



// RF Tx NGF ULR2.4-safe / RF Rx NGF ULR2.4-safe

Mounting and wiring instructions / Wireless tilting sensor

English

Use of the mounting and wiring instructions

All actions described in these instructions may only be performed by qualified persons who have been trained and authorised by the operating company.

1. Read and understand these mounting and wiring instructions.
2. Comply with the valid occupational safety and accident prevention regulations.
3. Install and operate the device.

Selection and installation of devices and their integration in control systems demand qualified knowledge of all the relevant laws, as well as the normative requirements of the machine manufacturer.

Scope of delivery

1 device, mounting and wiring instructions, carton.

Safety information



In this document, the warning triangle is used together with a signal word to indicate a hazardous situation.

The signal words have the following meanings:

NOTICE indicates a situation which may result in material damage.	CAUTION indicates a situation which may result in minor or moderate injury.
WARNING indicates a situation which may result in serious injury or death.	DANGER indicates a situation which will result in serious injury or death.

General information

NOTICE
After installation and during the operation of the NGF system in connection with the crane system, additional hazards may occur. These hazards go beyond the framework of these mounting and wiring instructions. They must be documented by the manufacturer of the overall system.

NOTICE
The NGF system is subject to specific preventive measures in terms of electromagnetic compatibility. Install and operate it in accordance with the used standards listed in the technical data section in this document.

Intended use

The wireless tilting sensor monitors the position of the bottom hook block of a crane and helps to hold it in a horizontal position. As a second application, it monitors the position of a load (e.g. with a parallel lift).





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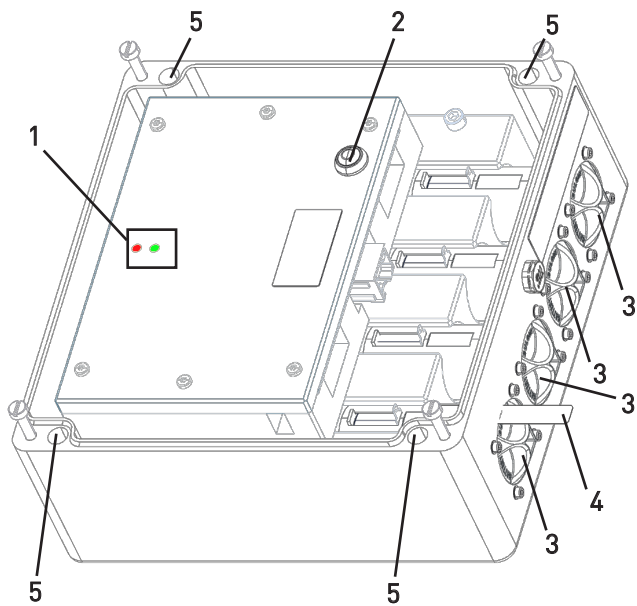
English

System components

The system consists of a transmitter (Tx) and a receiver (Rx). The transmitter measures the angles and transmits the measured values via radio. The measured values are determined by two independent measuring systems. The radio link is a 2.4 GHz low-energy system. The transmitter is powered by batteries or accumulators. The two participants are paired in such a way that only one specific transmitter can communicate with the corresponding receiver. The receiver (Rx) is attached to the roller head and receives the measured values via radio. The received data is then transmitted to the crane control via the LSB (Liebherr System Bus) interface.

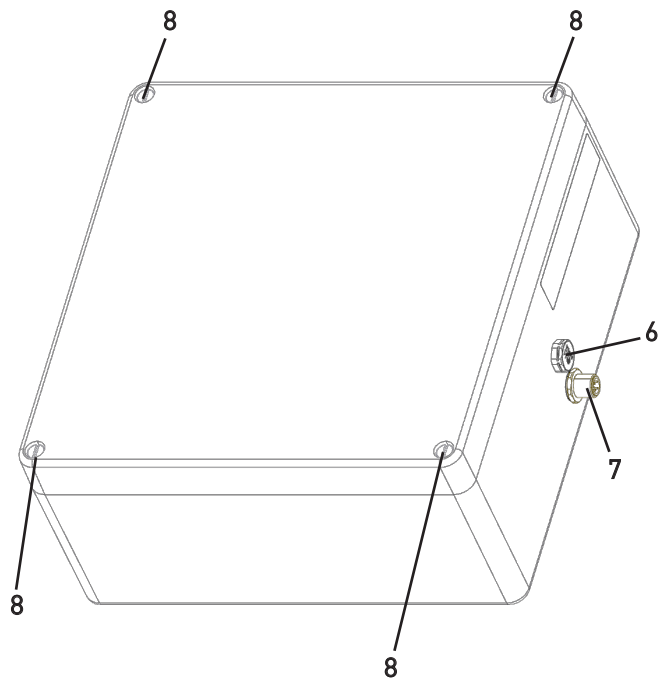
Product components

RF Tx NGF ULR2.4-safe (transmitter)



