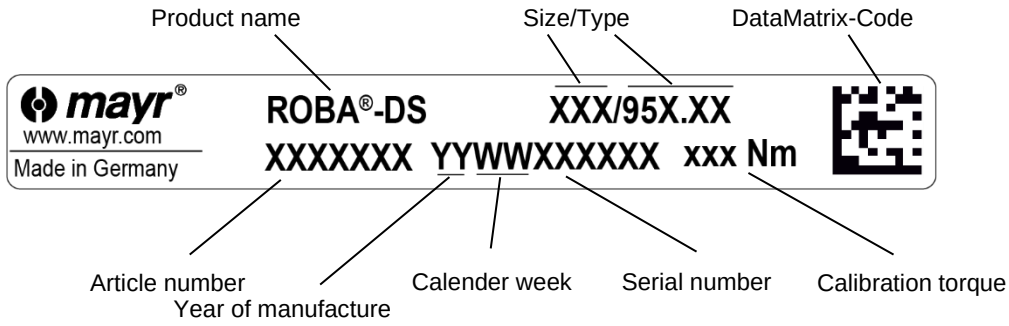
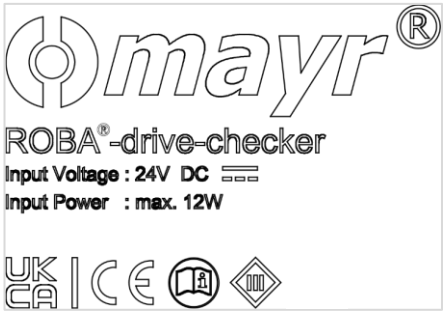
2.4 Identification/ Type Tag

mayr® components are clearly marked and described on the Type tag:

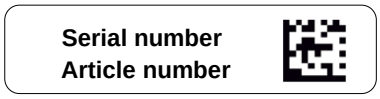
3 ROBA-DS type tag



3.1.1 Multi-gateway type tag



Laser engraving on housing



Type tag on front plate

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4 Product Description

4.1 Scope of Delivery / State of Delivery

- ❑ Gateway is manufacturer-assembled on delivery.
- ❑ Please check the scope of delivery as well as the state of delivery immediately after receiving the goods. *mayr*® power transmission will take no responsibility for belated complaints. Please report transport damage immediately to the supplier. Please report incomplete delivery and obvious defects immediately to the manufacturer.
- ❑

4.2 Function

ROBA®-drive-checker –
the measuring machine element

The torque-measuring shaft coupling ROBA®-drive-checker is a new component in the tried-and-tested modular system of our backlash-free ROBA®-DS disk pack coupling.
The main elements of the ROBA®-drive-checker are the multi-gateway and measuring sleeve.
The multi-gateway ensures robust, reliable data transfer – as a transmitter and receiver – and ensures energy is transmitted to the sleeve.
The sleeve between two misalignment-compensating ROBA-DS disk packs measures the torque with proven strain gauge technology. The system permits uncomplicated condition monitoring of machines and systems as well as calibration when installed. With data from the coupling, machines can be optimally integrated into smart production environments. The drive line is made fit for Industry 4.0 with a minimal investment. The user maintains complete control of their data. External cloud systems or software from third parties are unnecessary.

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4.3 Views

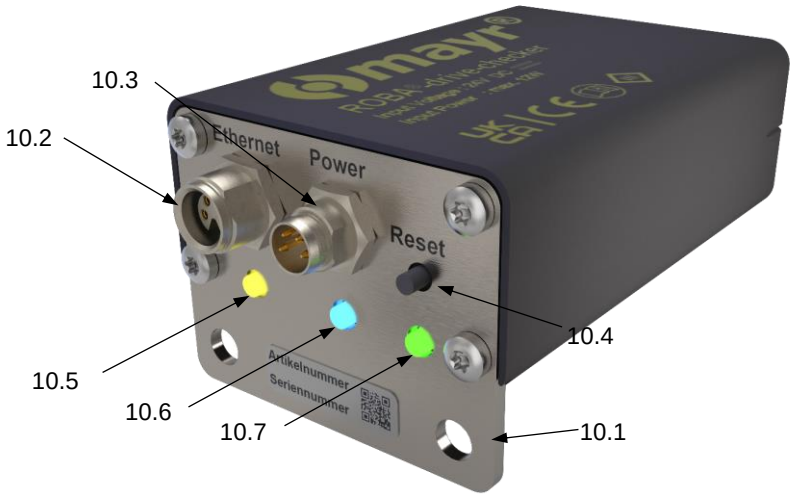

Fig. 1

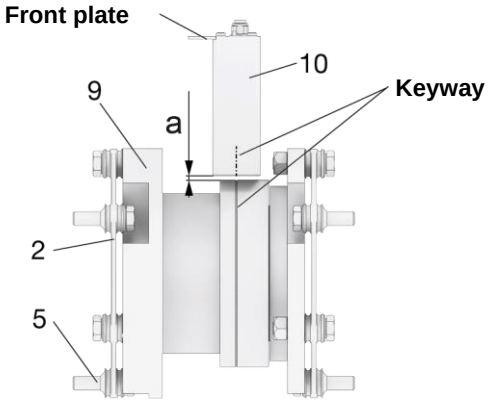

Fig. 2

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4.4 Parts List

(Only use *mayr* ® original parts)

