

# siegmund

## Operating manual

(Translation of the original operating manual)

## Welding Cell

Item no. 00xx.RC



**Bernd Siegmund GmbH**

Keep for future reference!

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## Legal notice

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# 1 General information

**IMPORTANT**

Read carefully before use!

Keep for future reference!

This operating manual contains information on the safe handling of the welding cell, item numbers 00xx.RC, a fixture in which a welding robot is installed. The "x" in the item number stands for different versions. The versions with the item numbers 0020.RC, 0030.RC and 0040.RC have existed up until now. Additional item numbers will be assigned for new versions based on this criterion.

The welding cell is also referred to as a "product" in this operating manual.

Before commencing their activities, all people who are tasked by the owner with the operation, maintenance or repair of the welding cell must have read and understood the operating manual, in particular section "2 Safety". This especially applies to personnel who are only occasionally tasked with work on the welding cell, e.g. maintenance technicians and external personnel.

**⚠ WARNING****Observe the operating manual:**

- All people who operate the welding cell must have read the operating manual beforehand.

The owner must ensure that at least one copy of the operating manual is available at the welding cell and accessible to the target people who handle the product.

The operating manual is part of the product and must be kept throughout its service life.

The operating manual must be passed on to every subsequent owner or user of the welding cell.

The manufacturer will not be liable for personal injuries and property damage that are attributable to non-observance of the operating manual and in particular the safety instructions given in the operating manual.

## 1.1 Target group

The target group of this operating manual are all people who are tasked by the owner with activities (e.g. operation, cleaning, maintenance, repair, etc.) on the welding cell. This will also apply to external personnel.

Furthermore, observe the personnel requirements specified in section 2.2!

## 1.2 Documentation

Product-related documentation that includes e.g. technical drawings and this operating manual, is included with the welding cell.

The scope of delivery includes an installation manual. The data sheet for the protective welding screens and the manufacturer's information on the table used are available in the download area of Bernd Siegmund GmbH.

The structure of this operating manual complies with the relevant standards and regulations.

## 1.3 Definitions

| Term  | Explanation                                                                                                                           |
|-------|---------------------------------------------------------------------------------------------------------------------------------------|
| Cobot | Collaborative robot for collaboration with people without protective equipment according to ISO 10218-1 and 2 as well as ISO TS 15066 |

## 1.4 Copyright

This operating manual as well as the operating documents remain the intellectual property of Bernd Siegmund GmbH. They are supplied to the customer/owner as an integral part of the product.

Without our explicit consent, these documents may be neither duplicated nor made available to third-party companies, in particular competing companies.

## 2 Safety

### 2.1 Explanation of safety instructions and warning notices

This operating manual contains safety instructions and warning notices which are intended to prevent personal injuries and property damage. It is essential to observe the warning notices. Failure to observe these notices can lead to personal injuries, property damage and damage to the welding cell.

#### Presentation of safety instructions and warning notices

Safety instructions and warning notices are clearly highlighted. They have the following structure:



#### **WARNING**

##### Type of danger

Description, cause and source of the danger

- Measure 1 to avert the danger
  - ⇒ Optional: submeasure
- Measure 2

The following signal words are used:

|                                                                                                    |                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>DANGER</b>   | Warning of immediate severe injury or risk to life<br>Indicates an immediately hazardous situation that will lead to death or severe injury if the safety measures are not observed. |
|  <b>WARNING</b> | Warning of potential severe injury or risk to life<br>Indicates a potentially hazardous situation that can lead to death or severe injury if the safety measures are not observed.   |
|  <b>CAUTION</b> | Warning of a danger<br>Indicates a potentially hazardous situation that can lead to minor or slight injury if the safety measures are not observed.                                  |
| <b>NOTE</b>                                                                                        | Warning of property damage<br>Failure to observe this notice can result in damage to the machine or its surroundings.                                                                |

#### Simplified safety instructions and warning notices

Safety instructions and warning notices may deviate from the form shown above if they are also understandable and actually more succinct in simplified form.

Simplified safety instructions and warning notices consist of

- Signal word with coloured background corresponding to the warning levels
- Information text

Example of a simplified warning notice, "Warning" danger level:



- Text of the simplified safety instruction and warning notice

### Warning symbols

The following symbols indicate hazards:

|                                                                                   |                             |                                                                                    |                       |
|-----------------------------------------------------------------------------------|-----------------------------|------------------------------------------------------------------------------------|-----------------------|
|  | General hazard              |  | Risk of crushing      |
|  | Risk from optical radiation |  | Risk of hand injuries |
|  | Danger from suspended loads |  | Electrical hazards    |
|  | Danger from hot surfaces    |                                                                                    |                       |

### Prohibition symbols

The following symbols indicate prohibitions:

|                                                                                     |                |                                                                                      |                                                                        |
|-------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------|
|  | Access denied! |  | No access for people with electrical medical implants, e.g. pacemaker. |
|-------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------|

### Personal protective equipment

The following symbols indicate that personal protective equipment must be worn:

|                                                                                     |                         |                                                                                      |                     |
|-------------------------------------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------------|---------------------|
|  | Use hand protection     |  | Use foot protection |
|  | Use head protection     |  | Use eye protection  |
|  | Use protective clothing |  | Use a welding mask  |

Also observe the owner's in-plant health and safety regulations concerning the wearing of personal protective equipment!