Legend	
1	Status LEDs (red/green)
2	Pairing button (Tx only)
3	Battery/battery compartment cover (Tx only)
4	Battery insulation strip (Tx only)
5	Bore holes, $\varnothing$ 6,5 mm

RF Rx NGF ULR2.4-safe (receiver)



Legend	
6	Enclosure ventilation
7	M12 flange connector (Rx only)
8	Enclosure cover screws



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Installation



WARNING

Loose screws can cause parts to come loose and fall off. Tighten all cover screws hand-tight.

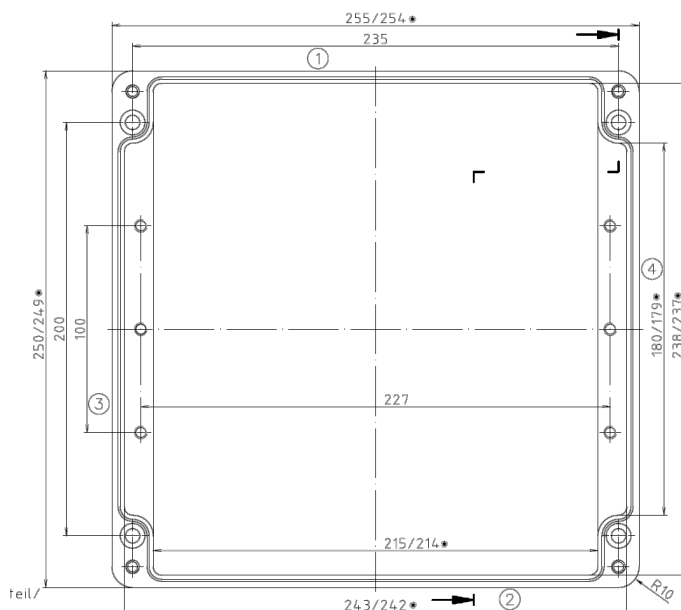
The mechanical installation of the transmitter and receiver is the responsibility of the system operator.

The type of mounting and the mounting screws must be appropriate for the intended application.

The maximum diameter of the bore hole is 6.5 mm.

During installation, ensure that no moisture penetrates the sensor. Protection class IP65 is only achieved with a closed enclosure cover.

For correct wiring of the receiver, read the »Technical Data« chapter of this manual.



Battery



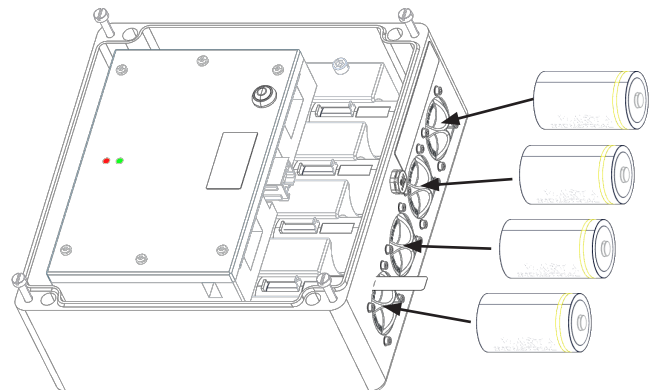
WARNING

A wrong battery type may cause too short runtimes, wrong voltage or make the batteries not fit into the device. Use the NGF Tx with the specified battery type only.

Do not mix old and new batteries. Make sure that the battery charge lasts long enough for the intended work.

Use four 1.5 V alkaline batteries, type D, specified for industrial use (see technical data).

Battery insertion



Pairing



WARNING

If the receiver (Rx) is paired with a different transmitter (Tx) than the intended one, the measured hook tilt may be wrong. This may lead to a dangerously inclined hook block. Make sure that the installed set of NGF Tx and Rx devices is paired correctly.

