

# AGRO<sub>PILOT</sub>

Agricultural Radio Control

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## Update History

Date	Version	Description
05/14/2012	0.1	First draft
07/09/2012	0.2	Dimensions receiver/adapter plate adjusted
07/13/2012	1.0	Sender labeling adjusted
07/25/2012	1.1	Fig. 12 (sample connection to 400VAC revised to be clearer)
09/28/2012	1.2	Yagi antenna installation added
10/03/2012	2.0	Release after testing for CE conformity
11/05/2012	2.1	Description of the "integrated Telepilot" option
11/30/2012	2.2	Description of the "remote antenna" option (ModemPilot)
02/22/2013	2.3	Description of individual configuration of connection between receiver and laptop
10/16/2019	2.4	Adaptation of the CE declaration of conformity after RED remeasurement

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## 1 Introduction

The AgroPilot radio system consists of a transmitter and a receiver. Communication takes place mainly from the transmitter to the receiver. With the "feedback" option, the relay states can be displayed on the transmitter.

Thanks to sophisticated wireless technology, distances of up to several kilometers can be achieved (line of sight).

In addition, the receiver has an integrated PLC (CoDeSys) that allows more complex linkages to be established. The PLC functionality is optional and is only enabled upon request.

The handheld transmitter features 12 robust, water- and weather-proof silicone buttons that provide comfortable tactile feedback. They are backlit and indicate the relay status of each function. The robust, high-quality laser labeling can be customized.

Depending on the model, the receiver features 2, 4, 6 or 7 relay outputs and includes an integrated buzzer. The relays can be programmed by touch, resting, to switch off after a certain time or to prevent switching off. If the PLC option has been enabled, as many separate linkages and delays as desired can be implemented.

## 2 Safety Notices



The receiver must be installed, serviced and set up only by trained electricians. All installation and safety standards must be followed.



Before putting into service, check whether the correct operating voltage has been set in terms of performance and voltage (see receiver model label).



The switches must not be operated ungrounded.



The receiver terminal box may only be opened once the current has been cut off.



Never work on the terminals or controls when the current is active!



Never wash the unit with water or clean with high pressure water.



The AgroPilot radio remote control must NOT be used in applications where failure or malfunction of the product could result in personal injury or material damage.

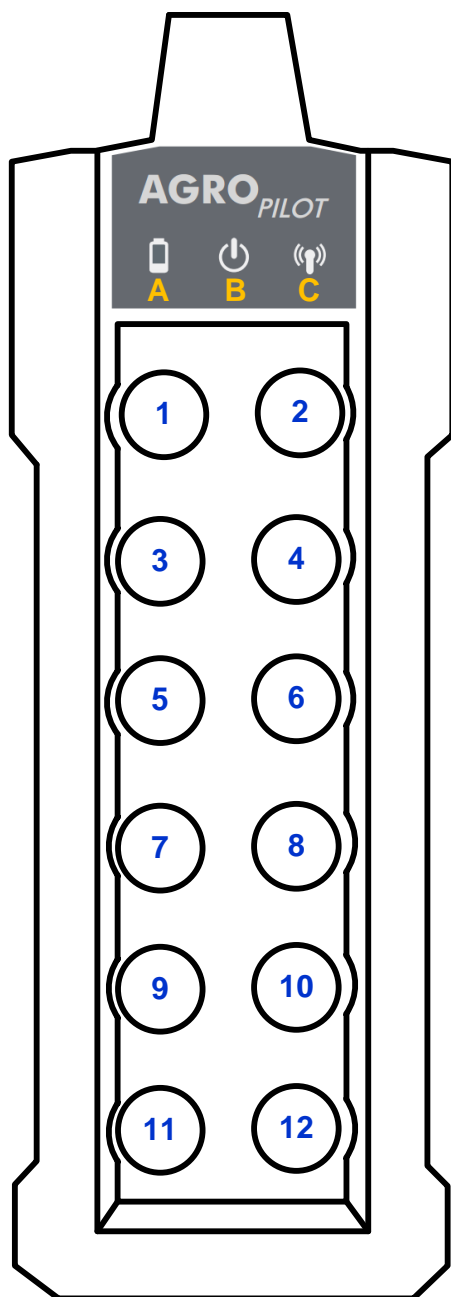
### 3 Hand-Held Transmitter

#### 3.1 Installation

The transmitter is delivered with 3 pre-installed AA alkaline batteries and is ready to use without further preparation.

#### 3.2 General Functions

Fig. 1: Front Side of Transmitter



LED display:

A: Low battery status  
(if lit, change battery)

The LED will flash as the battery is getting low, but the transmitter will continue operating for some time. If the LED stays lit (without blinking), the batteries must be changed.

B: Transmitter on  
(if lit, indicates the transmitter is ready to operate)

The LED lights up when a button is pressed to indicate that the transmitter is ready to use. After approx. 15 seconds without further input from the user, the transmitter will return to standby mode. The LED will flash to indicate this.

C: Wireless connection  
(displays quality of wireless connection)

If the LED flashes quickly, this indicates communication between the transmitter and the receiver. If the LED stays lit (without blinking), the connection has been disrupted.

Button:

1: Pump on

2: Pump off

3: Water valve

4: Liquid fertilizer valve

5: Return on

6: Return off

7: Agitator on  
(only on Model 6K)

8: Agitator off  
(only on Model 6K)

9: Reserve on  
(only on Model 6K)

10: Reserve off  
(only on Model 6K)

11: Transmitter on  
(hold for at least 1 sec.)

12: Buzzer

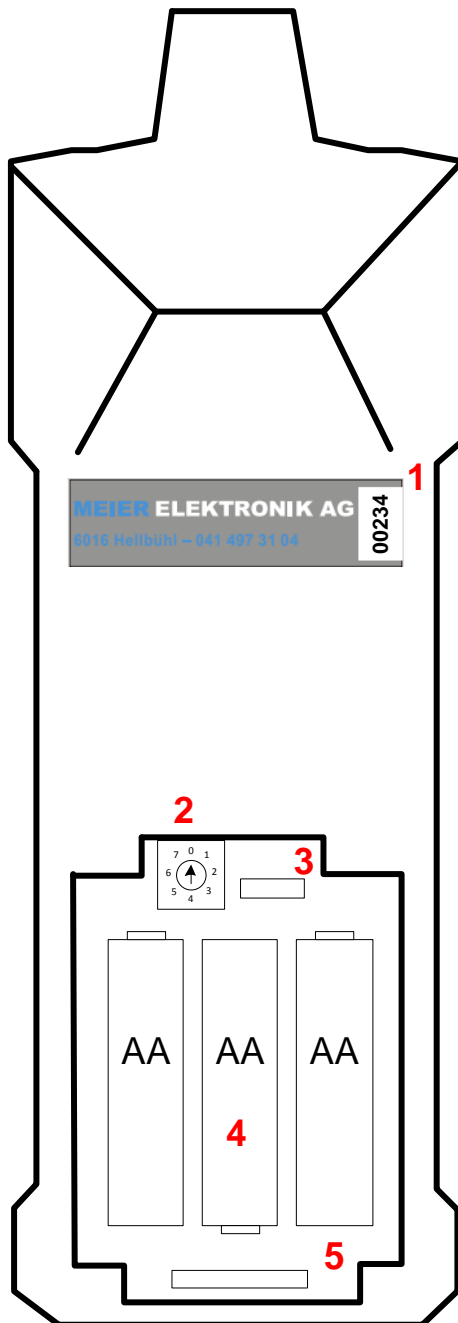
#### 3.3 Changing Batteries

Remove the battery housing cover on the back of the transmitter to reach the battery compartment and the manufacturer interfaces.



For the machine to work properly, use standard AA, 1.5V **alkaline** batteries. The batteries can be ordered from Firma Meier Elektronik AG or from a specialist store.

**Fig. 2: Rear Side of Transmitter**



1: Device number

2: Frequency selector

3: Programming interface

4: Batteries

5: Configuration interface

Each transmitter/receiver pair has a unique device number. The device numbers for the transmitter and receiver must be identical.

A maximum of 8 different frequencies are available. If you change the frequency with the dial, do the same on the receiver.

Manufacturer's programming interface (not used by end users)

3 AA (1.5V) alkaline batteries

Manufacturer's USB configuration interface (not used by end users)

## 4 Integrated TelePilot

### 4.1 General

If AgroPilot contains the optional integrated TelePilot, the controller can be accessed globally. This allows issues with the range of radio signals to be easily bridged. This feature requires a telephone (mobile or landline).

## 4.2 Operation

Use your phone to dial the number of the receiver housing and use the phone's keypad to turn features/channels on or off. With \* (star), you can switch a feature ON. With the # (pound sign), you can switch it OFF, if it is bistable. Momentary functions (such as the buzzer) turn themselves off.

