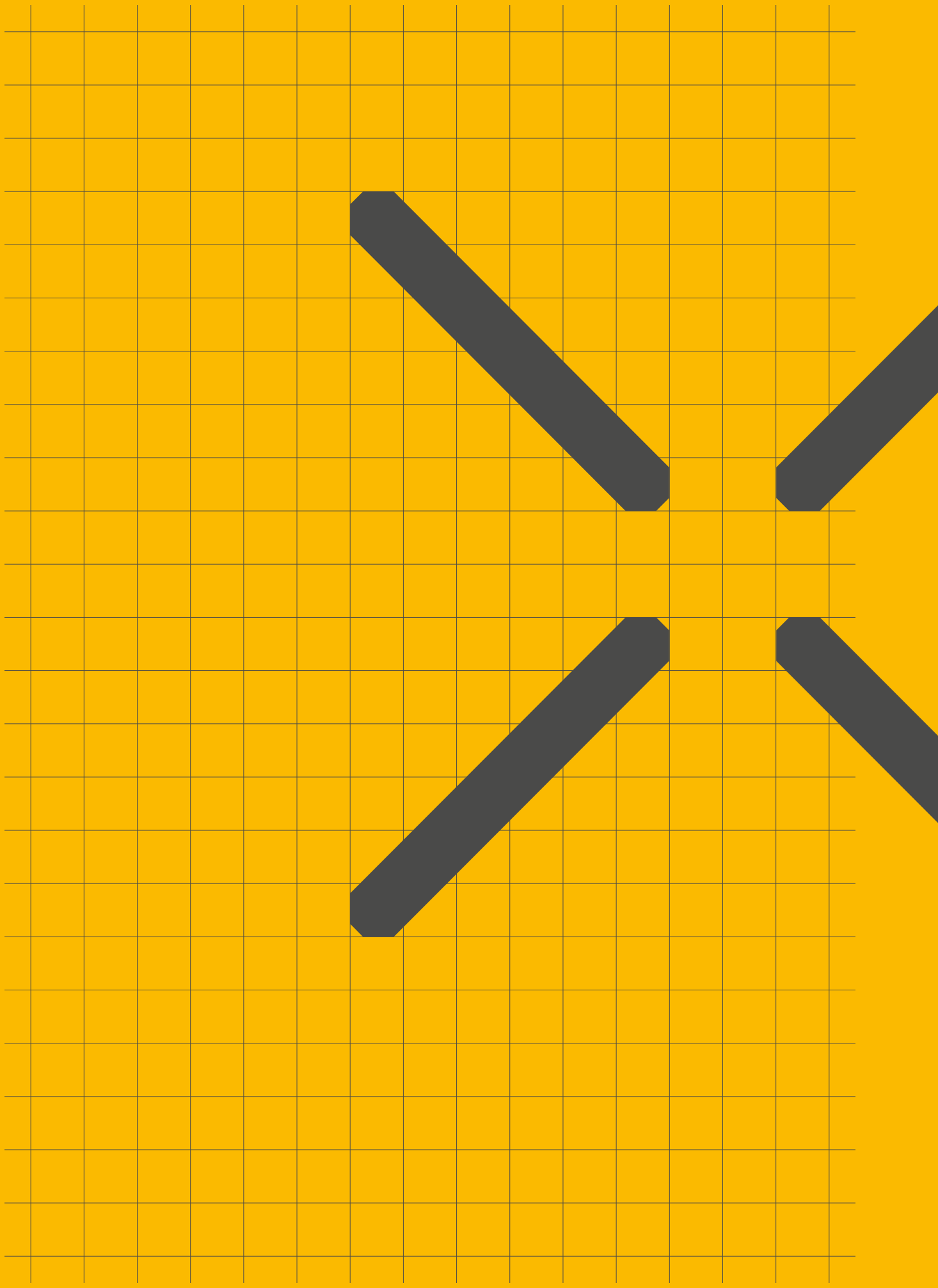
EWELLIX

MAKERS IN MOTION

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Control unit - BCU



Contents

⚠ WARNING

Read this manual before installing, operating or maintaining this actuator. Failure to follow safety precautions and instructions could cause actuator failure and result in serious injury, death or property damage.

1.0 General information

1.1 Information on this manual

This manual provides information necessary for the proper and safe installation, operation, maintenance, dismantling and disposal of this column (also called device). It is an integral part of the equipment, and must be kept so that it is accessible to personnel.

Before doing anything with this device, personnel must read this manual thoroughly and understand its contents. Compliance with all specified safety instructions and operating instructions is vital for safe and proper use of this device.

In addition, national and local governmental accident prevention regulations and general safety instructions must be observed in the area where this device is being used.

Illustrations in this manual are intended to facilitate a basic understanding of these concepts and may differ from the actual design.

1.2 Explanation of symbols and signal words

Safety precautions

Safety precautions in this manual are identified by symbols and signal words. These signal words (shown to the right) indicates the severity of the hazard.

Adhere to these safety precautions and act cautiously in order to avoid accidents resulting in personal injuries and damage to the device and the equipment into which it has been installed.

⚠ DANGER

Indicates a dangerous situation, which will lead to death or serious personal injury, if the precautionary measures are ignored.

⚠ WARNING

Indicates a dangerous situation, which can lead to minor or moderate injury or property damage, if the precautionary measures are ignored.

⚠ CAUTION

Indicates a dangerous situation, which can lead to minor or moderate injury the precautionary measures are ignored.

NOTICE

Indicates information considered important, but not hazard-related (e.g. messages relating to property damage).

NOTE

Emphasizes useful hints and recommendations as well as information for efficient and trouble-free operation.

2.0 Introduction

This chapter contains information on the structure and categorization of the operating manual. It simplifies the handling of the operating manual and facilitates fast access to the desired information.

2.1 Operating Instructions

Ewellix manufactures state-of-the-art electric actuators, control units and operating equipment.

The object of this operating manual is to give you, the user, an introduction to correct and safe use.

In order to make it possible to reach this objective, it is imperative that you should read the chapter Safety (↳ **3.0 Safety, page 7**) carefully and follow the instructions in this operating manual.

2.1.1 Validity

The instructions in this manual refer to the linear actuator BCU control unit with the following identification:

- Manufacturer: Ewellix
- Product name: BCU control unit
- Type designation: BCUxx-xxx xxx-xxxx
- Year of manufacturer: 2015
- CE-mark: according to the technical documentation

2.1.2 Target Audience

The operating manual is intended for technical personnel and authorized users who use the BCU control unit in their products and work with them. The Operating Authority determines who is authorized as the user.

We distinguish between different user groups, as the requirements on the users vary, depending on the activity they perform.

NOTE

You will find definitions of the user groups along with their corresponding requirements in the chapter on safety (↳ **3.0 Safety, page 7**). You can assume one or more of these user groups provided you meet the applicable requirements

The organization and implementation of the operating instructions takes into account the different user groups.

2.2 Summary of Contents

The operating instructions serve as a reference work. The information therein is organized into four task- and theme-related parts:

Basic Principles

The Basic Principles section gives the basic knowledge that every user should have.

Normal Operation

The Normal Operation section contains information needed for operating the product under normal conditions, i.e. undisrupted operation for use according to its intended application.

Special Operations

The Special Operations section describes all jobs deviating from normal operation, such as installation, initial start-up, maintenance, fixing faults and doing repairs.

