



Operating Instructions

Original Operating Instructions

spectrum 1

YOS000G0





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Attachments: System specific views, circuit diagrams and / or output wiring.

Pictographs



Danger due to electrical voltage. Touching live parts inside the unit can be fatal or cause serious injuries.



Instructions for occupational health and safety. Not following these instructions can lead to accidents that can cause damage, serious injuries or even death.



Important information about the operation of the radio system.

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Safety Instructions

Read these operating instructions carefully before working with the radio system. This applies in particular to the installation, commissioning and maintenance of the radio system.

The operating instructions are a constituent part of the radio control system and must always be kept close at hand for the responsible personnel.

The term 'machine' is used in the operating instructions for the different possible uses of the radio system.

Intended Use

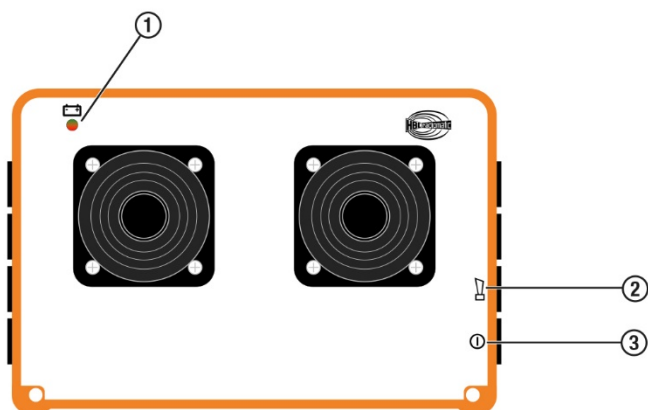
- The radio system is used for the control of machines and for data transfer. Observe the occupational safety and accident prevention regulations applicable to each application.
- The intended use also includes reading the operating instructions and adhering to all safety information contained therein.
- The radio system must not be used in areas where there is a risk of explosion, nor for the control of machines used to convey persons, unless it is explicitly approved for these uses by the manufacturer.
- Modifications to the radio system may only be carried out by specialist personnel who have been trained and authorized by HBC-radiomatic. All modifications must be documented at the factory in the radio control master file.
- The safety devices of the radio control system must not be modified, removed or bypassed. In particular, modifications to any part of the radio system's complete E-STOP system are not allowed.

Safety Instructions for Installation and Operation

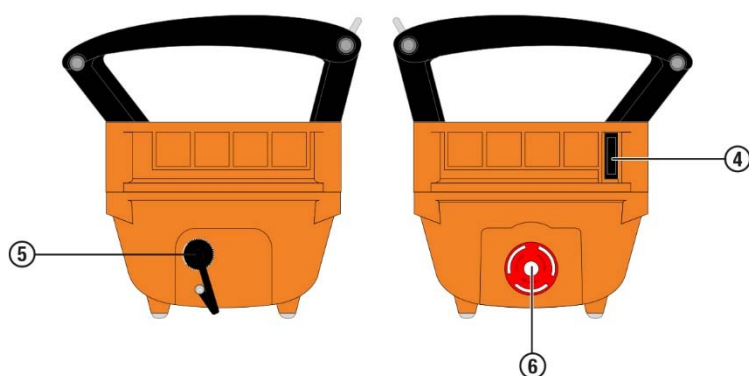
- The electrical connection according to the enclosed output wiring diagram must be established by a qualified electrician exclusively.
- The receiver may only be opened by trained personnel. Components inside the receiver can be energized at life-threatening voltages. The supply voltage for the machine must be disconnected before the receiver is opened.
- Please also note that, with radio systems, the presence of persons in the danger zone – in particular beneath the load (cranes!) – is prohibited in all cases.
- Select a safe location for radio control, from which you have a good and complete view of the working movements of the machine, the load movements and the surrounding working conditions.
- It is not permissible to leave a radio transmitter unattended when it is activated. Always switch off the radio transmitter when it is not required. This applies in particular if you change location, when working without radio control, during breaks and at the end of work. Always protect the radio transmitter against use by unauthorized persons, for example by locking it away.
- In the event of an emergency and with all faults, switch off the radio transmitter immediately by pressing the STOP switch.
- Only operate the radio system when it is in perfect working order. Faults and defects that could influence safety must be rectified by specialists who have been trained and authorized by HBC-radiomatic before the system is put back into operation.
- Note that the operational directions of the operating elements may appear inverted depending on location and viewing angle to the machine. This applies in particular to rotary cranes if your location changes from inside to outside the radius of the crane. The operator must make himself familiar with the directional markings on the machine before starting to work.
- Repairs may only be carried out by specialist personnel who have been trained and authorized by HBC-radiomatic. Use original replacement parts and accessories (e.g. rechargeable batteries) exclusively; otherwise it is possible that the equipment safety can no longer be guaranteed and our extended warranty will be voided.
- Remain vigilant when working with the radio system and familiarize yourself with its functions. This applies in particular if you are working with it for the first time or if you work with it only occasionally.

- Before starting to work, examine the STOP switch for mechanical ease of motion and electronic function at least once a day:
When you press the STOP switch with the transmitter on, the status LED of the transmitter has to go out. If the status LED does not go out then you have to disable the radio control system immediately. Remove the battery and the radiomatic® iLOG from the transmitter and inform a service technician.
- Switch the transmitter off at least once per working day and restart it.

Transmitter Equipment



- ① Status LED
- ② Signal button (option)
- ③ Start button
- ④ radiomatic® iLOG
- ⑤ Connection for cable control (option)
- ⑥ STOP switch



The images are just examples, so the delivered product may look different. Please refer to the enclosed transmitter layout and wiring diagram for the equipment of your radio transmitter.

Operation

The transmitter is equipped with an electronic radiomatic® iLOG key. radiomatic® iLOG contains all the data required for operating the transmitter. Operation is not possible without radiomatic® iLOG! Depending on the version the radiomatic® iLOG can also be used for operation of replacement transmitters of identical construction.

When activating the transmitter and if the radio connection is interrupted (e.g. if the connection is lost or the transmission range is exceeded), the transmitter reacts with the so-called enforced zero-position. Release all operating elements so they can return to the zero-position and actuate the start button. The machine will not react if the operating elements are not in zero-position. This prevents uncontrolled machine movements after the radio connection has been interrupted.

Activating the Transmitter



Note:

Whenever you activate the radio system, make sure the receiver is switched on before the transmitter.

With start sequence

The steps 3 and 4 need to be carried out within **5 seconds**.

1. Insert a charged battery into the battery compartment.
2. Turn the STOP switch to unlock.
3. Shortly press the start button and then release. The transmitter will switch off if the button is pressed for longer than half a second!
4. Press the start button again until an acoustic signal sounds and the status LED flashes green. Then release the button. The transmitter is now ready for operation.
5. Depending on the application, you must press the start button again before movement commands can be carried out.



Note:

The transmitter switches off if

- the start button is pushed for longer than half a second in step 3 of the start sequence.
- the start sequence (steps 3 and 4) takes over 5 seconds.
- another button is pressed during the start sequence.


