RADIO CONTROL SYSTEMS

Operating instructions

Nano-M SMJ USA/Canada
Compact-M

Transmitter Type / Version
Factory No.
Frequency

Receiver Type / Version
Factory No.
Frequency

OTTO-HAHN-STR. 3 - 5
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General information

Standard scope of delivery

- Transmitter including carrying system
- Receiver with integrated mounting holes
- Connection cable for the receiver

The order confirmation and/or the delivery note when the system is received is binding for the actual scope of delivery.

Safety information

Even if you have already operated radio control systems, always read these operating instructions before commissioning. Only these operating instructions include the latest information about your NBB radio control system.

Please refer to the enclosed documents for explanations about the operating license. Always observe the relevant work safety and accident prevention regulations. Only trained and authorised persons may operate the NBB radio control system. The safety features installed in the NBB radio control system must be checked regularly.

The NBB radio control system must be shut down immediately if there are any faults. The transmitter must be switched off using the EMERGENCY STOP switch or the STOP key. The connection cable must be disconnected at the receiver of the connection socket (terminal) of the controlled system. The radio control system may only be repaired by NBB or specialists authorised by NBB.

Disregard of these recommendations puts you and others in danger! NBB refuses any warranty or liability in such cases. This radio control system is only suitable for the control of construction machines and industrial systems. The applied safety measures (EMERGENCY STOP, zero position) are only fully effective in this application area. Any different use is not permitted and releases NBB from any responsibility.

Never expose the radio control system to a strong jet from high pressure cleaning equipment!

Nameplates

The transmitter and receiver type, serial number, frequency range and approval for non-EU countries are specified on the nameplates.
Please always specify the serial number for queries.

Example:

Transmitter Type / Version: **Nano-L SMJ**
Factory No.: 999 899 4990
Frequency: 402 -470 MHz
CE

Receiver Type / Version: **Compact-V**
Factory No.: 999 899 4990
Frequency: 402 -470 MHz
CE

Maintenance

Your NBB radio control system is maintenance-free to a large extent. Nevertheless observe the following points:

- Regularly check the EMERGENCY STOP and STOP function.
- Remove remnants of building material.
- Disconnect receiver from the power supply for arc welding work, otherwise there is a risk of damage to the receiver electronics.
- Regularly check wear parts.

Warranty

NBB grants a functional warranty of 12 months from the date of sale on all NBB radio control systems (transmitter, receiver, charger). Working hours and material costs are included in the warranty. Shipping costs shall be at the expense of the buyer. Wear parts, relays, rechargeable batteries and batteries are excluded from the warranty.

The functional warranty will become null and void for damage, accidental damage, negligence, improper use, non-compliance of the operating conditions, non-observance of the operating, test and service information as well as for repairs or device modifications that are not authorised by NBB.

NBB is not liable for indirect damage and reserves the right to decide on improvements or replacements.

In the event of faults

If a fault event occurs with the NBB radio control system, cease work immediately!

Please note that even small faults can represent the beginning of extensive defects. Always contact your dealer or NBB in the event of a fault. Do not attempt to repair the NBB radio system yourself, irreparable damage may occur.

Transmitter Nano-M SMJ

Variations

Nano-M SMJ with a display and 2 joysticks

Nano-M SMJ with 3 joysticks

Nano-M SMJ with a display and 8 joysticks

Nano-M SMJ with 6 joysticks

Nano-M SMJ with a display and 3 joysticks

Nano-M SMJ with 4 joysticks

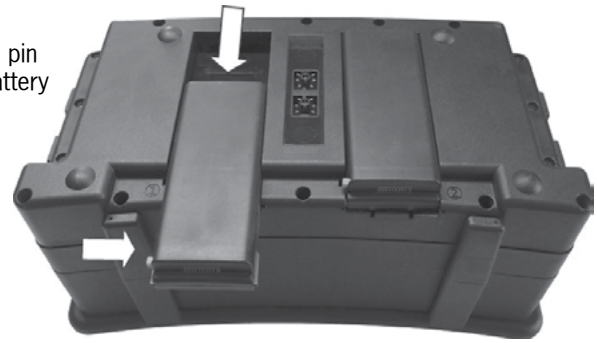
Nano-M SMJ 7.2 V accumulator system

Commissioning

Operating voltage 7.2 V:
Insert the battery in the battery compartment for commissioning.
For removal, press in the locking pin to unlock and slide out the battery to the side.