**Table 1: Overview of TelePilot Functions:**

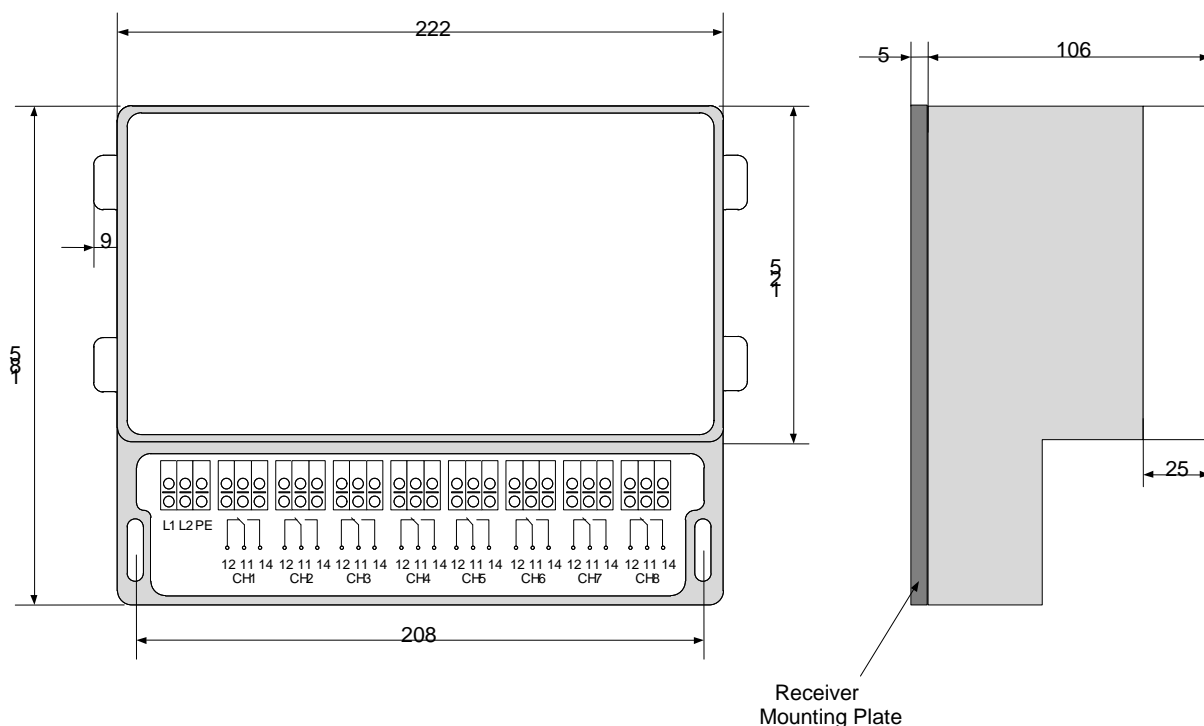
Pump ON	1*
Pump OFF	1#
Open water valve	2*
Liquid fertilizer valve	2#
Return on	3*
Return off	3#
Agitator on	4*
Agitator off	4#
Reserve on	5*
Reserve off	5#
Buzzer	8* (turns itself off)

## 5 Receiver

### 5.1 How to Install the Receiver Housing

The receiver housing has a stable aluminum mounting plate on the rear side that allows for different installation options. Depending on the installation option, the receiver can be mounted on the DIN track, brackets, a rubber buffer or by magnet.

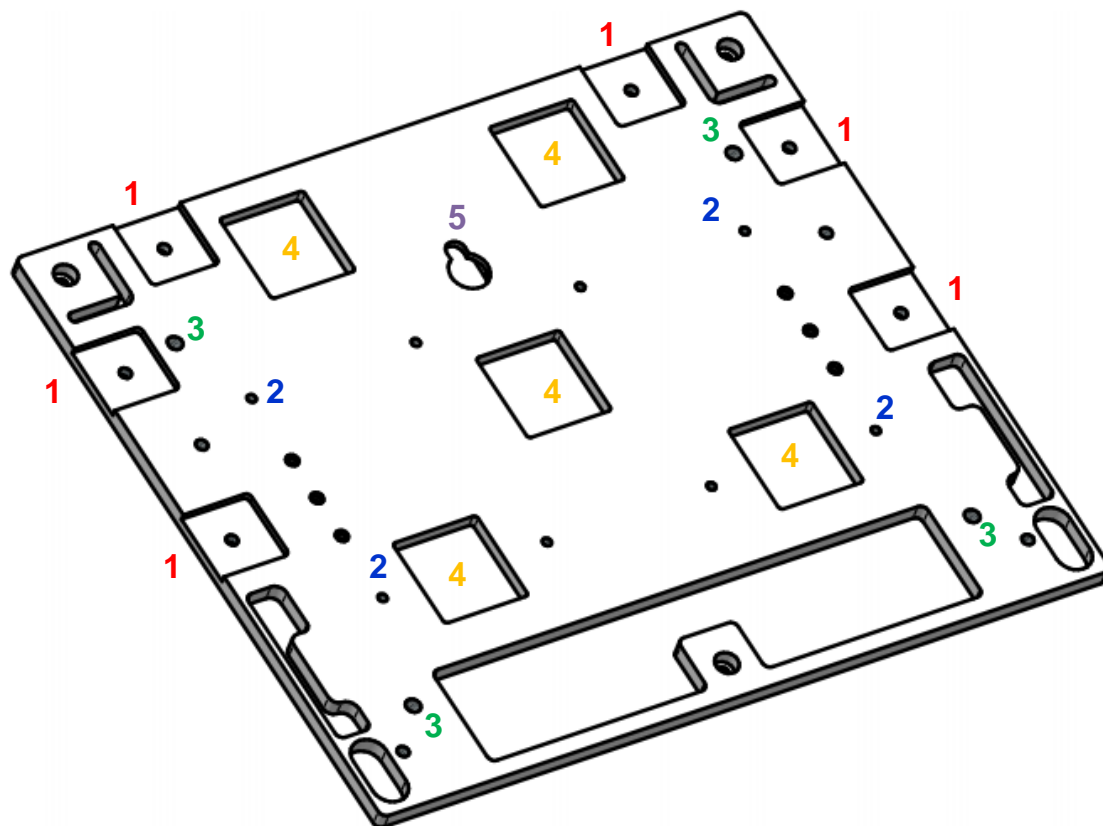
**Fig. 3: Receiver Housing with Mounting Plate**



If the receiver is used outdoors, it should not be exposed to direct weather influences which will unnecessarily reduce its useful life.  
Protect the receiver from spraying water and other environmental influences



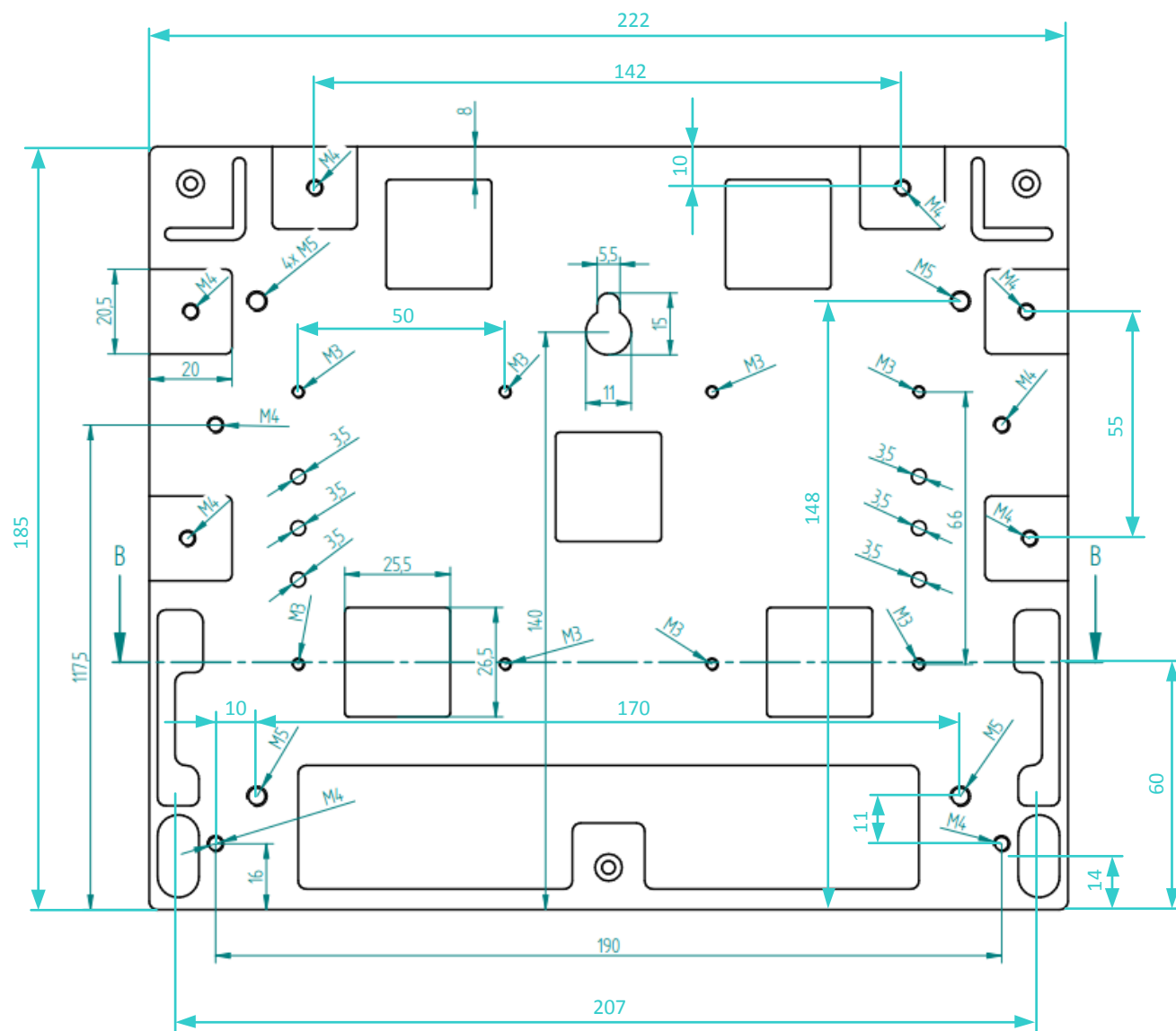
**Fig. 4: Receiver Mounting Plate**



**Table 2: Receiver Mounting Options**

Fastening	Description
1	Fastening with brackets. 4 brackets are included if ordered.
2	Fastening with DIN brackets. 2 DIN brackets are included if ordered.
3	Fastening with rubber buffers. 4 rubber buffers are included if ordered.
4	Fastening with magnets. 4 magnets are included if ordered.
5	Individual mounting options