You must then repeat steps 3 and 4 or 3 to 5.



Caution:

Before starting work always trigger the acoustic signal. This warns all colleagues that the machine is about to move.

With merlin® TUC

1. Insert a charged battery into the battery compartment.
2. Unlock the STOP switch by turning it. The status LED flashes green 2 times per second, and one red.
3. Hold the merlin® TUC at the position on the transmitter marked with this symbol  (cf. illustration).
The transmitter vibrates and an acoustic signal sounds.
When the status LED blinks green, the transmitter is ready to operate.
4. Depending on the application, you may need to press the Start button before control commands can be executed.



Note:

The transmitter can only be activated with a valid merlin® TUC. If you use a card that does not match the respective transmitter or is not approved for this transmitter, the transmitter vibrates 3 times. At the same time an acoustic signal sounds. The transmitter is automatically shut down after 2 seconds. Please contact your superior in such cases. If this happens, please contact your superior, a service technician in your company or your contact at HBC.

The transmitter also shuts down if the start sequence is not completed within 10 seconds. In this case press the start button and repeat the procedure!



Caution:

Before starting work always trigger the acoustic signal. This warns all colleagues that the machine is about to move.

Deactivating the Transmitter

Press the STOP switch.



Note:

Replace the battery when the status LED in the transmitter flashes red, an acoustic signal sounds and the transmitter vibrates. Otherwise, the transmitter will switch off in a few minutes. Recharge the empty battery in the respective charger.

Automatic Power Off (APO) Function

The transmitter is equipped with an automatic power off function (APO) and will switch off automatically after a preset time without command input.

The automatic power off serves to increase safety and also saves battery power.



Note:

The default switch-off time is 15 minutes. If you would like to adjust the switch-off time or to deactivate the APO function, please contact your responsible HBC service partner.

After an automatic power off, the transmitter must be reactivated as described in the chapter “Operation”.



Caution:

The automatic power off does not relieve the operator of the responsibility to turn off the transmitter with the STOP switch when not in use.

Automatic Movement Off (AMO) Function

After a defined time after the last movement command has been operated, the transmitter switches into the AMO operating mode and no more movement commands can be executed. Commands, such as horn, can still be executed.

You can leave the AMO operating mode by pressing the start button for one second. All operating elements for movement commands must be in zero position during this operation. This prevents unintended machine movements when the AMO operating mode is exited.



Note:

The default AMO time is set to 5 minutes. To change the AMO time and de-activate the AMO function, proceed as described in the chapter “Display Content and Functions” under “Safety functions”.

Battery and Battery Charger

Li-ion Battery

The battery capacity (= the amount of electric current that can be stored) and the battery charge (= the actual amount of stored current) depend on the age of the battery and the environment temperature. If the temperatures are below 0 °C (32 °F) or above 40 °C (104 °F), less current can be retrieved.

Please adhere to the following safety notifications in all cases. When the Li-ion battery is improperly handled, there is the risk of explosion and of fire. This could lead to life-threatening injuries that might result in death under specific circumstances.



Safety instructions:

- Use the batteries only in connection with the designated devices.
- Never use or charge damaged or faulty batteries.
- Do not throw the batteries into fire, short-circuit, damage or open them.
- Use only the associated charger by HBC-radiomatic to charge the battery.
- Charge the battery at an ambient temperature of 0 – 45 °C (32 – 113 °F).
- Do not expose the batteries to direct sunlight.
- The batteries have to be recycled or disposed of properly.



Notes:

- In all cases, charge the batteries completely before initial use. This ensures that the batteries have their full capacity in use.
- A battery charge of 30 – 50 % is ideal for storing Li-ion batteries. This charge is reached after charging an empty battery for approx. 1 hour.
- Store the batteries at -15 – +35 °C (5 – 95 °F).
- When storing Li-ion batteries, recharge them after a maximum time of 3 months and adapt the charging time correspondingly.

When handled properly, Li-ion batteries by HBC-radiomatic can reach up to 500 charging cycles. Even after that, your batteries can be used for some time with a slightly decreased capacity.

DC battery charger

The scope of delivery of the battery charger includes a DC connection cable with a suitable wall plug and an AC wall plug transformer.

Please adhere to the following safety notifications in all cases. When the charger is improperly handled, there is the risk of fire and of electrical shock. This could lead to life-threatening injuries that might result in death under specific circumstances.



Safety instructions:

- Use this charger only to charge the batteries specified on the type plate.
- The charger may not be used in hazardous areas or in the vicinity of flammable materials.
- The charger has to be operated with the voltage indicated on the back.
- The charger has to be used in vehicles or indoors only.
- Use the charger only within the specified temperature range of 0 – 45 °C (32 – 113 °F).
- Protect the charger against heat, dust and humidity.
- Do not cover the charger while it is in use.
- Disconnect the charger from the power supply when it is not in use.
- In case of any fault of the charger or the connecting cable disconnect it immediately and put it out of operation.
- Do not make technical changes to the charger or the connecting cable.

**Maintenance and servicing:**





- Disconnect the plug before cleaning the charger.
- Make sure that the contacts of the charger and the battery pack are free from dirt in order to ensure a faultless functioning of the charger.

Charging the Battery

1. Connect the charger to the power supply via the connecting cable or the wall plug transformer.
2. Insert the battery into the compartment.

Charging will start automatically.

A duo LED indicates the current operating state of the battery.

-  The battery is charged
-  The battery is charging
-  The battery is defective
-  The battery temperature is below 0 °C (32 °F) or above 45 °C (113 °F).

Technical Data QD405000	
Operating voltage	10 – 30 V DC
Charging time	6 – 8 h
Operating temperature	0 – 45 °C (32 °F – 113 °F)
Housing material	PC-ABS
Protection class	III
Charging method	CC-CV
End-of-charge voltage	4.2 V

Technical Data AC Wall Plug Transformer	
Operating voltage	100 – 240 V AC
Input current	≤ 1 A
Output voltage	12 V DC
Output current	3 A

Frequency Management

Fixed Frequency

If the identification plate in the battery compartment of the transmitter shows a frequency value (e.g. 433,500 MHz), the transmitter operates with a fixed frequency.

Please contact your service department if the frequency has to be changed because the radio channel is already assigned to another user.

Manual Frequency Switching

If the identification plate in the battery compartment of the transmitter shows the label **man**, the transmitter features manual frequency switching.

This function can be used to change the radio channel during radio operation.

Actuate the start button until an acoustic signal sounds. Then release the button.

Please contact your service department if all available frequencies are occupied.

radiomatic® AFS

If the identification plate in the battery compartment of the transmitter shows the label **AFS**, the transmitter is equipped with radiomatic® AFS (Automatic Frequency Selection).

When activating the transmitter radiomatic® AFS will check if the present radio channel is free. If the radio channel is occupied, the system automatically finds and saves a free radio channel.

If the radio channel currently in use is occupied by another radio control system, you must switch the transmitter off and on again in order to allow radiomatic® AFS to switch to a free radio channel.

