USER MANUAL CONTROL UNIT
RCB11 & RCB12

About REAC

REAC is passionate about helping people in their daily lives, and by providing a wide range of advanced power solutions suitable for many different applications, we hope to make people's lives a little bit easier. Our aim is to offer our clients an excellent service, backed up by experience and know-how in the application of advanced motion systems.

REAC's power solutions contain compact and strong electrical actuators, lift and tilt systems, control units and hand controls. We know that our customers have different needs and therefore our products are designed to be customized according to their application’s specific requirements.

We are confident to say that we can solve a wide range of motion problems, so please challenge us!

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Table of Contents

1 Introduction

1.1 Documentation

This manual describes the control systems RCB11 and RCB12

The following related documentation is also available:

- RCB11 data sheet
- RCB12 data sheet
- RPP10 data sheet
- RHC10 data sheet
- General Features in RST10

1.2 Symbols

The following symbols will be used in this document:


Failure to comply with these instructions may result in accidents involving personal injury.


Failing to follow these instructions can result in the product being damaged or destroyed.


Useful tips, recommendations and information for efficient, trouble-free use.

1.3 Abbreviations

FSI – Flexible (digital) Switch Inputs

RCB – REAC Control Box

RHC – REAC Hand Control

RPP – REAC Power Pack

VPI – Versatile Power Interface

2 Product description

2.1 Overview

The RCB11 and RCB12 is a 4 channel control box.

2.2 System and compatibility

A REAC control system consists of a control box, a power source, a hand control, and one or several actuators.

2.2.1 RCB11

- RCB11 can be combined with RPP10 (REAC Power Pack), RHC10 (REAC Hand Control) and any REAC actuator[1].
- RCB11 can also be directly connected to generic digital switches, in those cases a hand control is not sufficient.

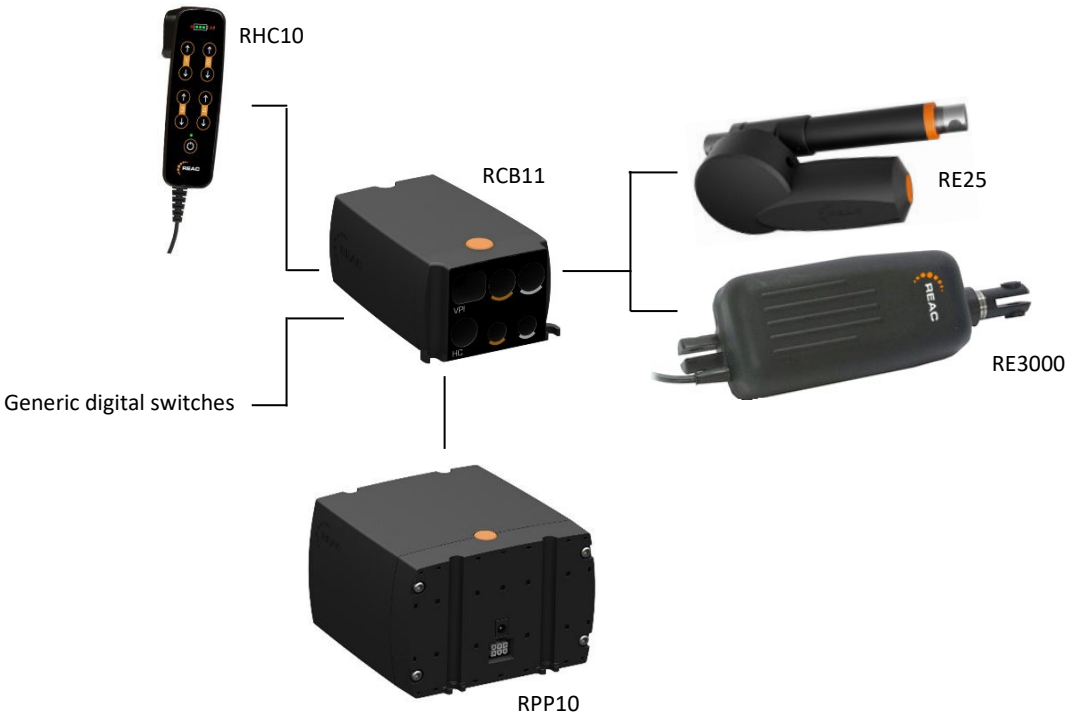


Figure 1 RCB11 System and compatibility

[1] Except RE7000 which has a special interface.

2.2.2 RCB12

- RCB12 can be combined with RPP10 (REAC Power Pack), RHC10 (REAC Hand Control) and **any** REAC actuator[2].
- RCB12 can also via an adapter (RCH12) be connected to generic digital switches, in those cases a hand control is not sufficient.

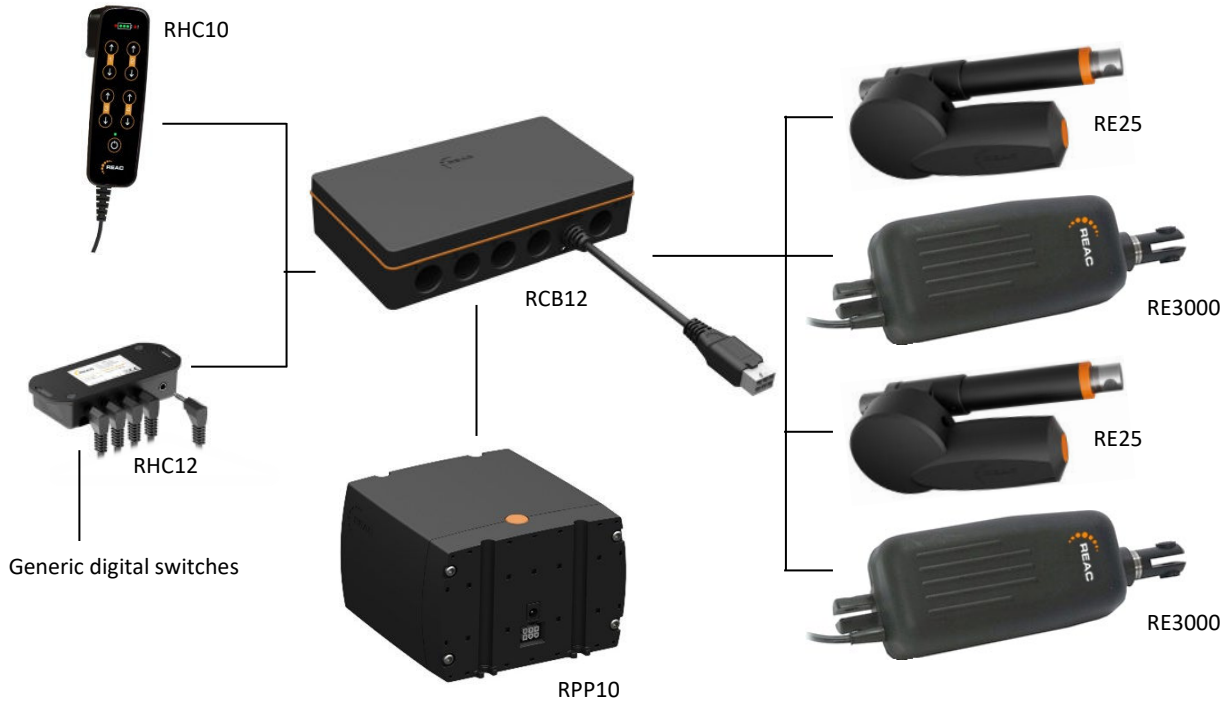


Figure 2 RCB12 System and compatibility

[2] Except RE7000 which has a special interface.