To have transmitter and receiver communicate with each other, pair the devices once.

Before the pairing, make sure that the following conditions apply:

- Tx is powered up.
- Tx is in Idle Mode.
- Battery insulation strip has been removed.
- Enclosure cover has been removed.
- Rx is powered up.
- Rx is connected to the LSB bus interface.
- Rx and Tx are in radio range.



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To set the devices to Pairing Mode:

- Tx: press the pairing button on top of the inner case for >5 seconds.
- Rx: send the LSB pairing command. The command must include the transmitter serial number (to be found on the Tx label).

After both devices have been set to Pairing Mode, the receiver will send the new pairing ID to the transmitter. If this ID contains the correct TX serial number, the transmitter will acknowledge the pairing and both devices fall back to Idle Mode. The new pairing ID is saved on both devices.

Operation Modes

RF Rx NGF ULR2.4-safe

Mode	Meaning
Active Mode	Main operating mode of the system. The crane hook is driven by the control system. RF transmission between both devices is normally <50 ms (without radio disturbances). The mode is changed by the LSB interface command.
Idle Mode	The crane hook is not driven. RF transmission interval is reduced <500 ms to save battery power. Mode is changed by LSB interface command.
Disconnect/Error Mode	The red status LED lights up. (Try rebooting the system). For possible causes, see the paragraph »Troubleshooting«.

RF Tx NGF ULR2.4-safe

Mode	Meaning
Active Mode	Main operating mode of the system. The crane hook is driven by the control system. RF transmission between both devices is normally <50 ms (without radio disturbances). If the radio connection is lost for >10 minutes, the transmitter changes to Sleep Mode.
Idle Mode	The crane hook is not driven. RF communication is reduced <500 ms to save battery power. If the radio connection is lost for >10 minutes, the transmitter will change to Sleep Mode.
Disconnect/Error Mode	The red status LED lights up. (Try rebooting the system.) For possible causes, see the paragraph »Troubleshooting«.
Sleep Mode	The transmitter wakes up every 15 seconds to wait for an active receiver. If an active receiver is found, the mode changes back to Active Mode or Idle Mode.

Mode	Meaning
Deep Sleep Mode	Power consumption is reduced to a minimum. To activate this mode, press the pairing button two times >5 s.

Status LEDs

RF Tx NGF ULR2.4-safe

Operation mode	LED behaviour
Active Mode/Idle Mode, HF connection OK	blinks green, 1 Hz
Active Mode/Idle Mode, HF connection interrupted	continuously red
Pairing Mode	blinks red, 1 Hz
Sleep Mode	flashes green every 15 s
Deep Sleep Mode	OFF
Bootloading Mode, HF connection OK	blinks green, 5 Hz
Bootloading Mode, HF connection interrupted	blinks red, 5 Hz

RF Rx NGF ULR2.4-safe

Operation mode	LED behaviour
Active Mode/Idle Mode, HF connection OK	continuously green
Active Mode/Idle Mode, HF connection interrupted	continuously red
Pairing Mode	blinks red, 1 Hz
Bootloading Mode, HF connection OK	blinks green, 5 Hz
Bootloading Mode, HF connection interrupted	blinks red, 5 Hz



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Design of wireless range

The wireless signal is attenuated on the way from the transmitter to the receiver. In addition, the wireless signal is attenuated by obstacles. The degree of attenuation depends on the material of the obstacle. Ideally, with a direct line of sight, the wireless range will be greater than 300 m.

Penetration of radio waves:

Material	Penetration
wood, gypsum, glas uncoated	90...100%
brick stone, press boards	65...95%
armoured concrete	10...90%
metal, aluminium lamination, water	0...10%

The following influences may reduce the wireless range as well:

- High frequency interference.
- WLAN or Bluetooth networks (or comparable 2.4 GHz networks) in the vicinity.
- Inappropriate antenna arrangement.

Radio operation

Transmission is carried out in the licence-free 2.4 GHz ISM frequency band.

NOTICE

Simultaneous operation with WLAN or Bluetooth networks is possible. If there are repeated disturbances or radio disconnection, conduct a radio network planning.

NOTICE

Portable and mobile HF communication equipment may negatively affect the functionality of the NGF radio system. This may lead to a loss of single telegrams or of the wireless connection. If needed, limit the number of mobile communication equipment in the vicinity of the NGF radio system.