Appendix

The Appendix contains information that the user has to be able to access at any time. This includes information on using the operating instructions (indexes) as well as data concerning the product itself (technical data).

Aids for accessing information

This manual has access aids that make it easier for you to quickly access the desired information:

- You can most easily find all information on a given topic from the Table of Contents, thanks to the task and theme-related organization of the operating instructions.
- Information on a certain activity or a special topic can be found most quickly through the Index.
- Within the chapters of the operating instructions, you can orient yourself with the help of the margin notes.

2.3 Organizational Measures

In case of questions to which answers cannot be found in the operating manual, please directly contact the manufacturer.

2.3.1 Location of the operating manual

The operating manual can only be of any use to you if you have access to it at all times. Therefore, always keep it accessible near the machine.

2.4 Conventions

In this operating manual, we use some abbreviations and markings for identifying text sections or notes. The depiction conventions are described in the following paragraphs.

2.4.1 Warning and usage instructions

Please note the significance of the following warning and usage instructions.

NOTE

Pointers to usage information that understand the user to use the product in a technically correct and efficient manner or understand the properties of the product.

2.4.2 Position numbers and referencing

Position numbers

We number parts in diagrams in serial order in the clockwise direction, with unique numbers.

Cross-references to text positions

We put references to chapters or figures in brackets. They contain the corresponding chapter number or figure number.

⚠ CAUTION

Warnings for instructing the user on the residual dangers to persons and property that remain owing to the incomplete efficacy of the protective measures; note regarding special training and personal protection equipment that may be required.

⚠ WARNING

Warnings regarding irreparable damage to persons and property that have been found to exist on the basis of the danger analysis. With a pointer regarding protective measures and any special training and personal protection equipment that may be required.

3.0 Safety

This chapter targets all the users of the BCU control unit. It contains information on safe use and optimum utilization.

3.1 Safety Program

The safety concept of the Ewellix regulates the authorization for use and the responsibilities of the individual users.

The BCU control unit is constructed and built according to the state-of-the-art and the recognized technical rules of safety.

EG-conformance is documented with the technical documentation.

3.1.1 Purpose of use of the BCU control unit

The BCU control unit has been designed and constructed for use in accordance with its intended purpose-conformant use. If you use the BCU control unit for any use other than the use described, the manufacturer cannot be held liable for damage that results therefrom.

3.1.2 Intended use

The authorized use of the BCU control unit is the:

- Controlling of a maximum of three actuators for pressure or tension-stressed strokes.

NOTE

The operations data can be obtained from chapter Appendix of this operating manual (↳ **10.0 Appendix, page 28**) and are only valid for the use with Actuators from Ewellix.

3.1.3 Unintended use

Control unit BCU are suitable for indoor use only and must not be exposed to weathering, strong radiation fields, corrosive or explosive atmospheric media (↳ **10.0 Appendix, page 28**)

NOTE

Any authorized use of the device can cause personal injury and property damage. Always adhere to the instruction given in the manual.

3.1.4 User groups

To ensure safety, we place requirements on the users of the BCU control unit, that must be adhered to under all circumstances. Only persons who meet the requirements are entitled to use the BCU control unit.

We refer to all persons who operate, use, commission the control unit, process it further or pass it on for further processing as user groups. As the requirements of these user groups strongly depend on their role, we distinguish between the following user groups:

Operating Authority

The operating authority is the contractual partner of the executor or the reseller. They can impose legal conditions on the operating authority when purchasing the control unit. The operating authority ensures that the user is instructed on the authorized use of the equipment.

Executor

The executor is the contractual partner of the reseller or the manufacturer. He assembles the control unit into a total device. He is authorized by the manufacturer of the BCU control unit to use the control unit in accordance with the regulations and has the necessary expert knowledge.

Technician

The technician has the professional technical training to implement the BCU control unit according to its authorized use. Besides the chapter Safety, he is also familiar with the chapter Special operating modes. He finds the necessary technical characteristic data in **10.0 Appendix, page 28**.

Reseller

The reseller forwards the machine

Operator

Every other person who uses the BCU control unit we define as an operator. The operator must have read the Safety chapter in this manual before using the machine. Moreover, he must be instructed about the normal operation by the operating authority.

3.1.5 Operating modes

Intermittent

The BCU control unit is exclusively intended for intermittent operation (↳ **Technical Data, page 29**).

3.1.6 Danger zones

We differentiate between two danger zones that must be observed, depending on user group.

Persons

The danger zone covering persons includes, apart from the actual users, third parties as well (other personnel, visitors, patients etc.). In cases of damage, the liability is that of the Operating Authority.

Device

The danger zone device comes under the user group Executor and Technician and covers the BCU control unit and all the mounted-on devices.

3.1.7 Areas of responsibility

There are different areas of responsibility, corresponding to the different user groups.

Operating Authority

The Operating Authority has the responsibility for the danger zone covering Persons and ensures that only authorized and instructed users work with the BCU control unit. He is responsible for the following points:

- Determining the persons who may use the BCU control unit (authorized persons)
- Instruction of the users
- Compliance with all the relevant legal conditions and specifications

NOTE

The Operating Authority may only authorize such persons for using the BCU control unit, who conform to the requirements for the user roles.

Executor

The executor is responsible for the following points:

- Generation of a CE-conformant operating manual of the device in which the BCU control unit has been integrated
- Adherence to the safety requirements in accordance with this operating manual.

Reseller

The reseller is responsible for the following points:

- Passing on this operating manual and the BCU control unit to the executor or the
- Passing on of a CE-conformant operating manual and the device in which the BCU control unit has been integrated to the Operating Authority.

Technician

The technician is responsible for the following points:

- Compliance with the instructions of the manufacturer and safe designing of the interfaces to other devices.
- Installation and use of the BCU control unit in accordance with its intended purpose-conformant use
- Installation of optional modules and connecting cables

Operator

The operator ensures that nobody is endangered owing to the operation of the BCU control unit. In particular, he is responsible for:

- Operation of the BCU control unit in normal operation
- Immediate and specification-conformant reaction to faults

⚠ WARNING

The control units BCU do not have an on/off switch and if required to be switched off, for example in an emergency, the control unit must be disconnected fro the power supply, Only this measure will de-energize the control units. Applications where the control units are built in must provide an emergency stop switch or isolation from the mains supply on all poles. Additional protective means might be necessary in case of battery options.

3.2 Specific dangers

The following section lists the residual risks that have been determined by risk assessment. The manufacturer has constructively, and with protective measures, minimized the effects of existing hazards. Pay attention to the residual hazards and potential countermeasures described in the following chapters.

⚠ WARNING

Warning regarding electrical shock owing to damaged plugs or damaged network cables. Never touch a damaged network plug or a damaged network cable when the BCU control unit is running, since the BCU control unit are supplied 120 V AC or 230 V AC.

- Ensure, before you pull a defective plug out of the plug socket, that the current fuse is cut off.

⚠ CAUTION

Take care not to damage the BCU control unit from water jets. The BCU control unit is protected against powerful water according to IPX4.

⚠ CAUTION

Please be aware of damage to people or property as the result of incorrect operation. Incorrect operation can endanger people in the danger zone or objects.

- Before pressing a button on the operating unit, ensure that you press the right bottom.
- Take appropriate measures to ensure that the operating unit cannot be operated.