The statutory safety and accident prevention regulations apply irrespective of the instructions and information provided in this operating manual. The observance of all applicable health and safety regulations and statutory requirements is a prerequisite for avoiding personal injuries and damage to the product during operation, maintenance, repair work, etc.

## 2.2 Obligations of owner and personnel

### 2.2.1 Obligations of owner, organisational measures

The owner tasks in-house personnel or external personnel with the operation, maintenance, repair, etc. of the welding cell.

#### **Danger warnings**

The owner must ensure that the safety instructions and warning notices for the product are observed and that the safety instructions and warning notices as well as the information signs are in a clearly legible condition.

#### **Modifications**

Without the consent of the manufacturer, it is not permitted to make any modifications (retrofits, additions) to the machine if such modifications may impair safety. When installing safety devices, they must also be agreed with the manufacturer or the effects on safety must be considered through their own efforts. When safety devices are added or replaced, e.g. safety switches, sensors for position monitoring must always maintain or increase the existing safety level, e.g. performance level of control-related safety devices. New safety devices must not impair the effectiveness of existing ones.

#### **Checks, servicing**

Legally required periods for recurring checks and servicing as specified in section "7 Repairs and, maintenance" in the operating manual for the components must be observed.

#### **Personnel selection, personnel qualification**

Work on the welding cell must only be carried out by reliable personnel authorised to do so by the owner. Activities on the welding cell require the knowledge of a trained person; additionally, an appropriate technical qualification is required for certain activities. The owner must therefore ensure that trained personnel are used for operation, maintenance, repair, etc. of the welding cell and that qualified specialist personnel are used insofar as the activity to be performed requires such personnel.

#### **Certified instruction of operating personnel**

- The owner is obliged to instruct every person who works on or with the product. The owner should be provided with confirmation of participation in instruction and training measures, etc. relating to the welding cell.

### **WARNING**

- Access to the product is restricted to trained and authorised personnel only.



- The owner must clearly and unambiguously define the areas of responsibility of personnel with respect to operation, maintenance, repair, etc.
- The owner must establish the responsibilities of the operating personnel, also with regard to safety-compliant conduct, and empower the operating personnel to refuse to carry out unsafe activities.
- Personnel who are in the training, instruction, learning or onboarding phase, as well as people under the age of 18 may work on the welding cell only if they are under the constant supervision of an experienced person.

The owner must take organisational and instructive measures to ensure that the relevant safety standards and safety rules are observed by people who are tasked with operation, maintenance and repair of the machine.

The owner must check the safety-aware and risk-conscious conduct of the personnel at least occasionally.

### Personal protective equipment

The owner is obliged to provide personnel with the required personal protective equipment, e.g. welding goggles, protective clothing, protective gloves and safety footwear.

The owner must ensure that only personnel with the required protective equipment work on the welding cell.

### 2.2.2 Obligations of personnel

All people who are tasked with working on the welding cell are obliged

- to conduct themselves in a safe and responsible manner at all times in order to ensure occupational health and safety;
- to follow and comply with national laws and regulations as well as the applicable in-plant regulations defined by the owner with respect to accident prevention, work safety and firefighting;
- to observe the operating manual for the components (robot, welding unit) when working on the welding cell. This particularly applies to personnel who are only occasionally active (e.g. personnel tasked with maintenance of the welding cell);
- to perform the following if the operating behaviour changes and if malfunctions occur which jeopardise the safety of people:
  - to cancel the operation immediately
  - to immediately report the faults to the relevant authority / person
  - to notify the affected personnel

## 2.3 General safety instructions

When working on and in the welding cell, the following must be observed:

- The safety instructions in this operating manual
- Occupational safety and accident prevention regulations for all activities with robots and for the specific welding processes carried out in the welding cell
- The owner's instructions for the welding processes used

In addition, the operating manual for the robot and the welding unit must be observed, in particular the safety and warning notices.

The welding cell may be used only if it is fully functional and in a technically flawless condition. Before each use, a visual inspection of the welding cell must be carried out to ensure that it is functioning properly, e.g. check

- for damage, i.e. it must always be opaque to protect against optical radiation; and
- to ensure the correct operation of the safety switches on the doors.

Replace defective components.

The robot must be firmly anchored to the welding plate or tabletop or other fixtures within the welding cell. Refer to the robot operating manual and mounting instructions for installation.

**WARNING**

- Wear suitable and approved personal protective equipment for the welding process used: Eye protection according to standards, others if necessary.