To achieve optimum availability, install and operate the transmitter and receiver with a minimum distance of 1.5 m and a maximum distance of 300 m to each other.

Coexistence and parallel operation of NGF24 systems

If there is more than one 2.4 GHz system in the same area that sends radio transmissions on the same frequency and at the same time, the telegrams will collide.

Troubleshooting

Possible causes for disconnected/missing wireless connection:

- The devices are out of wireless range.
- The battery charge of the transmitter is empty or no batteries have been inserted.
- The transmitter is in Deep Sleep Mode.
(Press the pairing button to wake up the transmitter.)
- The receiver and/or transmitter is in error state.
(Try the power cycle of both devices.)

Maintenance and cleaning

With careful installation as described above, only minor maintenance is necessary. steute recommends routine maintenance as follows:

1. Check the enclosure and connection cable for damage and soiling.
Clean enclosure on the outside only. Clean enclosure with household cleaning agents. Do not use compressed air to clean.
2. Check the plug-in connection.
3. After each start-up, perform a function test.
If a battery is present, check the battery charge level.

Disposal

- Observe national, local and legal regulations concerning disposal.
- Recycle each material separately.

Repair

NOTICE

Alterations to the device may cause irreparable loss of function. Do not alter the device.

Return damaged devices to steute.

Safety notes

The described device has been developed in order to assume safety functions as a part of an entire plant or machine. It is the responsibility of the manufacturer of a plant or machine to guarantee the correct general function.

N.B.

Subject to technical modifications. Reconstruction and alterations to the devices are not allowed.



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Compliance

This wireless system has been found to comply with several national and international directives which are listed and explained as follows.

EU: Directive 2014/53/EU (RED)

The wireless system conforms to the European directive on radio equipment and telecommunications terminal equipment 2014/53/EU. Protective requirements in regard to electromagnetic compatibility are carried out under consideration of the harmonised standards EN 301 489-1/17 and EN 300 328.

Japan: 特定無線設備の技術基準適合証明等に関する規則 (Ordinance concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment)

Article 2, Clause 1, Item (19) – 2

Japanese Radio Law and Japanese Telecommunications Business Law Compliance.

This device is granted pursuant to the Japanese Radio Law (電波法) and the Japanese Telecommunications Business Law (電気通信事業法) This device should not be modified (otherwise the granted designation number will become invalid).

USA: FCC - Title 47 CFR Part 15

Canada: RSS - 247 Issue 2

Notice: Changes or modifications made to this equipment not expressly approved by (steute) may void the FCC authorization to operate this equipment.

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.

This device complies with Part 15 of the FCC Rules and with Industry Canada licence-exempt RSS standard(s).

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux la partie 15 des règles de la FCC et CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.