Completely charge the rechargeable battery before initial use.

Press in the locking pin
and slide out the battery



If the NBB radio control system is not to be used for a long time, it is strongly recommended to charge the battery approx. every 4 weeks. This prevents deep discharge of the battery and enhances its service life. If you decommission the NBB radio control system for a long time, we recommend that you remove the batteries from the transmitter!

Please refer to the technical annex for the exact design.

Safety equipment

Safety equipment in the NBB radio control system:

- EMERGENCY STOP or STOP function
- Zero position interlock
- Addressing each transmitter using a unique bit combination
- Rubber sleeves to protect the switch

Please check the sleeves and the housing for breaks and cracks each time before commissioning the transmitter. Contact your service team if necessary. Non-observance can cause malfunctions and water damage.

Operation of the system

Operation:
The red dot flashes.

Switching the transmitter on and off

Design with emergency stop

Unlock the **Emergency Stop pushbutton** by turning clockwise to switch on the transmitter.

Two short signals can be heard.

A red dot flashes in the LED display and an antenna symbol appears in the LC display during operation.

The transmitter is switched off by pressing the **Emergency Stop pushbutton** once.

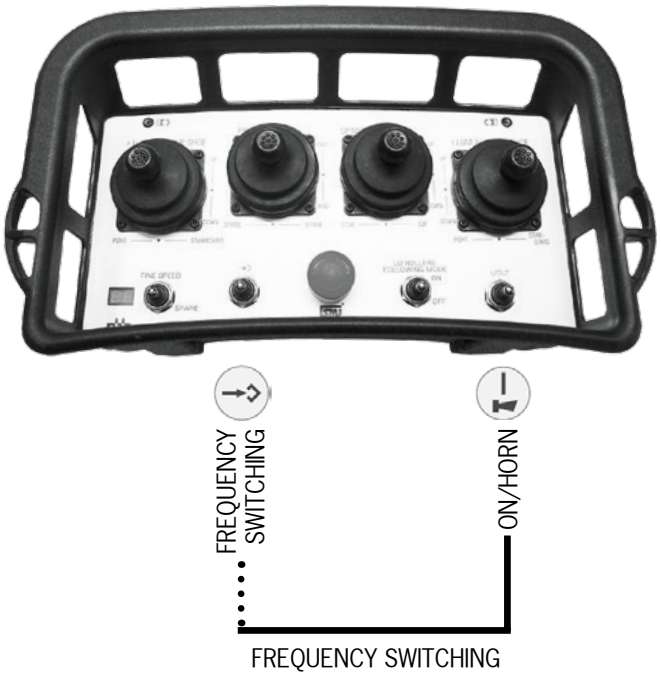
After pressing the EMERGENCY STOP switch, stop telegrams are sent for 2 seconds to switch off the system. This shut-off time is displayed on the LED display by the segments rotating clockwise.

To ensure faultless operation, please observe the following rules for operation precisely: The system to be controlled - provided the transmitter is ready for operation - can only be switched on if no command transmitters are activated. The command necessary for this is activated by the **«On/Horn»** key. Here a horn signal is triggered for the system to be controlled. After switching on the system to be controlled, this key is used, according to the work specifications, for repeated triggering of the horn signal.

Frequency switching:

To switch the frequency, press and hold the **«On/Horn»** key. Now press the **«Frequency switching»** key successively. If the receiver locks on a new frequency, a horn signal can be heard and the system is ready for operation.
Please observe the country-specific regulations, if applicable.

The system can also be equipped with automatic frequency switching (LBT) as an option.



Channel number:
During operation, the set channel can be displayed by pressing the **«Frequency switching»** key.