2.3 Connectors

2.3.1 RCB11 connectors

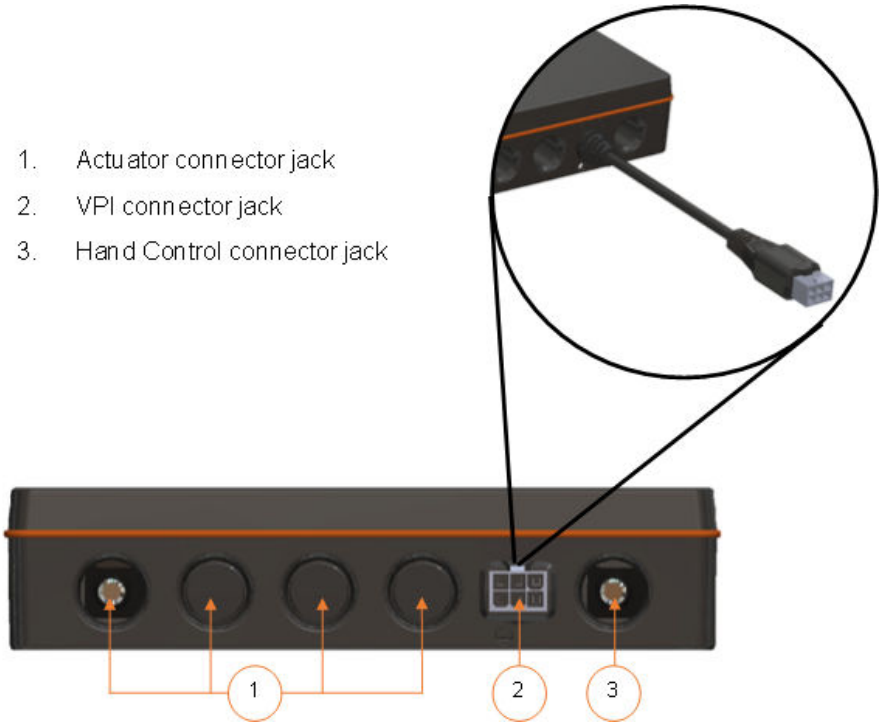
The connector front can as an option be equipped with an overlay to simplify connector mounting. The overlay can be customized to fit a certain application.

Overlay example and the placement of the connectors:

1. VPI connector jack
2. Actuator connector jack
3. Actuator connector jack
4. Hand Control connector jack
5. FSI connector jack
6. FSI connector jack

2.3.2 RCB12 connectors

1. Actuator connector jack
2. VPI connector jack
3. Hand Control connector jack



2.3.3 Connector Description

VPI Connector

VPI (Versatile Power Interface) is a connector for batteries, main supply or other external power.

Actuator Connector

Any REAC actuator[3] can be used with the RCB11, if equipped with a 6.5 mm phono connector.
To achieve full IP-protection the connector needs to be equipped with O-rings. The actuator connector can also be equipped with color markings to simplify correct mounting.

Hand Control Connector

REAC Hand Control RHC10 can be used together with the RCB11. As standard equipped with a 6.5 mm phono connector. To achieve full IP-protection the connector needs to be equipped with O-rings. The actuator connector can also be equipped with color markings to simplify correct mounting.

FSI Connector[4]

The FSI (Flexible digital Switch Input) connector is an interface for reading generic digital switches using a 3.5 mm phone connector, for applications where the hand control is not preferred.

Different control interfaces can be used, but they need to be individually configured. During evaluation and try out this can easily be done by using RST10 PC-tool (see chapter 4). For serial production a pre-calibrated software can be ordered from REAC.

The FSI connector can be equipped with color markings to simplify correct mounting.

All cables are eqipped with O-rings, without the O-rings the IP protection will be lost.

Actuator connectors and the hand control connector are of the same type. Make sure that the connectors are correctly plugged. Color coding of cables and control box is available as an option.

If digital switches are used, it is recommended to use switches that have normally open polarity, to get a "hold-to-run" behavior. Also, normally open switches will consume less power, compared to normally closed.

To simplify assembly of the O-rings put some grease on them (standard Vaseline is ok).

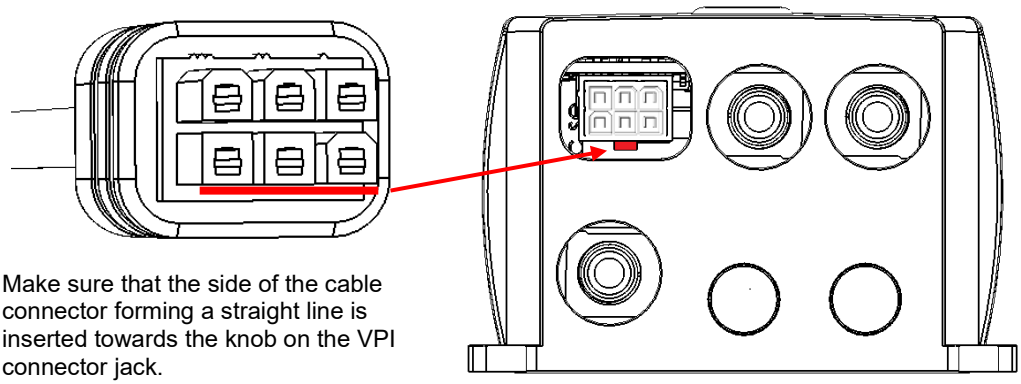
[3] Except RE7000 which has a special interface.
[4] This is only available on RCB11 Premium, to connect digital switches to RCB12 the digital input adapter, RHC12, needs to be used as a gateway.

2.3.4 Important when connecting VPI

When the VPI cable between the control box and the power pack RPP10 is connected there are a few important things to remember.

RCB11 VPI jack

The connector is keyed and must be inserted according to the picture below.



Make sure that the side of the cable connector forming a straight line is inserted towards the knob on the VPI connector jack.

RPP10 VPI jack

Please make sure that the cable is firmly attached to the unit chassis with e.g. cable ties or similar to avoid unintended detachment.

⚠ Forcing the VPI connector in to the RCB11 the wrong way can damage the control box electronics and cause malfunction.

ⓘ If the cable between the control box and the battery has been disconnected the procedure for internally connecting the battery has to be done again. The battery will be internally disconnected even if the cable is reattached. See chapter 3.2 for more information.

2.4 Power supply

RPP10

- RPP10[5]. can be used together with either RCB11 or RCB12.
- RPP10 is the Pb battery pack which both RCB11 and RCB12 are matched to by default.

2.4.1 Power connector

RCB11 and RCB12 both have to be connected to some external power source, via the VPI-connector, since they do not have any built-in battery. As long as the power source supports the VPI interface, it can be connected.

The VPI-interface supports the following types of power sources:

- A Pb matched battery pack
- A smart battery pack
- Some other third party power source.

RCB11 premium and RCB12 premium are able to automatically detect which type of power source that has been attached.

RCB11 premium and RCB12 premium are needs to be setup for handling a certain power source correctly. By default they are both setup expecting a Pb matched battery pack.

See chapter 2.6 for connection instructions.

Both RCB11 and RCB12 are equipped with a feature to handle regenerative energy from the actuators[6] to the batteries. This makes it possible to use actuators with very good efficiency, which in turn gives an improved time between charging.

2.4.2 Battery data retrieval

Depending on the type of power source used, battery data such as current charge level and other information is retrieved in different ways:

- A Pb battery pack is not able to provide any data regarding battery characteristics and charge level. The state charge of a matched Pb battery pack needs to be analyzed by the control unit, by using assumptions about the battery pack that has to be stored in the control unit, and therefor the control unit and battery pack has to be matched to work properly.
- A smart battery pack is able to provide all data regarding characteristics and charge level.
- In the case of using some third party power source, which is unmonitored by the control unit, the control unit will not be able to get any data regarding characteristics and charge level, nor be able to analyze the power source in any way. Therefore, no charge level indicator will be available in this case.

Only RCB11 premium has support for getting data from a smart battery pack.

2.4.3 Presenting charge level

Battery charge level, if available, can be presented to the user in two ways:

- By using RCB11 or RCB12 equipped with an RHC10 hand control. The standard RHC10 has a battery level indicator as default. When the low battery indicator LED is flashing, the battery level is low and charging is recommended.

[5] Further information regarding RPP10 can be found in the RPP10 Data Sheet or in the User Manual for RPP10, which can be downloaded from REAC webpage.
[6] Requires regenerating actuators.

- By using RCB11 Premium or RCB12 Premium with sound warnings enabled. Equipped with a speaker, which can give an audible feedback when the battery has reached a low battery level, and a movement is requested.