**Owner action required**

The owner must ensure the following when programming the system control:

- Safety switch with an electromagnetic lock on the safety doors: The safety doors must remain locked until robot movements are stopped. The operation must not start if a safety door is open. The safety switch on the safety must be supplied with power via the system control so that the function is maintained when the mains plug of the welding cell is not plugged in. Locking is not required if the robot moves at a speed of  $< 250$  mm/s throughout the entire operating process, and for robots specially developed for collaborative operation (cobots).
- Robot: Robot path within the welding cell. In general, it is recommended to program a protection zone that prevents the robot from leaving the safety enclosure in the event of a fault. A protection zone must be programmed for robots that are not suitable for collaborative operation.

The control cabinet and welding unit must be equipped with lockable main switches. If there is no lockable main switch on the welding unit, another way of safely interrupting the power supply must be provided and it must be prevented from being switched on again by other people.

The owner must install a sufficient number of emergency stop devices in an easily accessible position, e.g. at each access door, internally and/or externally. An emergency stop is recommended on each side where access to the welding cell is possible through safety doors. If the owner deviates from this requirement, they should record this in their own assessment.

**Dangers when working on the welding cell**

The dangers at the welding cell result above all from the robot installed in it and from the welding processes used in it.

Therefore, in addition to the following safety instructions and warning notices, the operating manual for the components installed in the welding cell must be observed.

For hazards caused by the welding processes, the following must also be observed:

- the in-house regulations on occupational health and safety; and
- the applicable health and safety regulations and accident prevention rules for the machining processes used

Start the operating process only if there is no danger to people on the welding cell. The operator must ensure that nobody is put at risk.

In case of signs of fire, e.g. smoke, a smouldering smell that does not originate from the welding process, stop the work process immediately.



### **WARNING**

#### **Risk of crushing / impact**

Robot movements in the welding cell can injure people.

- Only install approved robots in the welding cell according to the intended use specified in section 3.4.
- Secure the robot through additional protective measures provided by the robot manufacturer, e.g. programming of protection zones, use of collaborative robots, see also section 2.2.1.



### **WARNING**

#### **Danger caused by welding**

People at the welding cell can be injured by welding radiation or fumes.

- Welding in the welding cell may only be carried out with an extraction system.
- Wear approved safety glasses to protect against welding radiation.
- Observe the operating manual, in particular the safety instructions and warning notices for the welding unit that is being used.
- Only those people required for the work are allowed to be in the danger zone.

If the interior of the welding cell is divided into two work areas with a partition, manual activities, e.g. loading/unloading, can be performed in the work area in which the robot is not welding. In this case, the following safety rules apply:

- Wear suitable welding goggles and protective clothing as welding radiation, weld spatters and sparks from the other work area may not be completely prevented.
- Bend into the cabin only as much as necessary for the work.

### **WARNING**

- No access for people with electrical medical implants, e.g. pacemaker.



**WARNING****Risk of electric shock**

Live electrical components from control cabinets and the electrical installation will cause life-threatening injuries or death from electric shock if touched.

There is a particular risk if electrical components or insulation is damaged.

- Do not remove protective devices that protect against live parts, e.g. insulation and covers.
- Regular check of separation points and wearing parts to ensure that equipotential bonding and earthing of the system are intact.
- Regular check of the insulation and connections.
- Do not open the control cabinet. Store the control cabinet key in a location that is not accessible to unauthorised people.
- If electrical components are damaged and live parts are exposed, stop the operation immediately and arrange for the damage to be repaired by a qualified electrician. Re-install protective devices immediately or have them repaired.
- Work on the electrical system must only be carried out by qualified electricians.
- Keep moisture away from live parts.

Electrical components are installed in the welding cell by the owner. Therefore, once the electrical installation has been completed, the owner must carry out VDE testing in accordance with DIN VDE 0113 (EN 60204-1).

**CAUTION****Risk of physical overexertion**

People can physically overexert themselves when lifting or raising heavy workpieces.

- Use suitable transport equipment for transporting, inserting and removing heavy workpieces.
- Lift heavy workpieces with the aid of several people if necessary.
- People with limitations to their physical capacity, such as orthopaedic injuries or pregnant women, must not lift heavy workpieces.
- Avoid subjecting your back, arms and legs to excessive strain.

**CAUTION****Risk of falling**

People climbing into the welding cell can fall.

- Do not climb into the welding cell.

**CAUTION****Risk of burns**

People can burn themselves on hot workpieces, welding tools and electrical components.

- Allow workpieces to cool down before touching them.
- Do not touch welding tools or electrical components.
- Wear protective gloves.



In addition, observe the safety instructions and warning notices in the sections in which the activities with and on the welding cell are described, see section 4-8.

**Maintenance instructions**

The reliability of the product can only be guaranteed if the maintenance instructions given in this operating manual and the operating manuals of the components are followed precisely.

**Environmental regulations**

The applicable environmental regulations must be complied with during all work operations.

When selecting cleaning agents and operating materials, consider environmental compatibility, health risks, disposal regulations and the local possibilities for correct disposal!

## 3 Product

### 3.1 Product description

A robot is installed in the welding cell to perform automated welding work. The components are clamped in the welding cell.