Please refer to the technical annex for the exact position of the **«On/Horn»** and **«Frequency switching»** keys.

Battery life warnings:

The LED display of the active battery flashes green during operation. When the control lamp flashes orange, the battery indicates a remaining capacity of approx. 10%. The depletion of the battery capacity is indicated by the red control lamp lighting up. To replace the depleted battery place the system on a solid, level surface with access to the bottom at the system. Remove the spent battery and replace with a fully charged battery. The radio system will not have an interruption in contol during battery replacement provided the second battery is installed and has capacity left. Only charge the discharged battery in the charger.

Battery display:

- **LED - flashes green:** Battery OK and in operation.
- **LED - flashes orange:** Battery capacity left around 10%.
- **LED - flashes red:** Battery capacity left around 5%.
- **LED - permanently lights up red:** Battery empty, transmitter switches to 2nd battery.

Energy saving function:
If no keys are pressed within a specified time*, the transmitter automatically switches off. The red dot in the LED display goes out.
A transmitter can also be manufactured without a standby function for continuous operation as an option.

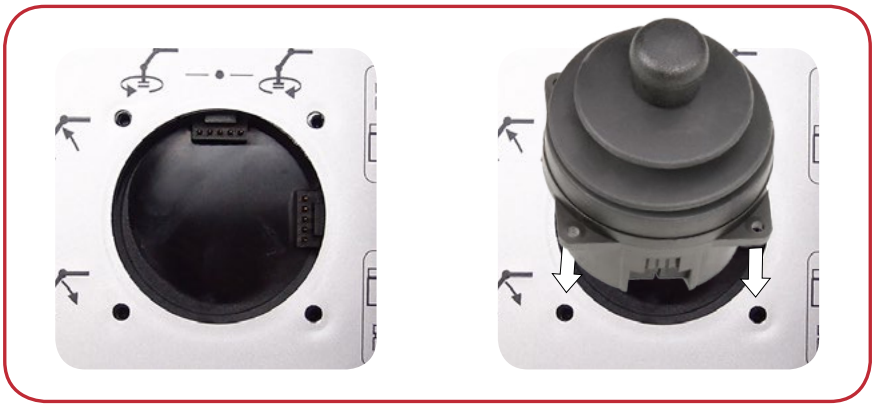
**The standby time can be set as desired.*

Changing the Surface Mounted Joystick:

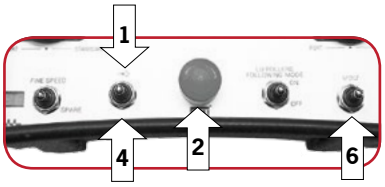
Switch off the transmitter and remove the batteries.

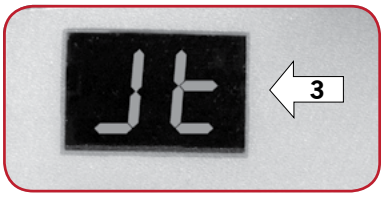
Loosen all 4 screws of the Surface Mounted Joystick with a Torx 10 screwdriver and remove the screws.

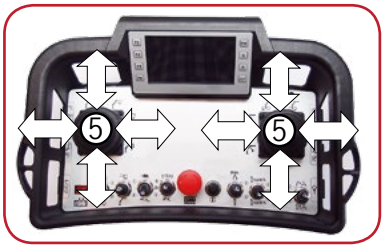
Remove the Surface Mounted Joystick from the top.
Insert the new Surface Mounted Joystick and make sure that the plugs and sockets are above each other. Screw down the Surface Mounted Joystick with the 4 screws previously removed and reinsert the batteries.



Start teach mode after changing the Surface Mounted Joystick.







Surface Mounted Joystick teach mode activation with pushbutton:

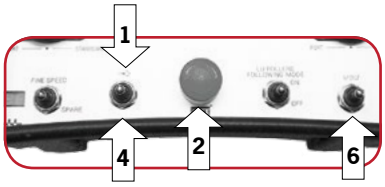
■ To activate teach mode, the transmitter must be switched off.

