Fluidcontrol

IO-Link

Contamination indicator

BCI 24-Dx

Installation and Operation Instructions

Original instructions

BE130008
10/2023

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Read this instruction carefully prior to installation and/or use. Pay attention particularly to all advises and safety instructions to prevent injuries. Bühler Technologies can not be held responsible for misusing the product or unreliable function due to unauthorised modifications.

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1 Introduction

1.1 Intended Use

The contamination indicator BCI 24 is used to monitor the filter capacity in oil circuits. A microprocessor-controlled pressure transmitter monitors the pressure drop above the filter element which increases as the filter contamination increases.

WARNING

All device models are solely intended for industrial applications. They are **not safety components**. The devices must not be used if failure or malfunction thereof jeopardises the safety and health of persons.
Use in explosive areas is **prohibited**.

1.2 Model key

BCI 24 - D ☐ 3 ☐ ☐ - ☐ ☐ ☐ ☐

Type designation

BCI	Contamination indicator

Process connection
compatible with third-party products

H	Hydac/Stauff G1/2
M	Filtration Group/Bosch Rexroth M20x1,5
F	MP-Filtri G1/2
C	Eaton G1/2

Options/outputs

0 -	2S1A	2 x switching output / 1 x analog
7 -	1D1S	1 x switching output / IO-Link

Pressure drop range

3	max. 3 bar
6	max. 6 bar

1.3 Contents

- Contamination indicator BCI 24
- Product Documentation

2 Safety instructions

2.1 Important advice

Operation of the device is only permitted if:

- the product is used under the conditions described in the installation- and operation instruction, the intended application according to the type plate and the intended use. In case of unauthorized modifications done by the user Bühler Technologies GmbH can not be held responsible for any damage,
- when complying with the specifications and markings on the nameplates.
- the performance limits given in the datasheets and in the installation- and operation instruction are obeyed,
- monitoring devices and safety devices are installed properly,
- service and repair is carried out by Bühler Technologies GmbH,
- only original spare parts are used.

This manual is part of the equipment. The manufacturer keeps the right to modify specifications without advanced notice. Keep this manual for later use.

Signal words for warnings

DANGER	Signal word for an imminent danger with high risk, resulting in severe injuries or death if not avoided.
WARNING	Signal word for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	Signal word for a hazardous situation with low risk, resulting in damaged to the device or the property or minor or medium injuries if not avoided.
NOTICE	Signal word for important information to the product.

Warning signs

These instructions use the following warning signs:

Warns of a general hazard

General information

Voltage warning

Unplug from mains

High pressure warning

2.2 General hazard warnings

The equipment must be installed by a professional familiar with the safety requirements and risks.

Be sure to observe the safety regulations and generally applicable rules of technology relevant for the installation site. Prevent malfunctions and avoid personal injuries and property damage.

The operator of the system must ensure:

- Safety notices and operating instructions are available and observed,
- The respective national accident prevention regulations are observed,
- The permissible data and operational conditions are maintained,
- Safety guards are used and mandatory maintenance is performed,
- Legal regulations are observed during disposal,
- compliance with national installation regulations.

Maintenance, Repair

Please note during maintenance and repairs:

- Repairs to the unit must be performed by Bühler authorised personnel.
- Only perform conversion-, maintenance or installation work described in these operating and installation instructions.
- Always use genuine spare parts.
- Do not install damaged or defective spare part. If necessary, visually inspect prior to installation to determine any obvious damage to the spare parts.

Always observe the applicable safety and operating regulations in the respective country of use when performing any type of maintenance.

3 Transport and storage

Only transport the product inside the original packaging or a suitable alternative.

The equipment must be protected from moisture and heat when not in use. It must be stored in a covered, dry, dust-free room at room temperature.

4 Installation and connection

DANGER

Electric voltage

Risk of electric shock

a) De-energise the system.

b) The equipment may only be installed, maintained and put into operation by instructed, competent personnel.

c) Always observe the applicable safety regulations for the operating site.

DANGER

Toxic, acidic gases/liquids

Protect yourself from toxic, corrosive gasses/liquids when performing any type of work. Wear appropriate protective equipment.

4.1 Installation

The equipment must be installed by a professional familiar with the safety requirements and risks.