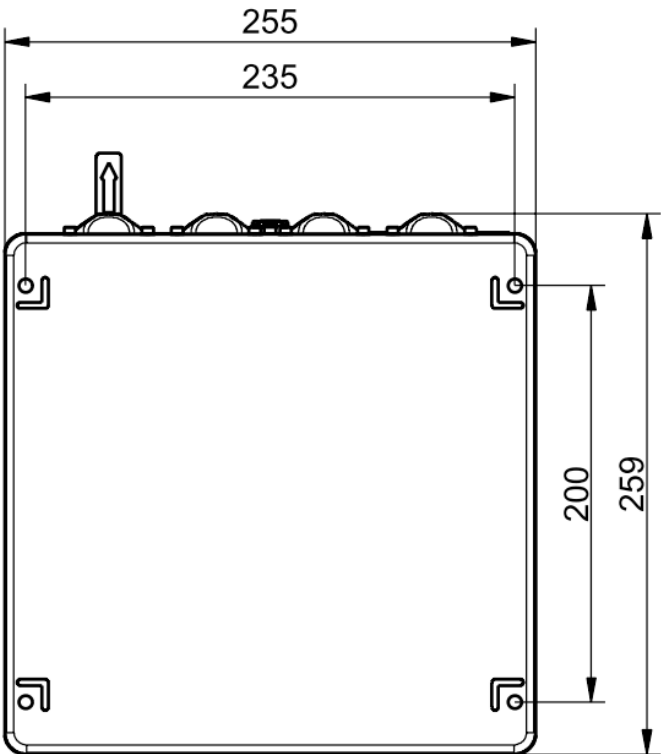


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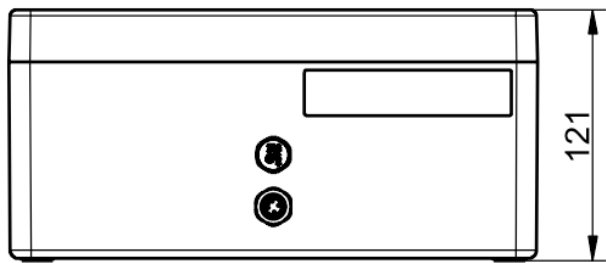
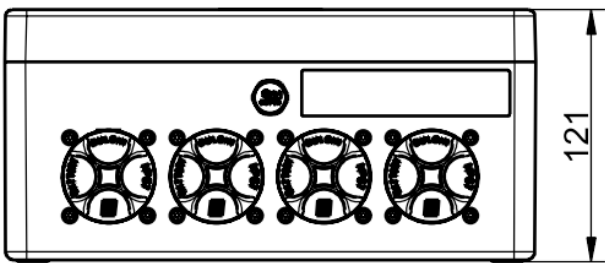
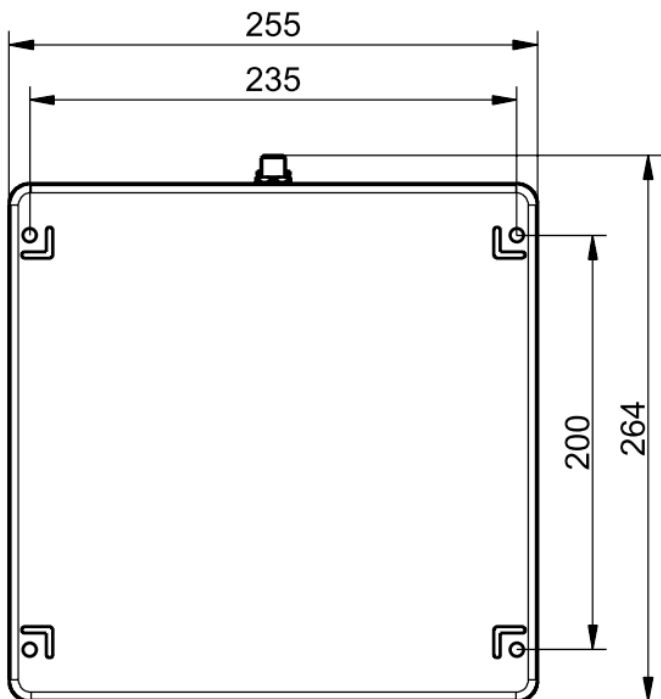
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Dimensions

RF Tx NGF ULR2.4-safe



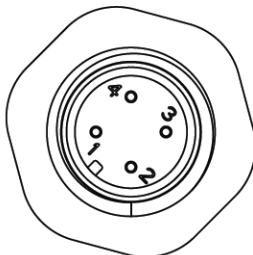
RF Rx NGF ULR2.4-safe



Production date

Production date on type label: DD.MM.YYYY

Pin assignment of RF Rx NGF ULR2.4-safe



Pin	Signal	Assignment
1	+24 V	Power supply
2	-	empty
3	0 V (GND)	Ground
4	LSB	Liebherr System Bus



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Mounting and wiring instructions / Wireless tilting sensor

Technical data

RF Tx NGF ULR2.4-safe (transmitter)

Applied standards	EN 60947-5-1; EN ISO 13849-1; EN 61784-3
Enclosure	Polyester UP-GF 25-30 %, squirrel grey, similar to RAL 7000
Degree of protection	IP65 to IEC/EN 60529
Transmission interval	<50 ms (active) <500 ms (idle)
Synchronization after Sleep Mode	max. 20 s
Power consumption (active)	approx. 55 mA
Power consumption (disconnect)	approx. 68 mA
Power consumption (Idle Mode)	approx. 35 mA
Power consumption (Sleep Mode)	approx. 1.2 mA
Power supply	4 x Alkaline LR20 (Type D) 6.0 V
Ambient temperature	-40 °C ... +70 °C
Storage and transport temperature	-40 °C ... +85 °C
Weight:	7.5 kg (7.0 kg without battery)
Battery	
Type	Alkaline
Size	Mono/D/LR20/MN1300, 1.5 V
Capacity	16,5 Ah (at 20 °C)
Specification	for industrial use