10	Multi-gateway
10.1	Front plate
10.2	Ethernet connection
10.3	Power connection
10.4	Reset button
10.5	Ethernet LED
10.6	Power LED
10.7	Status LED / Reset button operation indicator
2	see B.9.7
5	see B.9.7
9	Measuring sleeve

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5 Technical Data

5.1 Ambient conditions

5.1.1 Ambient temperature

–20 ° up to +60 °C
Humidity RH to 100%
no icing and condensation

The Technical Data refer to the stated temperature range.

5.1.2 Pollution degree

Pollution degree 3

5.2 Technical Data

5.2.1 General operating conditions / operating values

Supply voltage M8 (Pin1/3)	SELV/PELV ripple content ≤ 5 %	Uin	[V]	24 V (21.6-26.4)
Current	Max.	I_{max}	[A]	0.5
	Typical	I	[A]	0.2
Device fuses	Type Value			UL522.214 0.5 A slow acting [1)]
Protection				IP67
Operating temperature			[°C]	-20 to +60
Storage temperature			[°C]	-20 to +85

Characteristics		Test conditions	Unit	Value		
				Min.	Typical	Max.
Linearity deviation of analog output Current Voltage		 *0-20 mA* *0-10 V*	%		 < ±0.2 < ±0.2	
Temperature effect/10 K On the zero signal Output signal Current Voltage		 *0-20 mA* *0-10 V*	%		 < ±0.2 < ±0.2	
Digital sensitivity Current Voltage	$SENA_M$	 *2048 Digits's / 20mA* *2048 Digits's / 10V*	 [µA] [mV]		 4.883 / digit 2.442 / digit	

1) Fuse holder specifications: clearance ≥0.5 mm, creepage distance ≥1.25 mm

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5.2.2 Temperature sensor specifications of the sleeve (rotor)

Characteristics		Test conditions	Unit	Value		
				Min.	Typical	Max.
Measuring range	T_{Range}		[°C]	-40		+125
Sensitivity	SEN_T				0,1 / digit	
Measurement rate	D_{RATE}		[Hz]		5	
The sensor is found on the electronic measuring equipment. The measured temperature can thus deviate from the sleeve or ambient temperature by approx. +5 °C!						

5.2.3 Speed sensor specifications of the sleeve (rotor)

Characteristics		Test conditions	Unit	Value		
				Min.	Typical	Max.
Measuring range	V_{Range}		[rpm]	±10		±15000
Sensitivity	SEN_V				Two samplings per rotation	
Measurement rate	D_{RATE}		[Hz]	0.233		250

5.2.4 Torque sensor specifications

Characteristics		Test conditions	Unit	Value		
				Min.	Typical	Max.
Measuring range	M_{Range}		[Nm]	- M_{nom}		+ M_{nom}
Calibration torque	M_{nom}		[Nm]		See DS type tag	
Accuracy class		*T = -20 to 60 °C*			1	
Linearity deviation including hysteresis dlh		M_{nom} *0% - 100%*	%		< ±0.5	
Relative standard deviation of repeatability		M_{nom} *0% - 100%*	%		< ±0.05	
Temperature effect/10 K On the zero signal Output signal		 M_{nom} *0%* M_{nom} *100%*	%		 < ±0.5 < ±0.5	
Digital sensitivity	$SEND_M$	*30000 Digit's /* M_{nom} *100%*	%		0.00333% / digit	
Measurement rate	D_{RATE}	Bessel 1Hz Bessel 10Hz Bessel 100Hz Bessel 200Hz Bessel 500Hz Bessel 1000Hz	[kHz]		1.25 1.25 1.25 2.5 2.5 2.5	

➔ See DS type tag for calibration torque

ROBA®-DS Size		16	40	100	160
Coupling nominal torque T_{KN} [1)] valid for changing load direction as well as for max. permitted shaft misalignment	[Nm]	190	450	800	1600
Coupling peak torque T_{KS} valid for unchanging load direction, max. load cycles ≤ 10^5	[Nm]	285	675	1200	2400

Calibration torque may vary upon customer request (see DS type tag)

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6 Intended Use

6.1 Guidelines for Application

- ❑ Use in clean environment

6.2 Limits

- ❑ The multi-gateway must not be used above 2000 m (above sea level).
- ❑ IK Code = IK08 (impact energy > 5 J)

6.3 Reasonably Foreseeable Misuse

The following uses are prohibited and may generate hazards.

- ❑ Any opening of the screws on the housing.