Fig. 1 Sample welding cell

| No. | Product component                                      |
|-----|--------------------------------------------------------|
| 1   | Welding table with perforated plate                    |
| 2   | Safety doors, number depending on the customer's order |
| 3   | Side panel                                             |
| 4   | Roof, hinged                                           |
| 5   | Partition                                              |

The welding cell is available in three different sizes (internal dimensions):

- 2000 mm x 1000 mm
- 2400 mm x 1200 mm
- 3000 mm x 1500 mm

An example of a version/size is shown in Fig. 1. Other sizes can be realised at the customer's request.

The interior of the welding cell can be divided into two work areas with a partition. In this case, the robot can work in one area and manual activities, e.g. loading / unloading can be performed in the other area with suitable protective measures, safety devices and personal protective equipment.

## 3.2 Scope of delivery

The welding cell comprises the components described in section 3.1.

The welding cell is mounted on welding tables supplied by Bernd Siegmund GmbH. These may already be available at the customer's site or can be supplied with the product. One or more welding plates (perforated plates) can optionally be mounted. The welding cell can be adapted to additional equipment, e.g. welding table, perforated plate.

As new versions can be created as well as versions adapted to customer requirements, the respective version and the additional equipment available for this can be found in the offers for configurations and specifications provided by Bernd Siegmund GmbH. The scope of delivery includes an installation manual. The data sheet for the protective welding screens and the manufacturer's information on the table used are available in the download area of Bernd Siegmund GmbH.

The welding cell is optionally equipped with a welding plate. The interior can be divided into two or more work areas with partitions.

Depending on the order, other optional components may be, for example:

- Safety switches
- Wiring
- Emergency stop devices
- Accessories for the table

If necessary, plugs are supplied to protect against radiation leakage and intervention into the robot cell through the welding table and these must be installed by the owner.

The robot installed in the welding cell, the welding equipment, the extraction system and any other safety devices are provided by the owner and are not included in the scope of delivery.

The system and robot control, including the safety functions, are also programmed by the owner.

## 3.3 Operator positions

Operator stations are located at the sides of the welding cell equipped with safety doors for inserting and removing the components to be processed.

## 3.4 Intended use

The welding cell serves as a safety enclosure for welding work carried out by a robot installed in the cell.

The welding cell is intended to be mounted on welding tables supplied by Bernd Siegmund GmbH, which are already available at the customer's site or can be supplied together with the welding cell.

It is intended for the work in the welding cell to be done with

- an arc welding process, MIG; MAG; TIG; plasma welding; or
- welding processes for which the protective welding screens are approved, see the product information, data sheet for the protective welding screens in the download area of Bernd Siegmund GmbH.

It is only permitted to operate the welding cell with an extraction system.

The welding cell is equipped with components for this purpose. The components are clamped. The maximum load capacity for robots, workpieces, etc. is 2 t. Higher load capacities are permitted on certain tables. These can be found in the manufacturer's information on the table, see the download area of Bernd Siegmund GmbH. Do not use tables with castors.

Robots with the following properties are approved for installation:

- Maximum load capacity: 20 kg at the end of the robotic arm
- Maximum tool centre point speed (TCP): 1,000 mm/s depending on the fixing of the table to the floor or in agreement with the manufacturer

A protective area must be programmed for the robot within the welding cell to prevent the robot from leaving the welding cell.

It is also permissible to mount the robot on a linear guide.

All collaborative robots (cobots) are also approved according to

- EN ISO 10218-1 and 2 Industrial robots - Safety requirements
- ISO TS 15066 Robots and robotic devices – Collaborative robots

The robots are positioned on the table and can also work laterally or overhead. They must be secured with mounting materials approved by Bernd Siegmund GmbH (U-shaped bracket, console, etc.).

The mounting and, if necessary, the electrical insulation, e.g. by means of an insulation plate, must be adapted to the welding process.

The welding cell may only be mounted on tables supplied by Bernd Siegmund GmbH or tables approved by Bernd Siegmund GmbH. The table can be mounted on a lifting platform or similar fixture. The installation must be carried out by the owner in a professional manner using appropriately qualified personnel and according to the technical data for the respective version of the welding cell.

Sub table boxes may be mounted.

The loading can be done

- with a crane
- with a forklift truck
- manually (light components).

Testing by the owner: If the dangerous movements caused by the overrun of the robot are not stopped before a person enters the danger zone after opening the safety door, an electromagnetic lock must lock the safety doors until the robot movements are stopped.

Welding processes may only be carried out in the welding cell if the necessary safety measures are fulfilled and the operating manuals for the devices used for this purpose are observed.

The welding cell and its components must not be modified without first consulting the manufacturer.

Intended use also includes:

- Use of the welding cell only when it is in perfect working order;
- Compliance with the operating and ambient conditions specified by the manufacturer
- Compliance with the processes described in this operating manual and observance of all safety instructions.
- Compliance with the safety instructions in the operating manual for the robot and welding equipment used.

### **WARNING**

- Use the welding cell only for its intended use in line with the technical data (see section 3.6) and the operating manual for the robot and welding equipment.