DANGER

Electric voltage

Risk of electric shock

When connecting devices, please note the maximum voltages and currents (see technical data) and use the correct wire cross-sections and circuit breakers.
When selecting the connection lines, also note the maximum operating temperatures of the devices.

WARNING

System pressurised

De-pressurize the system prior to assembly.

The contamination indicator BCI 24 screw directly into the line filter. Tighten the BCI 24 to a torque of approx. 25 Nm. Be sure the seal (copper ring, O-ring or NBR sealing ring, varies by version) is in perfect condition.

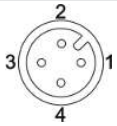
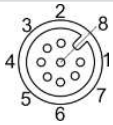
NOTICE

The top and bottom of the BCI 24 match. Therefore do not use a different top. The system could otherwise be damage.
However, loosening a locking screw allows turning the top so the cable outlet of the M12 plug connector can be repositioned as needed. Then secure the screw hand-tight!

4.2 Electrical connections

The BCI contamination indicator is powered with +18-30 V direct voltage. The sensor connects with a cable and standard M12 plug-in connectors.

4.2.1 Pin assignment

Version	1D1S	2S1A
Plug	**M12 4-pin**	**M12 8-pin**
Connection schematic		
Pin		
1	+24 V DC	+24 V DC
2	S2 (PNP), max. 200 mA	GND
3	GND	PNP OUT1, max. 200 mA
4	C/Q (IO-Link)/S1	NC
5		Analog OUT4 - 20 mA
6		PNP OUT2, max. 200 mA
7		NC
8		NC
	S1 = HnC 75 % S2 = HnC 100 % adjustable via IO-Link	OUT1 = HnC 75 % OUT2 = HnC 100 % not adjustable

5 Operation and Control

NOTICE

The device must not be operated beyond its specifications.

5.1 Version with analog and switching outputs (2S1A)

With this version the switching outputs are the primary signals.

To ensure the switching outputs respond, the respective threshold must be overrun for at least 4 seconds. This will avoid the system responding too soon if the brief pressure peaks occur.

Switching output 1 is configured as NC contact with increasing pressure drop. This switching output opens at 75 % of the set pressure drop measuring range.

Switching output 2 is configured as NC contact with increasing pressure drop. It opens at 100 % of the set pressure drop measuring range.

All switching outputs are reset automatically.

The analog output supplies a 4-20 mA current signal proportional to the set pressure drop measuring range.

Attention! For technical/physical reasons the lower 10 % of the measuring range are hidden. Within this range the output current remains at 4 mA until the release threshold is reached. This version has signal suppression for temperatures < 30 °C! If the device temperature is < 30 °C, the current remains at 4 mA and the switching outputs remain in the basic position.

5.2 Version with IO-Link interface (1D1S)

This unit is equipped with an IO-Link interface, which requires an IO-Link master.

The IO-Link interface allows direct access to process and diagnostics data as well as configuration of the unit during operation.

The IODDs required to configure the unit are available at https://ioddfinder.io-link.com.

If the IO-Link interface is not being used (no master or only used to parameterise), the BCI 24 functions as a regular pressure drop switch with 2 switching outputs.

In the event of increasing pressure drop, switching output 1 is configured as an NC contact as standard. This switching output opens at 75% of the set pressure drop measuring range.

In the event of increasing pressure drop, switching output 2 is configured as an NC contact as standard. It opens at 100% of the set pressure drop measuring range.

However, they can be parameterised via IO-Link master.

For more information please visit: www.io-link.com

6 Cleaning and Maintenance

Regularly check sealing screw connections for leaks, particularly if vibration may occur. Apart from this the device is maintenance-free.

The method for cleaning the devices must be adapted to the IP protection class of the devices. Do not use cleaners which could damage the device materials.

7 Service and repair

This chapter contains information on troubleshooting and correction should an error occur during operation.

Repairs to the unit must be performed by Bühler authorised personnel.

Please contact our Service Department with any questions:

Tel.: +49-(0)2102-498955 or your agent

For further information about our services and customised maintenance visit http://www.buehler-technologies.com/service.

If the equipment is not functioning properly after correcting any malfunctions and switching on the power, it must be inspected by the manufacturer. Please send the equipment inside suitable packaging to:

Bühler Technologies GmbH

- Reparatur/Service -

Harkortstraße 29

40880 Ratingen

Germany

Please also attach the completed and signed RMA decontamination statement to the packaging. We will otherwise be unable to process your repair order.