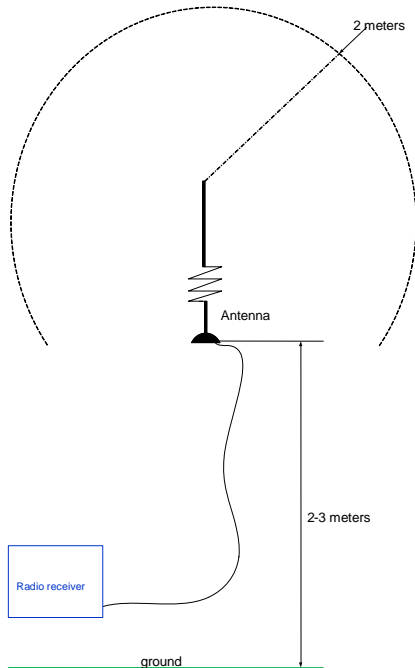
**Fig. 5: Dimensions of the Receiver Mounting Plate**



## 5.2 How to install the Antenna

Reception is best if in a direct line of sight. Because this is usually not possible, the receiving antenna must be positioned so that it can send or receive signals on its own.

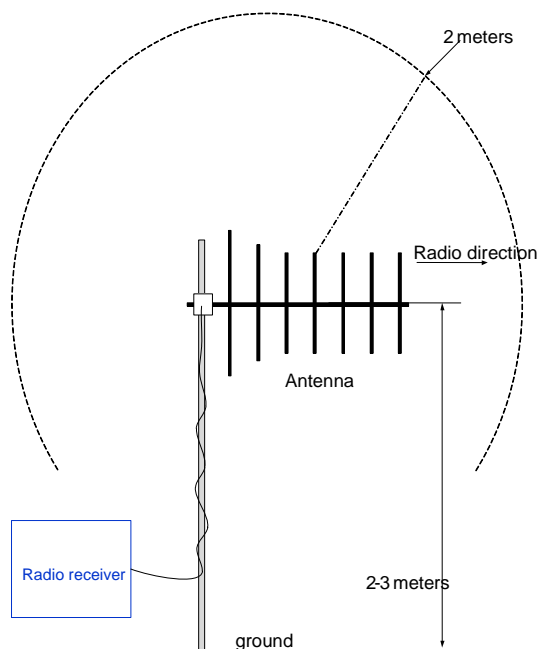
**Fig. 6: Standard Antenna Installation**



It is ideal when there are no obstacles blocking the antenna for 2-3 meters. In addition, the reception quality can be increased if the antenna is mounted 2-3 feet above the ground.

Set the magnetic mount antenna on a metal bracket. The metal bracket then serves as the counter-potential and also contributes significantly to improving the antenna's range.

**Fig. 7: Installing the Yagi Antenna**

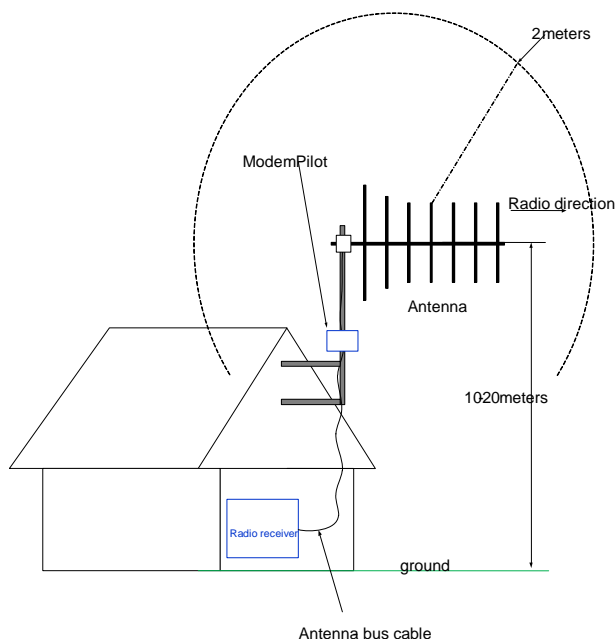


It is ideal when there are no obstacles blocking the antenna for 2-3 meters. In addition, the reception quality can be increased if the antenna is mounted 2-3 feet above the ground.

The antenna is to be mounted insulated on a metal rod. Ideally, use a wooden pole.

The entire installation material (antenna, antenna cable and antenna masts) can be obtained from Meier Elektronik AG!

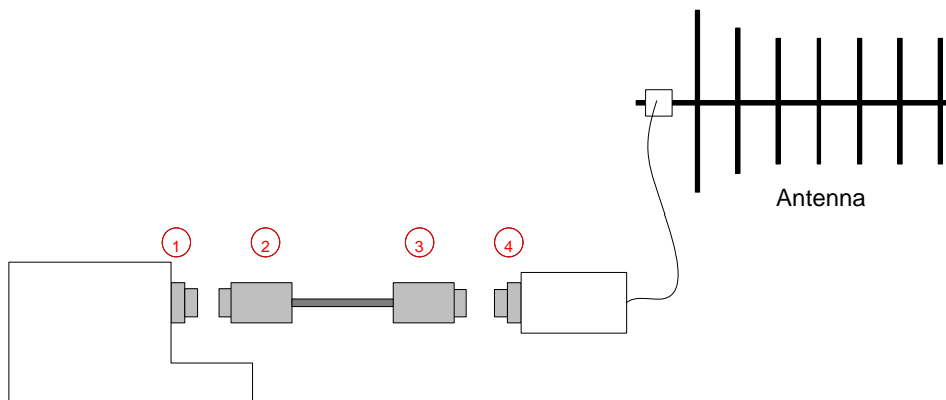
**Fig. 8: Installing the Remote ModemPilot Antenna**



If the radio receiver via an active external antenna (ModemPilot), the antenna can be mounted up to 50m from the receiver. The antenna should be mounted as high as possible and free of obstructions.

The remote antenna (ModemPilot) is connected via four 0.14mm<sup>2</sup> bus cables to the receiver. The cable can be inserted on both sides and wired 1:1. If you opt to configure your own cable, the connections are 1:1 or as follows:

**Fig. 9: Connecting the Remote ModemPilot Antenna**



Receive Female	Round Male Connector Cable	Round Female Connector Cable	Male ModemPilot
Pin 1 →	Pin 1 →	Pin 1 →	Pin 1 →
Pin 2 →	Pin 2 →	Pin 2 →	Pin 2 →
Pin 3 →	Pin 3 →	Pin 3 →	Pin 3 →
Pin 4 →	Pin 4 →	Pin 4 →	Pin 4 →



The antenna should always be mounted potential-free. It should not be grounded or mounted to a vehicle chassis!

The antenna mast may be made of metal, however, the mast must be attached to wood or another insulated material.

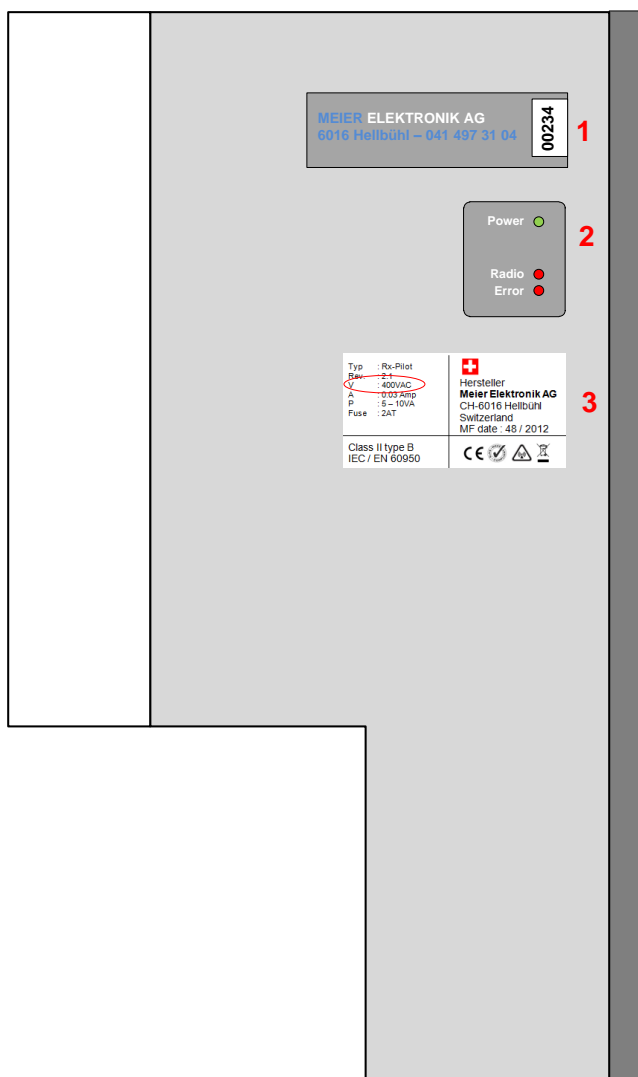
### 5.3 Installation

Before placing the receiver into operation, it must first be connected to the power supply and the relay outputs must be wired.