When the low battery feedback is activated a few strokes remains, how many depends on the application and the level can be configured by using the RST10 tool (see chapter 4.4.13).

The charge level can also be read using RST10 tool. For information about this see 4.4.12 .

> Charge level is only available when using a matched Pb battery or when using a premium control unit with a smart battery pack. If using some other third party power source, or using a basic control unit with a smart battery pack, charge level is not applicable.

2.4.4 Battery disconnect

Purpose

To protect power packs from deep discharge and damaged battery cells, the control unit is equipped with a battery disconnect feature which make it possible for the control unit to disconnect itself from the power pack, completely, to increase storage time. While disconnected, the storage time of a complete system will be equal to the storage

First use

When the control unit has been connected to the external battery with the cable it is still internally disconnected due to the built-in battery disconnect functionality. When the system is ready for first use the battery needs to be internally connected.

Reconnect

To reconnect the battery, plug in the standard 24 V charger delivered with the battery pack.
Wait approximately 5 seconds and then unplug the charger. The battery is now connected. The general recommendation is to keep the charger connected until fully charged.

Automatic internal battery disconnect

To prevent deep discharge and protect batteries on the field or during long transports the battery is automatically disconnected at critical low battery level or after 18 days of standby. This time can be configured by using RST10.

Request disconnect using PC tool

It is possible to manually disconnect the battery internally, via the HC bus connector, and the PC tool RST10 (chapter 4.4.12.)

Request disconnect using charge connector

It is also possible to manually disconnect the battery internally, via the charger connector, not having to unplug any other connectors. To disconnect the battery this way, plug in a 9 V power source to the charger input. Wait minimum 5 seconds and maximum 10 seconds before unplugging alternatively, if a REAC hand control (e.g. RHC10) is connected, wait for all LEDs to flash before unplugging. All LEDs flashing is a confirmation from the control unit that the battery has been disconnected.

Requirements of 9 V power source

- Output connector: 5.5 mm x 2.1 mm barrel jack with positive center
- Output voltage: 6-10 V DC (e.g. a 9 V battery can be used)
- Output current: minimum 50 mA, maximum 800 mA (fused or current limited)

2.5 Safety functions

2.5.1 Duty cycle

To prevent the actuators (the motors) from overheating, REAC control systems have a built-in supervision and protection feature. Most REAC actuators have a specified duty cycle of 2 minutes run followed by 18 minutes of rest. In the control unit, this is realized as a percentage out of a total time.

There are three limits used to determine if the user shall be warned or if the operation should stop. Each limit can be configured by using RST10, see chapter 4.4.6.

The following limits can be configured per actuator channel:

- Warning limit
- No acceleration allowed limit (OK to continue movement at current speed or slower).
- No movement allowed limit.

2.5.2 Disabled motor activation while charging

If the charger is connected motor activation is prevented by the control unit (RCB11 and RCB12). The reason is that the charger is not intended to run a motor and doing so might cause EMC disturbance from the charger.

2.5.3 Overcurrent

Over current is a limit that is used to detect if the actuator is overloaded, runs into any obstacle or reaches an end limit (if limit switches are not used). Current peaks above the set current limit is cut after 250 ms, or immediately at 2 A over current level.

It is possible to configure individual current limits for all channels via the RST10, see chapter 4.4.5.

2.5.4 Internal errors

If any internal error is detected, the operation is turned off for one channel only, or for all channels, based on the type of error. The alert indicator LED[7] is lit. Errors are automatically cleared after 10 seconds. But if the cause of an error still remains, the error will immediately return, for yet another 10 seconds.

[7] The alert LED is always available on a REAC standard hand control, RHC10.

3 Getting started

3.1 Before first use

Before using the RPP10 for the first time, you should charge the battery for 24 hours. This to ensure full charge and to prolong the lifetime of the battery.

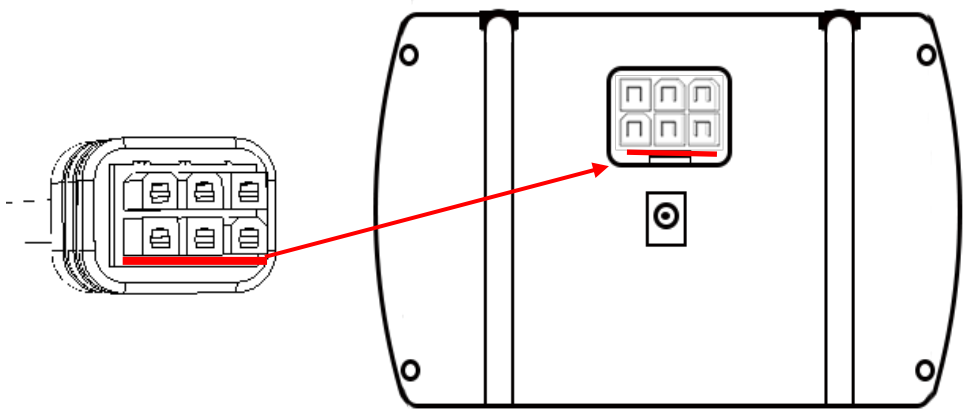
To charge the battery the first time, do the following:

1. Connect the RPP10 to a control box, see section 3.2.
2. Connect the battery charger to the RPP10 charger jack and to a wall socket.
3. Check that the LED on the charger is red, indicating charging.
4. Keep the charger connected for 24 hours.

3.2 Connecting the control box

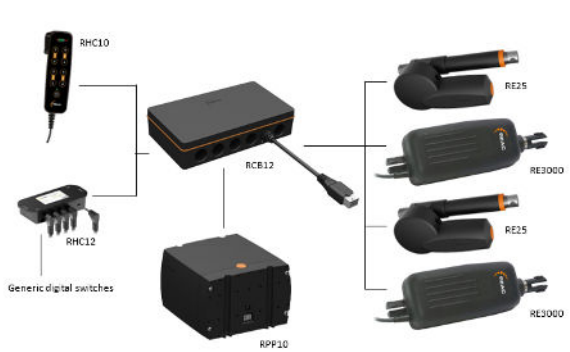
You connect the control box to the VPI connector on the RPP10. For the RCB11, a VPI cable is needed. The RCB12 control box has a fixed VPI cable

The VPI connector is keyed and must be inserted according to the image below. Make sure the part of the connector that forms a straight line is facing the straight line on the RPP10 connector.



To connect the control box to the RPP10, do the following:

1. RCB11: Connect the VPI cable to the VPI connector on the control box.
2. Connect the VPI cable to the VPI connector on the RPP10.



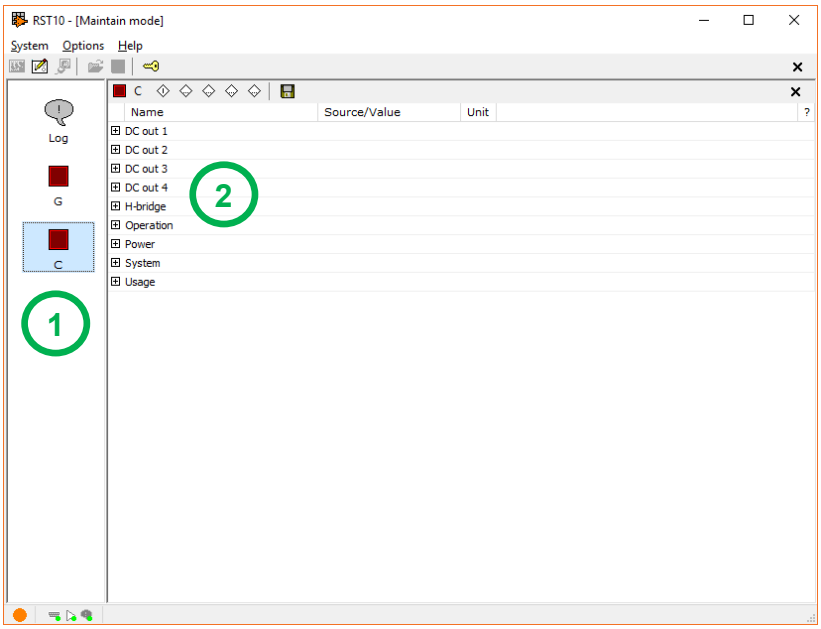
4 RST10 toolbox

The REAC Service Toolbox RST10 is a Windows software consisting of several maintenance and service tools. The RST10 can be used to configure settings, evaluate application solutions, perform service tasks, and monitor system behavior.