The radiomatic® AFS option also includes the manual frequency switching function.



Note:

If radiomatic® AFS is to perform optimally, all the other radio systems in the immediate working environment (e.g. the factory hall or building site) should be switched on before starting to use the radio system for the first time. This allows radiomatic® AFS to detect automatically which radio channels are already being used in the working area, and thereby to choose a suitable free channel for its own use.

In addition, when switching the radio system on for the first time, the user should make sure that his distance from the radio receiver and from the machine is a realistic reflection of the working situation.

DECT

DECT technology is an extremely convenient method for uninterrupted radio control without frequency conflicts. The operator always works on a free radio channel and does not need to make manual settings.

Adaptive Frequency Hopping (AFH)

If the identification plate in the battery compartment of the transmitter shows the label **AFH**, the transmitter is equipped with Adaptive Frequency Hopping.

AFH (Adaptive Frequency Hopping) works with automatic frequency coordination in the 2.4 GHz frequency band and thus ensures interruption-free working in areas with many radio users. Manual frequency coordination is not necessary. With the worldwide 2.4 GHz frequency band AFH can be used all over the world.

Enhanced Safety Functions for the Operator (Optional)

The availability of the following options depends on the design and configuration of your radio control system.

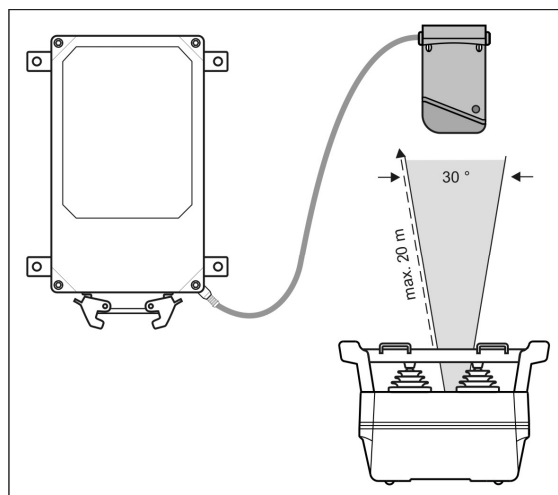
Protection from Unintended Machine Operation

radiomatic® infrakey

The radio system can only be activated via an infrared link between the transmitter and the receiver. This increases the safety of operation, i.e. the machine can not become inadvertently enabled.

radiomatic® infrakey operates either with an infrared module in the receiver housing (radiomatic® infrakey internal) or with the offset infrared antenna focus I (radiomatic® infrakey external).

To activate radiomatic® infrakey, actuate the start button on the transmitter.



Function of radiomatic® infrakey with focus I



Notes:

- The range of the infrared beam is max. 20 m (66 ft).
- The angle of radiation is 30°.
- The front panel of the receiver must be visible (only radiomatic® infrakey internal).

Enabling Switch

The two-step enabling switch provides enhanced safety during maintenance and service work on or in the machine as well as for applications with multiple users. In order to transmit control commands to the machine, the operator has to keep the switch pushed into the first step. Only then are the other operating elements activated. If the operator releases the button or pushes it into the second step (e.g. as the result of a cramp), all machine functions are immediately stopped. With this, the operator is protected from dangerous unintended movements of the machine in case he should lose consciousness or no longer has control over the transmitter.

If an application is controlled by more than one operator, movement commands can only be performed if all operators keep the enabling switch pushed into the first step.

Joystick with Deadman Function

In order to issue control commands, the button integrated into the joystick must be pressed before the joystick is moved. The function then locks and remains effective until the joystick is back in the zero position. This avoids of potential risks through the unintentional actuation of the joystick.

radiomatic® touch-to-activate

radiomatic® touch-to-activate allows for enabling of control commands or operating elements by touching (= touch-to-activate) the joystick button or the roll-over bar. The operating elements and control functions to be enabled by means of radiomatic® touch-to-activate can be configured according to the customer's wishes.

Activation with the Joystick Button

- Touch the joystick button from above.
The joystick will vibrate briefly.
- Immediately grip the joystick button at the side with two or more fingers.
Now movement commands can be executed by deflecting the joystick.

Depending on the configuration of the radio transmitter, one or several movement commands can be enabled.

Activation with the Roll-Over Bar

Depending on the configuration of the radio transmitter, you have to

- place one hand on the left roll-over bar.
- place one hand on the right roll-over bar.
- place a hand on both roll-over bars.

One or several movement commands can be enabled.

Activation is indicated by

- LEDs on the respective joystick or
- a message on the color display (if the radio system is equipped accordingly).

Shut-off on Implausible Control Commands

The automatic shut-off will activate after a sequence of multiple questionable movement commands, for example if the operator moves the joystick successively in different directions in an irregular manner. This function protects the operator and the whole work environment from potential dangers as well as the machine from wear resulting from rapid and erratic movements.

Depending on the ordered version this function can operate in three different ways:

- The complete radio system is shut down.
- Safety-relevant functions are deactivated.
- A previously defined function (e. g. crane horn) is activated.

To deactivate the function, press the start button until the status LED flashes green. Then the transmitter is ready to operate again.

radiomatic® shock-off / zero-g / inclination switch

In specific emergency situations, these safety features can prevent unintended movement commands from being given to the machine, protecting the operator as well as other personnel in close proximity to the machine in use.

radiomatic® shock-off can react if the transmitter receives a hard impact.

radiomatic® zero-g can react if the transmitter is falling down or being thrown.

radiomatic® inclination switch can activate if the transmitter exceeds an inclination angle of approx. 45° for a specified time and/or is positioned upside down.

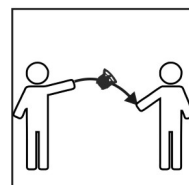
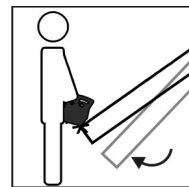
Depending on the ordered version the features can operate in three different ways:

- The complete radio system is shut down.
- Safety-relevant functions are deactivated.
- A previously defined function (e. g. crane horn) is activated.

To deactivate the features, press the Start button until the status LED flashes green. Then the transmitter is ready to operate again.



The safety features do not relieve the operator of his responsibility to turn off the transmitter with the STOP switch when not in use.



Protection Against Incorrect Operation

Micro Drive

With the micro drive function the speed of the machine is limited to a preselected level. Even at full movement of the joystick/linear lever, the operator can not exceed this speed limit. In this manner demanding drive maneuvers can be managed and inexperienced users can be protected from potential dangers that can result from “speeding”.

Orthogonal Drive (Electronic Cross Gate)

With the orthogonal drive function dangerous situations, caused by unintentional diagonal movements are being prevented. The operator will have to return the joystick back to zero position before another directional command can be activated. This function is suitable for example for situations where the operator has to make precision commands in confined areas. Diagonal movements are not possible.

Additional Work Safety

Integrated LED Flashlight


The integrated LED flashlight  is activated and de-activated by means of a button on the transmitter.