Compare the voltage listed on the receiver nameplate with your operating voltage (see Fig. 10 – Point 3).

**Fig. 10: Receiver Labeling**



1: Device number

Each transmitter/receiver pair has a unique device number. The device numbers for the transmitter and receiver must be identical.

2: Power LED

Shows the operating status of the device.

→ Power

If the device is switched on, the green LED (**Power**) is lit.

→ Radio

If the receiver is sending and receiving messages correctly, the **Radio** LED flashes.

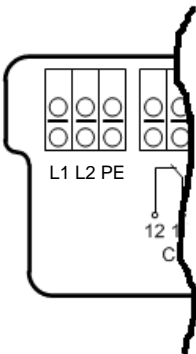
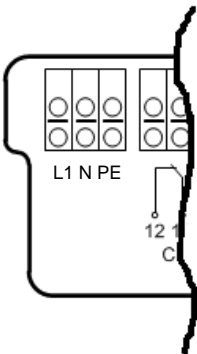
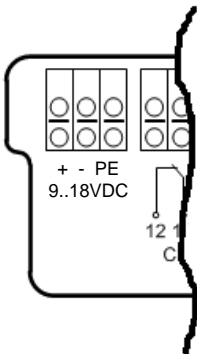
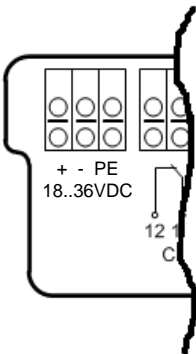
→ Error

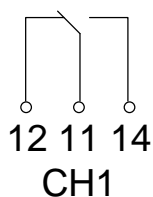
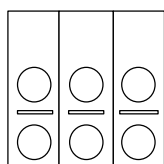
If the device is not operating properly or at all, a code indicating the potential cause will flash via the **Error** LED. Refer to the error code list on Page 28 / Table 9.

3: Nameplate

General information about the device, such as operating voltage, fuse, power and frequency.

**Table 3: Connecting the Various Receiver Power-Supply Voltages**

400V~	230V~	9 to 18VDC	18 to 36VDC
Phase 1 → L1 Phase 2 → L2 Ground → PE	Phase 1 → L1 Neutral → N Ground → PE	9 to 18V → + GND / 0V → - Ground → PE	18 to 36V → + GND / 0V → - Ground → PE
			

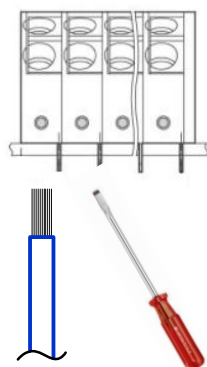


The receiver supports a maximum of 8 high-quality relay channels. The contacts are potential-free and always run SPDT relays (NC/NO contacts).

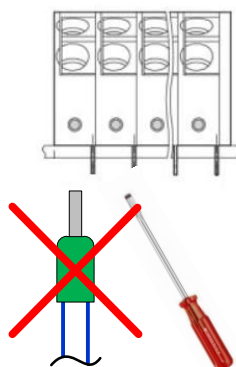
The NC contact is at pin 12/11 and the NO contact is at pin 11/14.

The maximum switching voltage of the relays is 400V~ and is specially approved for this area!

The relay can operate 1-phase motors directly with a load of up to 0.3W at 230V!

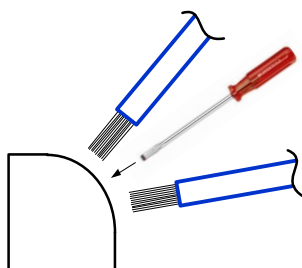


Use a #1 flat-headed screwdriver to make the connection.



**DO NOT** use wire end ferrules at the receiver connection cable!

The cables will only make the optimal connection **without** ferrules!



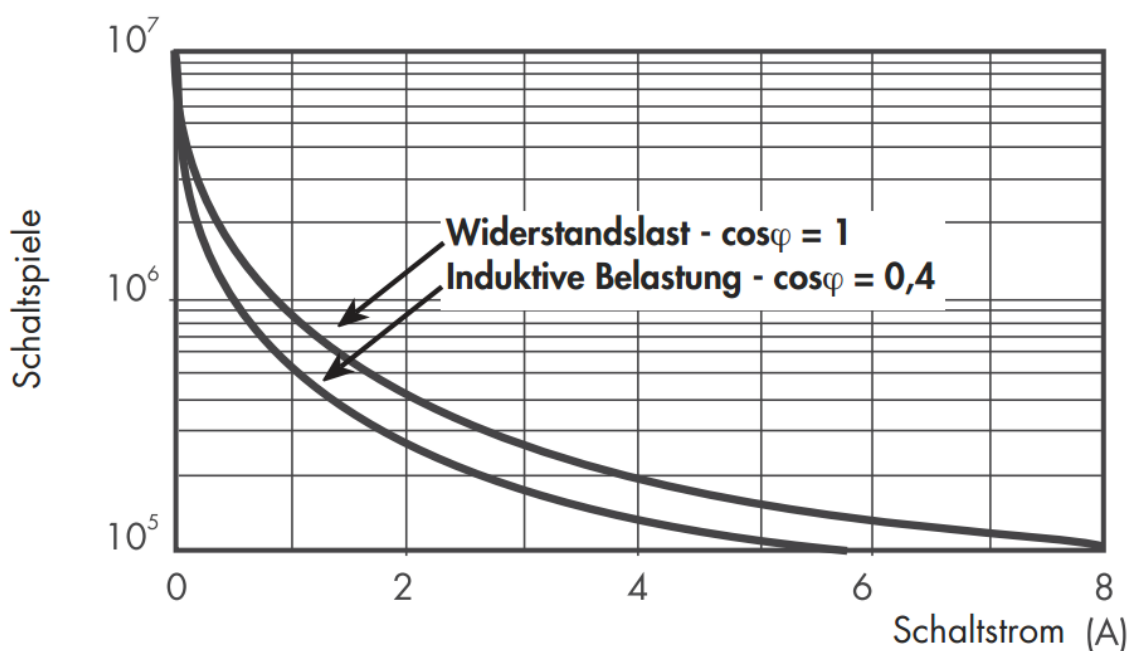
Pressing the notch on the front will open the press connection to allow the cables to be inserted. The upper and lower wire connection are electrically connected to each other.

Use only one wire per connector!

**Table 4: Relay Specifications**

Max. continuous current / max. starting current [A]	8 / 15
Rated voltage / max. switching voltage [V~]	230 / 400V
Rated load AC1 [VA]	2000
Rated load AC15 (230 V~) [VA]	400
1-phase motor load, AC3 operation (230V~) [kW]	0.3
Max. switching current DC1: 30/110/220V [A]	8 / 0.3 / 0.12
Min. switching load [mW, V/ mA]	300, 5/5