RF Rx NGF ULR2.4-safe (receiver)

Applied standards	EN 60947-5-1; EN ISO 13849-1; EN 61784-3
Enclosure	Polyester UP-GF 25-30 %, squirrel grey, similar to RAL 7000
Connection	Flange plug 4 pol. M12x1 A-coded
Degree of protection	IP65 to IEC/EN 60529
Rated operational current I_e	30 mA at 24 V 60 mA at 12 V
Operating voltage U_e	12-24 VDC -15 % ... +10 %
Short-circuit protection	0.5 A Polyswitch
Ambient temperature	-40 °C ... +70 °C
Storage and transport temperature	-40 °C ... +85 °C
Weight:	6.7 kg

Safety characteristics according to EN ISO 13849-1

(for RF Tx NGF ULR2.4-safe and RF Rx NGF ULR2.4-safe):

Performance Level	PL d
Category	3
MTTF _d	93.8 years
DC _{avg}	91.33 %
Interference immunity / Interference emission	EN 61000-6-2:2005 EN 61000-6-4:2011 ISO 7637-2:2011 ISO 11452-4:2011 ISO 11452-2:2004

NGF24 (radio module)

Frequency range	2.4 ... 2.48 GHz
Synchronized transceiver count	2 (Channel A/B)
Number of hopping channels/ hop time/dwell time	80 channels/7.4 ms/2.6 ms
Channel spacing / Hops per second	1 MHz / 100 1/s
Nominal channel bandwidth	325 kHz
Modulation method / format	FHSS/MSK
Data rate / Package length	150 kBaud/37 Byte (2.6 ms)
Transmitting power	100 mW
Wireless range	max. 300 m
Certification	EU: ETSI EN 300 328; EN 301 489-1/-17 USA: FCC-ID: XK5-NGF24 Canada: IC: 5158A-NGF24 Japan: R: 202-SMI037

EU-KONFORMITÄTSERKLÄRUNG EU DECLARATION OF CONFORMITY

gemäß der Funkanlagen-Richtlinie 2014/53/EU
according to RED 2014/53/EU

Als Hersteller trägt die Firma steute Technologies die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung /
As manufacturer, steute Technologies is solely responsible for issuing this Declaration of Conformity.

Art und Bezeichnung der Betriebsmittel /
Type and name of equipment: Funk-Neigungsgeber RF ... NGF ULR2.4-safe /
Wireless position sensor RF ... NGF ULR2.4-safe

*detaillierte Produktliste siehe Anhang auf der nächsten Seite /
*for a detailed product list, see the appendix on the next page

Die oben beschriebenen Gegenstände der Erklärung erfüllen die folgenden Harmonisierungsrechtsvorschriften der EU /
The object(s) of declaration described above is/are in conformity with the following EU harmonisation legislation:

Angewandte EU-Richtlinie / Applied EU directive	Harmonisierte Normen / Harmonised standards
2014/53/EU Funkanlagen-Richtlinie / 2014/53/EU Radio Equipment Directive	EN 300 328 V2.1.1:2016
Weitere angewandte EU-Richtlinien / Additionally applied EU directives	Harmonisierte Normen / Harmonised standards
2006/42/EG Maschinenrichtlinie 2006/42/EC Machinery Directive	EN 60947-5-1:2017
2014/35/EU Niederspannungsrichtlinie / 2014/35/EU Low Voltage Directive	EN 60947-5-1:2004 + AC:2005 + A1:2009 + A2:2014
2014/30/EU EMV-Richtlinie / 2014/30/EU EMC Directive	EN 61000-6-2:2005 EN 61000-6-4:2011 EN 301 489-1 EN 301 489-17
2011/65/EU RoHS-Richtlinie / 2011/65/EU RoHS Directive	EN 50581:2012
Weitere angewandte Normen / Additionally applied standards	ISO-Normen / ISO standards
Straßenfahrzeuge - Elektrische, leitungsge- führte und gekoppelte Störungen / Road vehicles - Electrical disturbances from conduction and coupling	ISO 7637-2:2011
Straßenfahrzeuge - Komponentenprüfungen / Road vehicles - Component test methods	ISO 11452-4:2011 ISO 11452-2:2004