6.4 Installation Position

Can be installed horizontally and vertically

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7 Installation

7.1 Installation Conditions

7.1.1 Guidelines for EMC-compatible Installation

General:

The ROBA®-drive-checker has been developed, manufactured and tested as an electronic inspection and measuring device in compliance with the DIN EN 61010 standard and in accordance with the Low-Voltage Directive. During installation, operation and maintenance of the product, the requirements for the standard must be observed. The ROBA®-drive-checker is intended for installation in machines, systems and devices indoors and must only be used for the purpose for which it has been ordered and approved.

The network cable used must at least correspond to the CAT5 standard.

All cables attached to the device must not run more than 30 m to the mains adaptor, control unit and network hub!

The EMC directive can only be adhered to by the complete device or machine.
The measures described for compliance with the EMC directive for electronic inspection and measuring devices are examined under laboratory conditions, and cannot necessarily be bindingly transferred onto the condition of a machine or system in case of deviations.

Interference immunity:

The interference immunity as per the stated standards is achieved without additional measures.

Interference emission:

The interference emission is in accordance with the standard without further additional measures.

- ❑ Observation of the requirements of the standard IEC 60364-4-44/VDE0100-444
- ❑ Observation of the remarks/guidelines/instructions of the control cabinet, line filter and frequency converter manufacturer regarding EMC-compliant setup
- ❑ Observation of the EMC guidelines from ZVEI and DEMVT
- ❑ Observation of the recommendations of the IEC TR 61000-5-2

- ❑ Mains, power, measurement, signal and control lines laid separately
- ❑ Possibly use shielded, separate line per system
- ❑ Line shielding must be EMC compliant and have the greatest possible surface area
- ❑ Ensure good earth connections on the metal body of the system
- ❑ Avoid antennae effects: Keep lines as short as possible; do not form rings or loops
- ❑ Signal lines over 30 m are considered long lines and may require special measures
- ❑ According to IEC 618003, IT networks are “second environment” category C4 and require special measures
- ❑ Inspection and measuring devices with interference emission levels for industrial usage (environment/class A, second environment) may require additional measures when used for domestic purposes (environment/class B, first environment)

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7.2 Installation

► Attach multi-gateway (10) to the holder provided by the customer

► The front plate (10.1) must be connected to earth ground!

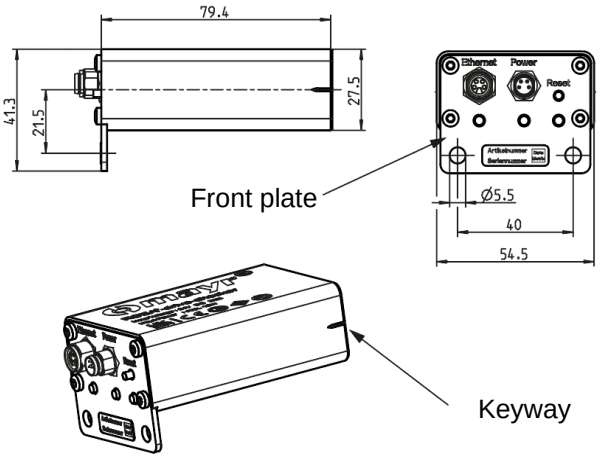

Fig. 9.1

Aligning the multi-gateway

► Axial position: Align the keyway of the multi-gateway (10) with the keyway of the ROBA-drive-checker sleeve (9)

► Radial gap dimension a = 2 mm ± 1 mm

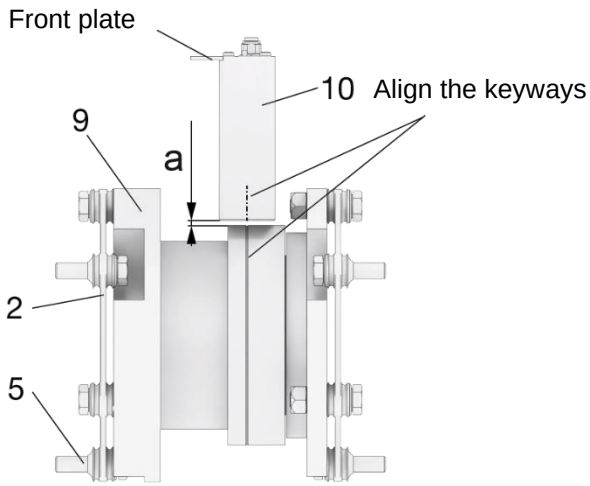

Fig. 9.2

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7.2.1 Attaching the front plate to the earth ground