1. Press and hold the **«Frequency switching»** key.
2. Switch the transmitter on.
3. The letters **«Jt»** appear in the display after 2 seconds.
4. Now release the **«Frequency switching»** key.
5. Completely move the Surface Mounted Joystick in one direction and return it to the 0-position. Repeat this for all directions. Perform point 5 for all other Surface Mounted Joystick if required. Reactivation of teach mode is not required.
6. Press the **«On/Horn»** key once. Teach mode will be closed and the new Surface Mounted Joystick will function as intended by the system design.
7. Attention! The transmitter is now in working mode!

■ **Error:** If **«Jt»** does not appear in the display, please switch off the transmitter and start teach mode activation from the beginning!

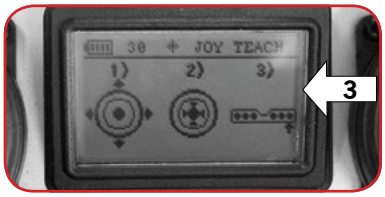
Technology SMJ - Surface Mounted Joystick

Surface Mounted Joystick teach mode activation with pushbutton and display:

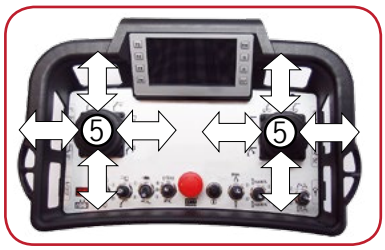


- To activate teach mode, the transmitter must be switched off.

1. Press and hold the «Frequency switching» key.
2. Switch the transmitter on.
3. «Joy Teach» with graphics appears in the display after 2 seconds.
   Now release the «Frequency switching» key.
5. Completely move the Surface Mounted Joystick in one direction and return it to the 0-position. Repeat this for all directions. Perform point 5 for all other Surface Mounted Joystick if required. Reactivation of teach mode is not required.
6. Press the «On/Horn» key once. Teach mode will be closed and the new Surface Mounted Joystick will function as intended by the system design.
7. Attention! The transmitter is now in working mode!



- Error: If «Joy Teach» does not appear in the display, please switch off the transmitter again and start teach mode activation from the beginning!



The TEACH MODE, memory of max. and min.-values of the valves adjustment with proportional control, is activated by a separate combination of keys.
Please refer to the technical annex.

Technical data

Transmitter	Nano-M SMJ
Transmission frequency range	See nameplate Switchable frequency to respective national band possible as a result of synthesizer technology.
Data security	Addressing each transmitter using a unique bit combination
LF-modulation	FSK - Signal acc. to CCITT V.23
Baud rate	1200 -9600 baud (bit / sec.)
Range	Approx. 300 - 1000 m (depending on environment)
Operating voltage	Accumulateur 7.2 V NBB
Current consumption	60 - 100 mA
RF output	≤ 10 mW ERP
Protection class	IP 65
Operating ambient temperature	From -20 to +65 °C
Weight (without battery)	3500 g
Measurements (L x W x H)	354 x 229 x 141 mm