This chapter describes the RST10 user interface and the configurable RCB10+ parameters.

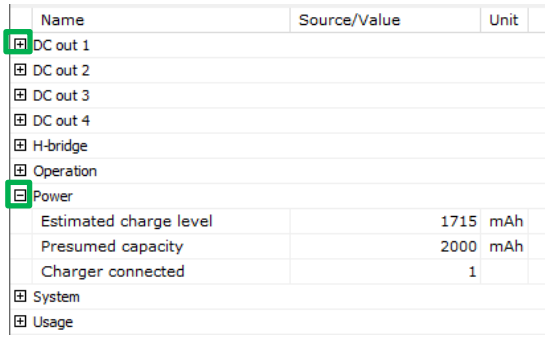
For installation and connection instructions, see section 3.3.

4.1.1 User interface

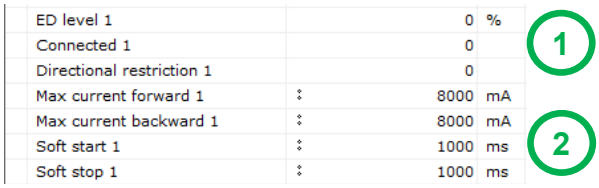


1. This area displays icons for each detected unit and a log:
    a. **Log** aggregated log for all units
    b. **G** USB adapter (gateway)
    c. **C** control box
    d. **H** hand control

    To select a unit, double-click the icon.
2. This area displays groups of status registers and parameters for the selected unit.
    a. To expand a group, click the plus sign.
    b. To collapse a group, click the minus sign.



This image shows status registers and parameters in an expanded group.



1. Status registers are values that only can be read/viewed.
2. Parameters are values that can be changed. Parameters have a colon sign in front of the value.

To change a parameter, do the following:

1. Click the parameter value.
2. Enter a new value.
3. Press Enter. The new parameter value becomes effective immediately.

Parameters related to a channel will become effective after the next movement on that channel.

4.2 RCB11 and RCB12 parameters

To view and change the RCB11 and RCB12 parameters, select the **C** icon and expand the groups.

The configurable parameters are available in the following groups:

- DC out 1-4, one group per actuator channel
- Operation
- Usage

4.2.1 Soft start and soft stop

The soft start and soft stop parameters are used to adjust the start and stop ramps of the motor.

The parameters are set in time (ms). The time is between 0 to 100% PWM. Simply explained it works more like a ramp speed setting, rather than an actual time setting. If a movement at 50% PWM is demanded, that PWM level will be reached in half the time.

The *Soft start* and *Soft stop* parameters are available in the **DC out** groups.

4.2.2 Gain

If an actuator is considered to run too fast, either because it is built that way or as a result of the mechanics around it, the speed can be limited by using the gain parameter. This can be needed, for example, if the load is “helping” the actuator in one direction.

There is one parameter in each direction: *Gain forward* and *Gain backward*. The gain parameters are set in % of the full pass-through of the signal.

The *Gain forward* and *Gain backward* parameters are available in the **DC out** groups.

Even if the parameter is called “gain”, this is not about amplification of the signal.
The maximum gain is the neutral 100%, meaning that it is only possible to reduce the signal.

4.2.3 Low battery warning

The hand control has a low battery LED and the RCB10+ Premium has a low battery sound alarm. The LED starts flashing and the alarm gives a sound when the RCB10+ has reached a low level.

It is possible to adjust the level for when the low battery warnings will be activated.

The level is set as an absolute value in mAh. This makes it possible to set a level where there are a certain number of strokes left for a typical application, regardless of power source.

The low battery warning parameter is available in the **Operation** group.

4.2.4 Service intervals

RCB10+ can optionally be used with other hand controls than RHC10. Some hand controls have a service interval indication LED. It is possible to adjust the limits for the service indication and to reset the interval counters.

> ⚠ Only authorized personnel is allowed to change the service limits and reset the counters. If necessary service is not performed, damage to the system and personal injury can occur.

The service interval limit defines the number of strokes before the service indication LED on the hand control will light up.

The limit is set per channel using the parameter *Strokes service interval X*, where X is the channel number.

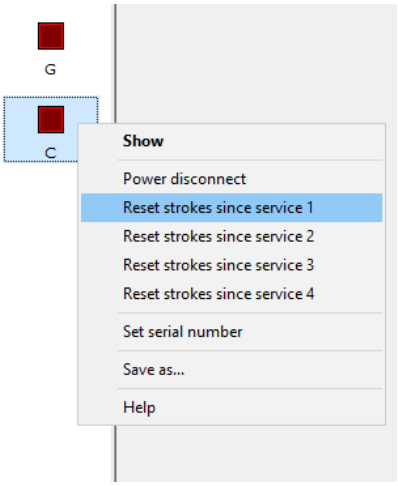
To disable the service interval limit, select the value, press Delete, and then press Enter. The text “Not set” is shown instead of a value. If the limit is disabled, the service indication LED will never light up.

The service interval parameters are available in the **Usage** group.

4.2.4.1 Reset counter

To reset the service interval counter to 0, do the following:

1. Right-click the **C** icon. This displays a menu.



2. To reset the counter for channel X, select **Reset strokes since service X**.
3. In the Confirmation dialog, select **Yes**.

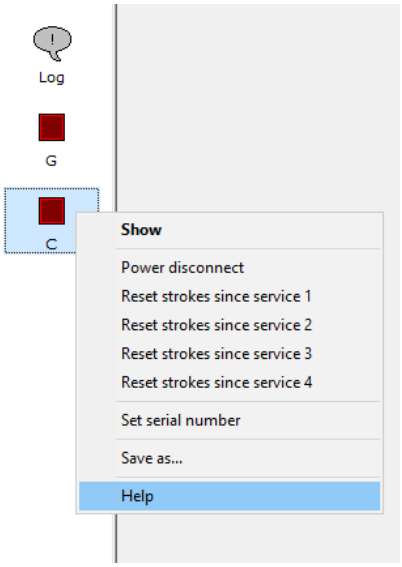
4.3 Additional functions

4.3.1 Checking system information

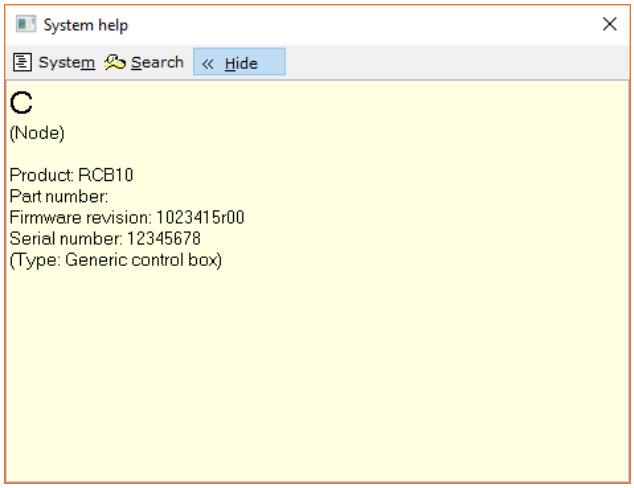
It is possible to display information about all units in the system, for example firmware revision and serial number.