► Example: Attach the front plate to the earth ground

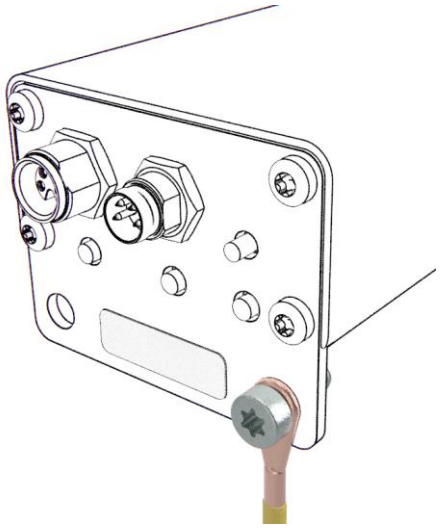

Fig. 9.3

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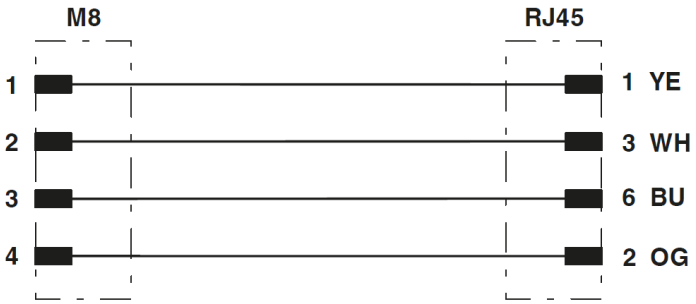
8 Initial Operation

The multi-gateway is delivered without cables.
Standard cables are always used (see chapter **8.1**)

8.1 Connection cable

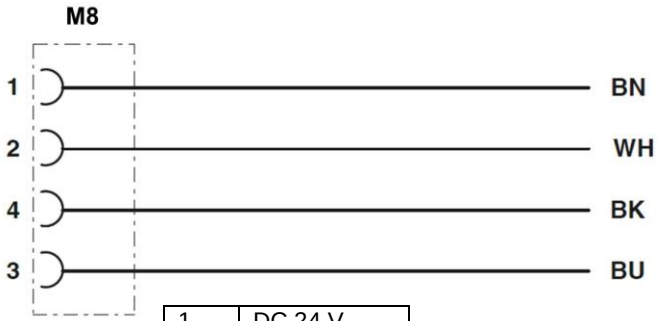
Ethernet connection (7.2)

NBC-M 8MS/2,0-93BR4AC network cable (Phoenix Contact)



Power connection (7.3)

SAC-4P- 2,0-PUR/M 8FS 0,34 – sensor/actuator cable (Phoenix Contact)



1	DC 24 V
2	Analog$_{OUT}$
3	GND
4	AGND

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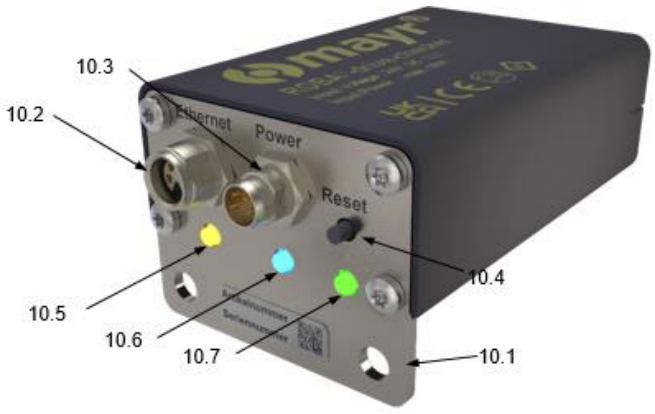
8.2 Buttons and indicators

8.2.1 Reset Button (10.4)



6 functions can be configured.

Calling up the different functions:

- Press the reset button (10.4) and hold it until the LED (10.7) signalizes the desired function.
- Release the reset button (10.4).

Example: You want to select the “Start pairing” function. Hold the reset button (10.4) for 3 seconds until the LED (10.7) lights orange. Release the reset button.

Press reset button	Color	Mode	Function
	Indicator LED (10.7)		
1 sec.	Red	On	Reset
3 sec.	Orange	On	Start pairing
6 sec.	Green	On	Configuration assistant
9 sec.	Red	Quick flashing	Reset multi-gateway to factory settings
12 sec.	Orange	Quick flashing	-
15 sec.	Green	Quick flashing	-

8.2.2 LED

LED (10.7)

Status

Color	Mode	Condition
Green	On	Connected (Dashboard mode)
Green	Slowly dimming	Connected (Run mode)
Orange	On	Not connected
Orange	Slow flashing	Rotor in bootloader
Orange	Quick flashing	Firmware update
Orange	Slow pulse	Device scan (pairing)
Orange	Quick pulse	System initializing
Red	On	System error (wireless)
Red	Slow flashing	System error (software)
Red	Quick flashing	System error (update failed)
Red	Slow pulse	System error (pairing failed)
Red	Quick pulse	System error (hardware)

LED (10.6)

Power indicator

Color	Mode	Condition
Blue	On	Power on

LED (10.5)

Ethernet indicator

Color	Mode	Condition
Orange	On	100 Mbps connected
Orange	Flashing	100 Mbps data exchange
Yellow	Flashing	10 Mbps data exchange

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8.3 Connecting the multi-gateway

8.3.1 Ethernet

Only necessary if the network function is used

1. Connect the green network cable to the Ethernet connection (10.2) in the multi-gateway
   ► Make sure it fits securely!
2. Connect the green network cable to the customer's network socket
   ► Make sure it fits securely!