You will find the form in the appendix of these instructions, or simply request it by e-mail:

service@buehler-technologies.com.

7.1 Removal information

The housing temperature depends on the process temperature, therefore remember when working on the device:

Allow the device to cool down before performing maintenance or repairs.

Before remove the device, ensure the system is depressurised to prevent liquid from escaping. If necessary, use a collection container.

Please observe the safety notices in chapter Setup and connection.

7.2 Accessories

Item no.:	Model
9144050031	M12x1 4-pin LED * 5.0 m connection
9144050047	M12x1 4-pin 5.0 m connection
9144050010	M12x1 4-pin 1.5 m connection
9144050033	M12x1 8-pin 5.0 m connection
9144050048	M12x1 8-pin 1.5 m connection
9146100158	Straight cable socket M12x1 5-pin

*LED cable not compatible with active IO-Link communication. Only use in SIO mode.

8 Disposal

The applicable national laws must be observed when disposing of the products. Disposal must not result in a danger to health and environment.

The crossed out wheelie bin symbol on Bühler Technologies GmbH electrical and electronic products indicates special disposal notices within the European Union (EU).

The crossed out wheelie bin symbol indicates the electric and electronic products bearing the symbol must be disposed of separate from household waste. They must be properly disposed of as waste electrical and electronic equipment.

Bühler Technologies GmbH will gladly dispose of your device bearing this mark. Please send your device to the address below for this purpose.

We are obligated by law to protect our employees from hazards posed by contaminated devices. Therefore please understand that we can only dispose of your waste equipment if the device is free from any aggressive, corrosive or other operating fluids dangerous to health or environment. **Please complete the "RMA Form and Decontamination Statement", available on our website, for every waste electrical and electronic equipment. The form must be applied to the packaging so it is visible from the outside.**

Please return waste electrical and electronic equipment to the following address:

Bühler Technologies GmbH
WEEE
Harkortstr. 29
40880 Ratingen
Germany

Please also observe data protection regulations and remember you are personally responsible for the returned waste equipment not bearing any personal data. Therefore please be sure to delete your personal data before returning your waste equipment.

9 Appendices

9.1 Technical Data

Technical Data BCI 24-Dx

Model	**BCI 24-Dx3x0-2S1A**	**BCI 24-Dx3x7-1D1S**
Operating pressure	max. 400 bar	max. 400 bar
Ambient temperature	-20 °C to +70 °C	-20 °C to +70 °C
Medium temperature	-40 °C to +85 °C	-40 °C to +85 °C
Material/Version		
Electronics housing	1.4305	Anodised aluminium
Flange G1/2, M20x1.5	1.4305, Viton	1.4305, Viton
Weight	360 g	160 g
Electrical data		
Input values	Pressure drop	Pressure drop
Principle of Measurement	Differential pressure piston with magnet and hall sensor	Differential pressure piston with magnet and hall sensor
Operating voltage	18 - 30 V DC	18 - 30 V DC
Power input	< 100 mA	< 100 mA
IP rating (with plug top)	IP67	IP67
Sum of all deviations	10 % from full range	10 % from full range
Output	4-20 mA + 2x switching output 200 mA	IO-Link*
	Signal suppression for outputs in temperatures under 30 °C** and during temporary pressure peaks.	Signal suppression for outputs during temporary pressure peaks.

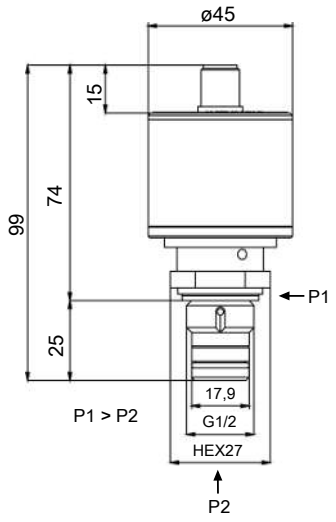
*in IO-Link mode 1 switching output, in SIO mode 2 switching outputs