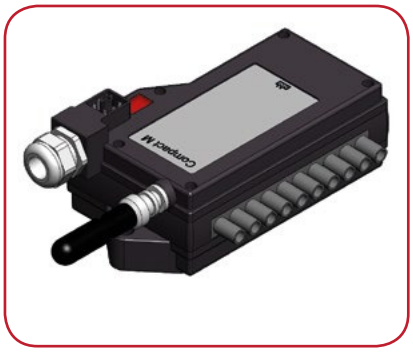
Receiver Compact-M

Variations

Compact-MA

Compact-MB

Compact-MC



Compact-MD

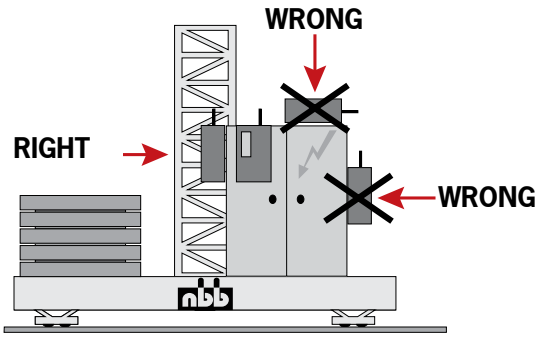
Commissioning

The receiver is connected via a connection cable to the system to be controlled. Please observe the instructions of the system manufacturer when installing.
We strongly recommend establishing this connection via a central, easily accessible plug connection (e.g. Tyco type (HTS) plug connection, series HE/ HB/HN/ HA, or a comparable one from a different manufacturer) to enable a fast and precise error diagnosis for servicing and to be able to remove the receiver without installation work.
The power for the receiver is supplied via the connection cable in most cases.

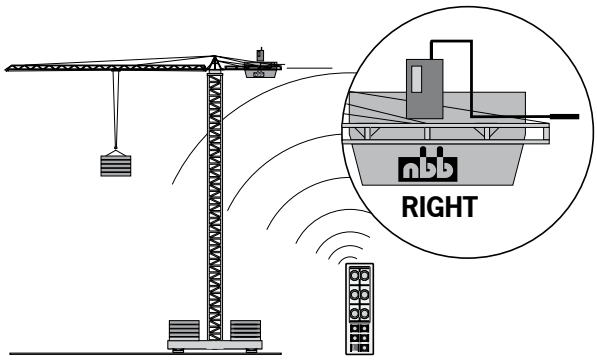
In general a ground cable (neutral conductor) must be installed for systems that have never been operated with a radio control system. Otherwise the power for the receiver electronics cannot be supplied! Please make sure that the operating voltage of the receiver corresponds with the connection values of the system to be controlled. The valid operating voltage is noted in the Annex.

Mounting instruction

- Only mount the receiver vertically to the external wall of the switch cabinet and make sure that the antenna protrudes above the wall.
- Make sure that the antenna is not partially or completely shielded by metal parts.
- For installation in the cabin or switch cabinet, the antenna is installed on the outside using the extension cable and attached with the mounting bracket as horizontal as possible at a distance to the metal parts to be shielded.
- The antenna should always be mounted so that it remains visible every time the location of the transmitter is changed.



Installation for rotating tower crane.



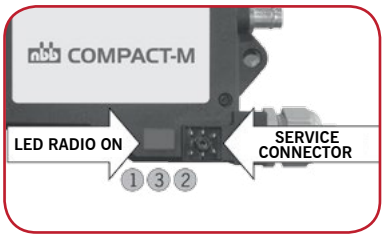
Mount antenna with extension cable horizontally for rotating tower crane

Function control

A regular system test of the NBB radio control system is necessary for the maintenance of operational safety. For single shift operation, we recommend performing this control at least once a week. The control can be performed with the aid of the control lamps located on the receiver. For this purpose, the transmitter must be ready for operation.

- Above all make sure that no-one is in the danger zone. **Risk of accident!**
- Only switch the receiver on - the transmitter should remain switched off.
- Put the transmitter into operation by pressing the “START/ON/HORN” key.
- Now check the commands (always start with the lowest level) and the correct response of the system to be controlled.
- **STOP control**. Press the STOP key on the transmitter. Afterwards check whether the system to be controlled performs the stop operation sequence, i.e. whether it switches off (shutoff time depends on application).

Function control



Meaning of the LED display on the Compact-M:

Receiver connect to power, without communication with transmitter:
1. LED constant ON (green)
2. LED flashing irregular (orange) -> receiver searching transmitter

Connect to transmitter:
1. LED flashing regular (green)
2. LED flashing regular (orange) -> communication ok

1. LED flashing irregular (green)
2. LED flashing irregular (orange) -> Interference on RF signal
-> (change frequency)

1. LED flashing regular in 1 sec. interval (red) -> Emergency relay fault.
2. LED flashing regular (orange)

Receiver Compact-M with charger (optional):
3. LED flashing regular (yellow) -> battery charging
3. LED constant ON (yellow) -> battery full charged

Service connector: Only for NBB service team.