**Fig. 11: Electrical Service Life with AC**



Schaltspiele = switching cycles

Schaltstrom = switching current

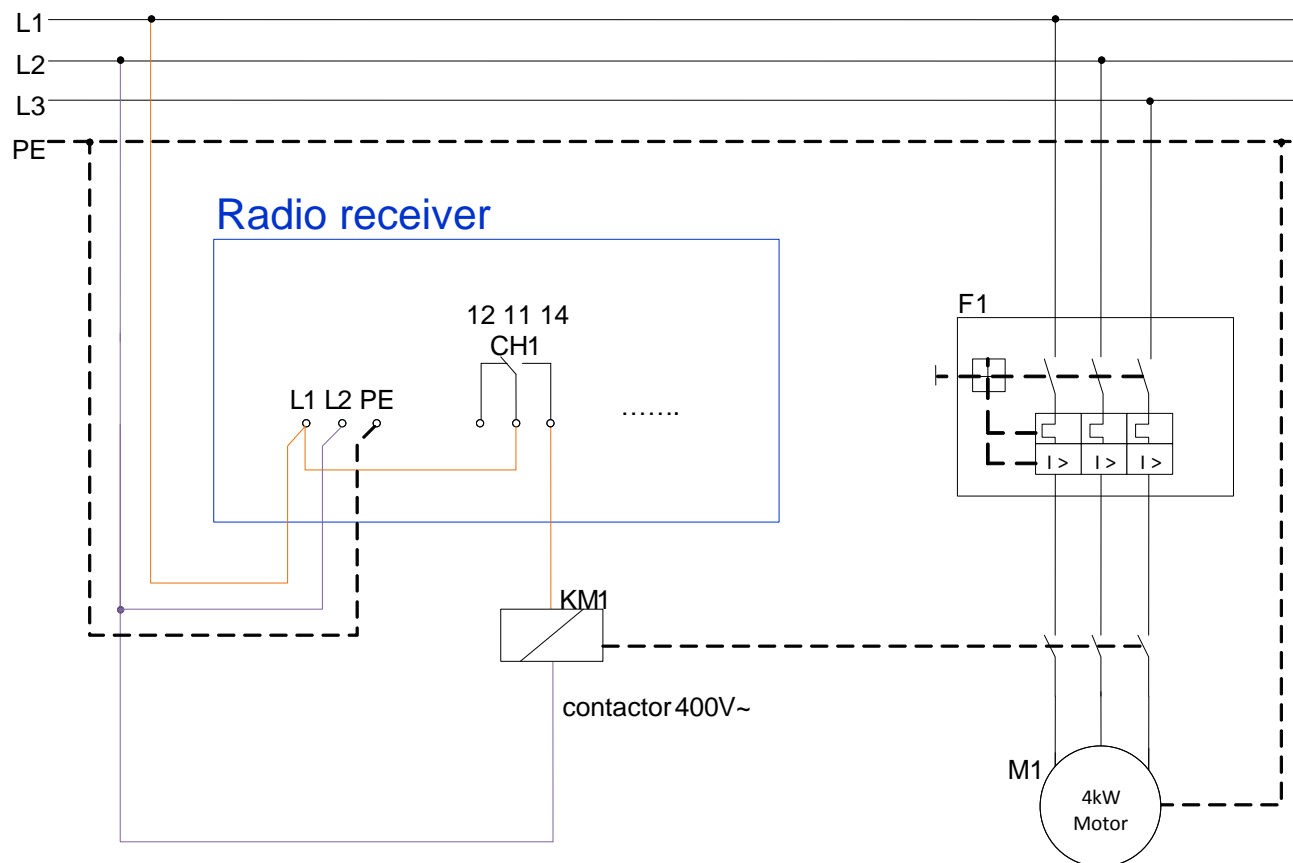
Widerstandslast = resistance load

Induktive Belastung = inductive load

## 5.4 Sample Receiver Connections

### 5.4.1 Sample connection to 400 V~ with contactor and motor

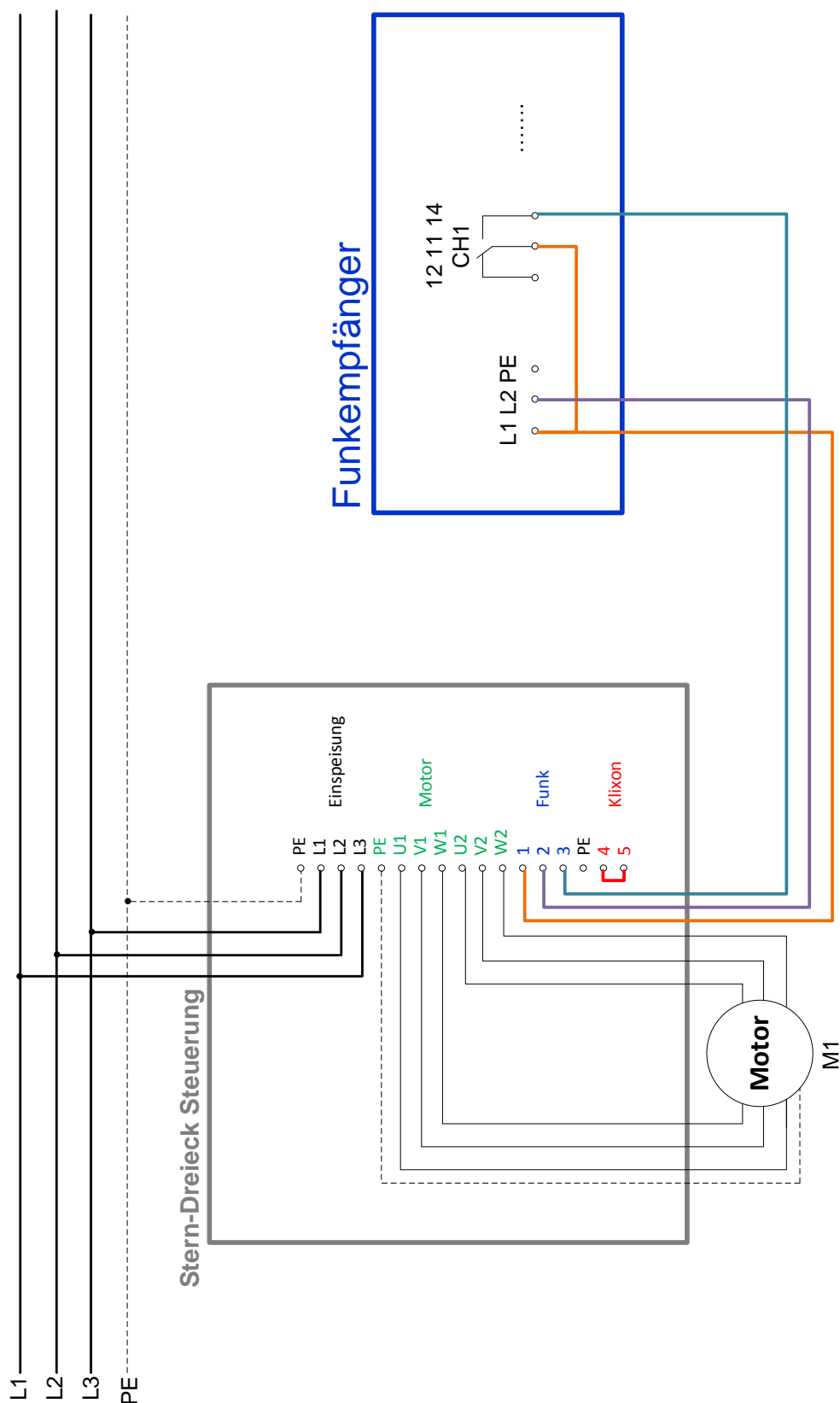
Fig. 12: Sample connection to 400 V~ with contactor and motor





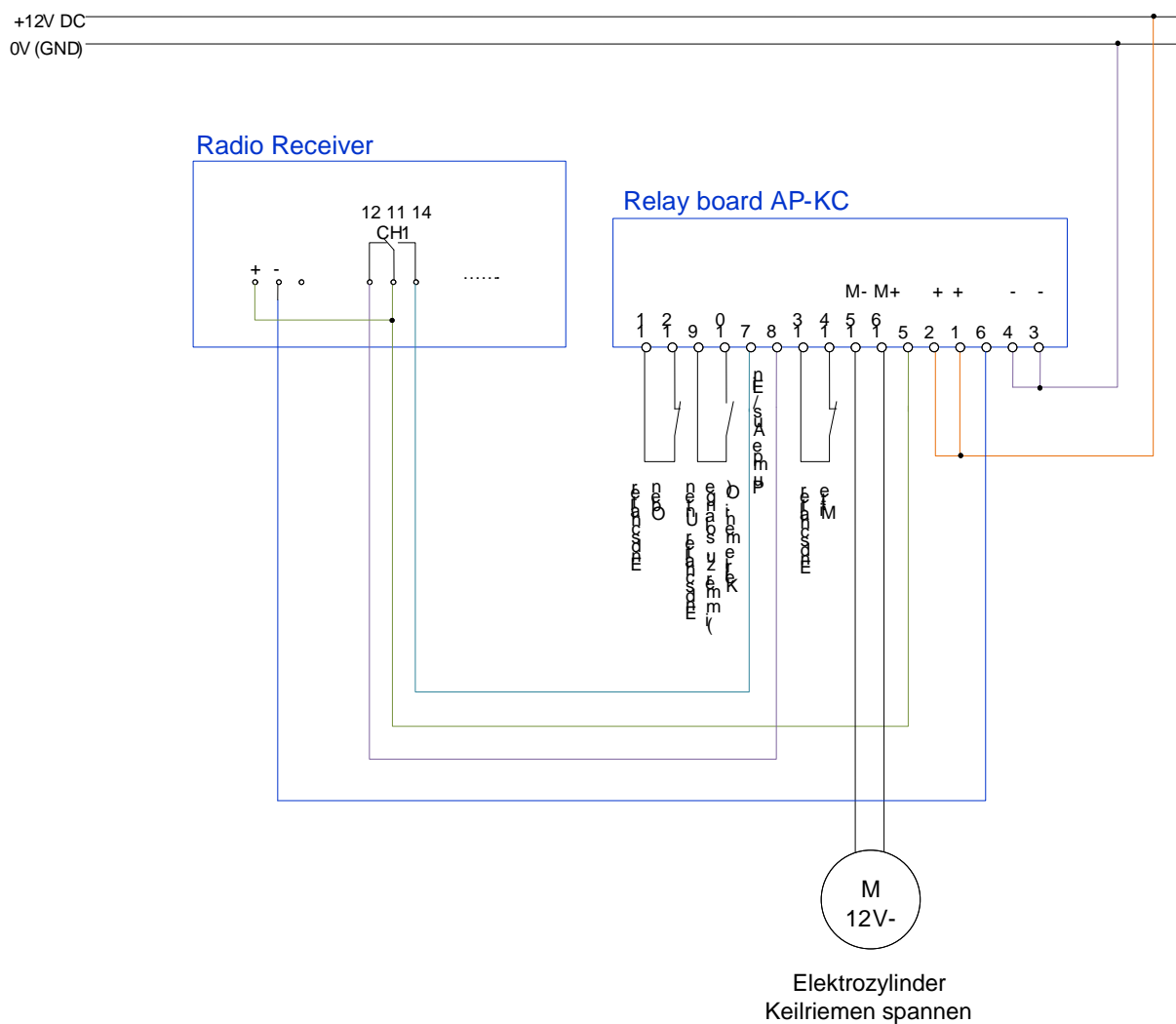
#### 5.4.2 For connection to 400 V~ star-delta control