**Other temperatures available upon request.

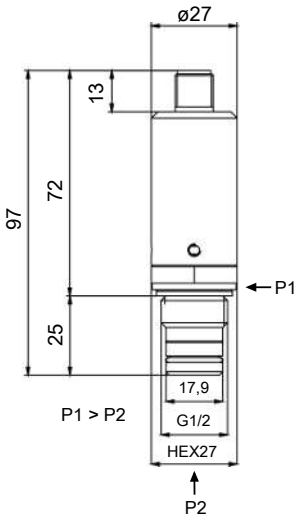
9.2 Dimensions

Connecting flange compatible with third-party product Hydac

BCI 24-DH3x0-2S1A

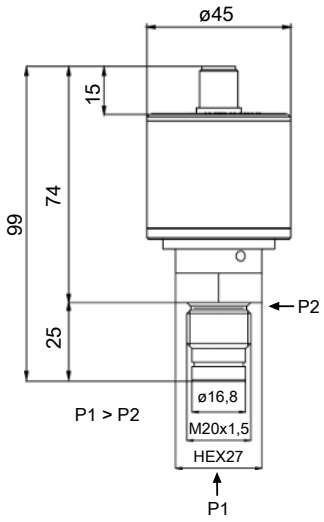


BCI 24-DH3x7-1D1S

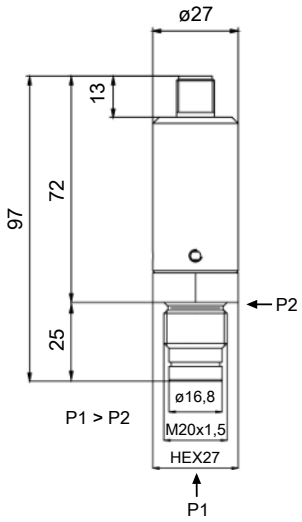


Connecting flange compatible with third-party product Filtration Group

BCI 24-DM3x0-2S1A

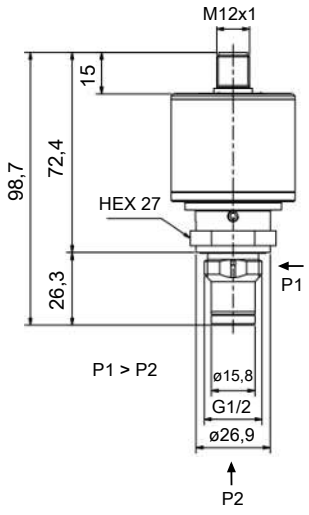


BCI 24-DM3x7-1D1S

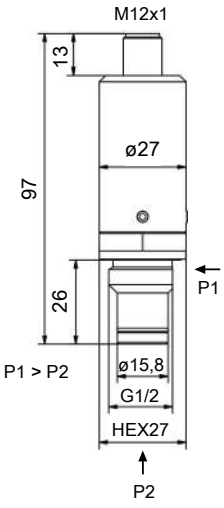


Connecting flange compatible with third-party product MP-Filtri

BCI 24-DF3x0-2S1A

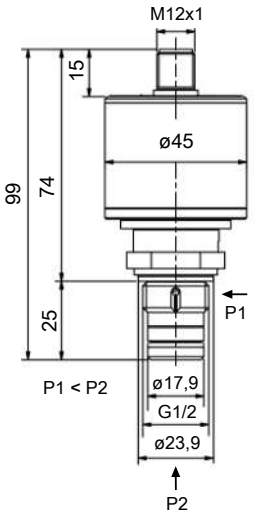


BCI 24-DF3x7-1D1S

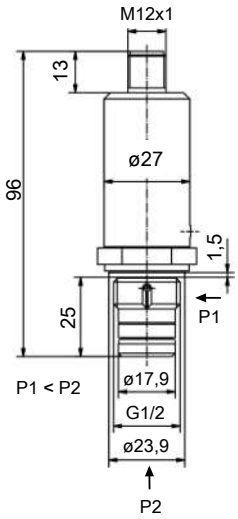


Connecting flange compatible with third-party product Eaton

BCI 24-DC3x0-2S1A



BCI 24-DC3x7-1D1S



10 Attached documents

- Declaration of Conformity KX130024
- RMA - Decontamination Statement

EU-Konformitätserklärung
EU Declaration of Conformity

Hiermit erklärt Bühler Technologies GmbH, dass die nachfolgenden Produkte den wesentlichen Anforderungen der Richtlinie

Herewith declares Bühler Technologies GmbH that the following products correspond to the essential requirements of Directive

2014/30/EU
(Elektromagnetische Verträglichkeit / *electromagnetic compatibility)*

in ihrer aktuellen Fassung entsprechen.

in its actual version.