The manufacturer will not accept liability for personal injuries and property damage resulting from inappropriate use of the welding cell.

## 3.5 Foreseeable misuse

Misuse arises if

- welding processes or machining processes other than those listed in section 3.4 Intended use are carried out, in particular laser welding;
- robots other than those permitted in section 3.4 Intended use are installed in the welding cell; or
- the specified maximum loads for the welding cell table are exceeded.

### **WARNING**

- Do not use the welding cell if it or the components installed in it are damaged.

It is not permitted to

- climb into the welding cell and close the door behind you; or
- stand under the table during the welding process.

Do not carry out maintenance work while it is in operation.

The welding cell must be fully assembled for it to be operated and must not be partially or completely disassembled during the welding process.

All types of use not described in section "3.4 Intended use" are forbidden and are regarded as misuse.

### 3.6 Technical data

|                                                    |                                                                                                                                                                                               |                                      |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Dimensions<br>(Approx. length x width<br>x height) | Versions with                                                                                                                                                                                 | Approx. weight without welding table |
|                                                    | — 2000 mm x 1000 mm x 2300 mm                                                                                                                                                                 | 190 kg                               |
|                                                    | — 2400 mm x 1200 mm x 2300 mm                                                                                                                                                                 | 210 kg                               |
|                                                    | — 3000 mm x 1500 mm x 2300 mm                                                                                                                                                                 | 270 kg                               |
| Extraction system                                  |                                                                                                                                                                                               |                                      |
| Diameter                                           | 150 - 200 mm depending on the model                                                                                                                                                           |                                      |
| Performance                                        | The total internal cell volume (to be calculated based on the dimensions) must be extracted 12 times per hour (to be adjusted on site depending on the welding process and the weld material) |                                      |
| Electrical connection                              |                                                                                                                                                                                               |                                      |
| Power supplied via a power supply unit             | 230 V                                                                                                                                                                                         |                                      |
| Ambient conditions                                 |                                                                                                                                                                                               |                                      |
| Operating environment                              | Industrial and commercial areas, dry indoor areas                                                                                                                                             |                                      |
| Temperature                                        | +10 to +40°C                                                                                                                                                                                  |                                      |

The mechanical and electrical connections for the welding cell and exhaust air are described in the installation manual supplied by Bernd Siegmund GmbH, installation instructions for the robot can be found in the installation manual for the robot and instructions for the electrical connection for the welding current can be found in the operating manual for the welding equipment.

Other sizes can be realised at the customer's request.

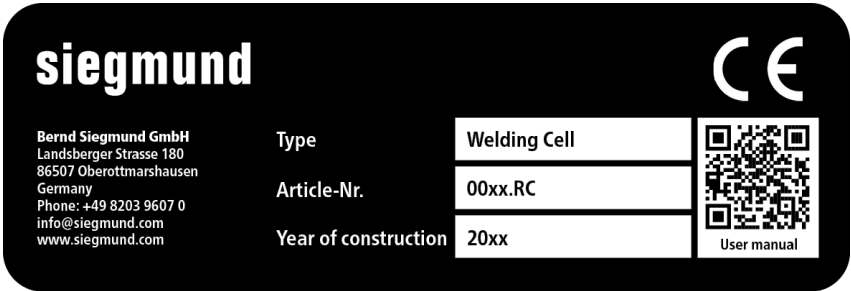
### 3.7 Safety devices

The machine has the following safety devices:

| Description                | Location                                                                                                                                                              |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Protective welding screens | Complete welding cell                                                                                                                                                 |
| Safety switches            | Doors and roof of the welding cell to be installed by the owner                                                                                                       |
| Plugs                      | Protection against intervention and radiation leakage through the perforated plate or from the welding table (Included in the delivery, to be installed by the owner) |

For welding work, the owner must install an extraction system that ensures complete removal of the fumes that are generated.

3.8 Rating plate



The "x" in the item number (article no.) stands for different versions. The versions with the product numbers 0020.RC, 0030.RC and 0040.RC have existed up until now. Additional product numbers will be assigned for new versions based on this criterion.

The "x" in the year of construction represents the year of manufacture of the respective welding cell.

## 4 Transport

### 4.1 Delivery

The welding cell is delivered by the manufacturer or transport company with appropriately qualified personnel.

### 4.2 Safety

When transporting the welding cell or its individual components, e.g. for repair or replacement, injuries may occur if they fall or tip over. Therefore, observe the following safety instructions:

- Attach the welding cell and components to be transported securely to the transport equipment.
- Use only transport equipment, lifting gear and slings that are suitable for the load. Observe the weight specifications of the welding cell or the components to be transported.
- Attach the lifting gear at suitable attachment points.
- Move the load slowly and smoothly.
- Avoid unstable positioning of the load on the transport equipment; avoid rocking and swinging.
- Observe the applicable regulations for transport with a forklift truck or crane.
- When transporting and installing individual components, observe the operating manual from the respective manufacturer, also in particular the safety instructions.
- Do not use any frayed or scored lifting gear such as ropes and belts.
- Do not place lifting gear such as ropes and belts on sharp edges and corners and do not knot or twist it.
- Put down the load when leaving the work area.