If problems arise:
1. Check whether the transmitter is switched on.
2. Check the power supply of the receiver.
3. (optional) Check or change the current frequency channel.

Technical data

Receiver	Compact-M
Receive frequency range	See nameplate
Data security	Addressing each receiver by a separate, unique combination >16 million options
Safety	EMERGENCY STOP with self-test Restart lockout in the event of a faulty EMERGENCY STOP relay
Contact load of EMERGENCY STOP relay	Max. 4 A; 12 V/24 V DC
Contact load of relay	Max. 6 A; shortcircuit-safe; analog PWM or digital 12 V/24 V DC
Power consumption	<4 VA / 12 V DC; <3 VA / 24 V DC depending on the number of active relays
Supply	Please refer to the technical documents
Operating ambient temperature	From -20 to +70 °C
Protection class	IP 65
Weight	Approx. 1100 g
Measurements (L x W x H)	215 x 160 x 65 mm

Battery - 7.2 V

Completely charge the battery before initial use.
Never put an uncharged battery into operation as it can be destroyed as a result.
Only completely discharged batteries should be charged.

Always remember to operate your controller until the capacity of the battery is completely depleted.The battery only has its maximum capacity after five complete charging and discharging procedures!

Completely discharge the battery in the control unit before charging again.
The charging time depends on the type of battery. It is normal for the battery to heat up during charging or over long periods of use. Charge batteries at an ambient temperature of 10 to 35° C. To prevent deep discharge, the battery should be recharged once a month if not used. If the battery temperature is too high or too low, no charging takes place. Deep discharge and extreme temperatures damage the battery. Heat in particular reduces performance. To extend the service life of the battery, store the charged battery in a cool and dry location. NBB is not liable for subsequent damage due to incorrect use.

Safety information

Do not open, modify or burn the battery. Do not drop it or subject it to strong impact. Protect the battery from rain, moisture and extreme temperatures. Keep the contacts clean and make sure the battery does not come into contact with metal objects (e.g. aluminium foil). Do not short circuit the battery.

A charged battery is a concentrated energy source! Never store the battery in toolboxes, or similar, where there is a risk of short circuiting due to metal parts (short circuit due to keys in trouser pockets is also possible).

Disposal

Do not throw away used batteries in household waste. Used batteries should be disposed of according the local, state, and federal regulations.

Warranty

Any warranty claims for damage or premature wear due to non-observance of the above operating and safety information shall be denied by NBB Controls.

Technical data

Technology	NiMH
Voltage	7.2 V
Capacity	1500 mAh
Maximum charging current	1,0 C (with appropriate monitoring)
Operating temperature (discharge)	From -20 to +60 °C
Operating temperature (charge)	From +10 to +35 °C
Measurements (L x W x H)	Approx. 126 x 52 x 22 mm
Weight	Approx. 200 g

Instructions for use

Display of the charging procedure via a DUO-LED:

LED - continuously lights up green:	STANDBY. Charger is ready for operation. Insert the battery in the battery compartment.
LED - continuously lights up orange:	CHARGING. The battery is being charged.
LED - rapidly flashing orange:	Charging complete.
LED - slowly flashing orange:	Battery is deeply discharged or ambient temperature for quick charging is too low.

There is a regeneration or warm-up phase with reduced charging current before changing over to actual quick charging.
Leaving the battery in the charger beyond the charging time is not a hazard.
Only use the charger when it is dry!