Beschreibung des Zubehörs und der Bestandteile, die den bestimmungsgemäßen Betrieb der Funkanlage ermöglichen /
Description of accessories and equipment which allow the radio equipment to operate as intended:

Bestandteile sind mindestens die Komponenten /
These components are contained at least: IC SMD 2.4 GHz RF Transceiver CC2500RGP QFN20; Mat.-Nr. 1419313 / Mat. No. 1419313
Quarz SMD 26MHz ±10ppm 3,2x2,5mm; Mat.-Nr. 1419311 / Mat. No. 1419311
IC SMD RF-Front-End 2,4GHz CC2591 VQFN-16; Mat.-Nr. 1419314 / Mat. No. 1419314
SMD Bandpassfilter 2450MHz; Mat.-Nr. 1419257 / Mat. No. 1419257
Patch-Antenne 2450MHz 25x25x4,5mm; Mat.-Nr. 1419261 / Mat. No. 1419261

Löhne, 23. April 2019/April 23, 2019
Ort und Datum der Ausstellung / Place and date of issue

Marc Stanesby
Rechtsverbindliche Unterschrift,
Marc Stanesby (Geschäftsführer) /
Legally binding signature,
Marc Stanesby (Managing Director)





Zusatzinformation zu Montage- und Anschlussanleitungen Additional information on mounting and wiring instructions Information complémentaire aux instructions de montage et de câblage Ulteriori informazioni sulle istruzioni di collegamento e montaggio Informação adicional para as instruções de montagem Дополнительная информация по монтажу и инструкциям по подключению

- [bg] При поискване Вие ще получите тази асамблея, а също и връзката ръчно майчиния си език.
- [cs] Na požádání obdržíte tento návod na montáž a připojení také v jazyce vaší země.
- [da] På anmodning kan De også rekvirere denne montage- og tilslutningsvejledning på deres eget sprog.
- [de] Auf Anfrage erhalten Sie diese Betriebsanleitung auch in Ihrer Landessprache.
- [el] Εφόσον το ζητήσετε λαμβάνετε αυτές τις οδηγίες τοποθέτησης και σύνδεσης και στην γλώσσα της χώρας σας.
- [en] These instructions for use are also available in your national language on request.
- [es] Estas instrucciones de montaje y conexionado se pueden solicitar en su idioma.
- [et] Soovi korral on see installimis- ja ühendusjuhend saadaval ka teie riigikeeles.
- [fi] Pyydettäessä asennus- ja kytkentäohjeet on saatavana myös sinun omalla äidinkielellä.
- [fr] La notice d'instruction est disponible sur demande, dans votre langue nationale.
- [ga] Arna iarraidh sin gheobhaidh tú na teoracha tionóil agus na teorach seo i do theanga féin.
- [hr] Na zahtjev ćete dobiti ova uputstva za montažu i priključenje i na svom jeziku.
- [hu] Egyeztetés után, kérésére, ezt a szerelési- és csatlakoztatási leírást, biztosítjuk az Ön anyanyelvén is.
- [it] Questa istruzione di collegamento e montaggio è inoltre disponibile nella vostra lingua su richiesta.
- [lt] Jei jums reikėtų šios įdiegimo ir pajungimo instrukcijos valstybinę kalbą, teiraukitės pardavėjo.
- [lv] Šo montāžas un pieslēgšanas instrukciju pēc pieprasījuma varat saņemt arī savas valsts valodā.
- [mt] Dan il-manwal dwar il-montaġġ u konnessjonijiet huwa disponibbli wkoll fil-lingwa tiegħek.
- [nl] Op aanvraag kunt u deze montage- en installatiehandleiding ook in uw taal verkrijgen.
- [pl] Niniejsza instrukcja montażu i podłączenia jest dostępna na życzenie w języku polskim.
- [pt] Instruções de ligação e montagem podem ser disponibilizadas em outros idiomas também - consulte-nos.
- [ro] La cererea dumneavoastră, vă trimitem instrucțiunile de folosi-re și instrucțiunile de montaj și în limba română.
- [sk] Na vyžiadanie obdržíte tento návod na montáž a pripojenie takisto v jazyku vašej krajiny.
- [sl] Na zahtevo boste dobili ta navodila za montažo in priklop tudi v vašem domačem jeziku.
- [sv] Den här monterings- och elinstallation instruktionen finns även tillgänglig på ditt nationella språk efter förfrågan.