Fig. 13: For connection to 400 V~ star-delta control



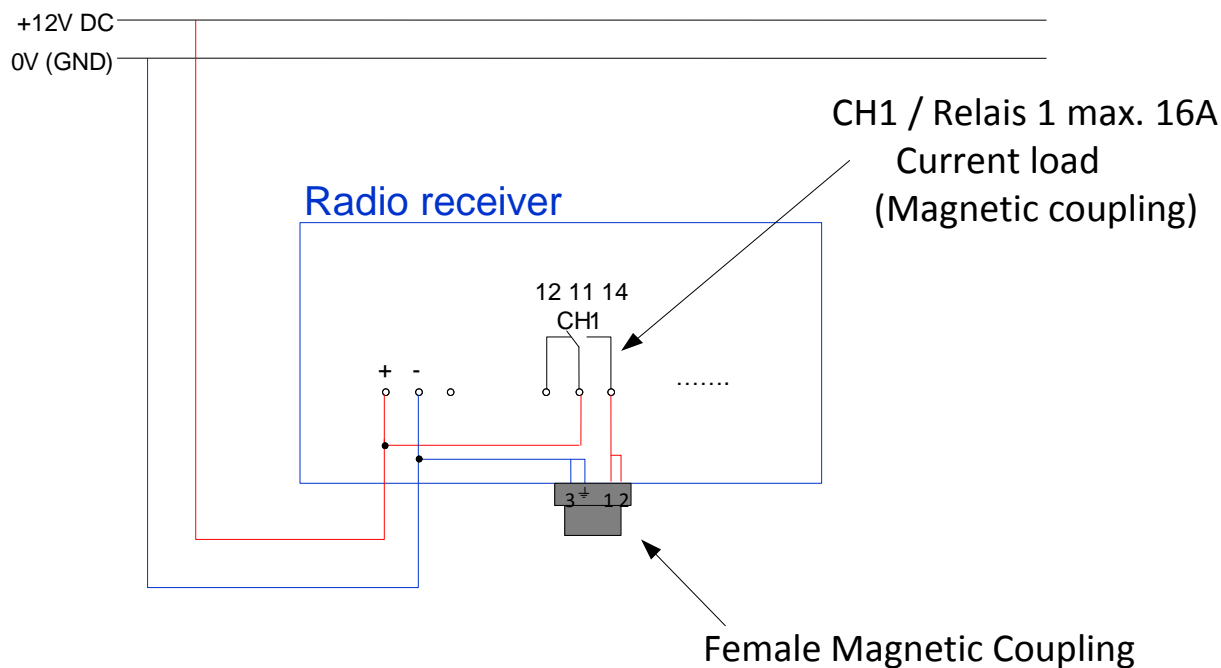
### 5.4.3 Sample connection to 12V- with relay board for V-belt coupling

**Fig. 14: Sample connection to 12V- with relay board for V-belt coupling**




#### 5.4.4 Sample connection to 12V for magnetic coupling

**Fig. 15: Sample connection to 12V for magnetic coupling**

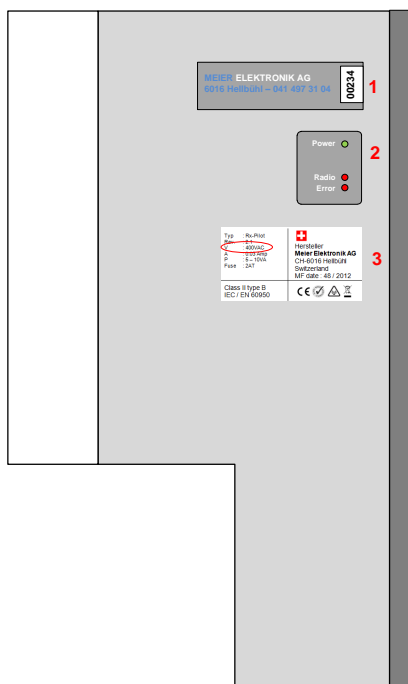


If the magnet coupling pin is removed, the protective cover must be mounted on the bushing to protect the contacts against environmental influences. This will increase the useful life of the connector.

### Table 5: Pin Assignment for Magnetic Coupling

Pin Number	Description
1	Switched + via relay 1 (+12 V)
2	Switched + via relay 1 (+12 V)
3	GND / minus
	GND / minus

## 5.5 Putting into Service



1. When switching on the power to the receiver, all three operating LEDs (Power, Radio, Error) will initially be lit.
2. After about 8 seconds, the Radio and Error LEDs will switch off for about 3 seconds.
3. Then, the Radio and Error LEDs will flash for 1 second and, if the GSM modem is installed, for about 6 seconds.
4. After successfully going through this start-up routine, the Radio and Error LEDs switch off and only the Power LED remains lit.
5. The device is now ready for use.
6. If the transmitter is functioning correctly, when you press a button on it, the feedback will be actuated on the transmitter and you can start working with the device.

If the device is not operating properly or at all, a code indicating the potential cause will flash via the **Error** LED. Refer to the error code list in Table 9, p.28

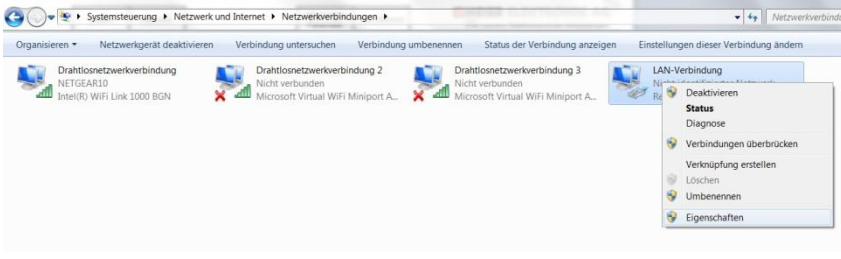
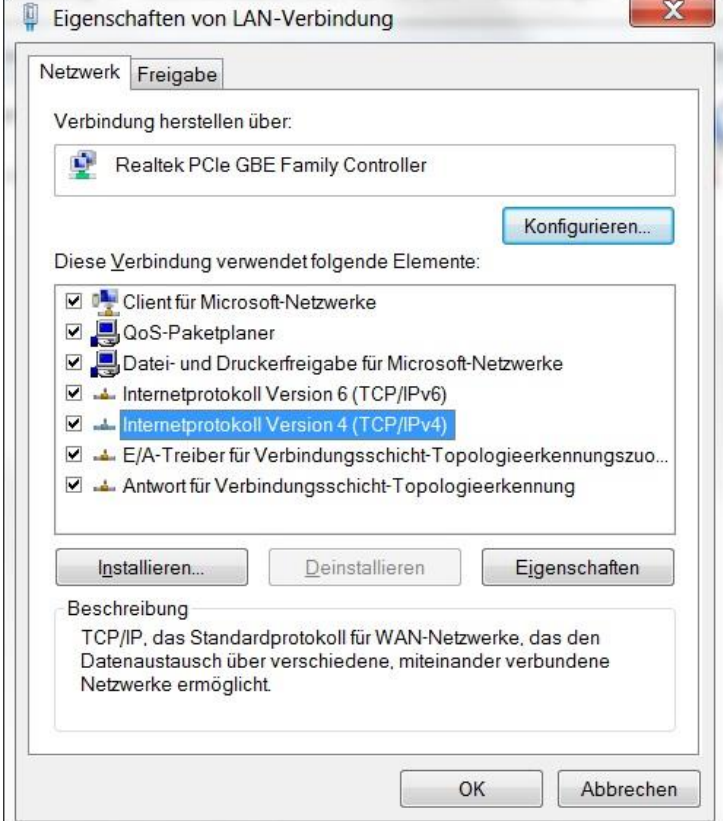
## 5.6 Establishing a Connection between the Receiver and a Laptop/PC

### 5.6.1 Configuring an LAN Connection

If the device is a multi-functional AgroPilot or optional individual system configurations were chosen, you can assign parameters to the system via a web browser.