To check the system information for a unit, do the following:

1. Right-click the icon for the unit. This displays a menu.



2. Select **Help** from the menu.
3. The *System help* window displays information for the unit.



4.3.2 Checking the charge level

To check the battery charge level, do the following:

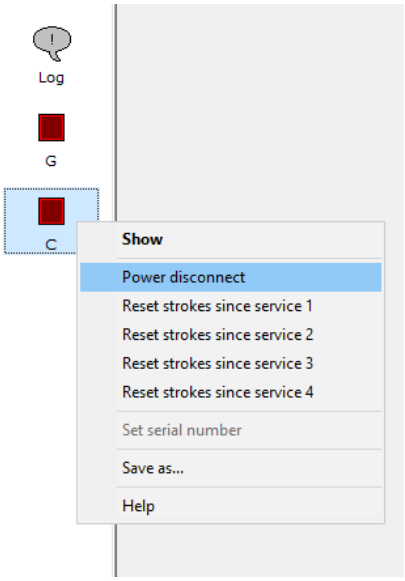
1. Double-click the **C** icon.
2. Expand the group **Power**.
3. The status register *Estimated charge level* displays the estimated battery charge level.

4.3.3 Disconnecting the battery

To protect the battery from deep discharge, it is possible to disconnect the battery. For more information, see sections 2.5.2 and 4.2.

To disconnect the battery using RST10, do the following:

1. Right-click the **C** icon. This displays a menu.



2. Select **Power disconnect** from the menu.
3. In the Confirmation dialog, select **Yes**.

4.3.4 Checking flags

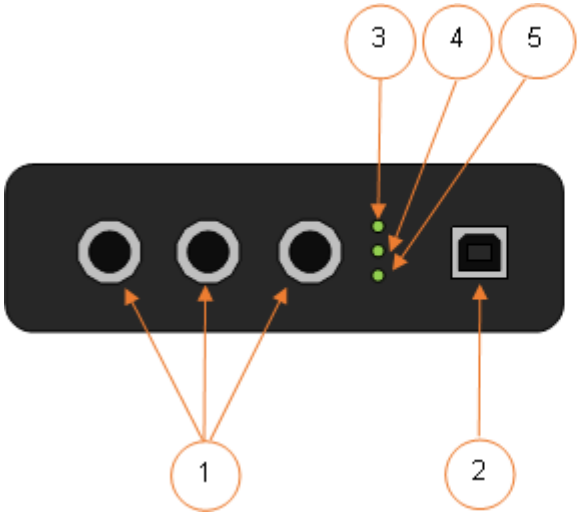
If a motor channel is not working, the RST10 can be a helpful tool in combination with the trouble shooting guide in chapter 7.

The RST10 can provide additional information via error and diagnostic flags:

- *Flags in the **H bridge** group:* All status registers starting with “Error” should be 0.
  If not, something is probably broken. To make sure it is a consistent error, wait 10 seconds and then try again. Wait another 10 seconds and try another channel. If the error is consistent, the flag will be set again and again.
- *Flags in the **Battery** group:* The status register *Charger connected* should be 0.
  If not, a charger is connected and the control box is preventing any movement. To clear this flag, disconnect the charger from the RCB10+.
- *Flags in the **DC out** groups:* There is one DC out group per channel, each with a set of flags.
  - The *Error jack ID*, *Error chain link*, and *Incompatible device detected* flags should be 0.
    If not, the system parts are probably not connected correctly. Check that the actuators and the hand control are connected to the correct connectors on the RCB10+.
  - The *Connected* flag should to be 1.
    If not, the system has not detected any actuator on that channel. Check that the actuator is properly connected to the motor output.
  - The *Directional restriction* flag should be 0, when no restrictions apply.
    If not, try to run in the other direction (an obstacle or end limit may have restricted the movement in one direction).
  - The *ED no start* and *ED stop* flags should be 0.
    If not, the channel is used too much. Wait 20 minutes and then try again.

4.4 Connect control unit via USB adapter

4.4.1 USB adapter overview



1. HC connectors
2. USB connector
3. USB Power LED
4. PC tool LED
5. HC bus LED

4.4.2 Connect USB cable

A regular USB cable (A-B type) is used between the USB adapter and the PC. The cable should be inserted into the USB connector. See chapter 4.3.1.

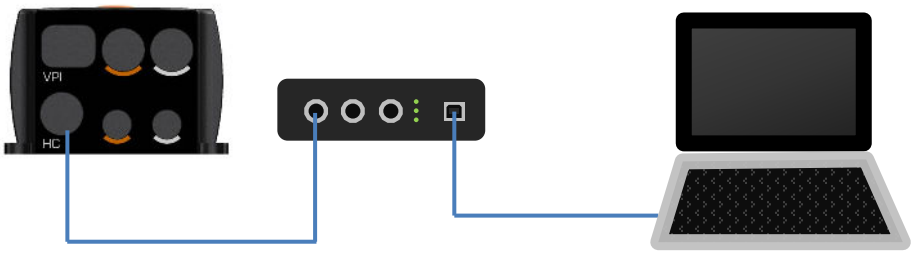
When connecting a control unit to a PC for the first time, the PC needs to get and install drivers to be able to handle the new control unit. It is recommended to be connected to the Internet while doing this, then it will all be made automatically.

This will take a while, in the meantime the system will inform that it is working on it, by showing information, usually in the lower left corner of the screen.

When the driver installation is done, a message will be shown that the device is ready to use.

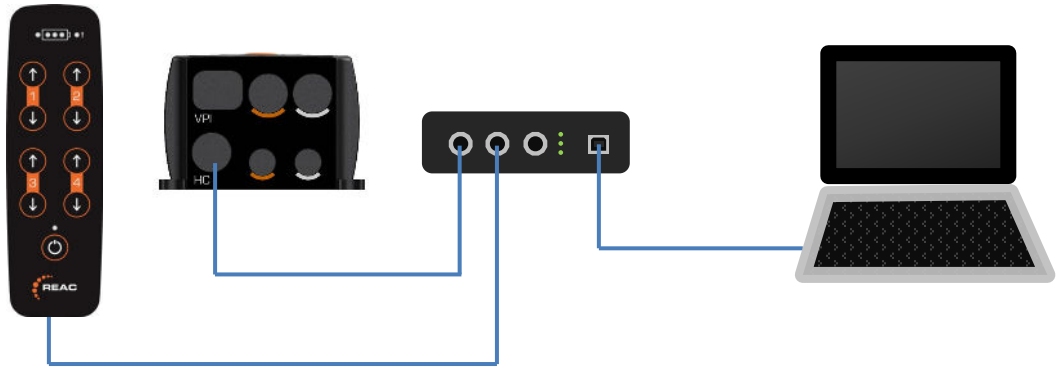
4.4.3 Connect control unit

Between the control unit and the USB adapter a straight 6.35 mm male to male tele plug cable is used. In the control unit, it shall be inserted in the HC connector, instead of the hand control. On the USB adapter. There are three identical HC connectors. Either one can be used.



4.4.4 Use the hand control

To be able to test and monitor the system live, running actuators from the hand control, while having the PC connected, the hand control can optionally be inserted via any of the HC connectors on the USB adapter.

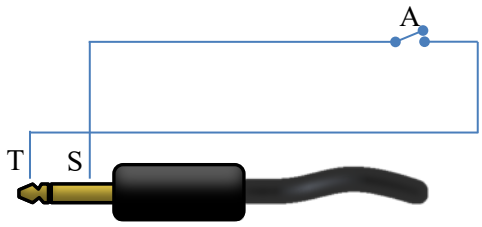


4.4.5 FSI switch inputs

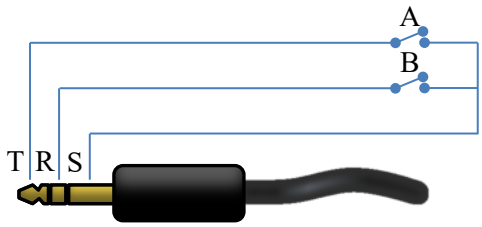
In the control unit view (icon C), in the “FSI switch inputs” group, parameters for matching how the switches are connected, and also for assigning which switches are connected to which functions.

The parameters named “Switch input layout” are used for selecting one of four possible schematics for how the switches are connected.