Caution:

In order to avoid blinding, never look directly into the beam of light and do not point the flashlight in the eyes of humans or animals. Irritations from blinding may result in dangerous situations, such as overlooking obstacles or other dangerous areas.

Front Panel Lighting

The front panel lighting  is activated and de-activated by means of a button on the transmitter.

Extended Control Concepts (Optional)

The availability of the following options depends on the design and configuration of your radio control system.

Catch-Release

Via the Catch-Release option two or more transmitters can control a machine alternately.

When the receiver is switched on, the machine can initially be controlled via any associated transmitter. Once the receiver is taken over by one transmitter, the other transmitters no longer have access.

Take over machine

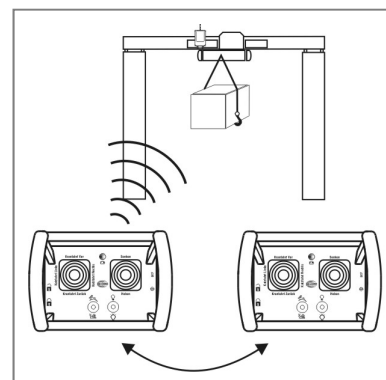
1. Switch the transmitter on.
2. Enter the "Catch" command on the transmitter and actuate the start button.

The access rights for the machine remain with that transmitter until the "Release" command is issued by that transmitter.

Release machine

1. Enter the "Release" command on the transmitter.
2. Switch the transmitter off.

The access rights for the machine are cancelled. Machine control can be taken over by another transmitter.



Operating Example:

Transmitter 1 has taken over the machine. Transmitter 2 is to be given control.

1. Enter the "Release" command on transmitter 1.
2. Switch transmitter 1 off.
3. Switch transmitter 2 on.
4. Enter the "Catch" command on transmitter 2 and actuate the start button.

Transmitter 2 now has sole access to all machine functions.

**Notes:**

- If a receiver has already been adopted by a transmitter can be displayed via a lamp on the machine.
- If the operating voltage of the receiver is disrupted, the receiver has to be caught by the transmitter again.
- If the transmitter is deactivated without the command "Release" having been issued, the other transmitters have no access to the receiver. In this case, deactivate all transmitters paired with the receiver and shortly disconnect the operating voltage from the receiver. This will reset the system to the starting condition described above.
- Always activate the "catch" command after the radio connection has been disrupted in order to maintain the connection of your radio transmitter to the selected radio receiver(s).

Tandem Operation

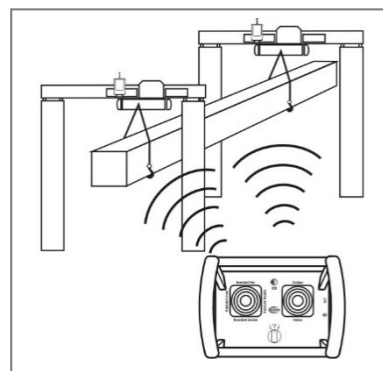
**Note:**

If your radio system is equipped with tandem operation, there must be a radio link to both receivers at all times since otherwise no control commands can be given. This also applies if you would like to control the machines individually.

The radio system consists of 1 transmitter and 2 receivers for 2 machines. The transmitter can control the machines individually or in parallel.

The machines are selected at the transmitter via a rotary switch:

- A** only machine A
A+B machine A + machine B
B only machine B



Catch-Release-Tandem Operation

**Note:**

If your radio system is equipped with tandem operation, there must be a radio link to both receivers at all times since otherwise no control commands can be given. This also applies if you would like to control the machines individually.

With the Catch-Release-Tandem Operation two or more transmitters can control several machines alternately.

Each machine is equipped with a receiver that can receive and monitor all transmitter frequencies.

After activating the receivers all transmitters have equal access to the radio control system.

Take over machine

1. Switch the transmitter on.
2. Turn rotary switch on the transmitter to the respective position.
3. Enter the "Catch" command on the transmitter and actuate the start button.

The transmitter with control over the machine(s) retains the access to the receiver until the operator has issued the "Release" command.

Release machine

1. Enter the "Release" command on the transmitter.
2. Switch the transmitter off.

The access rights for the machine(s) are cancelled. Machine control can be taken over by another transmitter.

Operating Example:

Transmitter 1 has taken over machine A. Transmitter 2 is to be given control over machine A+B.

1. Enter the "Release" command on transmitter 1.
2. Switch transmitter 1 off.
3. Switch transmitter 2 on.
4. Turn rotary switch on transmitter 2 to A+B.
5. Enter the "Catch" command on transmitter 2 and actuate the start button.

Transmitter 2 now has sole access to all machine functions.



Notes:

- If a receiver has already been adopted by a transmitter can be displayed via a lamp on the machine.
- If the operating voltage of the receiver is disrupted, the receiver has to be caught by the transmitter again.
- If the transmitter is deactivated without the command "Release" having been issued, the other transmitters have no access to the receiver. In this case, deactivate all transmitters paired with the receiver and shortly disconnect the operating voltage from the receiver. This will reset the system to the starting condition described above.
- Always activate the "catch" command after the radio connection has been disrupted in order to maintain the connection of your radio transmitter to the selected radio receiver(s).

Pre-selection of Trolley or Hoist

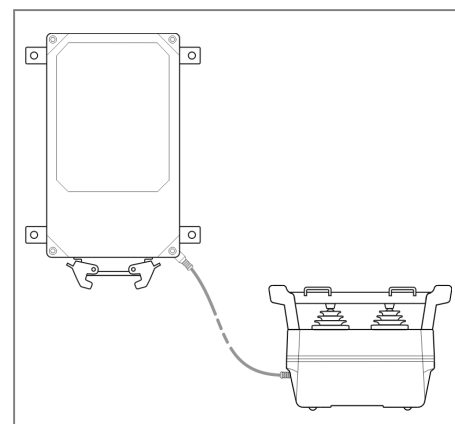
The operator is able to select the trolley or hoist that he wishes to control. It is also possible to simultaneously control both trolleys/hoists, for example in order to transport particularly long or wide loads.

Cable Option

With a cable you can generate a direct data connection between the transmitter and receiver. The radio transmission is disabled. At the same time, the power supply of the transmitter is provided through the cable, as well.

Connecting the cable

1. Switch the transmitter off.
2. Remove the screw lock on the transmitter and receiver.
3. Connect the transmitter and the receiver with the cable. Ensure that the connector is locked.
4. Switch the transmitter on.



Notes:

- If you connect the cable while working with the system, the transmitter will switch off automatically. Activate the transmitter as describe in the chapter "Operation" to switch to cable operation.
- When the system is in cable mode the transmitter will receive the supply voltage from the receiver, i.e. the transmitter can be used without the battery.
- If you disconnect the cable from the transmitter and receiver, the system will switch off automatically. Activate the transmitter as describe in the chapter "Operation" to switch to radio operation.

Performance and Availability Optional)

The availability of the following options depends on the design and configuration of your radio control system.