Produkt / products: Verschmutzungsanzeiger / Contamination indicator
Typ / type: BCI 24-Dx

Die Betriebsmittel dienen zur Überwachung der Filterkapazität in Ölkreisläufen.
The equipment is used to monitor the capacity of oil filters in oil-circulating systems.

Das oben beschriebene Produkt der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:
The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

EN 61326-1:2013

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

Dokumentationsverantwortlicher für diese Konformitätserklärung ist Herr Stefan Eschweiler mit Anschrift am Firmensitz.
The person authorised to compile the technical file is Mr. Stefan Eschweiler located at the company's address.

Ratingen, den 08.04.2019

Stefan Eschweiler
Geschäftsführer – *Managing Director*

Frank Pospiech
Geschäftsführer – *Managing Director*

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

UK Declaration of Conformity

The manufacturer Bühler Technologies GmbH declares, under the sole responsibility, that the product complies with the requirements of the following UK legislation:

Electromagnetic Compatibility Regulations 2016

Product: Contamination indicator
Type: BCI 24-Dx

The equipment is used to monitor the capacity of oil filters in oil-circulating systems.

The object of the declaration described above is in conformity with the relevant designated standards:

EN 61326-1:2013

Ratingen in Germany, 01.11.2022

Stefan Eschweiler
Managing Director

Frank Pospiech
Managing Director

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

RMA-Formular und Erklärung über Dekontaminierung
RMA-Form and explanation for decontamination

RMA-Nr./ RMA-No.

Die RMA-Nr. bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service. Bei Rücksendung eines Altgeräts zur Entsorgung tragen Sie bitte in das Feld der RMA-Nr. "WEEE" ein./ You may obtain the RMA number from your sales or service representative. When returning an old appliance for disposal, please enter "WEEE" in the RMA number box.

Zu diesem Rücksendeschein gehört eine Dekontaminierungserklärung. Die gesetzlichen Vorschriften schreiben vor, dass Sie uns diese Dekontaminierungserklärung ausgefüllt und unterschrieben zurücksenden müssen. Bitte füllen Sie auch diese im Sinne der Gesundheit unserer Mitarbeiter vollständig aus./ This return form includes a decontamination statement. The law requires you to submit this completed and signed decontamination statement to us. Please complete the entire form, also in the interest of our employee health.

Firma/ Company

Firma/ Company	
Straße/ Street	
PLZ, Ort/ Zip, City	
Land/ Country	

Ansprechpartner/ Person in charge

Name/ Name	
Abt./ Dept.	
Tel./ Phone	
E-Mail	

Gerät/ Device	
Anzahl/ Quantity	
Auftragsnr./ Order No.	

Serien-Nr./ Serial No.	
Artikel-Nr./ Item No.	

Grund der Rücksendung/ Reason for return

- ☐ Kalibrierung/ Calibration
- ☐ Modifikation/ Modification
- ☐ Reklamation/ Claim
- ☐ Reparatur/ Repair
- ☐ Elektroaltgerät/ Waste Electrical & Electronic Equipment (WEEE)
- ☐ andere/ other

bitte spezifizieren/ please specify

Ist das Gerät möglicherweise kontaminiert?/ Could the equipment be contaminated?

☐ Nein, da das Gerät nicht mit gesundheitsgefährdenden Stoffen betrieben wurde./ No, because the device was not operated with hazardous substances.

☐ Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ No, because the device has been properly cleaned and decontaminated.

☐ Ja, kontaminiert mit:/ Yes, contaminated with:

☐ explosiv/ explosive	☐ entzündlich/ flammable	☐ brandfördernd/ oxidizing	☐ komprimierte Gase/ compressed gases	☐ ätzend/ caustic	☐ giftig, Lebensgefahr/ poisonous, risk of death	☐ gesundheitsgefährdend/ harmful to health	☐ gesundheitsschädlich/ health hazard	☐ umweltgefährdend/ environmental hazard

Bitte Sicherheitsdatenblatt beilegen!/ Please enclose safety data sheet!

Das Gerät wurde gespült mit:/ The equipment was purged with:

Diese Erklärung wurde korrekt und vollständig ausgefüllt und von einer dazu befugten Person unterschrieben. Der Versand der (dekontaminierten) Geräte und Komponenten erfolgt gemäß den gesetzlichen Bestimmungen.