⚠ CAUTION

No function is considered as a safe condition..

4.0 Safety EMC

4.1 Manufacturer's declaration of EMC compliance

IEC 60601-1-2:2014 Medical Electrical Equipment, Part 1–2: General requirements for basic safety and essential performance – Collateral Standard: Electromagnetic disturbances – Requirements and tests

4.2 Instructions for use / General

4.2.1 Professional healthcare facility environment

Physician offices, dental offices, clinics, limited care facilities, freestanding surgical centers, freestanding birthing centers, multiple treatment facilities, hospitals (emergency rooms, PATIENT rooms, intensive care, surgery rooms, except near HF SURGICAL EQUIPMENT, an MR system outside a RF shielded room of an ME SYSTEM for magnetic resonance imaging)

4.2.2 Essential performance

Control of electromechanical actuators

⚠ WARNING

The use of this equipment adjacent to or stacked with other equipment should be avoided because it could result improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.

⚠ WARNING

The use of accessories and cables other than those for which the control unit BCU was designed, can significantly degrade electromagnetic EMISSIONS and IMMUNITY performance

4.2.3 List of cables, Length of cables, accessories

Accessories	Part No.	Remark
EHA3	any	Hand switch
STJ	any	Foot switch
STE	any	Desk switch

Description Ports BCU	Drawing No.	Type	Length
Handswitch cable straight	160627	15 × AWG30	2,5 m
Motor cable straight DIN Sp Runner	160601	2 × AWG16	1,5 m
Motor cable straight DIN Sp Runner with two Hall sensor	160621	2 × AWG16 and 2 × AWG24	1,5 m
Motor cable straight DIN Sp ECO	160620	2 × AWGIS	1,5 m
Motor cable straight DIN Sp MAX	160606	2 × AWGIS	1,5 m
Motor cable coiled DIN Sp MAX	160618	2 × AWG18	1,5 m

4.3 RF communications equipments

⚠ WARNING

Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm to any part of the ME equipment. Otherwise, degradation of the performance of this equipment could result

4.4 Technical description

Requirements applicable to all ME equipment and ME Systems Compliance for each Emission and Immunity standards

4.4.1 Emission guidance

The control unit BCU is intended for use in the electromagnetic environment specified below. The customer or user of the control box should ensure that they are used in such an environment

Emission test	Compliance	Electromagnetic environment-guidance
RF emission CISPR 11	Group 1	
RF emission CISPR 11	Class B	ME equipment class B
Harmonic emission IEC 6100-3-2	Class A	Harmonic current limit
Voltage fluctuation/ flicker emissions IEC 6100-3-3	Complies	

4.5 Instruction for maintaining BASIC Safety and Essential performance for the expected Service life

NOTE

Do not change the once installed final application due to EMC view Immunity test levels (IEC 60601-1-2:2014)

⚠ WARNING

This product was tested against actual conditions of frequency wireless environment present in Europe

Enclosure port

Phenomenon	Basic EMC standard or test method	Immunity test levels	
		Professional healthcare facility environment	Home healthcare environment
Electrostatic discharge	IEC 61000-4-2	±8 kV contact ±2 kV, ±4 kV, ±8 kV, ±15 kV air	
Radiated RF EM fields[1)]	IEC 61000-4-3	3 V/m[6)] 80 MHz – 2,7 GHz[2)] 80% AM at 1 kHz[3)]	10 V/m[6)] 80 MHz – 2,7 GHz[2)] 80% AM at 1 kHz[3)]
Proximity fields from RF wireless communications equipment	IEC 61000-4-3	See 8.1	
Rated power frequency magnetic fields[4) 5)]	IEC 61000-4-8	30 A/m[7)] 50 Hz or 60 Hz	

[1)] The interface between the PATIENT physiological signal simulation, if used, and the ME EQUIPMENT or ME SYSTEM shall be located within 0,1 m of the vertical plane of the uniform field area in one orientation of the ME EQUIPMENT or ME SYSTEM.

[2)] ME EQUIPMENT and ME SYSTEMS that intentionally receive RF electromagnetic energy for the purpose of their operation shall be tested at the frequency of reception. Testing may be performed at other modulation frequencies identified by the RISK MANAGEMENT PROCESS. This test assesses the BASIC SAFETY and ESSENTIAL PERFORMANCE of an intentional receiver when an ambient signal is in the passband. It is understood that the receiver might not achieve normal reception during the test.

[3)] Testing may be performed at other modulation frequencies identified by the RISK MANAGEMENT PROCESS.

[4)] Applies only to ME EQUIPMENT and ME SYSTEMS with magnetically sensitive components or circuitry.

[5)] During the test, the ME EQUIPMENT or ME SYSTEM may be powered at any NOMINAL input voltage, but with the same frequency as the test signal (↳ **see Table 1**).

[6)] Before modulation is applied.

[7)] This test level assumes a minimum distance between the ME EQUIPMENT or ME SYSTEM and sources of power frequency magnetic field of at least 15 cm. If the RISK ANALYSIS shows that the ME EQUIPMENT or ME SYSTEM will be used closer than 15 cm to sources of power frequency magnetic field, the IMMUNITY TEST LEVEL shall be adjusted as appropriate for the minimum expected distance.

Input a.c. power port

Phenomenon	Basic EMC standard	Immunity test levels	
		Professional healthcare facility environment	Home healthcare environment
Electrical fast transients / bursts [1) 12) 15)]	IEC 61000-4-4	±2 kV 100 kHz repetition frequency	
Surges [1) 2) 10) 15)] Line-to-line	IEC 61000-4-5	±0,5 kV, ±1 kV	
Surges [1) 2) 10) 11) 15)] Line-to-ground	IEC 61000-4-5	±0,5 kV, ±1 kV, ±2 kV	
Conducted disturbances induced by RF fields [3) 4) 15)]	IEC 61000-4-6	3 V [13)] 0,15 MHz – 80 MHz 6 V [13)] in ISM bands between 0,15 MHz and 80 MHz [14)] 80% AM at 1 kHz [5)]	3 V [13)] 0,15 MHz – 80 MHz 6 V [13)] in ISM and amateur radio bands between 0,15 MHz and 80 MHz [14)] 80% AM at 1 kHz [5)]
Voltage dips [6) 16) 18)]	IEC 61000-4-11	0% UT; 0,5 cycle [7)] At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° [17)] 0% UT; 1 cycle and 70% UT; 25/30 cycles [8)] Single phase: at 0°	
Voltage interruptions [6) 9) 15) 18)]	IEC 61000-4-11	0% UT; 250/300 cycle [8)]	

[1)] The test may be performed at any one power input voltage within the ME EQUIPMENT or ME SYSTEM RATED voltage range. If the ME EQUIPMENT or ME SYSTEM is tested at one power input voltage, it is not necessary to re-test at additional voltages.

[2)] All ME EQUIPMENT and ME SYSTEM cables are attached during the test.

[3)] Calibration for current injection clamps shall be performed in a 150 Ω system.

[4)] If the frequency stepping skips over an ISM or amateur band, as applicable, an additional test frequency shall be used in the ISM or amateur radio band. This applies to each ISM and amateur radio band within the specified frequency range.

[5)] Testing may be performed at other modulation frequencies identified by the RISK MANAGEMENT PROCESS.