Bank Switch

By switching operating levels via rotary switch or push button, the operator can choose between different operating levels. The number of available commands can be multiplied, even for small transmitters.

Reporting (Optional)

The availability of the following options depends on the design and configuration of your radio control system.

radiomatic® report – User Identification with merlin® TUC

The user identification function enables the management of access rights to your machines and protects them from unauthorized use. The login card merlin® TUC (Transmitter User Card) serves as a key to activate the control (see the description in the chapter “Activation with merlin® TUC”). In addition, the card can be configured individually. In connection with an HBC data logger, which is connected to the radio receiver, a user-based collection and detailed evaluation of diverse operational data of the radio system is possible.

Feedback to the Operator

Feedback by LED

Using this function, system or machine data can be displayed on the transmitter by LEDs.

Vibration Alarm

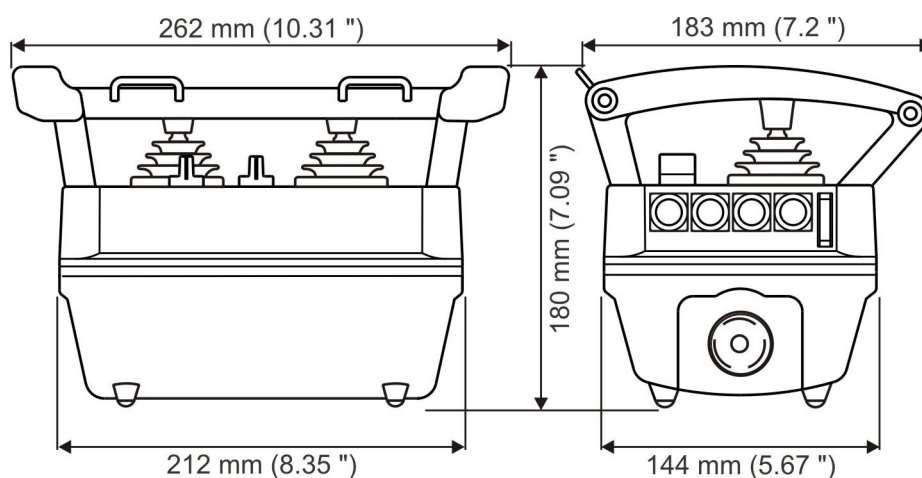
With the vibration alarm, the operator can be informed of an impending need to change the battery and/or potential dangers on the machine through the vibration of the transmitter. This information can be for example pre-warnings for high wind speeds or threatening excess crane loads.

Technical Data

Max. number of control commands	Up to 32 switching commands (On / Off); up to 8 stepless commands for master switch / linear lever, up to 4 further stepless commands, e.g. for potentiometer; Number of control functions expandable via radiobus® modules
Unique system addresses	Over 1.000.000 combinations
Supply voltage	3,6 V
Safety function	E-STOP: Performance Level d, category 3 according to EN ISO 13849-1:2015
Frequency ranges	405 – 475 MHz ¹ , 865 – 870 MHz, 902 – 928 MHz, 1210 – 1258 MHz ¹ 2.4 GHz: 2402 – 2480 MHz DECT: 1790 – 1930 MHz
Channel spacing	12.5 / 25 kHz 2.4 GHz: 1 MHz DECT: 1.728 MHz
Antenna	Internal
Battery type	BA405____ (Li-Ion)
Battery capacity	6,4 Ah
Continuous operating time	Approx. 40 h
Operating temperature range	-20 °C ... +70 °C (-13 °F ... +158 °F)
Housing material	Glass-fiber reinforced plastic / PA6 GF30
Dimensions	262 x 183 x 180 mm (10.31 x 7.20 x 7.09 inches)
Weight (incl. battery)	Approx. 2.0 kg (4.41 lbs.)
Protection class	IP65

¹ Not all frequency ranges available.

Dimensions



Troubleshooting



Note:

Please check the functions using the cabin or cable controls first!

Problem	Possible Cause	Remedy
Transmitter does not react when switched on.	<ul style="list-style-type: none"> – No power. 	<ul style="list-style-type: none"> – Check battery contacts for damage or contamination. – Insert a fully charged battery into the battery compartment. – Recharge battery.
No radio communication.	<ul style="list-style-type: none"> – Start-up routine has not been properly performed. – The receiver is out of the radio range of the transmitter (distance between transmitter and receiver is too large). – Radio link is impaired due to an obstacle (e.g. a building). – Interference in the radio channel (only for radio systems without automatic frequency management). – Source of interference (e.g. walkie-talkie) in close proximity to the transmitter or receiver. 	<ul style="list-style-type: none"> – Activate the receiver before you switch on the transmitter. – Change your location or reduce the distance between transmitter and receiver. – Change the radio channel (for radio systems with manual / partially automatic frequency management). – If possible, remove the source of interference.
Low-power indication after minimal operating time.	<ul style="list-style-type: none"> – Battery contacts are contaminated or damaged. – Battery not charged. – Battery defective. 	<ul style="list-style-type: none"> – Check battery contacts for damage or contamination. – Recharge battery. – Ensure that recharging process runs correctly. – Check transmitter functions using a fully charged or replacement battery.
The display in the transmitter flashes green but it is not possible to effect control commands.	<ul style="list-style-type: none"> – Receiver has no voltage. – No radio communication. 	<ul style="list-style-type: none"> – Check the connecting cable to the receiver. – Check the functions via the LEDs in the radio status panel of the receiver.
Some commands are not carried out.	<ul style="list-style-type: none"> – Receiver defective. – Interruption in the connecting cable to the machine. 	<ul style="list-style-type: none"> – Check if all connecting cables and cable junctions are tight.

If none of the measures mentioned resolve the problem, then please contact your service technician, distributor or HBC-radiomatic.

Maintenance

The radio control system is virtually maintenance-free. Please observe the following points:

- Check the STOP switch functionality at regular intervals. Dirt deposits on the switch can hinder the mechanism and impair the function.
- Check the rubber bellows or rubber seals of the operating elements at regular intervals for leak-tightness. Replace immediately if cracks appear since the penetration of dirt and humidity may damage the function of the operating elements.
- Never use a high-pressure cleaner or sharp or pointed objects to clean the transmitter.
- Charge and discharge transmitter batteries regularly.

In the Event of a Fault



Warning:

Never operate a machine with a faulty or defective radio control system!

- Never try to repair the electronics of the radio control system! Opening the transmitter or receiver housing terminates the manufacturer warranty.
 - Send any defective or faulty equipment to your local distributor or to the manufacturer. They are experts and have the necessary know-how and original spare parts.
 - Always send in the complete radio system (transmitter, receiver, batteries, battery charger, connection cables, and other equipment) and attach a detailed fault description.
 - Do not forget to enclose your address and telephone number so that we can get in touch with you quickly if necessary.
- To avoid damage during transport, use the original packing supplied with the radio control system; otherwise pack securely. Send the consignment to your distributor or to the following address:
HBC-radiomatic GmbH
Haller Str. 45 – 53
74564 Crailsheim, Germany
Phone: +49 7951 393-0
Fax: +49 7951 393-50
E-Mail: info@radiomatic.com
- If you wish to bring a defective radio system to your distributor or the factory by yourself, we kindly ask you to make an appointment in advance.