#### Personnel

- Only authorised and trained or suitably qualified people are allowed to transport the welding cell or individual components. They are responsible for correct and safe transport.
- The operator of the transport equipment must ensure that nobody is put at risk while lifting, transporting and setting down the welding cell or components. Pay attention to people in the transport path.
- All people who are not required for the work must leave the danger zone. Do not stand under loads and do not enter the swivel range of loads.



#### CAUTION

#### Risk of physical overexertion

People may physically overexert themselves when lifting or raising the welding cell or its components.

- Use suitable transport equipment to transport the welding cell or its components.
- People with limitations to their physical capacity, such as orthopaedic injuries or pregnant women, must not lift heavy components.
- Avoid subjecting your back, arms and legs to excessive strain.

## 5 Commissioning

### 5.1 Safety

Commissioning and programming only to be carried out by trained and qualified personnel.

Commissioning and programming with a hand-held programming unit. The following requirements must be met:

The automatic operation of the robot cannot be activated exclusively via the hand-held programming unit. Operation of the robot in manual mode only after previous selection of the teach mode (T1).

The robot movement initiated by the hand-held programming unit must only be performed at a reduced speed (< 250 mm/s).

Must only be controlled by a hand-held programming unit that meets the requirements of EN ISO 10218-1 and EN ISO 13849-1/2, amongst others, featuring:

- an emergency stop in accordance with EN ISO 13850; and
- three-stage enabling device.

Alternatively, a device approved by the manufacturer of the robot can be used if this meets the requirements.

Always observe robot movements from outside the danger zone. Work must always be carried out when the system is at a standstill. Movements may only be triggered if this is essential for the work. If work within the range of the moving robot cannot be avoided, the following principles apply:

- Triggering of movements only with a hand-held programming device in accordance with EN ISO 10218-1:2011 with a three-stage enabling button, emergency stop, etc.
- Only the "Manual with reduced speed" (T1) operating mode is permitted: Movements may only be carried out at a reduced speed < 250 mm/s.
- Monitoring of the work by a second person who can immediately shut down the plant in dangerous situations.

## 5.2 Owner action required

The owner must ensure the following when programming the system control:

- Safety switch with an electromagnetic lock on the safety doors: The safety doors must remain locked until robot movements are stopped. The operation must not start if a safety door is open. The safety switch on the safety must be supplied with power via the system control so that the function is maintained when the mains plug of the welding cell is not plugged in. Locking is not required if the robot moves at a speed of < 250 mm/s throughout the entire operating process, and for robots specially developed for collaborative operation (cobots).
- Robot: Robot path within the welding cell. In general, it is recommended to program a protection zone that prevents the robot from leaving the safety enclosure in the event of a fault. A protection zone must be programmed for robots that are not suitable for collaborative operation.

The control cabinet and welding unit must be equipped with lockable main switches. If there is no lockable main switch on the welding unit, another way of safely interrupting the power supply must be provided and it must be prevented from being switched on again by other people.

The owner must install a sufficient number of emergency stop devices. An emergency stop is recommended on each side where access to the welding cell is possible through safety doors. If the owner deviates from this requirement, they should record this in their own assessment.

Electrical components are installed in the welding cell by the owner. Therefore, once the electrical installation has been completed, the owner must carry out VDE testing in accordance with DIN VDE 0113 (EN 60204-1).

## 6 Operation

### 6.1 Safety

Before each use, a visual inspection of the welding cell must be carried out to ensure that it is functioning properly, e.g. check

- for damage and the tightness of the robot and all components;
- to ensure the correct operation of the safety switches on the doors; and
- the electrical wiring.

In case of signs of fire, e.g. smoke, a smouldering smell that does not originate from the welding process, stop the work process immediately.



#### **WARNING**

##### **Danger caused by welding**

People at the welding cell can be injured by welding radiation, weld spatters, sparks or fumes.

- Welding in the welding cell may only be carried out with an extraction system.
- Wear approved safety glasses to protect against welding radiation.
- Observe the operating manual, in particular the safety instructions and warning notices for the welding unit that is being used.
- Only those people required for the work are allowed to be in the danger zone.

If the interior of the welding cell is divided into two work areas with a partition, manual activities, e.g. loading/unloading, can be performed in the work area in which the robot is not welding. In this case, the following safety rules apply:

- Wear suitable welding goggles and protective clothing as welding radiation, weld spatters and sparks from the other work area may not be completely prevented.
- Bend into the cabin only as much as necessary for the work.

#### **WARNING**

- No access for people with electrical medical implants, e.g. pacemaker.



**CAUTION****Risk of physical overexertion**

People can physically overexert themselves when lifting or raising heavy workpieces.

- Use suitable transport equipment for transporting, inserting and removing heavy workpieces.
- Lift heavy workpieces with the aid of several people if necessary.
- People with limitations to their physical capacity, such as orthopaedic injuries or pregnant women, must not lift heavy workpieces.
- Avoid subjecting your back, arms and legs to excessive strain.