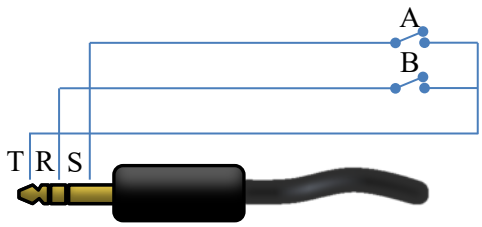
Layout 1, “mono” pin layout (default)



Layout 2, normal “stereo” pin layout



Layout 3, alternative, “mono-like” tip common, pin layout



Layout 4, alternative, ring common, layout

The parameters named “Switch input logic” are used for selecting if switches are normally closed, or normally open. 0 is normally open. 1 is normally closed.

The parameters named “Switch input role” are used for selecting which feature each switch shall be connected to. The following table shows which parameter value corresponds to which feature.

Value	Function
(Not set)	Disabled
0	Channel 1 forward
1	Channel 1 backward
2	Channel 2 forward
3	Channel 2 backward
10	On/off

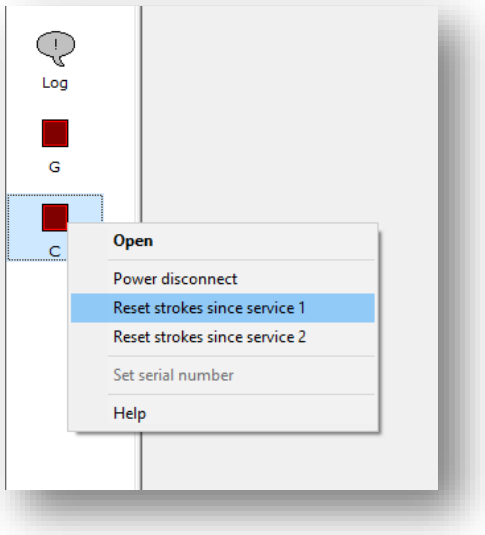
4.4.6 Service intervals

To adjust service recommendation intervals, and/or to reset the counters go to the control unit view (icon C), and the group called “Usage”. This group contains the parameter “Strokes service interval X”, where X is the channel number. These parameters can be set to the number of strokes before a service recommendation LED[8] will light up.

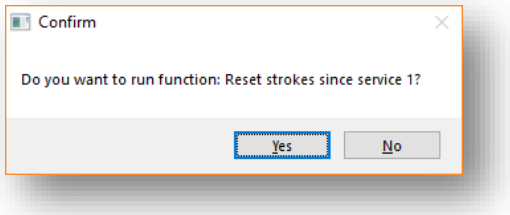
To disable these limits, select the value, hit “Delete” and then hit “Enter”. No LED[8] will light up then, ever. When no value is set, the text “Not set” is shown instead of a value.

> ⚠ Setting service limits must only be done by authorized personnel, since failing to perform necessary service on the system, may lead to subsequent malfunction or personal injury.

To reset a counter, i.e. to start the counters from 0, a function must be used. Functions can be reached in three different ways, the easiest is by right clicking on the C icon, in the area to the left and select the counter you want to reset.



A confirmation window will pop up:



> ⚠ Resetting counters must only be done by authorized personnel, since failing to perform necessary service on the system, may lead to subsequent malfunction or personal injury.

[8] The service LED is always available on a REAC standard hand control, RHC10.

4.4.7 Checking flags

If a motor channel is not working, RST10 can be a helpful tool in combination with the regular trouble shooting guide, or even as an alternative. The RST10 can via error and diagnostic flags give additional information not possible to find if not “getting under the skin” of the system. It can also be useful in situations where hand control with an alert LED is not available.

Useful flags:

- *Flags in the H bridge group:* All status registers starting with “Error” needs to be 0. If not, then something is probably broken. To make sure it is a consistent error, wait 10 seconds and try again, and perhaps wait 10 seconds and try another channel, to see if you get the same flags. If the error is consistent the flag will be set again and again.

- *Flags in the Battery group:* In this group there is a status register called “Charger connected”. If this is not 0 the control unit has detected that a charger is connected and therefore the control unit is not allowing any movement. To clear this flag, disconnect the charger.

- *Flags in the DC out group:* There are a set of flags belonging to each motor output channel found in “DC out” groups. There is one group for each motor output channel.

    - “Error jack ID”, “Error chain link” and “Incompatible device detected” flags shall all be 0. If not, the system is probably configured incorrectly. Check that everything is connected correctly, i.e. not mixing up actuators and/or hand control.

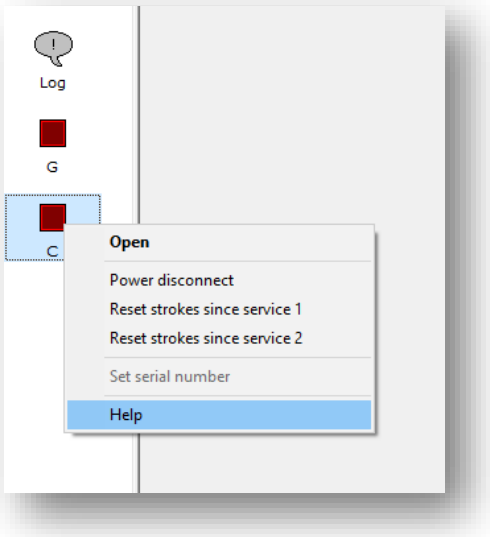
    - The “Connected flag” should to be 1. If not, the system has not detected any actuator on that channel. Check that the actuator is properly connected to the motor output.

    - The “Directional restriction” flag shall be 0, when no restrictions apply. If not 0, try to run in the other direction (an obstacle or end limit might have restricted movement in on direction).

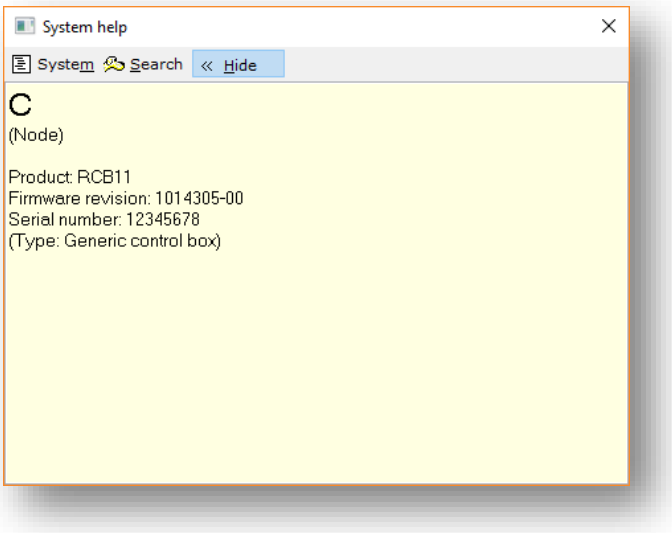
    - And finally check the flags “ED no start” and “ED stop” which both shall be 0. If not, the channel is used too much, wait 20 minutes and try again.

4.4.8 Checking system information

To check which models a system is made up of, or to check what revision of the firmware is used, right click in the unit in the area to the left, and select Help.



This will open the page in the system help for that unit. And it will look like this:



4.4.9 Checking charge level

The charge level of the build in battery can read in the status register “Estimated charge level”, found in the control unit view (icon C), in the group “Power”.

They are called “Max current forward” and “Max current backward” and are set in mA. One in each motor direction.

Motor movement will be stopped if motor current is above set level for 250 ms, or immediately if motor current is above set level plus 2000 mA.

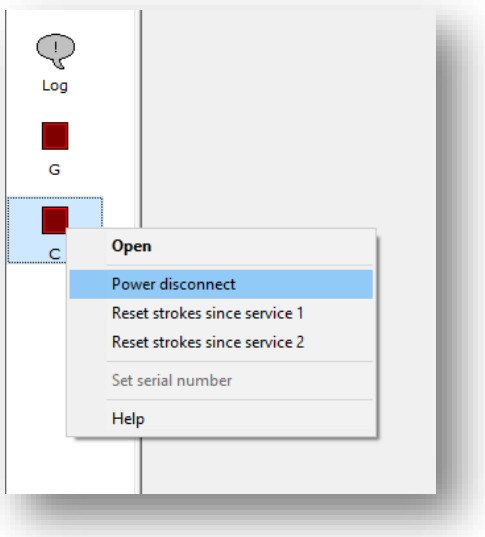
4.4.10 Set low battery warning limits

In the control unit view (icon C), in the group “Operation” there are always one parameter for setting at which level a flashing low battery LED will start flashing on RHC10 if one is present.