For an overview of our worldwide service and sales contacts, please visit our website www.hbc-radiomatic.com under "Contact".



Operating Instructions

Original Operating Instructions

FSE 507

YO5100G0



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Attachments: System specific views, circuit diagrams and /or output wiring.

Pictographs



Danger due to electrical voltage. Touching live parts inside the unit can be fatal or cause serious injuries.



Instructions for occupational health and safety. Not following these instructions can lead to accidents that can cause damage, serious injuries or even death.



Important information about the operation of the radio system.

Manufacturer:

HBC-radiomatic GmbH • Haller Straße 45 – 53 • 74564 Crailsheim • Germany • Tel. +49 7951 393-0 • info@radiomatic.com.
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Safety Instructions

Read these operating instructions carefully before working with the radio system. This applies in particular to the installation, commissioning and maintenance of the radio system.

The operating instructions are a constituent part of the radio control system and must always be kept close at hand for the responsible personnel.

The term 'machine' is used in the operating instructions for the different possible uses of the radio system.

Intended Use

- The radio system is used for the control of machines and for data transfer. Observe the occupational safety and accident prevention regulations applicable to each application.
- The intended use also includes reading the operating instructions and adhering to all safety information contained therein.
- The radio system must not be used in areas where there is a risk of explosion, nor for the control of machines used to convey persons, unless it is explicitly approved for these uses by the manufacturer.
- Modifications to the radio system may only be carried out by specialist personnel who have been trained and authorized by HBC-radiomatic. All modifications must be documented at the factory in the radio control master file.
- The safety devices of the radio control system must not be modified, removed or bypassed. In particular, modifications to any part of the radio system's complete E-STOP system are not allowed.

Safety Instructions for Installation and Operation

- The electrical connection according to the enclosed output wiring diagram must be established by a qualified electrician exclusively.
- The receiver may only be opened by trained personnel. Components inside the receiver can be energized at life-threatening voltages. The supply voltage for the machine must be disconnected before the receiver is opened.
- The power supply of the machine control as well as the contacts for external switching devices may only be connected to electrical circuits that have an all-pole separation device. (One separation device for the power supply and at least one separation device for the external switching devices.)
- For bus systems, the electronics of the machine needs to examine all control commands that belong to the Safety Circuit 2 for plausibility using the Si-2 hardware output on the side of the radio; in case there are implausibilities, it has to initiate the safe state immediately.
- Please also note that, with radio systems, the presence of persons in the danger zone – in particular beneath the load (cranes!) – is prohibited in all cases.
- Select a safe location for radio control, from which you have a good and complete view of the working movements of the machine, the load movements and the surrounding working conditions.
- It is not permissible to leave a radio transmitter unattended while it is activated. Always switch off the radio transmitter when it is not needed. This applies in particular if you change location, when working without radio control, during breaks and at the end of work. Always protect the radio transmitter against use by unauthorized persons, for example by locking it away.
- In the event of an emergency and with all faults, switch off the radio transmitter immediately by pressing the STOP switch.
- Only operate the radio system when it is in perfect working order. Faults and defects that could influence safety must be rectified by specialists who have been trained and authorized by HBC-radiomatic before the system is put back into operation.
- Note that the operational directions of the operating elements may appear inverted depending on location and viewing angle to the machine. This applies in particular to rotary cranes if your location changes from inside to outside the radius of the crane. The operator must make himself familiar with the directional markings on the machine before starting to work.
- Repairs may only be carried out by specialist personnel who have been trained and authorized by HBC-radiomatic. Use original replacement parts and accessories (e.g. rechargeable batteries) exclusively; otherwise it is possible that the equipment safety can no longer be guaranteed and our extended warranty will be voided.
- Remain vigilant when working with the radio system and familiarize yourself with its functions. This applies in particular if you are working with it for the first time or if you work with it only occasionally.

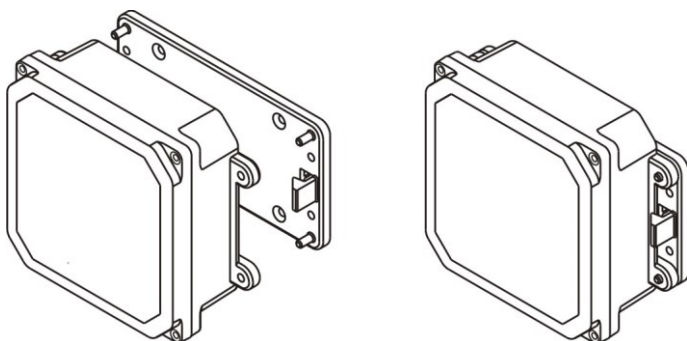
Installation

- The receiver should be mounted vertically with the cable connection downwards.
- Ensure that there are no metal parts within a radius of 1 m (3 feet) above the receiver.
- When the receiver has to be mounted in a control cabinet, a car antenna must be installed.
- Receivers with external antenna must be installed in such a way that the antenna stands freely and does not touch walls or metal parts. Otherwise a car antenna must be used, which can be supplied if needed.
- Receivers with plastic housing should be protected against direct sunlight (UV radiation) by appropriate measures.

Installation with Snap-In Wall Bracket

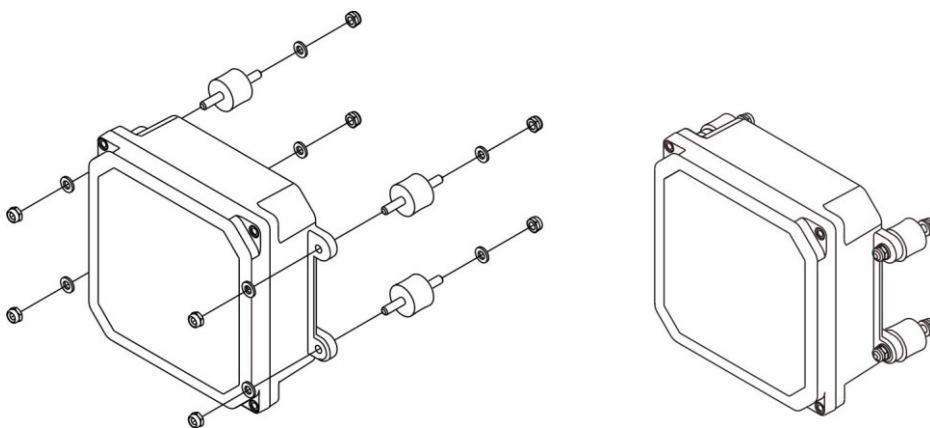
The receiver is installed by means of the snap-in wall bracket included in the delivery. Install the wall bracket with the provided drilling holes. Use only screws (max. M6) that are suitable to the installation location.