This declaration has been filled out correctly and completely, and signed by an authorized person. The dispatch of the (decontaminated) devices and components takes place according to the legal regulations.

Falls die Ware nicht gereinigt, also kontaminiert bei uns eintrifft, muss die Firma Bühler sich vorbehalten, diese durch einen externen Dienstleister reinigen zu lassen und Ihnen dies in Rechnung zu stellen.

Should the goods not arrive clean, but contaminated, Bühler reserves the right, to comission an external service provider to clean the goods and invoice it to your account.

Firmenstempel/ Company Sign

Datum/ Date

rechtsverbindliche Unterschrift/ Legally binding signature

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
E-Mail: service@buehler-technologies.com
Internet: www.buehler-technologies.com

Vermeiden von Veränderung und Beschädigung der einzusendenden Baugruppe

Die Analyse defekter Baugruppen ist ein wesentlicher Bestandteil der Qualitätssicherung der Firma Bühler Technologies GmbH. Um eine aussagekräftige Analyse zu gewährleisten muss die Ware möglichst unverändert untersucht werden. Es dürfen keine Veränderungen oder weitere Beschädigungen auftreten, die Ursachen verdecken oder eine Analyse unmöglich machen.

Umgang mit elektrostatisch sensiblen Baugruppen

Bei elektronischen Baugruppen kann es sich um elektrostatisch sensible Baugruppen handeln. Es ist darauf zu achten, diese Baugruppen ESD-gerecht zu behandeln. Nach Möglichkeit sollten die Baugruppen an einem ESD-gerechten Arbeitsplatz getauscht werden. Ist dies nicht möglich sollten ESD-gerechte Maßnahmen beim Austausch getroffen werden. Der Transport darf nur in ESD-gerechten Behältnissen durchgeführt werden. Die Verpackung der Baugruppen muss ESD-konform sein. Verwenden Sie nach Möglichkeit die Verpackung des Ersatzteils oder wählen Sie selber eine ESD-gerechte Verpackung.

Einbau von Ersatzteilen

Beachten Sie beim Einbau des Ersatzteils die gleichen Vorgaben wie oben beschrieben. Achten Sie auf die ordnungsgemäße Montage des Bauteils und aller Komponenten. Versetzen Sie vor der Inbetriebnahme die Verkabelung wieder in den ursprünglichen Zustand. Fragen Sie im Zweifel beim Hersteller nach weiteren Informationen.

Einsenden von Elektroaltgeräten zur Entsorgung

Wollen Sie ein von Bühler Technologies GmbH stammendes Elektroprodukt zur fachgerechten Entsorgung einsenden, dann tragen Sie bitte in das Feld der RMA-Nr. „WEEE“ ein. Legen Sie dem Altgerät die vollständig ausgefüllte Dekontaminierungserklärung für den Transport von außen sichtbar bei. Weitere Informationen zur Entsorgung von Elektroaltgeräten finden Sie auf der Webseite unseres Unternehmens.

Avoiding alterations and damage to the components to be returned

Analysing defective assemblies is an essential part of quality assurance at Bühler Technologies GmbH. To ensure conclusive analysis the goods must be inspected unaltered, if possible. Modifications or other damages which may hide the cause or render it impossible to analyse are prohibited.

Handling electrostatically conductive components

Electronic assemblies may be sensitive to static electricity. Be sure to handle these assemblies in an ESD-safe manner. Where possible, the assembles should be replaced in an ESD-safe location. If unable to do so, take ESD-safe precautions when replacing these. Must be transported in ESD-safe containers. The packaging of the assemblies must be ESD-safe. If possible, use the packaging of the spare part or use ESD-safe packaging.

Fitting of spare parts

Observe the above specifications when installing the spare part. Ensure the part and all components are properly installed. Return the cables to the original state before putting into service. When in doubt, contact the manufacturer for additional information.

Returning old electrical appliances for disposal

If you wish to return an electrical product from Bühler Technologies GmbH for proper disposal, please enter "WEEE" in the RMA number box. Please attach the fully completed decontamination declaration form for transport to the old appliance so that it is visible from the outside. You can find more information on the disposal of old electrical appliances on our company’s website.

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