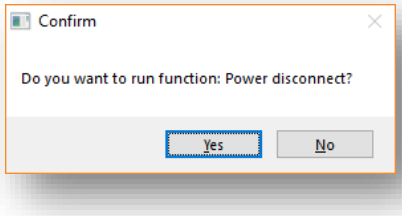
The level is set by an absolute value of unit mAh. This makes it possible to set a level where there are a certain number of strokes left, in some typical application, and that it is kept the same regardless of used power source.

4.4.11 Battery disconnect

By using RST10 it is possible to activate the deep discharge protection; described in chapter 2.7.2.2. This can be done by running the function “Power disconnect”.



A confirmation window will pop up:



4.5 Further reading

For general information about RST10 please review the datasheets. For more details please read General Features in RST10. These documents can be found on REAC website www.reac.se.

5 Maintenance

5.1 Service intervals

To ensure safe and proper operation, regular service is required. The service interval is dependent of the needs of the final application in which the control system is used and the service intervals based on number of actuator cycles can be configured via RST10, see chapter 4.4.8.

Between these service points regular maintenance and minor inspection must also be performed. Below follows a suggested maintenance schedule:

	Initially	Regularly	At planned service
Control unit Ensure control unit is firmly fixed.	✓		✓
Cover The plastic housing must be checked for mechanical damage (cracks).	✓	✓	✓
Cables Ensure cable that connects actuator and control unit is firmly affixed.	✓	✓	✓
Sealings The sealing rings of the control device plugs must be checked for damage and exchanged if necessary.	✓	✓	✓
Battery Ensure that at least 1 green LED is lit on battery indicator before use[9].	✓	✓	✓

5.2 Cleaning and disinfection

Product	Cleaning instructions
RCB11	Clean with a damp cloth or with a brush and water (water must not be under pressure)
RCB12	Clean with a damp cloth or with a brush and water (water must not be under pressure)

The systems must not be washed directly with a high-pressure cleaner.

Cable connectors must remain plugged during cleaning to prevent the ingress of water.

Cleaning with a steam cleaner is not permitted.

For disinfection, it is recommended to use soap or equal and clean with a damp cloth.

Cleaners and disinfectants must not:

- be highly alkaline or acidic
- contain caustic agents
- change the structure of the surface of the plastic or the adhesives.

[9] Assuming RHC10 is used

6 Trouble shooting

In addition to this trouble shooting guide, it can be useful to check error and diagnostic flags in the RST10 software, see section 5.3.4

Problem	Probable cause	Description	Solution
No actuator movement	Over current	Current peaks above the current limit are allowed for 250ms, when this is exceeded the actuator will be turned off. Can be caused by overload or by running into an obstacle or a mechanical end stop.	Overload – reduce load Obstacle – remove obstacle End stop – run in opposite direction
	Short circuit	Alert indication LED[10] will be lit.	Service is needed.
	Duty cycle protection	Duty cycle protection is a function to protect the actuator motor from overheating. Alert indication LED[10] will be lit, during attempt to run the actuator.	Wait until actuator “rest time” has elapsed.
	Actuator not correctly connected to control unit	No actuator movement	Make sure actuator is properly plugged into control unit.
	Actuator mix up	Wrong actuator will move.	Make sure actuator/actuators are connected properly. Color coding is possible on both actuator and control unit.
	Internal error	Alert indication LED[10] will be lit.	If waiting 10 s doesn’t help, service is needed[11].
	Actuator cable faulty	No actuator movement	Check the cable and replace the actuator if necessary
	Charger is connected	No actuator movement. Alert indication LED[10] will be lit, during attempt to run the actuator.	Disconnect charger.

[10] The service LED is always available on a REAC standard hand control, RHC10.
[11] Further information on internal errors, see chapter 3.5

System appears "dead"	Low battery level.	When the level is critically low system is disconnected to protect the battery[12].	Charge battery.
	Loose contact between battery part and control part.	Nothing happens when trying to activate the system.	Make sure battery pack is properly connected to control unit.
	Battery disconnect functionality activated.	Nothing happens.	Connect charger (see chapter 2.7.2.2).
	Battery is worn out.	Battery level indicators drop quickly after full charge.	Service is needed.
Hand control appears "dead"	Poor contact with control unit.	Nothing happens when pressing a button, no LEDs are lit.	Make sure hand control is properly plugged in to control unit.
	Low battery level.	Nothing happens when pressing a button, no LEDs are lit.	Charge batteries.
	Hand control out of order.	Nothing happens.	Service needed.

[12] Before this happens, a warning noise will sound and the low battery indicator LED next to the battery level symbol on the hand control will be flashing.

Alert indication LED[13] lit	Short circuit.	Alert indication LED will be lit.	Service needed.
	Duty cycle protection.	Duty cycle protection is a function to protect the actuator motor from overheating. Alert indication LED will be lit, during attempt to run the actuator.	Wait until actuator “rest time” has elapsed.
	Internal error.	Alert indication LED will be lit.	If waiting 10 s doesn’t help, service is needed[14].
	Charger connected while trying to run actuator.	Alert indication LED will be lit.	Disconnect charger.
No Charging	Charger cable not connected to control unit or wall socket.	LED on charger or LEDs on hand control not indicating charging.	Make sure the cable is properly connected to battery pack and/or in wall socket.
	Damaged batteries.	Charger connected for several hours, but no charging indication.	Service is needed.

6.1 Repairs

To avoid risk of malfunction, all repairs must be carried out by authorized REAC workshops or by a REAC appointed representative. Products under warranty must also be returned to an authorized REAC workshop.

Do not open the product. Damage to the product can occur.

[13] Requires a REAC hand control, RHC10
[14] Further information on internal errors, see chapter 3.5

6.2 Basic characteristics

	RCB11	RCB12
Output voltage	24 VDC	24 VDC
No of actuator channels	2	4
IP-class	IPX4	IPX4
Weight	0.2 kg	0.3 kg
Flammability rating	UL94 V-0	UL94 V-0
Color	Black (RAL9005) White (RAL9016)	Black (RAL9005) White (RAL9016)

6.3 Environmental conditions

	RCB11	RCB12
Operating		
Ambient temperature	-20 °C to +50 °C	-20 °C to +50 °C
Relative humidity	15% to 90%	15% to 90%
Atmospheric pressure	700 to 1060 hPa	700 to 1060 hPa
Storage		
Ambient temperature	-40 °C to +70 °C	-40 °C to +70 °C
Relative humidity	15% to 90%	15% to 90%
Atmospheric pressure	700 to 1060 hPa	700 to 1060 hPa
Oxygen rich environment	No	No
Label reading environment	50 cm / 500 lx	50 cm / 500 lx

⚠ Using the the products outside their specified limits may lead to subsequent malfunction or personal injury

6.4 Functional features

	RCB11 premium	RCB11 basic	RCB12 premium	RCB12 basic
Low battery sound alarm	✓		✓	
Deep discharge protection	✓	✓	✓	✓
Battery disconnect function	✓	✓	✓	✓
Battery status indicator[15]	✓	✓	✓	✓
External battery box	✓	✓	✓	✓
HC-bus interface	✓	✓	✓	✓
Service reminder tracking	✓	✓	✓	✓
Service tool (RST10)	✓	✓	✓	✓
Duty cycle protection	✓	✓	✓	✓
Adjustable soft start- and stop ramps (RST10)	✓	✓	✓	✓
Adjustable current limits (via RST10)	✓	✓	✓	✓

6.5 Control interface options

To interface with the system, there are a few different possibilities available:

	RCB11 premium	RCB11 basic	RCB12 premium	RCB12 basic
Via REAC Hand Control (RHC10)	✓	✓	✓	✓
Digital Input Ports (FSI Connectors)	✓			
Via REAC Digital Input Adapter (RHC12)	✓	✓	✓	✓

For further information regarding the hand control and digital input adapter, please view REAC website where data sheets and user manuals for each product can be found.