Detection and evaluation of the following start states:

Undervoltage:	Pre-charging with reduced charging current
Insufficient temperature:	Pre-charging with reduced charging current (warm up)
Excessive voltage:	No start of charging procedure

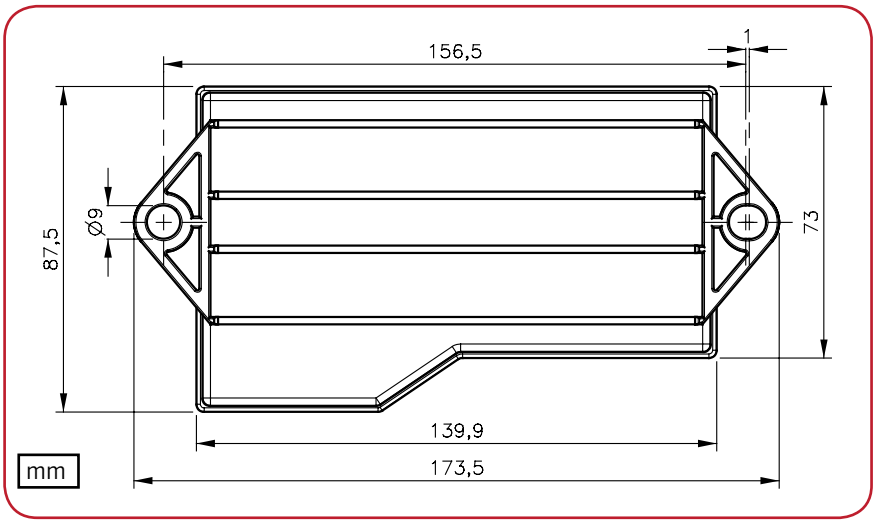
Shutdown when permitted maximum temperature is reached.

	2.250.1449	Universal charger (12V/24V DC) (without cable), black
	2.250.1450	Universal charger (2.250.1449) (12 V/24 V DC) Set with 2m cable, black, pluggable, with connector Europe (3.970.1449) and wall power supply (3.970.1448) (100/240 V AC / 12 V)
	2.251.1450	Universal charger (2.250.1449) (12 V/24 V DC) Set with 2m cable, black, pluggable, with connector USA/Japan (3.970.1451) and wall power supply (3.970.1448) (100/240 V AC / 12 V DC)
	2.250.1452	Universal charger (2.250.1449) (12 V/24 V DC) Set with 2m cable, black, not pluggable, with charger with car connector (cigarette lighter) (3.400.1451)
	2.250.1453	Universal charger (2.250.1449) (12 V/24 V DC) Set, black, with car connector (cigarette lighter) (3.400.1451), Primary adapter (GB, Australia, USA/Japan, Europe) (3.970.1449) and wall power supply (3.970.1455) (100/240 V AC / 12 V DC)

Charger for NiMH rechargeable batteries (7.2 V)

Mounting instruction

Please refer to the drawing for the measurements for attachment.



Technical data

Power supply	by 12 V / 24 V on-board electrical system or external power supply
Supply voltage	9 V - 32 V DC (Note: the charging procedure is lengthened below 10V)
Power supply system	Via coaxial power connector (external = 5.5 mm, internal = 2.1 mm)
Measurements (L x W x H)	173.5 x 73 x 43.7 mm

Configurable specific to battery (Delta Peak, dT/dt, charging current, timeout)

Integrated charger (in receiver) for charging NiMH rechargeable batteries (7.2 V).

Alternatively the receiver (DC supply) can be equipped with an integrated charger.
Quick charging (approx. 1 h): R16, R-CAN, Compact-M, Compact-V
Normal charging (approx. 3 h): PNN-BUS-3

US-FCC and CANADA IC

USA:
NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

ATTENTION:
Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment!

IC CANADA:
The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website www.hcsc.gc.ca/rpb

This device complies with Industry Canada license-exempt RSS standard(s).
Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme avec Industrie Canada exempt de licence Rss standard(s).
Son fonctionnement est soumis aux deux conditions suivantes :
(1) cet appareil ne peut causer d'interférences, et
(2) cet appareil doit accepter toute interférence, y compris des interférences qui peuvent provoquer un fonctionnement indésirable du périphérique.

Technical documents

Approvals and certificates

Approvals for EU countries: CE

Annex:

EC Declarations of Conformity

Available on request:

M-Zert GmbH

Certificate DIN EN ISO 9001:2008 Nº 03022

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We reserve the right to make technical and design changes.

Operating instructions Nano-M SMJ, Compact-M
Englisch, Teile-Nr. 3.150.1360, Stand 05.15