Place the receiver with the eyelets on the wall bracket pins and press it on the wall bracket until it clicks into place. Press the engagement pins outwards with a large screwdriver, to remove the receiver from the wall bracket. This releases the receiver off the wall bracket from where it can be removed to the front.



Installation with Mounting Loops

The receiver is installed via the integrated mounting loops on the receiver sides. Use the provided shock mounts for installation to dampen any vibrations that may occur.



Electrical Connection

Depending on the version, the radio receiver is connected either via a cable gland or with a Harting plug connection to the machine electrics.

Please observe that the receiver may only be connected to the supply voltage indicated on the type plate!



Attention:

For the connection to the PCB terminals on the receiver mainboard, use only conductor wires with the following specifications:

	Min. Ø	Max. Ø
Without wire-end sleeve	0.2 mm	1.5 mm
With wire-end sleeve	0.25 mm	1.5 mm
With wire-end sleeve with collar	0.25 mm	0.75 mm








Warning – shock hazard!






- The electrical connection may only be carried out by skilled personnel.
- The electrical connection must comply with the enclosed wiring diagram.
- Switch off the supply voltage before opening the receiver. There is a risk of fatality from touching live parts inside the housing!

Control Display

A control display with LEDs indicating the operating state of the radio system is located in the upper housing part.

The LEDs have the following meaning:

Control display		Simplex procedure (Data are only transmitted from the transmitter to the receiver.)
Meaning	Color	Receiver
On	 yellow	Illuminates as soon as the receiver is connected to the supply voltage.
RF	 red	Illuminates as soon as the radio connection is interrupted.
Si1	 green	Illuminates as soon as the E-STOP relays are closed.
Si2	 green	Illuminates as soon as a drive command is output.
Feedback	 yellow	Off

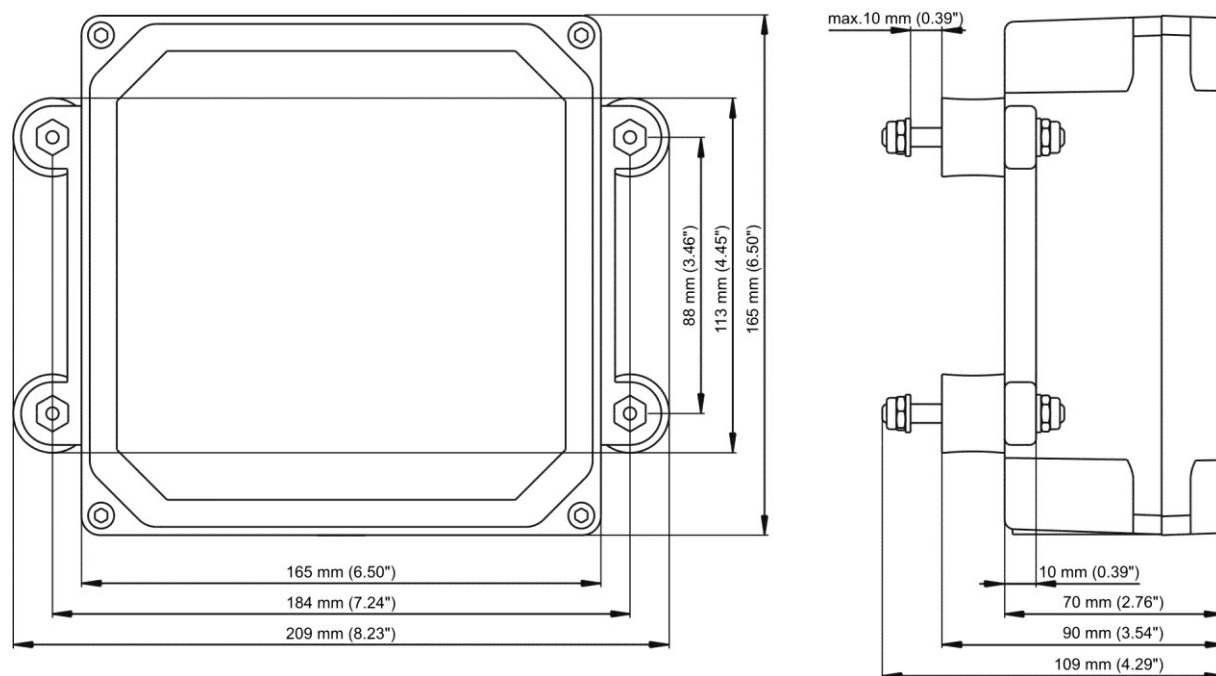
Control display		Duplex procedure (Data are transmitted in both directions. Non-safety-relevant data are transmitted in the feedback.)
Meaning	Color	Receiver
On	 yellow	Illuminates as soon as the receiver is connected to the supply voltage.
RF	 red	Illuminates as soon as the radio connection is interrupted.
Si1	 green	Illuminates as soon as the E-STOP relays are closed.
Si2	 green	Illuminates as soon as a drive command is output.
Feedback	 yellow	Illuminates as soon as a feedback telegram is transmitted.