[6)] ME EQUIPMENT and ME SYSTEMS with a d.c. power input intended for use with a.c.-to-d.c. converters shall be tested using a converter that meets the specifications of the MANUFACTURER of the ME EQUIPMENT or ME SYSTEM. The IMMUNITY TEST LEVELS are applied to the a.c. power input of the converter.

[7)] Applicable only to ME EQUIPMENT and ME SYSTEMS connected to single-phase a.c. mains.

[8)] E.g. 10/12 means 10 periods at 50 Hz or 12 periods at 60 Hz.

[9)] ME EQUIPMENT and ME SYSTEMS with RATED input current greater than 16 A / phase shall be interrupted once for 250/300 cycles at any angle and at all phases at the same time (if applicable). ME EQUIPMENT and ME SYSTEMS with battery backup shall resume line power operation after the test. For ME EQUIPMENT and ME SYSTEMS with RATED input current not exceeding 16 A, all phases shall be interrupted simultaneously.

[10)] ME EQUIPMENT and ME SYSTEMS that do not have a surge protection device in the primary power circuit may be tested only at ± 2 kV line(s) to earth and ± 1 kV line(s) to line(s).

[11)] Not applicable to CLASS II ME EQUIPMENT and ME SYSTEMS.

[12)] Direct coupling shall be used.

[13)] r.m.s., before modulation is applied.

[14)] The ISM (industrial, scientific and medical) bands between 0,15 MHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 40,66 MHz to 40,70 MHz. The amateur radio bands between 0,15 MHz and 80 MHz are 1,8 MHz to 2,0MHz, 3,5 MHz to 4,0 MHz, 5,3 MHz to 5,4 MHz, 7 MHz to 7,3 MHz, 10,1 MHz to 10,15 MHz, 14 MHz to 14,2 MHz, 18,07 MHz to 18,17 MHz, 21,0 MHz to 21,4 MHz, 24,89 MHz to 24,99 MHz, 28,0 MHz to 29,7 MHz and 50,0 MHz to 54,0 MHz.

[15)] Applicable to ME EQUIPMENT and ME SYSTEMS with RATED input current less than or equal to 16 A / phase and ME EQUIPMENT and ME SYSTEMS with RATED input current greater than 16 A / phase.

[16)] Applicable to ME EQUIPMENT and ME SYSTEMS with RATED input current less than or equal to 16 A / phase.

[17)] At some phase angles, applying this test to ME EQUIPMENT with transformer mains power input might cause an overcurrent protection device to open. This can occur due to magnetic flux saturation of the transformer core after the voltage dip. If this occurs, the ME EQUIPMENT or ME SYSTEM shall provide BASIC SAFETY during and after the test.

[18)] For ME EQUIPMENT and ME SYSTEMS that have multiple voltage settings or auto ranging voltage capability, the test shall be performed at the minimum and maximum RATED input voltage. ME EQUIPMENT and ME SYSTEMS with a RATED input voltage range of less than 25% of the highest RATED input voltage.

Input d.c. power port

Phenomenon	Basic EMC standard	Immunity test levels	
		Professional healthcare facility environment	Home healthcare environment
Electrical fast transients / bursts [a) g)]	IEC 61000-4-4	±2 kV 100 kHz repetition frequency	
Surges [1) 2) 7)] Line-to-line	IEC 61000-4-5	±0,5 kV, ±1 kV	
Surges [1) 2) 7)] Line-to-ground	IEC 61000-4-5	±0,5 kV, ±1 kV, ±2 kV	
Conducted disturbances induced by RF fields [1) 3) 4) 9)]	IEC 61000-4-6	3 V[8)] 0,15 MHz – 80 MHz 6 V[8)] in ISM bands between 0,15 MHz and 80 MHz[10)] 80% AM at 1 kHz[5)]	3 V8) 0,15 MHz – 80 MHz 6 V8) in ISM and amateur radio bands between 0,15 MHz and 80 MHz10) 80% AM at 1 kHz5)
Electrical transient conduction along supply lines [f)]	ISO 7637-2	Not applicable	As specified in ISO 7637-2

[1)] The test is applicable to all d.c. power PORTS intended to be connected permanently to cables longer than 3 m.
[2)] All ME EQUIPMENT and ME SYSTEM cables shall be attached during the test
[3)] INTERNALLY POWERED ME EQUIPMENT is exempt from this test if it cannot be used during battery charging, is of less than 0,4 m maximum dimension including the maximum length of all cables specified and has no connection to earth, telecommunications systems, any other equipment or a PATIENT.
[4)] The test may be performed with the ME EQUIPMENT or ME SYSTEM powered at any one of its NOMINAL input voltages.
[5)] Testing may be performed at other modulation frequencies identified by the RISK MANAGEMENT PROCESS.
[6)] For ME EQUIPMENT and ME SYSTEMS intended to be installed in passenger cars and light commercial vehicles including ambulances fitted with 12 V electrical systems or commercial vehicles including ambulances fitted with 24 V electrical systems
[7)] Direct coupling shall be used.
[8)] r.m.s., before modulation is applied.
[9)] If the frequency stepping skips over an ISM or amateur radio band, as applicable, an additional test frequency shall be used in the ISM or amateur radio band. This applies to each ISM and amateur radio band within the specified frequency range.
[10)] The ISM (industrial, scientific and medical) bands between 0,15 MHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 40,66 MHz to 40,70 MHz. The amateur radio bands between 0,15 MHz and 80 MHz are 1,8 MHz to 2,0 MHz, 3,5 MHz to 4,0 MHz, 5,3 MHz to 5,4 MHz, 7 MHz to 7,3 MHz, 10,1 MHz to 10,15 MHz, 14 MHz to 14,2 MHz, 18,07 MHz to 18,17 MHz, 21,0 MHz to 21,4 MHz, 24,89 MHz to 24,99 MHz, 28,0 MHz to 29,7 MHz and 50,0 MHz to 54,0 MHz.

Patient coupling port

Phenomenon	Basic EMC standard	Immunity test levels	
		Professional healthcare facility environment	Home healthcare environment
Electrostatic discharge[3)]	IEC 61000-4-2	±8 kV contact ±2 kV, ±4 kV, ±8 kV, ±15 kV air	
Conducted disturbances induced by RF fields [1) 3) 4) 9)]	IEC 61000-4-6	3 V[2)] 0,15 MHz – 80 MHz 6 V2) in ISM bands between 0,15 MHz and 80 MHz 80% AM at 1 kHz	3 V[2)] 0,15 MHz – 80 MHz 6 V2) in ISM and amateur radio bands between 0,15 MHz and 80 MHz 80% AM at 1 kHz

[1)] The following apply:
– All PATIENT-COUPLED cables shall be tested, either individually or bundled
– PATIENT-COUPLED cables shall be tested using a current clamp unless a current clamp is not suitable. In cases were a current clamp is not suitable, an EM clamp shall be used.
– No intentional decoupling device shall be used between the injection point and the PATIENT COUPLING POINT in any case.
– Testing may be performed at other modulation frequencies identified by the RISK MANAGEMENT PROCESS.
– Tubes that are intentionally filled with conductive liquids and intended to be connected to a PATIENT shall be considered to be PATIENT-COUPLED cables.
– If the frequency stepping skips over an ISM or amateur radio band, as applicable, an additional test frequency shall be used in the ISM or amateur radio band. This applies to each ISM and amateur radio band within the specified frequency range.
– The ISM (industrial, scientific and medical) bands between 0,15 MHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 4 0,66 MHz to 40,70 MHz. The amateur radio bands between 0,15 MHz and 80 MHz are 1,8 MHz to 2,0 MHz, 3,5 MHz to 4,0 MHz, 5,3 MHz to 5,4 MHz, 7 MHz to 7,3 MHz, 10,1 MHz to 10,15 MHz, 14 MHz to 14,2 MHz, 18,07 MHz to 18,17 MHz, 21,0 MHz to 21,4 MHz, 24,89 MHz to 24,99 MHz, 28,0 MHz to 29,7 MHz and 50,0 MHz to 54,0 MHz.