8.3.2 Power

1. Connect the black power cable to the power connection (10.3) in the multi-gateway
   ► Make sure it fits securely!
2. Connect the black power cable to the customer's power supply
   ► Make sure it fits securely!

8.3.3 Switching on

1. Turn on the power supply
   ► LED 10.6 lights up immediately (blue)
   ► LED 10.7 (status) lights up after a few seconds

   LED 10.7 lights up green or pulses green: The multi-gateway (10) and measuring sleeve (9) are paired and ready for operation

   LED 10.7 lights up orange: The multi-gateway (10) and measuring sleeve (9) are not paired.

   Carry out the following steps:

   ► **8.3.4** „Paring“

   or

   ► **8.5** „configuration assistant“

8.3.4 Pairing

1. Press reset button (10.4) 3 seconds
   ► The status LED (10.7) continuously lights orange
2. Release the reset button (10.4).
   ► Pairing is started (can take up to 20 seconds)
   ► During pairing, the status LED (10.7) pulses orange (becomes brighter and darker)

► **Pairing successful:** Status LED (10.7) lights or pulses green: System is ready for operation:

► **Pairing unsuccessful:** Status LED (10.7) pulses red

1) Check position and gap between multi-gateway (10) and measuring sleeve (9), see (Fig. 9.2 section **7.2**)
2) Restart multi-gateway (10): Press reset button (10.4) 1 seconds
3) Repeat pairing procedure (point 1 and 2)

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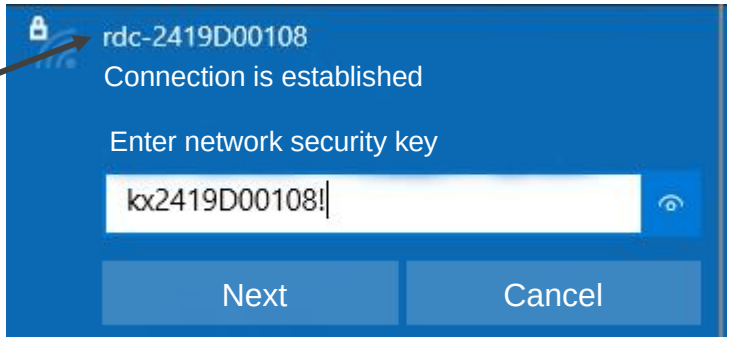
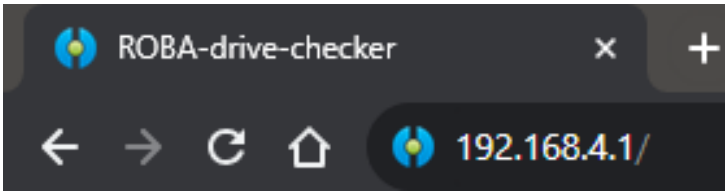
8.4 Establish the connection to the Multi-Gateway

8.4.1 Connecting via Wi-Fi access point

1. Press the reset button (10.4) for 6 seconds
   ► The status LED (10.7) continuously lights green
2. Release the reset button (10.4).

The access point has the name **rdc-{serial number}** as default. As can be seen on the figure, the serial number can be found on the type tag of the gateway.	
Connect the PC, tablet or mobile phone with the Wi-Fi access point (**rdc-{serial number}**). It should look like this on a Windows 10 PC. ❑ Entering a network security key is necessary (kx{serial number}!)	
The QR code to the right can be used to automatically open the browser without having to enter an IP address.	
Alternative to QR code: 1. Open a browser 2. Enter the IP address **192.168.4.1** in the address bar 3. Press the **Enter button**	

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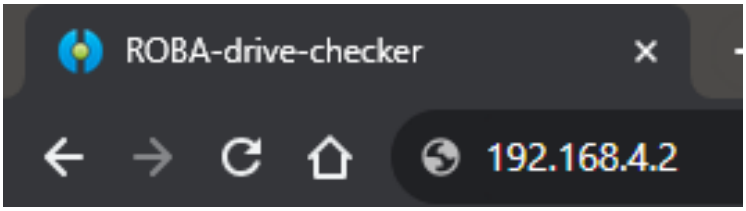
8.4.2 Connecting via network with static IP address

In the as-delivered condition, the multi-gateway is provided with the fixed IP address **192.168.4.2** and a subnet mask **255.255.0.0.** This makes it possible to contact the multi-gateway from similar networks like **192.168.100.X.** Only the first two parts of the IP range **(192.168)** must be identical, and the subnet mask of the PC that is being connected must be **255.255.0.0.**

After the multi-gateway has been connected with the network, connect the PC to the same network.
The PC can also be connected directly to the network cable, which is not included in the scope of delivery. To do so, you also have to set a static IP address on the PC. It is recommendable to take **192.168.4.3** for this purpose.