For this purpose, you will need an ethernet crossover cable and a laptop/PC with an ethernet jack. Follow these steps to establish a connection:

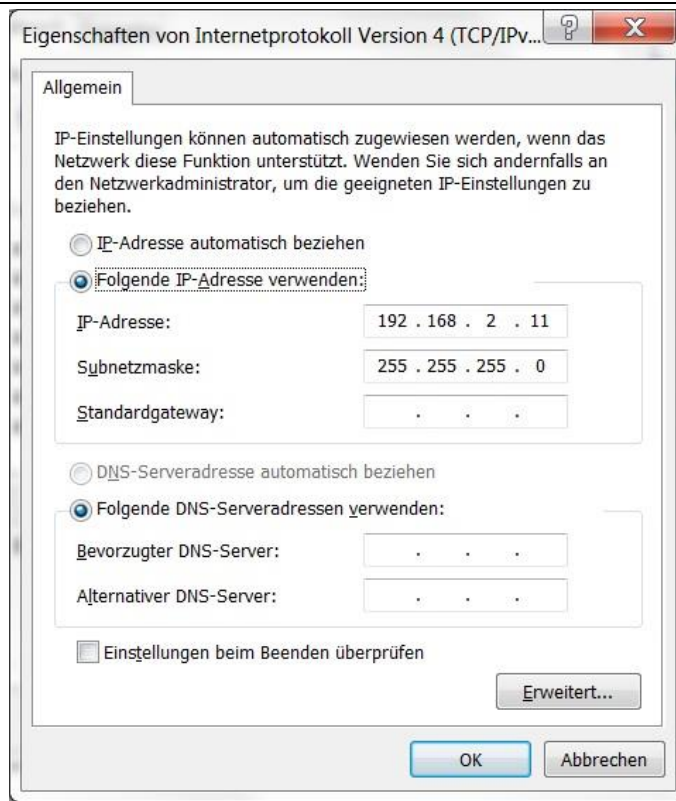
**Table 6: Configuring an LAN Connection**

<p><b>Step 1:</b> Open Control Panel &gt; Network Connections on the computer. <b>Right-click</b> on the LAN connection you want to use to connect to your radio system and select <b>Properties</b>.</p>	
<p><b>Step 2:</b> A window will appear, where you will select Internet Protocol Version 4 (TCP/IPv4). Then click on the <b>Properties</b> button.</p>	

**Step 3:**

Another window will appear where you will enter the following IP Address: **192.168.2.11**. Under Subnet Mask, enter **255.255.255.0**.

Confirm all open windows with **OK**.

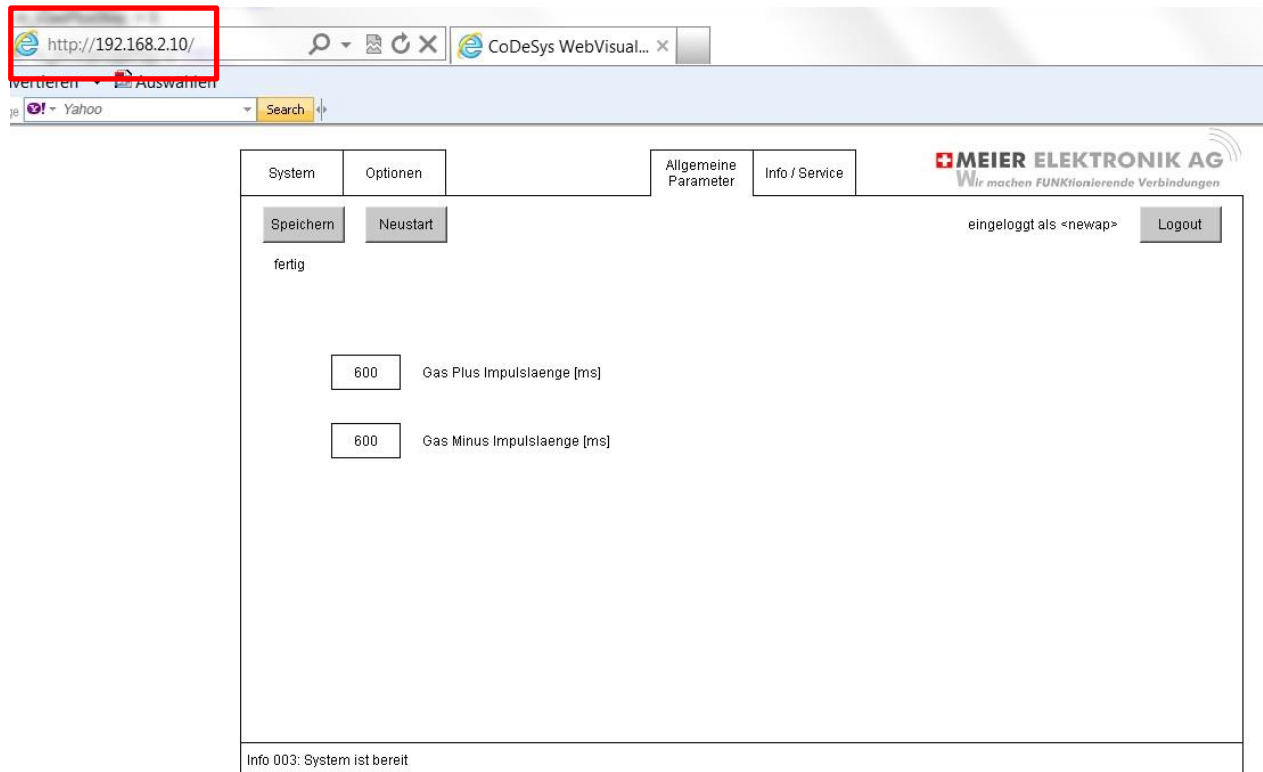


### 5.6.2 Connecting a Laptop/PC to the Receiver

1. Open the radio receiver and remove the front panel.
2. Attach the ethernet crossover cable (null modem cable) to the ethernet jack.
3. Connect the other end to the computer's ethernet jack.
4. Turn the receiver on and wait for it to start.
5. Start Internet Explorer (web browser) and enter <http://192.168.2.10> in the address bar.
6. If the connection is correct, a JAVA icon will appear asking for a password.
7. Enter "me" as the password.
8. This will open the radio receiver configuration

### 5.6.3 Configuring the Radio Receiver

**Fig. 16: Configuration Window**



1. Go to the General Parameters tab.
2. There you can change individual parameters.
3. Click Save to save the parameters you have changed.
4. The system must then be restarted. Click on Restart.
5. After pressing Restart, the connection will be lost to the radio receiver. To check the connection, following the login procedures under 5.6.2.

## 5.7 Table of Functions

The standard 4K/6K AgroPilot models have the following predefined functions (custom functions can be implemented without much effort. Ask your dealer or Meier Elektronik AG).

**Table 7: Receive Function Table**

1 / 2: Pump On / Off	CH1 - Relay 1 (bistable) or via an additional pin in models with magnetic coupling. See pin connections at Table 5, p. 19!
3 / 4: Water / Liquid fertilizer valve	CH2 - Relay 2 (bistable)
5 / 6: Return On / Off	CH3 - Relay 3 (bistable)
7 / 8: Agitator On / Off	CH4 - Relay 4 (bistable) (only on Model 6K)
9 / 10: Reserve On / Off	CH5 - Relay 5 (bistable) (only on Model 6K)
12: Buzzer	CH8: Buzzer (short-term function)
11: Hand-held transmitter on / Status	No relay function (Switches the transmitter on or queries feedback status)



If Output / Relay CH1 is not set, the internal buzzer will sound briefly every 2 seconds. This warns persons in the surrounding area that the machine/pump can be switched on at any time.

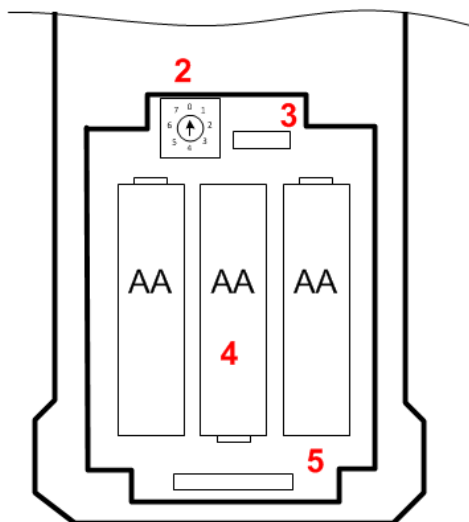


## 6 Changing the Frequency

If there is poor reception quality, it may mean that the radio channel is in use. Switching the channel may take care of the problem. If you do switch the frequency, it must be switched on both transmitter and receiver.

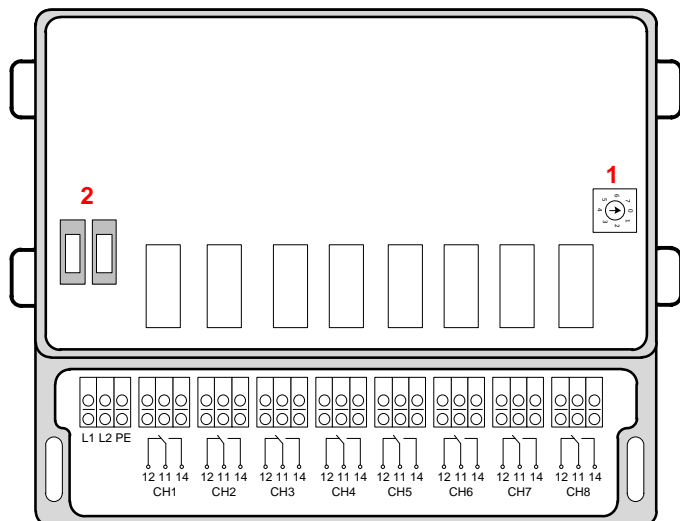


When changing the frequency, the receiver **MUST** first be switched off!