[2)] r.m.s., before modulation is applied

[3)] Discharges shall be applied with no connection to an artificial hand and no connection to PATIENT simulation. PATIENT simulation may be connected after the test as needed in order to verify BASIC SAFETY and ESSENTIAL PERFORMANCE

Signal input/output parts port

Phenomenon	Basic EMC standard	Immunity test levels	
		Professional healthcare facility environment	Home healthcare environment
Electrostatic discharge[3)]	IEC 61000-4-2	± 8 kV contact ± 2 kV, ± 4 kV, ± 8 kV, ± 15 kV air	
Electrical fast transients / bursts [2) 6)]	IEC 61000-4-4	± 1 kV 100 kHz repetition frequency	
Surges Line-to-ground [1)]	IEC 61000-4-5	± 2 kV	
Conducted disturbances induced by RF fields [2) 4) 7)]	IEC 61000-4-6	3 V [8)] 0,15 MHz – 80 MHz 6 V [8)] in ISM bands between 0,15 MHz and 80 MHz [9)] 80% AM at 1 kHz [3)]	3 V [8)] 0,15 MHz – 80 MHz 6 V 8) in ISM and amateur radio bands between 0,15 MHz and 80 MHz [9)] 80% AM at 1 kHz [3)]

[1)] This test applies only to output lines intended to connect directly to outdoor cables.

[2)] SIP/SOPS whose maximum cable length is less than 3 m in length are excluded.

[3)] Testing may be performed at other modulation frequencies identified by the RISK MANAGEMENT PROCESS.

[4)] Calibration for current injection clamps shall be performed in a 150 Ω system.

[5)] Connectors shall be tested per 8.3.2 and Table 4 of IEC 61000-4-2:2008. For insulated connector shells, perform air discharge testing to the connector shell and the pins using the rounded tip finger of the ESD generator, with the exception that the only connector pins that are tested are those that can be contacted or touched, under conditions of INTENDED USE, by the standard test finger shown in Figure 6 of the general standard, applied in a bent or straight position.

[6)] Capacitive coupling shall be used.

[7)] If the frequency stepping skips over an ISM or amateur radio band, as applicable, an additional test frequency shall be used in the ISM or amateur radio band. This applies to each ISM and amateur radio band within the specified frequency range.

[8)] r.m.s., before modulation is applied.

[9)] The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 40,66 MHz to 40,70 MHz. The amateur radio bands between 0,15 MHz and 80 MHz are 1,8 MHz to 2,0 MHz, 3,5 MHz to 4,0 MHz, 5,3 MHz to 5,4 MHz, 7 MHz to 7,3 MHz, 10,1 MHz to 10,15 MHz, 14 MHz to 14,2 MHz, 18,07 MHz to 18,17 MHz, 21,0 MHz to 21,4 MHz, 24,89 MHz to 24,99 MHz, 28,0 MHz to 29,7 MHz and 50,0 MHz to 54,0 MHz.

Test specifications for enclosure port immunity to RF wireless communications equipment

Test frequency	Band [1]	Service [1]	Modulation [3]	Maximum power	Distance	Immunity test level
MHz				W	m	V/m
385	380 –390	TETRA 400	Pulse modulation [2] 18 Hz	1,8	0,3	27
450	430 – 470	GMRS 460, FRS 460	FM [3] ± 5 kHz deviation 1 kHz sine	2	0,3	28
710	704 – 787	LTE Band 13, 17	Pulse modulation [2] 217 Hz	0,2	0,3	9
745						
780						
810 870 930	800 – 960	GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 5	Pulse modulation [2] 18 Hz	2	0,3	28
1 720 1 845 1 970	1 700 – 1 990	GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS	Pulse modulation [2] 217 Hz	2	0,3	28
2 450	2 400 – 2 570	Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse modulation [2] 217 Hz	2	0,3	28
5 240 5 500 5 785	5 100 – 5 800	WLAN 802.11 a/n	Pulse modulation [2] 217 Hz	0,2	0,3	9

NOTE: If necessary to achieve the IMMUNITY TEST LEVEL, the distance between the transmitting antenna and the ME EQUIPMENT or ME SYSTEM may be reduced to 1 m. The 1 m test distance is permitted by IEC 61000-4-3.

[1] For some services, only the uplink frequencies are included.

[2] The carrier shall be modulated using a 50% duty cycle square wave signal.

[3] As an alternative to FM modulation, 50% pulse modulation at 18 Hz may be used because while it does not represent actual modulation, it would be worst case.

5.0 Structure and function

This chapter is intended for all users of the BCU control unit. It shows the arrangement and explains the function.

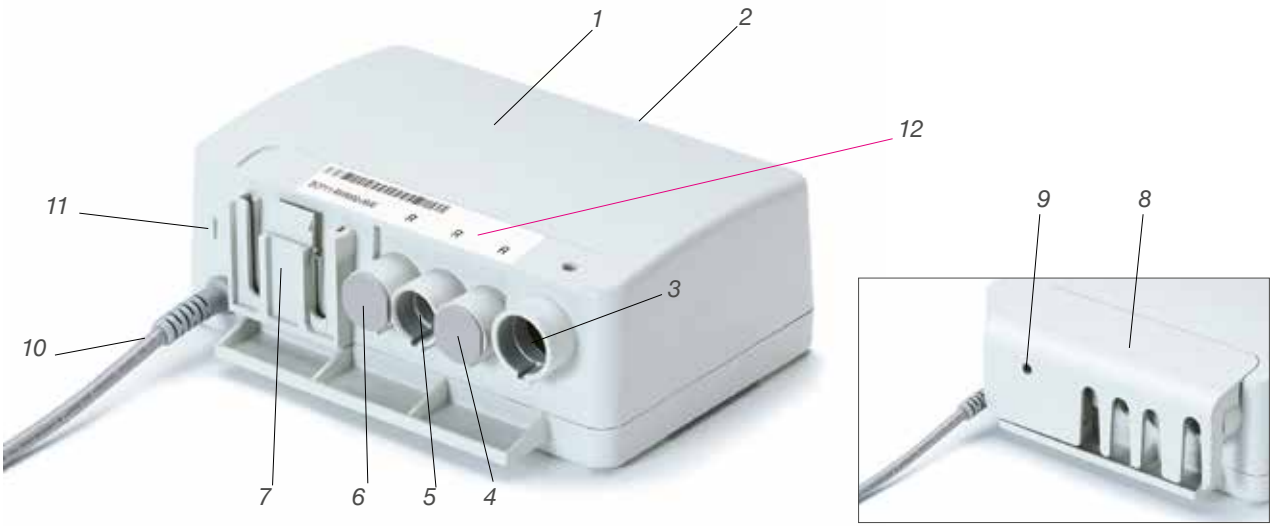
5.1 Structure

The following figures will give you an overview of the BCU control unit, its connections and operating devices.