[15] Available on RHC10.

6.6 Power options

There are some possibilities on how the control units might be powered:

	RCB11 premium	RCB11 basic	RCB12 premium	RCB12 basic
VPI connector with power type auto detect	✓		✓	
VPI connector with preset type		✓		✓
Supports a matched Pb battery pack	✓	✓	✓	✓
Supports smart battery packs	✓	✓	✓	✓
Supports other power supplies	✓	✓	✓	✓
Can monitor matched Pb battery packs	✓	✓	✓	✓
Can communicate with smart battery packs	✓		✓	
Built-in Pb battery				

6.7 Warranty

There is a warranty on REAC products against manufacturing faults. The warranty period begins on the purchasing date of the product and applies for 12 months. Warranty exclusions: REAC is entitled to deny any warranty if:

· The product has not been correctly used or the product usage specifications (load, environment, temperature, duty cycle, voltage, current, etc) have not been respected.

· The product has not been correctly maintained.

· The product has been tampered with.

· The product has been be exposed to violent or abrasive treatment.

Nonconformities due to age of the product (for example, discolouring of painting) are excluded from warranty.In case of doubt regarding the existence of a defect or if an inspection is required, REAC reserves the right to request the return of the product.

Any additional warranty obligations for parts replaced free of charge or for any service provided without charge under this warranty shall be excluded.

Warranty of the replaced parts under warranty period will end on the date of expiry of the warranty period of the product concerned.

6.8 Waste disposal

All REAC products are marked with this symbol. According to *Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/CE,* the symbol indicates that the product must be taken to a proper disposal site and cannot be discarded in normal household waste.

RCB10+ consist of several parts with different material, which means it cannot be disposed as one single item. It is recommended (at disposal) to disassemble and divide the product as much as possible into feasible waste groups to be able to recycle the product in the most environmentally friendly way.

The following waste groups have been identified for the RCB10+:

	Cables	Electronics	Metal	Plastic	Bies
RCB10+	• Internal harness • Charger cable	• Main circuit board • Charger circuit board	• Screws	• Cover	• 2 × 12 V Pb

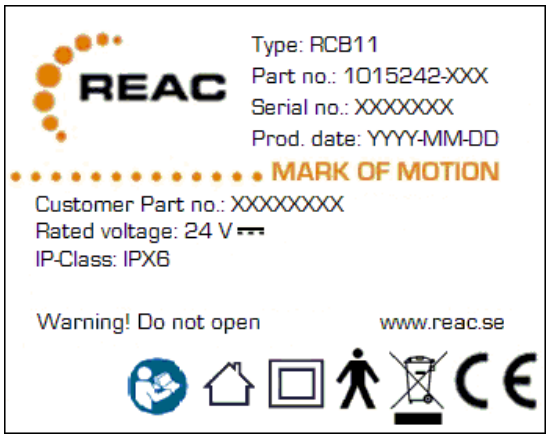
Some of these main groups can be divided into sub-groups. Metal can, for example, be divided into iron, stainless steel, and aluminum and alloy steel. Plastic can, for example, be divided into ABS, PA, PE, and PP. All REAC plastic units are provided with an interior code for plastic types and fiber contents.

7 Labeling

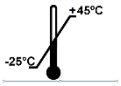
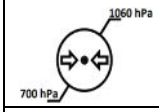
The following symbols are used on the label of REAC Control unit products.

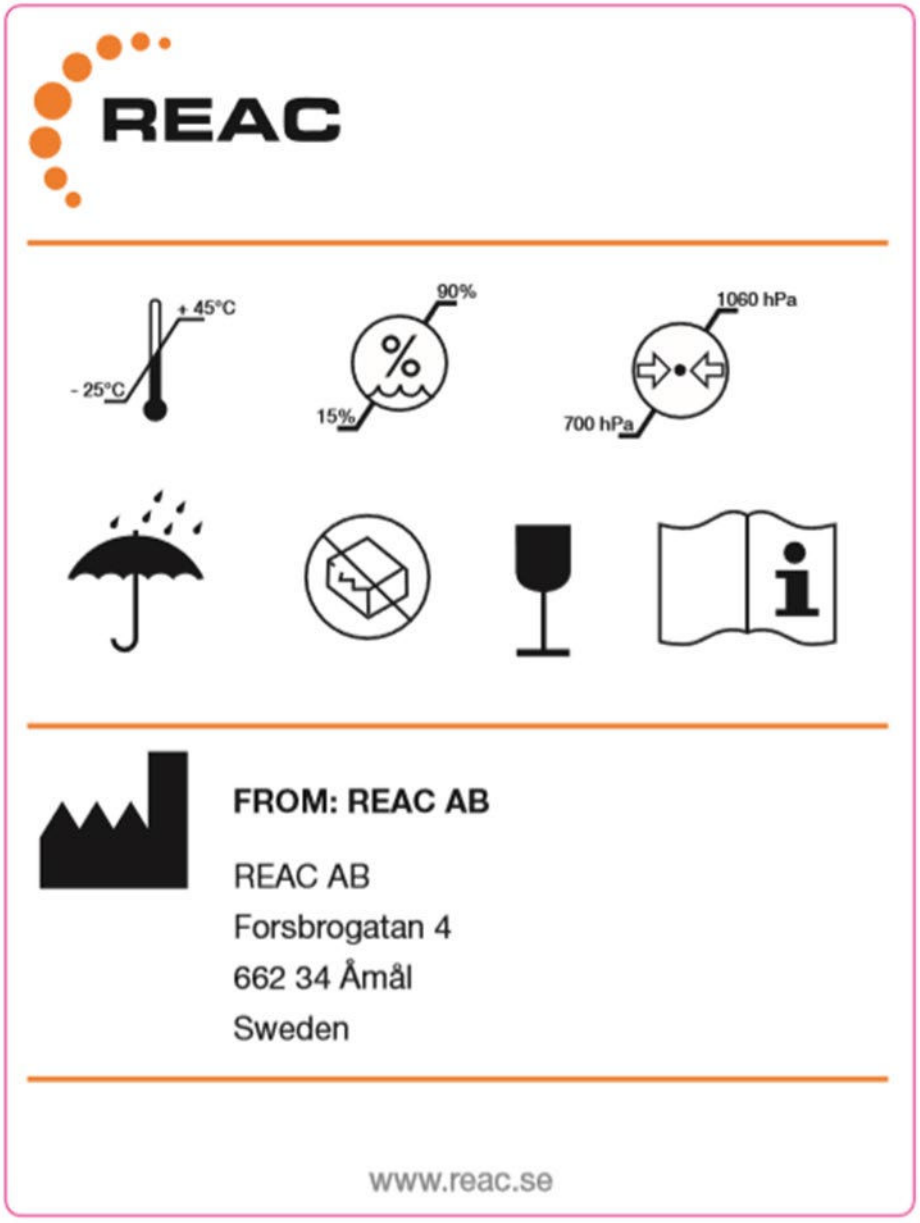
⎓	Rated voltage (24 VDC)
IPXX	Ingress of particles (first character) and water (second character) as per EN60529.
	IEC 60417-5840: Patient part of type B
	IEC 60417-5957: For indoor use only
	WEEE compliant
CE	CE-label attached based on Low Voltage Directive and EMC Directive.
	ISO 7010-M002: Risk(s) mitigated in accompanying documents

Label example:



The following symbols are used on the packaging of REAC Control unit products.

	Manufacturer/manufacturing date.
	Do not use if package is damaged.
	Fragile, handle with care
	Keep dry
	Temperature limits
	Relative humidity limits
	Atmospheric pressure limits
	Consult instructions for use


REAC
+ 45°C
- 25°C
90%
15%
1060 hPa
700 hPa
FROM: REAC AB
REAC AB
Forsbrogatan 4
662 34 Åmål
Sweden
www.reac.se

REAC AB
J A Wettergrens gata 7
421 30 Västra Frölunda, Sweden

REAC Poland Sp. z o.o
Ul. Metalowców 10
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Phone: +46 31 350 99 00