1. Open a browser 2. Enter the IP address **192.168.4.2** in the address bar 3. Press the **Enter button**	

If the web interface is not to be used, the configuration assistant can be started again as described above. Configuration takes place without Wi-Fi (see **8.5**):

1) Press the reset button (10.4) for 6 seconds
   ► The status LED (10.7) continuously lights green
2) Release the reset button (10.4).

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8.5 Configuring the ROBA®-drive-checker via the configuration assistant

The procedure is illustrated below based on the user interface of a mobile phone. It may appear slightly different depending on the device used.

The ROBA®-drive-checker measuring sleeve is called Rotor in the configuration assistant and web interface.

8.5.1 Step 1: Configure network

Note:
The network cable is not included in the scope of delivery but can be acquired separately.

This is a cable that can be connected to item 10.2 on the front plate of the multi-gateway.

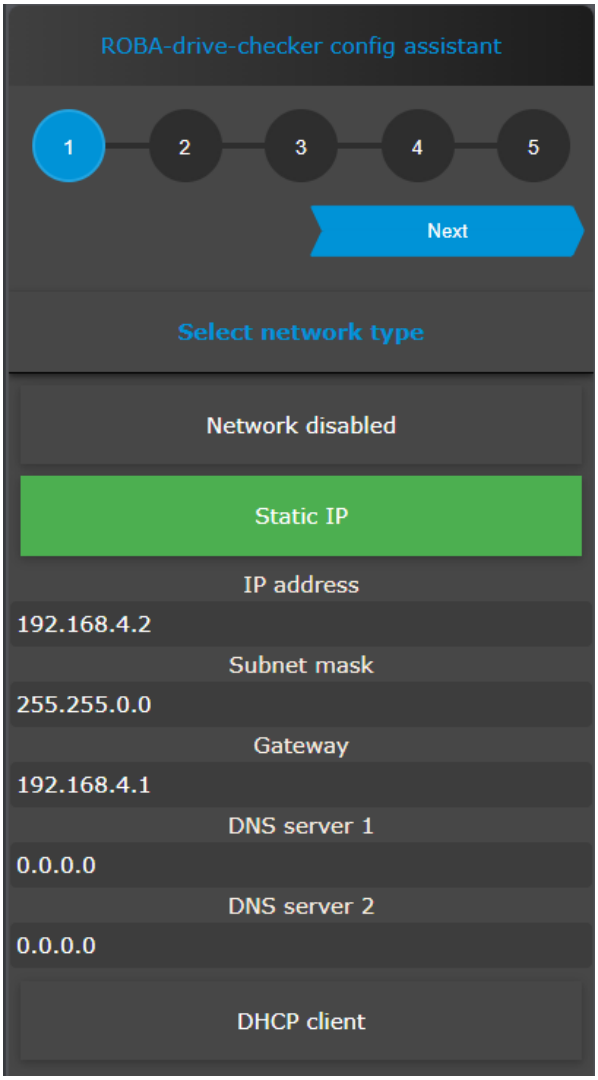
Configure the network for the physical networkitem 10.2:

„**Network disabled**“
- deactivates item 10.2 completely

„**Static IP**“
- manual configuration of the network

„**DHCP client**“
- automatic configuration of the network via DHCP server

❑ Click on "Next" to go to the next page of the configuration assistant



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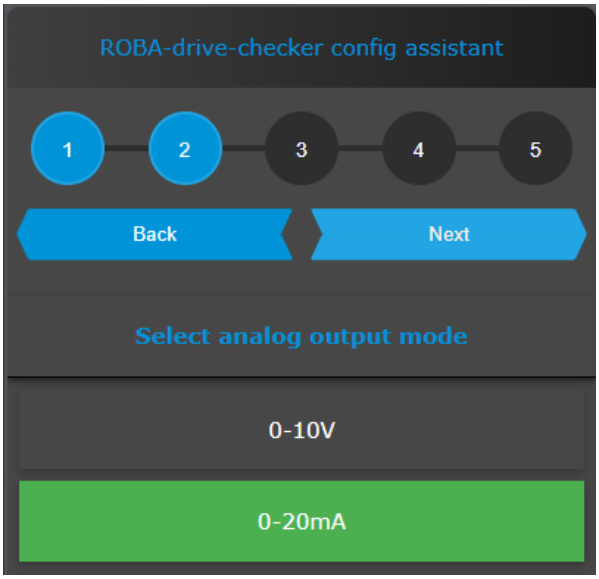
8.5.2 Step 2: Configuring the analog output

There are variants available with a voltage output of 0 – 10 V or a current output of 0 – 20 milliamperes.

- ❑ Click on **"Next"** to go to the next page of the configuration assistant
- ❑ Click „**Back**“ to return to the previous page.