5.1.1 Overall view and connections BCU control unit

Rear view

Fig. 1



1. Housing BCU control unit
2. Operating voltage indicator (placed on the front)
3. Connecting socket for operating device
4. Connecting socket **1** for actuator unit (with sealing stopper)
5. Connecting socket **2** for actuator unit
6. Connecting socket **3** for actuator unit (with sealing stopper)
7. Fastening for safety protective cover
8. Safety protective cover
9. Drilling for removing the safety protective cover
10. Mains cable (corresponding mains cable is already installed)
11. Ground terminal (Accessories for grounding – protection class I) – not portrayed
12. Identification of actuator and function

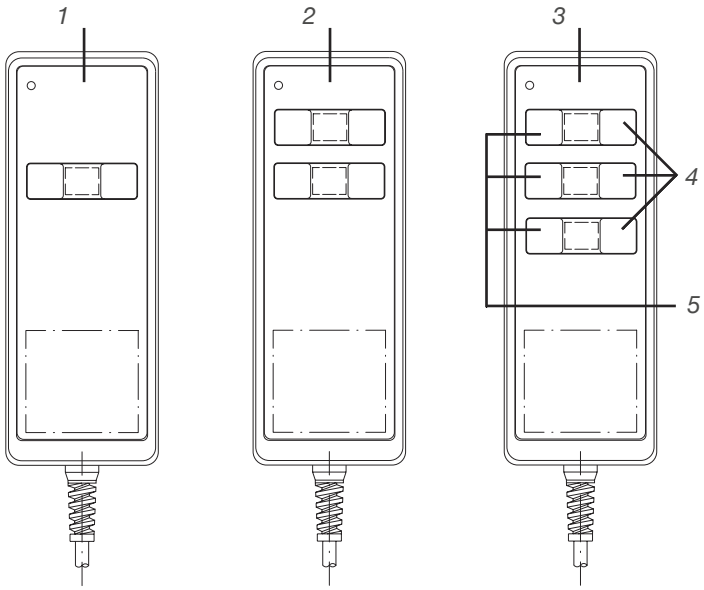
Base view

Fig. 2

1. System bracket
2. M5 screws

5.1.2 Operating devices

Fig. 3



1. Manual switch EHA31 for 1 operating function
2. Manual switch EHA32 for 2 operating functions
3. Manual switch EHA33 for 3 operating functions
4. Operating switch right-hand row «move actuator unit in» (standard configuration)
5. Operating switch left-hand row «move actuator out» (standard configuration)

5.2 Function

The description of the function will make it possible for you to understand the tasks of the BCU control unit, its operating devices and its options.

NOTE

Please note that the functions, plug layouts and options of the control unit are configured ex-works according to the requirements and cannot be changed subsequently.

5.2.1 Function principle

The principle of functioning of the BCU control unit is based on the controlling of a maximum of three connected actuator units. The functions present in the control program are actuated by means of manual switches or other operating devices. The BCU control unit is configured by the manufacturer.

The BCU control unit must be equipped with one operating device and at lease one actuator unit.

Overcurrent cut-off

The software with its integrated overcurrent cutoff switches off the BCU control unit in case of overload and protects the connected actuator units. The factory must parameterize the appropriate power-down values for the connected actuator.

Operating voltage indicator

The operating voltage indicator (↳ **position 2, fig. 1, page 18**) indicates whether the device is being supplied energy.

Safety protective cover

The safety protective cover protects the cable connections from being pulled out accidentally.

5.3 Options and Accessories

5.3.1 Options

Ground terminal

Options can be seen on the type plate.

Protection class I; three-core mains supply cable with ground terminal on the housing (↳ **position 11, Fig. 1, page 18**).

5.3.2 Accessories

In addition to the hand switch other operating units are available as accessories onrequest from a reseller or the manufacturer.

Manual switch

The manual switch (↳ **Fig. 3, page 19**) directly controls the actuator.

Move actuator unit in the actuator is moved in by pressing the right button (↳ **position 4**) with the arrow pointing downwards.

Move actuator unit out the actuator is moved out by pressing the left button (↳ **position 5**) with the arrow pointing upwards.

NOTICE

Please note that the manual switch is only conceived for one, two or three operating functions. Always use the relevant hand switch for all the user functions that are to be processed by the BCU control unit.

System bracket

The system bracket can be used to support the BCU control unit when the underside of the device is not accessible at the time of assembly (item ZBE-315 416).

6.0 Normal Operation

This chapter is directed at the users groups of operator and Operating Authority. It contains all the information that is required for the safe and problem-free use of the BCU control unit in normal operation.

In normal operation the BCU control unit analyses signals from one operating device in order to activate the stroke movement with the appropriate actuator.

6.1 Preconditions for operation

The BCU control unit controls one to three actuator units. The safety protective cover must be closed and the power supply ensured (energy supply lamp glows).

⚠ WARNING

Warning regarding electrical shock owing to damaged plugs or damaged mains cables. Never touch a damaged mains plug or a damaged mains cable when the BCU control unit are supplied 120 V AC or 230 V AC.

- Ensure, before you pull a defective plug out of the plugsocket, that the current fuse is cut off.
- Check the power cable regular for damage

6.2 BCU control unit Powering on

The preconditions for operation must be fulfilled (↳ **6.1 Preconditions for operation, page 21**). Operation takes place using an operating device (↳ **5.3 Options and Accessories, page 20**).

Note: The connection to the actuator unit is achieved with a safety low voltage (24 V DC).

6.3 Shutting down

Shut the BCU control unit down by pulling the plug of the control unit from the socket.

7.0 Special Operations

The following chapters are part of the special operations:

7.1 Installation and Initial Start-Up

8.0 Maintenance, Clearing Malfunctions, Repair, page 25

9.0 Removing from Service, Dismantling and Disposal, page 27

7.1 Installation and Initial Start-Up

This chapter is intended for the technicians and executors. It contains all the information that is required for the erection, connection and commissioning of the BCU control unit.

7.2 Preparation

Optimum preparation is a part of efficient installation and commissioning. This includes, among other things, clarifications regarding the locations and the preparation of the energy supply.

7.2.1 Transport

NOTE

The control unit must be examined for cracks in the housing when it is delivered. Immediately report any transportation damage that is found in writing to the freight-forwarding company and the manufacturer.

The BCU control unit is delivered packed as one unit in a cardboard box or in palettes. Entrust a freight forwarder with the dispatch of the BCU control unit.

Return to the manufacturer

Prepare the BCU control unit for transport as follows:

1. Dismantle the BCU control unit (↳ **9.2 Dismantling, page 27**).
2. Pack the BCU control unit carefully.

NOTE

The weight, the dimensions and the environment conditions can be found under the technical data in the Annex (↳ **Technical Data, page 29**).

7.2.2 Check the supply schedule

The BCU control unit consists of:

- a complete control unit
- with safety protective cover
- mains cables with power plugs
- 2 sealing stoppers (pre-assembled by factory; Art ZDV-160307-0008)

7.2.3 Energy supply

The BCU control unit require electrical energy only for operation. Note the connected loads in the annex of this operating manual (↳ **10.0 Appendix, page 28**).