## 6.2 Inserting and removing a workpiece

Access via the safety doors must be requested via the control to insert workpieces into the welding cell. Machining processes and robot movements are stopped. The safety doors remain electromagnetically locked as long this persists. The safety doors are not locked for robot movements up to 250 mm/s and collaborative robots.

Light workpieces can be inserted and removed by hand. Heavy workpieces are inserted into and removed from the welding cell using transport equipment, e.g. a crane or forklift truck.

The roof of the welding cell can be lifted to insert workpieces with a crane. This is done from the ground using a rod.

The following safety rules apply when transporting heavy workpieces with a crane, forklift truck or other transport equipment:

- Attach the workpiece securely to the transport equipment.
- Use only transport equipment, lifting gear and slings that are suitable for the load. Observe the weight of the workpiece.
- Move the load slowly and smoothly.
- Avoid unstable positioning of the load on the transport equipment; avoid rocking and swinging.
- Observe the applicable regulations for transport with a forklift truck or crane.
- Do not use any frayed or scored lifting gear such as ropes and belts.
- Do not place lifting gear such as ropes and belts on sharp edges and corners and do not knot or twist it.
- Put down the load when leaving the work area.

**Personnel**

- The workpieces must only be transported by trained and authorised personnel.
- All people who are not required for the work must leave the danger zone.
- The operator must ensure that nobody is put at risk when lifting, transporting and setting down the workpieces. Pay attention to people in the transport path.

**WARNING**

Transport with a crane:

- Do not stand under loads and do not enter the swivel range of the crane.
- Wear a protective helmet

The workpiece must be attached to the welding plate or tabletop before the machining process.

### 6.3 Machining process

The system is started after inserting the workpieces to be welded. To do this, the robot and welding unit must be switched on and the plug for the welding cell must be plugged in. The machining process is started via the system control or robot. The robot welds the workpiece using the specified process and according to the specified program.

The machining process can only be started when the safety doors are closed.

The safety doors are closed and electromagnetically locked during the machining process. Locking is not required for robotic movements with a maximum speed of 250 mm/s and collaborative robots.

After the machining process, access to the welding cell must be requested again and, if necessary, the roof must be lifted with a rod (if transported by crane) in order to remove the workpieces again.

## 7 Repairs and, maintenance

Repairs and maintenance ensure that the welding cell is always safe to use. The welding cell is basically maintenance-free. However, it must be in a fully functional, undamaged condition at all times. Damage must be rectified immediately.

NOTE: In addition, observe the maintenance instructions for the robot and welding unit.

Clean the protective screens and LED profiles regularly and if they are very dirty. Visibility into the welding cell must be ensured at all times and the traffic light signals must be recognisable.

### 7.1 Safety

Before maintenance or repair work, etc., switch off the main switch of the robot and welding unit and secure them against being switched on again: Lock the main switch, remove the key and take it with you. If there is no lockable main switch on the welding unit, the power supply must be interrupted elsewhere and secured against being restored.

#### **WARNING**

- Wear protective clothing: protective gloves, safety footwear.



#### **WARNING**

##### **Risk of electric shock!**

Live electrical components installed in the welding cell, the control cabinet and other electrical installations can cause life-threatening injuries or death from electric shock if touched.

- The electrical connection and work on electrical components must only be carried out by qualified electricians.
- Perform work only on devices that have been disconnected from the mains. Observe the 5 safety rules of electrical engineering when working on electrical components:
  1. Disconnect completely
  2. Secure against reconnection
  3. Check that there is no voltage
  4. Carry out earthing and short-circuiting
  5. Provide protection against adjacent live parts
- Use insulated tools.



## WARNING

### Risk of crushing!

People may be crushed by falling or tipping components, e.g. during removal or replacement.

- Secure components against tipping and falling over before assembly or after disassembly.



## CAUTION

### Risk of burns

People can burn themselves on hot workpieces, welding tools and electrical components.

- Allow workpieces, welding tools and electrical components to cool before touching them.
- Wear protective gloves.



NOTE: Also observe the safety instructions and warning notices in the operating manual for the robot and welding unit.



## WARNING

Unsuitable replacement parts may result in injuries to people and damage to the welding cell.

- Use only original replacement parts from the manufacturer.
- If you require replacement parts, contact the service address (section 9.3)!

Correct upkeep of the welding cell requires appropriately trained specialist personnel. All maintenance, upkeep and repair work may be performed only by trained specialist personnel qualified to carry out the tasks concerned. Repairs must only be carried out by specialist personnel.

Work on the electrical system must only be carried out by trained specialist personnel (qualified electricians).

The owner is responsible for assigning specialist personnel and for providing the appropriate training.

Contact Bernd Siegmund GmbH in the case of defective components or modifications to the welding cell.

Maintenance staff and specialist personnel are responsible for ensuring that the work is performed safely and that the appropriate health and safety measures are taken. They must have read and understood the relevant regulations before starting work.