Technical Data

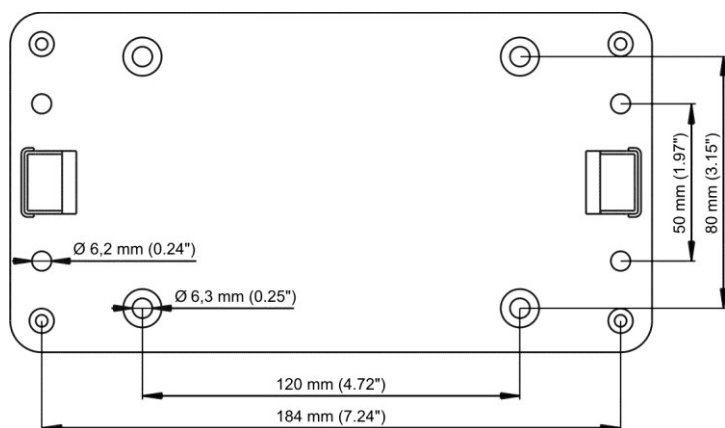
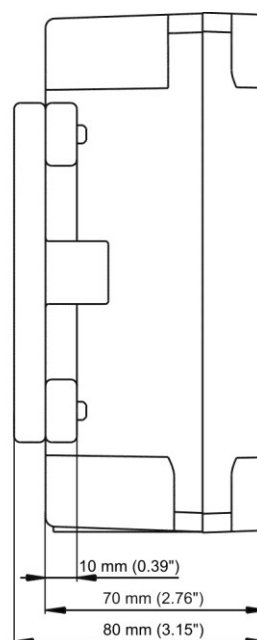
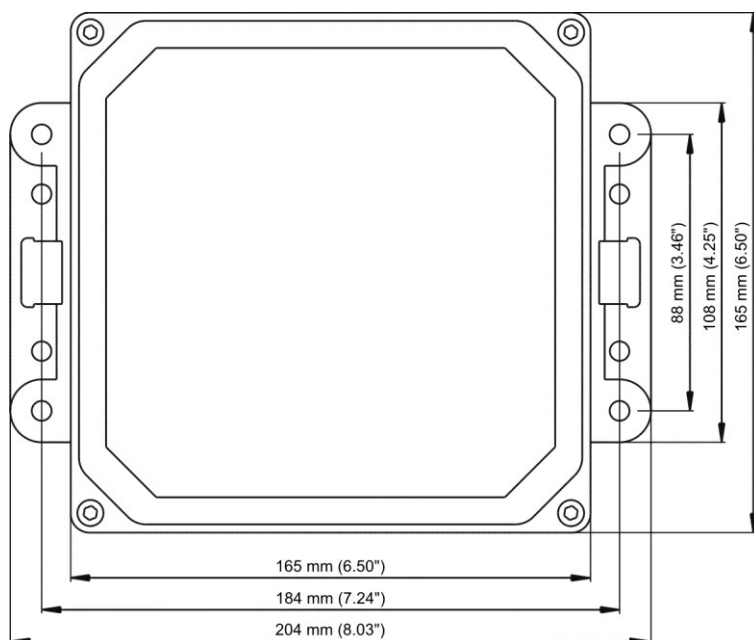
Max. number of control commands	6 digital + 6 analog + E-STOP + pilot valve
Unique system addresses	Over 1 000 000 combinations
Supply voltage	10 – 30 V DC
Power consumption	Max. 6 W
Inputs	2 x optocoupler
Outputs	6 x PWM
Interfaces	Cable option
E-STOP resp. Si1, Si2 control unit	1 x E-STOP output, High-Side Switch 10 A
Safety function	E-STOP: Performance Level d, category 3 according to EN ISO 13849-1:2015
Frequency ranges	2,4 GHz: 2402 – 2480 MHz DECT: 1790 – 1930 MHz
Channel spacing	2.4 GHz: 1 MHz DECT: 1,728 MHz
Connection	Cable gland (metric M20/25) Option: Harting Han 25D, cable gland (metric M25/20/20 with multi-hole seal)
Antenna	Internal Option: car antenna
Operating temperature range	-25 °C ... +70 °C (-13 °F ... +158 °F)
Housing material	Plastic
Dimensions	165 x 165 x 70 mm (6.5 x 6.5 x 2.8 inches)
Weight	Approx. 1 kg (2.2 lbs.)
Protection class	IP 65

Dimensions

Receiver Housing HR165 with Shock Mounts

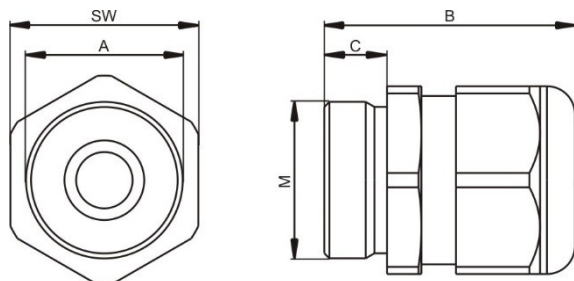


Receiver Housing HR165 and Snap-In Wall Bracket



Connection Options

Metric Cable Gland M20/25

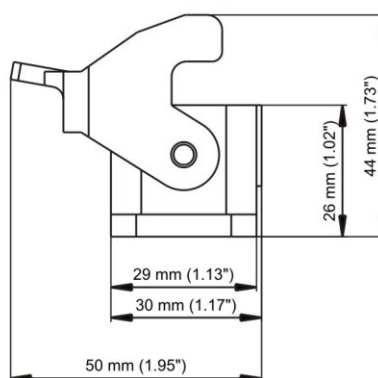
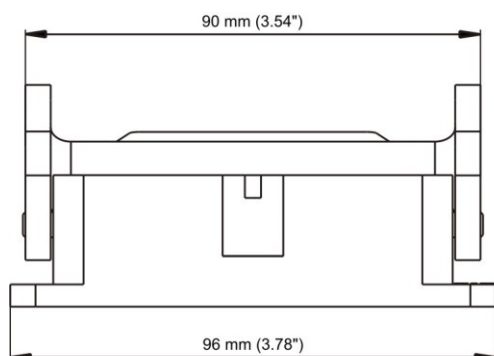


M	SW	A	B	C
M20	24 mm	5-9 mm*	36 mm	9 mm
M25	33 mm	9-16 mm**	42 mm	11 mm

* Multi-hole seal option: 4 or 6 x Ø 5,5 mm

** Multi-hole seal option: 2 x Ø 8,5 mm + 1 x Ø 5,5 mm

Harting Plug Connection Han 25



Troubleshooting



Note:

Please check the functions using the cabin or cable control first!

Problem	Possible Cause	Measures
Transmitter does not react when switched on.	<ul style="list-style-type: none"> – No power. 	<ul style="list-style-type: none"> – Check battery contacts for damage or dirt. – Insert a fully charged battery into the battery compartment. – Recharge battery.
Low-power indication after minimal operating time.	<ul style="list-style-type: none"> – Battery contacts are dirty or damaged. – Battery not charged. – Battery defective. 	<ul style="list-style-type: none"> – Check battery contacts for damage or dirt. – Recharge battery. – Ensure that recharging process runs correctly. – Check transmitter functions using a fully charged or replacement battery.
Some commands are not carried out.	<ul style="list-style-type: none"> – Receiver defective. – Interruption in the connecting cable to the crane or machine. 	<ul style="list-style-type: none"> – Check if all connecting cables and cable junctions are tight.

If none of the measures mentioned resolve the problem, then please contact your service technician, dealer or HBC-radiomatic GmbH.

Maintenance

The radio control system is virtually maintenance-free. Please observe the following points:

- Never use a high pressure cleaner or sharp or pointed objects to clean the receiver.
- Whenever welding the machine:
 - Switch off the radio control system.
 - Switch off the machine.
 - Disconnect all electrical connections to the receiver.Otherwise the receiver electronics can be destroyed.

In the Event of a Fault



Warning:

Never operate a machine with a faulty or defective radio control system!

- Never try to repair the electronics of the radio control system! Opening the transmitter or receiver housing terminates the manufacturer warranty.
 - Send any defective or faulty equipment to your local distributor or to the manufacturer. They are experts and have the necessary know-how and OEM spare parts.
 - Always send in the complete radio system (transmitter, receiver, batteries, battery charger, connection cables, and other equipment) and attach a detailed fault description.
 - Do not forget to enclose your address and telephone number so that we can get in touch with you quickly if necessary.
- To avoid damage during transport, use the original packing supplied with the radio control system; otherwise pack securely. Send the consignment to your distributor or to the following address:

HBC-radiomatic GmbH
Haller Str. 45 – 53
74564 Crailsheim, Germany
Phone: +49 7951 393-0
Fax: +49 7951 393-50
E-Mail: info@radiomatic.com
- If you wish to bring a defective radio system to your distributor or the factory by yourself, we kindly ask you to make an appointment in advance.

For an overview of our worldwide service and sales contacts, please visit our website www.hbc-radiomatic.com under "Contact".