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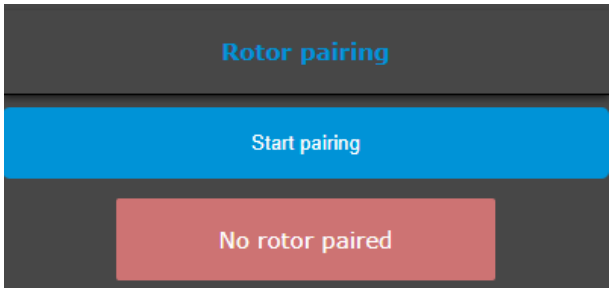
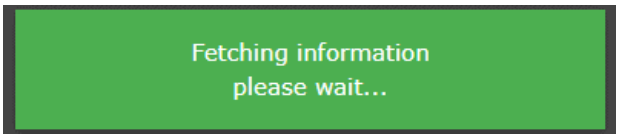
8.5.3 Step 3: Pairing the measuring sleeve

In the as-delivered condition, the multi-gateway and measuring sleeve are set to the factory setting. To be able to use the system and carry out the next steps, both devices must be paired with each other.

❑ Click „**Start pairing**“ to start the pairing process.



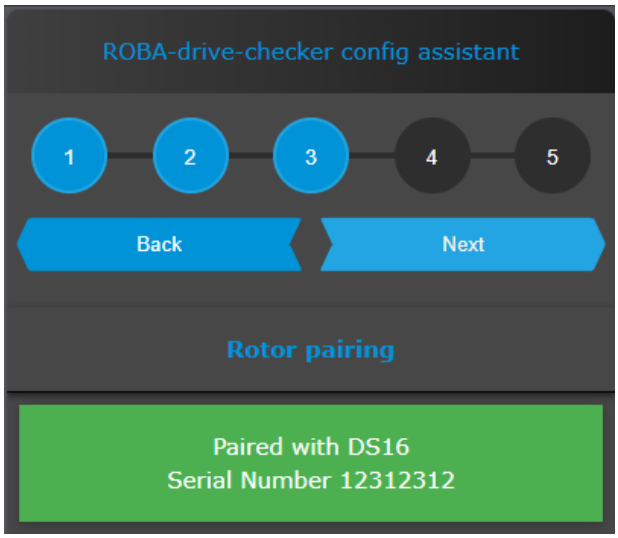
After approx. 40 seconds, the connection between the measuring sleeve and multi-gateway should be made and the multi-gateway queries all information from the measuring sleeve.



The measuring sleeve’s most important information such as size and serial number is displayed.

For example, „**Paired with DSXXX**“, whereby XXX is the size of the measuring sleeve. This example shows a size 16 measuring sleeve

❑ Click on „**Next“** to go to the next page of the configuration assistant



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8.5.4 Step 4: Adjusting the measuring sleeve distance

Adjusting the distance from the measuring sleeve to the multi-gateway:

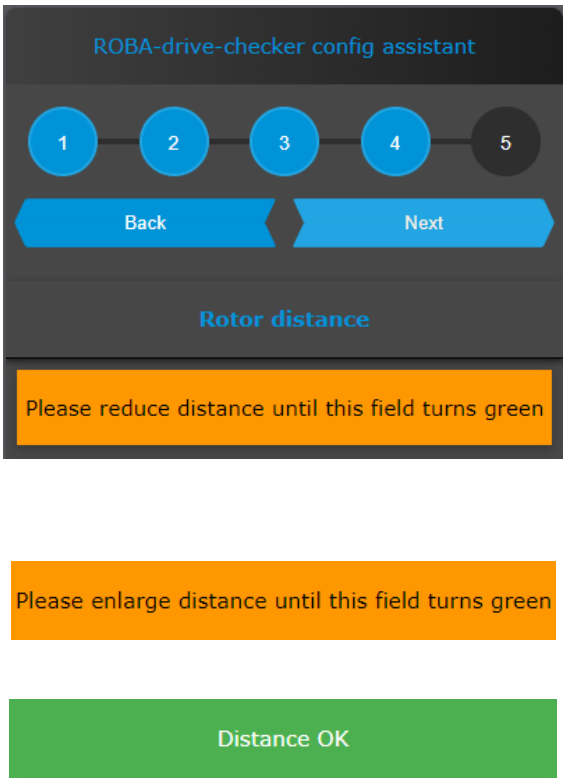
If the distance between the measuring sleeve and multi-gateway is too great, connection problems can occur as the measuring sleeve is not supplied with enough voltage. However, if the distance is too small, the measuring sleeve will be supplied with too much voltage. This can damage the measuring sleeve over time.

„Reduce distance“
- mechanically reduce the distance between the multi-gateway and the measuring sleeve

„Enlarge distance“
- mechanically increase the distance between the multi-gateway and the measuring sleeve

As soon as the distance is correct, the following message will be output.