Changing the frequency on the transmitter:

Open the battery compartment and turn the dial (2) to select a new radio channel. If you are changing the channel due to interference in your radio signal, it is recommended that you set the channel 3 levels higher or lower.



Changing the frequency on the receiver:

Open the receiver's transparent cover and turn the dial (1) to select a new radio channel.

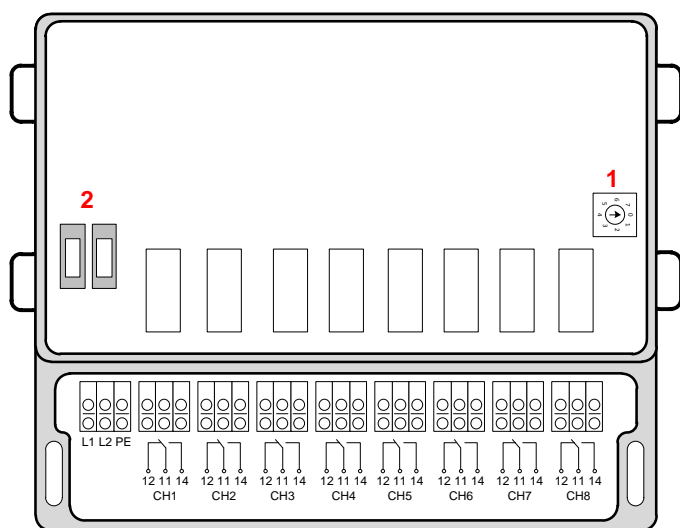
The receiver channel number must match the transmitter channel number. Otherwise, no communication is possible.

## 7 Replacing the Fuse

If the Power LED does not light up on the housing exterior and the power supply is switched on, the internal fuses need to be checked.



Never work on the terminals or controls when the current is active!



Changing the fuses in the receiver:

If you open the receiver's transparent cover, you will see two fuse holders (2). Using a pair of pliers to pull the fuses out.

Check the **2A time-lag fuses** for proper function and replace if necessary.

The fuses can be ordered from Firma Meier Elektronik AG or from a specialist store.

## 8 Troubleshooting

The following list is designed to help with troubleshooting problems with your device:



Never work on the terminals or controls when the current is active!

**Table 8: Faults**

Number	Problem	Possible Error
1	The LED does not light up even if the power is on.	Check the fuses (see 7).
2	Poor radio contact	Check the antenna setup (see 5.2) or change the radio channel (see chapter 6).
3	No radio contact, although the RF LED on the transmitter flashed and then stayed on.	Check whether the transmitter and receiver are set to the same channel (see 6).
4	No radio contact, although the RF LED on the transmitter flashed and then stayed on.	Check if the transmitter and receiver have the same device number (see Fig. 2 and Fig. 10). The transmitter and receiver can only communicate when they have the same device number.
5	No radio contact, although the RF LED on the transmitter flashed and then stayed on.	Check if the receiver is turned on (device LED must be lit).
6	No radio contact, low voltage LED on transmitter is lit continuously.	Change the batteries (see 3.3).
7	Relays CH3 and CH4 are not switching.	Check if CH1 has been turned on. If so, turn it off, so that CH3 and/or CH4 can switch on.
8	Relay does not switch.	Check other relay channels to see if they are connected. If so, the relay is defective.

## 9 Error Codes

If the receiver has an error, the cause can be determined from the blinking codes.

**Table 9: Error Codes**

1	Error 001: COM port for RF module could not be opened
2	Error 002: COM port for RF module could not be configured
3	Error 003: Configuration file could not be opened (read)
4	Error 004: Configuration file is empty (read)
5	Error 005: There was a problem reading the configuration file
6	Error 006: Configuration file could not be closed (read)
7	Error 007: Configuration file could not be opened (write)
8	Error 008: Configuration file could not be written
9	Error 009: Configuration file could not be closed (write)
10	Error 010: COM port for GSM module could not be opened
11	Error 011: COM port for GSM module could not be configured
12	Error 012: GSM modem could not be switched on
13	Error 013: GSM modem does not work correctly
14	Error 014: RTC (Real Time Clock) could not be initialized to read time and date
15	Error 015: GSM modem could not be initialized
16	Error 016: Last SMS Sent file could not be opened
17	Error 017: Last SMS Sent file could not be read
18	Error 018: SIM activation SMS could not be sent
19	Error 019: Last SMS Sent file could not be written
20	Error 020: Last SMS Sent file could not be closed (write)

## 10 Intended Use of this Device

The radio can be used for many automation tasks in industry and trade.



The product in this configuration must **NOT** be used in applications where failure or malfunction of the product could result in personal injury or material damage.

## 11 Specifications

**Table 10: AgroPilot Hand Transmitter Specifications**

Frequency [MHz]	869.525
Transmission power	+27 dBm / 500mW
Antenna	internal
Data encoding	NRZ coding, error detection with CRC8
Modulation	LoRa
Addressing	16-bit unique code set in factory, fixed
Keyboard	2x6 back-lit buttons Switched on by button 11 (hold for min. 1 second)
Standby	After 15seconds, transmitter will automatically go into standby mode
Power supply	3 x 1.5 AA/LR6 (alkaline) batteries
Power usage	max. 400mA (transmit mode)
Battery life	10 hours of continuous operation
Battery life	2-3 years under normal use
Maximum battery storage	3 years when inserted in transmitter and stored at ambient temperature (alkaline, 1.5V)
Housing	plastic, IP66 black with ventilation membrane withstand pressures of up to 1 bar.
Temperature range	-15 to +50°C
Storage temperature	15–25°C / < 90% RH
Moisture	<90% RH
Dimensions	198 x 67 x 32 mm (max. dimensions)
Compliance	CE, Class II type B, IEC / EN 60950

**Table 11: AgroPilot Hand Receiver Specifications**

Frequency [MHz]	869.525
Transmission power	+27 dBm / 500mW
Antenna	External antenna with 3m cable
Data encoding	NRZ coding, error detection with CRC8
Modulation	LoRa
Addressing	16-bit unique code set in factory, fixed
Programming	Via integrated CoDeSys PLC
Power supply	9 to 18VDC 18 to 36VDC 230 V~ 400 V~ Modified upon request
Power usage	40mA@400V~, 50Hz, 3–16VA
Relay contact rating	8A @ 400VAC nominal, 15A max. @ 400VAC (stronger relay outputs available on request)
Housing	plastic (PC/ABS), IP65 light gray with adapter plate for DIN track. Magnetic, tabs or rubber buffer assembly
Dimensions	220 x 184 x 112 mm
Temperature range	-15 to +50°C
Storage temperature	15–25°C / < 90% RH
Moisture	<90% RH
Compliance	CE, Class II type B, IEC / EN 60950

## 12 CE Conformity

**Gerät:** Long distance radio remote control

**Handelsmarke:** AgroPilot

**Typ:** AgroPilot 6K, 400VAC  
AgroPilot 6K, 12VDC

**Weitere Angaben:** See technical data sheet and operating instructions

The undersigned, as legally binding authorised representatives, declare that the above mentioned equipment complies with the following radio equipment, EMC and electrical safety requirements.

DIRECTIVE 2006/42/EG: Machinery Directive  
RICHTLINIE 2006/42/EG: Maschinenrichtlinie

DIRECTIVE 2014/53/EU Radio Equipment Directive (RED)  
RICHTLINIE 2014/53/EU Funkanlagen

DIRECTIVE 2014/30/EU Electromagnetic Compatibility (EMC)  
RICHTLINIE 2014/30/EU Elektromagnetische Verträglichkeit

DIRECTIVE 2014/35/EU Low Voltage Directive (LVD)  
RICHTLINIE 2014/35/EU Niederspannungsrichtlinie

DIRECTIVE 2011/65/EU Restriction of Hazardous Substances (RoHS)  
RICHTLINIE 2011/65/EU Beschränkte Verwendung bestimmter gefährlicher Stoffe

The following standards were applied:

EN 300 220-1 V3.1.1 2017-02  
EN 300 220-2 V3.1.1 2017-02  
EN 301 489-1 V2.1.1 2017-02  
EN 301 489-3 V2.1.1 2017-03  
EN 60950-1: 2006 + A2:2013

Testlaboratory: *EMC-TESTCENTER AG, Moosackerstrasse 77, CH-8105 Regensdorf*

Manufacturer: Meier Elektronik AG, Gewerbezone 61, CH-6018 Buttisholz

Authorised representative:

Buttisholz

02.07.2019

Ort

Datum

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### 13 EMV measurements



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Accredited according to ISO / IEC 17025 by:  
Swiss Accreditation Service SAS  
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**MANUFACTURER** Meier Elektronik AG  
**TRADE MARK**  **MEIER ELEKTRONIK AG**  
**EQUIPMENT UNDER TEST (E.U.T.)** ModemPilot with option ZP-RF-433

Also used in the following products:  
AgroPilot, MultiPilot, IoT Pilot, Profipilot

**STANDARD** ETSI EN 300 220-1 V3.1.1 (2017-02)  
ETSI EN 300 220-2 V3.2.1 (2018-06)  
ETSI EN 301 489-1 V2.2.0 (2017-03) (Not harmonised)  
ETSI EN 301 489-3 V2.1.1 (2017-03) (Not harmonised)

**TEST RESULT** Complied according to test table on pages 2 and 3

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