7.3 Installation and connections

The erection and alignment of the BCU control unit, as well as the interfaces and connections are shown in the following sections.

7.3.1 Erection and alignment

The following points must be kept in mind as regards the erection and alignment of the BCU control unit.

Ensure that:

- the mains plug remains accessible at all times,
- the mains cable cannot get crushed by the operation of the actuator,
- the connecting cables to the actuators cannot get crushed.

7.3.2 Interfaces and Connections

⚠ CAUTION

Warning regarding damage to the control unit owing to tilted plugs or damaged cables. Ensure that the plugs remain freely accessible and all cables remain safe and hidden.

Nominal values are given in the annex (↳ **Technical Data, page 29**). Check the following interfaces and connections and carry out the following processes:

- Connect operating device
- Connect the actuator unit
- Mount the safety protective cover

- Follow the instructions on the type plate
- Protection class I unit: connect ground wire
- Connect the network cables to the sockets

7.3.3 Process: Connect the operating device

Connect the HD15 plug of the operating device carefully and in the correct position to the corresponding socket of the BCU control unit.

Remark: Please note the additional instructions in section (↳ **5.3.2 Accessories, page 20**).

7.3.4 Process: Connecting the actuator unit

Requirements: Only actuators that have been approved by the manufacturer may be connected. Contact customer service to ensure that the actuator unit used for this control unit is permitted.

1. Plug in the plug of the actuator in the corresponding connecting socket of the BCU control unit (↳ **Fig. 1, page 18**).
2. Verify the letter on the actuator cord, corresponds with the letter on the label (↳ **pos. 12, Fig.1, page 18**).

NOTE

The IPX4 protection is only guaranteed if the connecting sockets not being used are closed with a sealing stopper. Two sealing stoppers are part of the supply schedule.

7.3.5 Process: Mount the safety protective cover

Requirements: All the connections are connected and the cables secured and hidden.

Plug the safety protective cover to the rear side of the device BCU control unit till the fastening of the safety protective cover meshes.

NOTE

If it is not possible to place the safety protection cover properly the plugs may not be inserted properly.

NOTE

You can remove the safety protective cover only with a tool (↳ **9.1 Shutting down, page 27**).

7.3.6 Process: Connect ground wire

Requirements: Only for units with protective class I

Connect the cable shoe to the earth connection using the nut from the ground wire screw.

Important: The nut may not be tightened too much because this could cause damage to the housing and the IPX4 protection could no longer be guaranteed. A proper connection must verified regularly.

7.3.7 Installation

⚠ CAUTION

To prevent electrical shock, this BCU controller may only be connected to a power with a protective Earth. The Protective Earth connector must secure a reliable connection to avoid a high contact resistance which can not become loose.

⚠ WARNING

Warning regarding electrical shock owing to damaged plugs or damaged mains cables. Never touch a damaged mains plug or a damaged network cable when the BCU control unit is running, since the BCU control unit are supplied 120 V AC or 230 V AC.

- Ensure, before you pull a defective plug out of the plug socket, that the current fuse is cut off.
- Check the power cable regular for damage.

Bolting

On the underside of the BCU control unit, there are holes for screws. Depending on the application, you can fasten the BCU control unit with screws (also ↳ **Dimensions, page 30**). If the underside of the BCU control unit is not accessible, a system bracket can be supplied as an accessory (↳ **5.3.2 Accessories, page 20**). With the system bracket, the BCU control unit can be screwed or bolted from the upper side.

⚠ WARNING

The control can be damaged if the M5 screws are tightened to a greater depth than 10 mm.

7.4 Initial Start-Up

Before you make the BCU control unit operational, carry out the installation inspection.

7.4.1 Installation inspection

Check the following points before the commissioning:

- Operating device connected (↳ **7.3.3 Process: Connect the operating device, page 23**)
- Actuator unit connected (↳ **7.3.4 Process: Connecting the actuator unit, page 23**)
- Unused connecting plugs closed with stopper plugs (↳ **7.3.4 Process: Connecting the actuator unit, page 23**)
- Safety protective cover installed (↳ **7.3.5 Process: Mount the safety protective cover, page 23**)
- Energy supply guaranteed
- Mains cable connected
- free access to the mains plug ensured
- Operating voltage indicator lights up

7.4.2 Commissioning

After a successful installation inspection, you can make the BCU control unit operational. To do so, press the corresponding actuation button of the operating device.

8.0 Maintenance, Clearing Malfunctions, Repair

This chapter is intended for the technicians and executors. It contains all the information that is required for the maintenance, troubleshooting and repairs of the BCU control unit.

8.1 Maintenance

The maintenance includes all the work that serves for the upkeep of the functional BCU control unit. This work includes inspections, replacement of wear parts and cleaning.

8.1.1 Maintenance plan

The BCU control unit is maintenance-free during its entire life (the life is specified in the annex, ↳ **10.0 Appendix, page 28**). The connecting cable and the housing must be checked regularly for wear.

8.1.2 Cleaning

⚠ CAUTION

Take care not to damage the BCU control unit from water jets. The BCU control unit is protected against spraying water according to IPX4, but not against water jets. Prevent the BCU control unit from being subjected to water jets.

Please remember the following with respect to the cleaning:

- Washing water, including the chemical additives must be PH-neutral
- alkali or acidic washing water can damage metal and plastic parts
- Hand wiping disinfecting only with isopropyl alcohol

NOTE

Any cleaners other than those mentioned will damage the BCU control unit.

8.2 Malfunctions

Faults that occur at the BCU control unit may only be rectified by technicians authorized by the manufacturer. For this purpose, the BCU control unit must be shut down and sent to Ewellix (↳ **3.2.1 Transport, page 22**).

The following sections contain notes on how you can detect faults, rectify them or treat them.

8.2.1 Fault rectification

1 – Actuator does not move any more.

Hypothesis 1-A:

No supply voltage, or wrong supply voltage, or missing plug contact or supply indicator lamp does not glow.

1. Check the operating voltage specification on the type plate and check whether the mains voltage of the socket corresponds to this value.
2. Check the mains plug of the BCU control unit and insert it if required into a mains socket.
3. Check the supply voltage and if required, change the fuse.
4. Check the HD15-plug of the operating device and if required, insert it into the BCU control unit (↳ **7.3.3 Process: Connect the operating device, page 23**).
5. Check the DIN8 plug of the actuator and if required, insert it into the BCU control unit (↳ **7.3.4 Process: Connecting the actuator unit, page 23**).

Are the supply voltage and the plug contacts intact?

Yes **6.0 Normal operation, page 21**

No **Hypothesis 1-B**

Hypothesis 1-B:

BCU control unit is overheated or the supply indicator lamp does not glow.

1. Pull the mains plug of the BCU control unit out of the mains socket and wait for about 30 minutes.
2. Insert the mains plug into the mains socket.

Was it BCU control unit overheated?

Yes — Report to the customer service

No — **Hypothesis 1-C**

Hypothesis 1-C:

Actuator faulty.

1. Carry out the troubleshooting in the operating manual of the actuator.

Is the actuator defective?

Yes — Replace the actuator and report to the customer service.