### After upkeep work:

- All covers and attachments removed during the work must be reattached before the product is used again.
- Check that all components and all connections are tight.

**⚠ WARNING**

- Maintenance work on the welding cell, robot or welding unit that is not performed promptly or is performed incorrectly may pose a risk to people after they are put back into regular operation.

## 7.2 Cleaning

Clean the welding cell regularly and clean off weld splashes.

**⚠ WARNING**

- Do not use aggressive cleaning agents.

Rub down the welding cell with a dry or damp cloth to clean it.

**NOTE**

When cleaning, ensure that contaminated washing fluids are disposed of in an environment-friendly and proper manner.

## 8 Decommissioning

### Temporary decommissioning



#### **WARNING**

- Unauthorised use of the welding cell may pose a risk to people.

Ensure suitable ambient conditions for storage; see section "3.6 Technical data".

### Final decommissioning, disposal

Disassembly may be performed only by specialist personnel.

Clean the welding cell before disassembly.

NOTE: Disassemble the robot and welding equipment according to the operating manual for these components.



#### *NOTE*

- Any residual media, especially hazardous and environmentally harmful substances from components installed in the welding cell must be collected in suitable containers and disposed of properly.



#### **WARNING**

### Risk of crushing!

People may be crushed by falling or tipping components.

- Personnel are responsible for ensuring that work is performed safely, e.g. use suitable lifting gear and slings when transporting components.
- Secure disassembled components to prevent them from falling or tipping.
- Wear personal protective equipment: protective gloves, safety footwear!



#### *NOTE*

- Disassemble the product into its components for final decommissioning and disposal.
- The parts must be recycled, disposed of in accordance with local regulations or returned to the manufacturer.

## 9 Appendix

### 9.1 Declaration of conformity

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#### EU-Konformitätserklärung / EU-declaration of conformity

|                                                  |                                                        |
|--------------------------------------------------|--------------------------------------------------------|
| Gerätebezeichnung:                               | Schweißzelle                                           |
| Description of the machine:                      | Welding Cell                                           |
| Artikelnummer:                                   | 0020.RC / 0030.RC / 0040.RC                            |
| Article number:                                  | 00xx.RC (für weitere Varianten / for further versions) |
| Name des Herstellers:                            | Bernd Siegmund GmbH                                    |
| Name of manufacturer:                            | Landsberger Straße 180<br>D-86507 Oberottmarshausen    |
| Name des Dokumentationsbevollmächtigten:         | Andreas Rack                                           |
| Name of authorized documentation representative: | Landsberger Straße 180<br>D-86507 Oberottmarshausen    |

#### Funktion / function:

Die Schweißzelle dient als Schutzumhausung für Schweißarbeiten durch einen in der Zelle installierten Roboter.

The welding cell serves as a protective enclosure for welding operations by a robot installed in the cell.

#### Angewandte harmonisierte Normen / harmonised standards used:

EN ISO 14120:2016-05 Sicherheit von Maschinen – Trennende Schutzeinrichtungen – Allgemeine Anforderungen an Gestaltung und Bau von feststehenden und beweglichen trennenden Schutzeinrichtungen

EN ISO 14120:2016-05 Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards

EN 60204-1:2019-06 Sicherheit von Maschinen – Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen

EN 60204-1:2019-06 Safety of machinery - Electrical equipment of machines - Part 1: General requirements

EN ISO 12100: 2011-03 mit EN ISO 12100:2013-08 Berichtigung 1 Sicherheit von Maschinen – Allgemeine Gestaltungsgrundsätze – Risikobeurteilung und Risikominderung

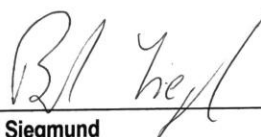
EN ISO 12100: 2011-03 with EN ISO 12100:2013-08 Safety of machinery - General principles for design - Risk assessment and risk reduction

Der Hersteller erklärt hiermit, dass das oben genannte Produkt den grundlegenden Anforderungen der Maschinenrichtlinie 2006/42/EG entspricht. Es ist als Sicherheitsbauteil nach Maschinenrichtlinie definiert.

The manufacturer declares that the abovementioned product complies with the terms of the machinery directive 2006/42/EC. It is defined as a safety component according to the machinery directive.

Oberottmarshausen, 28.07.2022

Ort, Datum  
location, date



**Bernd Siegmund**  
Geschäftsführer / CEO

## 9.2 Replacement parts



### **WARNING**

Unsuitable replacement parts may result in injuries to people and damage to the welding cell.

- Use only original replacement parts from the manufacturer!
- If you require replacement parts, contact the service address (section 9.3)

## 9.3 Service address

This operating manual contains descriptions and instructions to enable you to operate the welding cell and to perform simple upkeep tasks.

It does not describe any complex upkeep or repair work or any such work on the robot or welding unit. For such work, please contact Bernd Siegmund GmbH or read the operating manuals for these components!

You have further questions or requirements? We will be happy to help.

Our company address is:

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