❑ Click on „**Next“** to go to the next page of the configuration assistant



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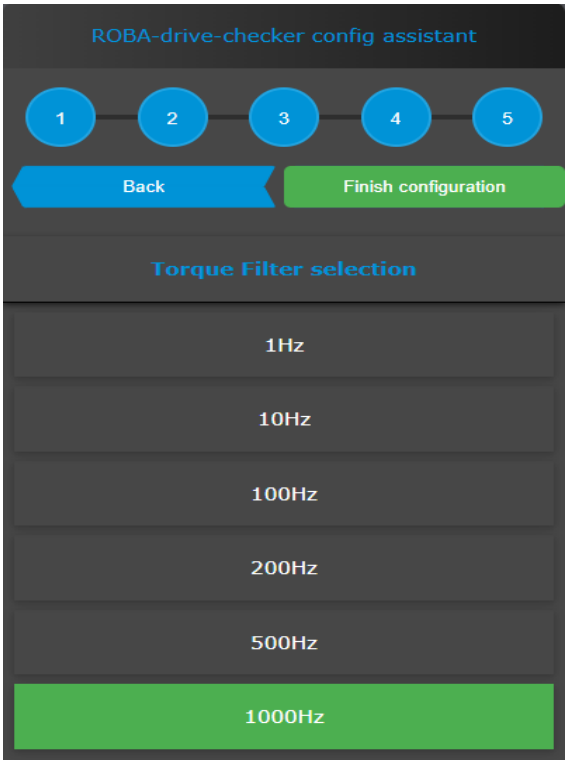
8.5.5 Step 5: Adjusting the torque filter

The torque filter defines how the raw signal on the measuring sleeve is filtered before it is transmitted to the multi-gateway.

In principle, the smaller the filter frequency (1 Hz = small, 1000 Hz = large), the stronger the signal is filtered (**less noise**) and fast changes are filtered out.

❑ Click on **"Finish configuration"** to finish and accept the configuration.



9 Maintenance / Inspections

The multi-gateway is largely maintenance-free.

10 Cleaning

Clean with a dry cloth

11 Disposal

Complete product:
Products which have not been disassembled can be disposed of under Code No. 160214 (mixed materials), or can be disposed of by a certified disposal firm.

Electronic Components
(Multi-gateway / sleeve):

Electronics: (Code No. 160214)

Guidelines on the WEEE Directive 2012/19/EU
Avoidance of waste from electrical and electronic devices and the reduction of such waste through recycling.

Our electromagnetic products (brakes, clutches) as well as the components required to control them (DC voltage modules) are frequently used in electrical and electronic devices within the appropriate area of application of WEEE, independent of the applicable product categories.
The stated products do not fall within the area of application of this Directive. They have been classified as electromagnetic / electronic components (VDE 0580) or as electronic equipment (DIN EN 50178), and have been determined for installation in devices for "use in accordance with the intended purpose". Only products which are to be viewed as devices in terms of the Directive and not as parts or components are subject to registration obligations.

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12 Malfunctions / Breakdowns

12.1 Mechanical

Malfunction	Possible Causes	Solutions
Changes to the running noise and/or vibration occurrences	Incorrect alignment, incorrect installation	1) Set the system out of operation 2) Find / resolve the cause of incorrect alignment 3) Check the clutch for wear
	Loose connecting screws, minor fretting corrosion under the screw head and on the Disk pack	1) Set the system out of operation 2) Check the clutch parts and replace if damaged 3) Tighten the connecting screws to the specified torque 4) Check the alignment and correct if necessary
	Tensioning and clamping screws or locking set screw for axial hub securement are loose	1) Set the system out of operation 2) Check the clutch alignment 3) Tighten the tensioning and clamping screws for axial hub securement to the required torque or tighten the locking set screw and secure it against self-loosening using sealing lacquer 4) Check the clutch for wear

12.2 Electric

Power LED does not light up	Power supply, connection cable	1) Set the system out of operation 2) Check mains adaptor and fuse 3) Check cable 4) Check plug is connected properly
Ethernet LED does not indicate activity	Connection cable, 10 Mbit network	1) Set the system out of operation 2) Check cable 3) Check plug is connected properly 4) Check network and switch
Status LED lights orange	Lights up permanently	The system is not paired. ❑ see section **8.3.4** or **8.5**
	Slow flashing	The measuring sleeve is in the bootloader. For more detailed information, see operational instructions for ROBA®-drive-checker web interface **(B.0539006.WEB.DE)**
Status LED lights red	Slow pulse	Pairing has failed. ❑ Restart system ❑ see section **8.3.4** or **8.5**
	Quick flashing	The update has failed. ❑ Restart system ❑ Repeat procedure
	Slow flashing	Internal error. ❑ Restart system If the error does not solve itself, please contact customer service!
	Quick pulse	
	Lights up permanently	

Mayr® power transmission will take no responsibility or guarantee for replacement parts and accessories which have not been delivered by *mayr*® power transmission, or for damage resulting from the use of these products.

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