No — **Hypothesis 1-D**

Hypothesis 1-D:

Life exceeded.

1. Check whether the BCU control unit is older than 10 years or has gone through more than 100 000 double-strokes.

Has the life been exceeded?

Yes — Replace the BCU and report to the customer service

No — **Hypothesis 1-E**

Hypothesis 1-E:

The actuator cannot be made to move again by any of the aforementioned measures.

1. Immediately contact the manufacturer.

BCU control unit carries out the wrong function or no function at all.

Hypothesis 2-A:

Parameter set of the BCU control unit is not correct for the actuator unit.

2. Check the type plate of the BCU control unit and the parameter set BCP.
3. Check the type plate of the actuator unit.
4. Contact the manufacturer.

8.2.2 Repair

Repair work must always be carried out only by a technician authorized by the manufacturer. Please do contact the customer service department in any case.

9.0 Removing from Service, Dismantling and Disposal

This chapter is intended for the technicians and executors. It contains all the information that is required for the shutdown, dismantling and disposal of the BCU control unit.

9.1 Shutting down

The BCU control unit must be shut down in the following sequence.

1. Render it BCU control unit voltage-free (isolate it) by pulling the plug of the control unit from the socket.
2. Remove the safety protective cover.
   2.1 Press through the hole of the safety protective cover with a pin or a thin screwdriver on the retaining spring (↳ **Fig. 1, page 18, position 9**).
3. Pull the DIN8 plug of the actuator out of the BCU control unit.

You can then dismantle or re-install the BCU control unit.

9.2 Dismantling

Before you start dismantling, shut down the BCU control unit (↳ **6.3 Shutting down, page 21**). The BCU control unit should be dismantled in the following sequence:

Loosen and remove the fastening screws.

You can then prepare the BCU control unit for the transport (↳ **7.2.1 Transport, page 22**), or store it or dispose of it as described in the sections that follow.

9.3 Storage

For disposal and transport, pack the BCU control unit in its original packing. Take into consideration as stated on page 35 values when selecting the storage location:

Room temperature: +5 °C to +40 °C

Atmospheric humidity: 5% to 85%

9.4 Disposal

The BCU control unit must be disposed of in a technically proper manner and in accordance with the local specifications.

A description of the dismantling and the requirements for the transport can be found in the corresponding sections.

10.0 Appendix

Technical data

Please refer to the following document:

Control units catalogue

PUB NUM IL-06008/3-EN-April 2022

For further technical information please contact Ewellix.

BCU

Control unit

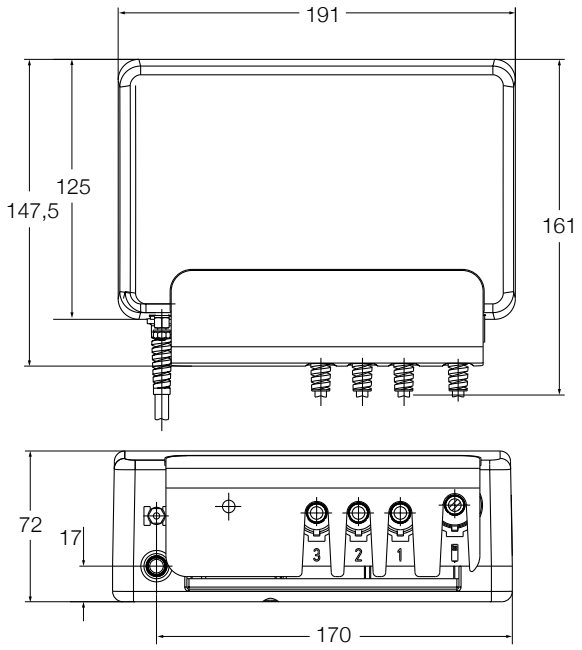
Benefits

- Compact 3-channel actuator control unit
- Single fault safety
- Overload and over-temperature protection
- Approved for medical applications
- Easy to clean
- Low standby current

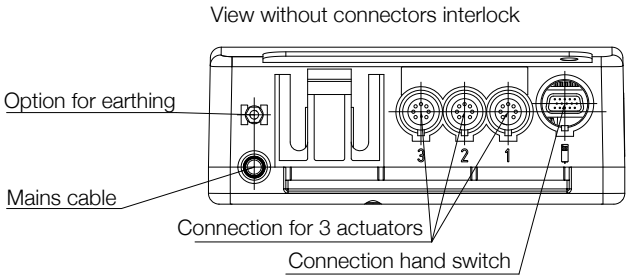
Technical data

	Unit	BCU 5	BCU 8
Motor ports (DIN8)	#	3	3
Operating device ports (HD15)	#	1	1
Battery ports	#	0	0
Limit switch ports	#	0	0
Single fault safety	yes/no	yes	yes
Encoder processing	yes/no	no	no
Input voltage	V AC	120	230
Frequency	Hz	60	50
Input current (max)	A	2,5	1,3
Standby power	W	1,2	1,5
Output voltage	V DC	24	24
Output current (max)	A	7	7
Duty cycle: intermittent	min.	1 min./9 min.	1 min./9 min.
Duty cycle: short time	min.	2	2
Ambient temperature	°C	0 to +40	0 to +40
Humidity	%	5 to 85	5 to 85
Degree of protection	IP	×4	×4
Approvals		IEC 60601-1(ed.3)	IEC 60601-1(ed.3)
Weight	kg	2,3	2,3

Dimensional drawing



Connecting diagrams



Suitable control units and accessories

	Linear actuators						Columns						Operating switches		
	CALA 36A (24 V DC)	CARE 33A	Magdrive MD22, MD23	RU20, RU21, RU22	MAX 10, MAX 30	ECOMAG	THG 10	TLG 10	TLT 10	TFG 10	CPMT1	TXG 10	EHA3	STJ	STE
BCU 5	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
BCU 8	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Hand switch Foot switch Desk switch

Ordering key

BCU control unit

Voltage

5 120 V AC, 60 Hz, class I
8 230 V AC, 50 Hz, class II

Mains power supply cable

2J Class II, straight 3,5 m, 2-pole plug, EU (for voltage type 8)
2H Class II, straight 3,5 m, 2-pole plug, UK (for voltage type 8)
2L Class I, straight 3,5 m, 3-pole plug, UL (for voltage type 5)

Each BCU needs a BCP

BCU parameterization

Functionality

11 All channels individually
21 Channel 2+1
30 All channels simultaneously
T1 Trendelenburg

Motors

A	CALA 36A (24V DC), ECO2, ECO3, ECO4, ECO5	3,7 A	Actuator 1	–
C	CARE 33A, TLT10 [1], TXG10 (EXG)	4,7 A	Actuator 2	–
E	TFG, ECO6, ECO8, ECO9	5,7 A	Actuator 3	–
M	MAX10, MAX30, THG10, TLG10	6,7 A		
R	RU20, RU21, RU22	8,5 A		
D	MD22, MD23	8,5 A		
S	CPMT1–1 [2]	8,5 A		
T	CPMT1–2 [2]	8,5 A		

Soft start/stop

0 Hard
3 Medium
6 Soft (on request)

[1] TLT is a 2-motor actuator. If simultaneous run is needed, BCP21-CC... is recommended.
[2] Reduced lift capability : CPMT-1 up to 3 000 N, CPMT1-2 up to 4 000 N

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