MINI PILOT

Small radio for long distances

Document version: 0.8
Author: M. Kurmann

Version overview

Date	Version	Description
10.12.2014	0.1	Created
11.11.2015	0.2	Bug in Table 6 fixed
05.01.2017	0.3	Connection with 7-pole plug to star-delta and soft starter control documented.
10.01.2017	0.4	Connection diagram 24V (standard)
25.10.2017	0.5	Adaptation scheme 7 pole connector with softstarter
12.03.2018	0.6	Images of new housing inserted
08.04.2019	0.7	Supplement to chapter 7: System extension with a NiveauPilot
08.08.2019	0.8	Adaptation/verification in accordance with the new RED standards (adaptation of the CE Declaration of Conformity)

Content

1 Introduction

The MiniPilot radio system consists of a transmitter and a receiver. Communication takes place in both directions between transmitter and receiver. This allows the relay states to be displayed as feedback on the transmitter.

Thanks to sophisticated wireless technology, a range of up to 700 m can be realised even without line of sight. However, the distance depends on the topology.

The transmitter has 6 robust and weatherproof silicone buttons with a pleasant tactile feedback. They are backlit and signal the relay status of each function. The labelling can be customised and is made robust and high-quality by means of thermal transfer printing.

The receiver has 4 relay outputs which can switch 400V ~/8A.

In addition, the receiver has 4 different function programs, a boost mode for range extension up to 700 m and on/off key lock. These functions can be changed independently by the user.

By logging the transmitter into the receiver, you can connect a transmitter very easily to the receiver and thus receive a unique code so that MiniPilot systems running parallel do not affect each other.

2 Safety instructions

The installation, service and settings of the receiver may only be carried out by electrically trained personnel.
It is imperative that all installation and safety standards are adhered to.

Before commissioning, check the receiver type plate to see if the correct operating voltage is used in terms of power and voltage.

The switchgear must not be operated unearthed.

The receiver terminal box may only be opened when currentless.

Never work under voltage on the terminals or on the controller!

Never wash the device with water or clean it with high pressure water.

If the receiver is subject to vibration, it must be mounted on rubber buffers so as not to shorten its service life.

The MiniPilot radio remote control must NOT be used for safety-relevant applications where a defect or malfunction of the product may endanger persons or cause material damage.

3 Scope of delivery

The following items are included in the scope of delivery of the MiniPilot:

- Transmitter
- 2 x AAA alkaline batteries
- Receiver
- Receiver antenna with SMA screw connection
- Belt clip with adhesive tape for self-assembly when desired.
- Lanyard
- Lettering (optional)
- External 230V ~ plug-in power supply (optional)
- External 400V ~ plug-in power supply (optional)
- 400V ~ power supply (optional) integrated in the receiver
- Connector (optional)
- Connection cable (optional)
- Fastening straps for the receiver (optional)

4 Hand-held transmitter

4.1 General description

Figure 1: Transmitter view front side

The transmitter has 6 backlit buttons that can indicate the status of the relays. Depending on the program selected, the buttons have different functions or different relay functions are performed.

An optional label describes the corresponding functions.

If the key lock is activated, the transmitter must first be unlocked by pressing the button 5. Only then are the functions with relay control possible.

If all buttons flash at 5s, the batteries are low and must be replaced.

If a button is flashing, the receiver is out of range or not switched on.

Figure 2: Transmitter view on the back

Item 1: Transmitter

Item 2: Belt clip

Item 3: lanyard

Item 4: Battery compartment

4.2 Inserting the batteries

The transmitter comes with batteries (2 x AAA alkaline) included. These must be inserted first.

Step 1:
Loosen the four screws with a small cross-head screwdriver

Step 2:
Insert the new batteries. Pay attention to the correct polarity

Step 3:
Briefly press button 5. When it starts to flash, the batteries are inserted correctly.

4.3 Mounting belt clip

Remove the adhesive tape liner on the belt clip and press in on the back of the transmitter.

Figure 3: Assembling belt clip

4.4 Assembling lanyard

Open the lanyard fastener and insert it into the eyelet of the belt clip.

Figure 4: Assembling lanyard

4.5 Battery replacement

Remove the two screws on the back (see item 5, Figure 2, page 6), you can remove the back of the MiniPilot housing (see procedure in section 4.2, page 6)

For the device to work properly, use 1.5V AAA or LR3 **alkaline** batteries. The batteries can be purchased from the company Meier Elektronik AG or in specialist shops.

5 Receiver

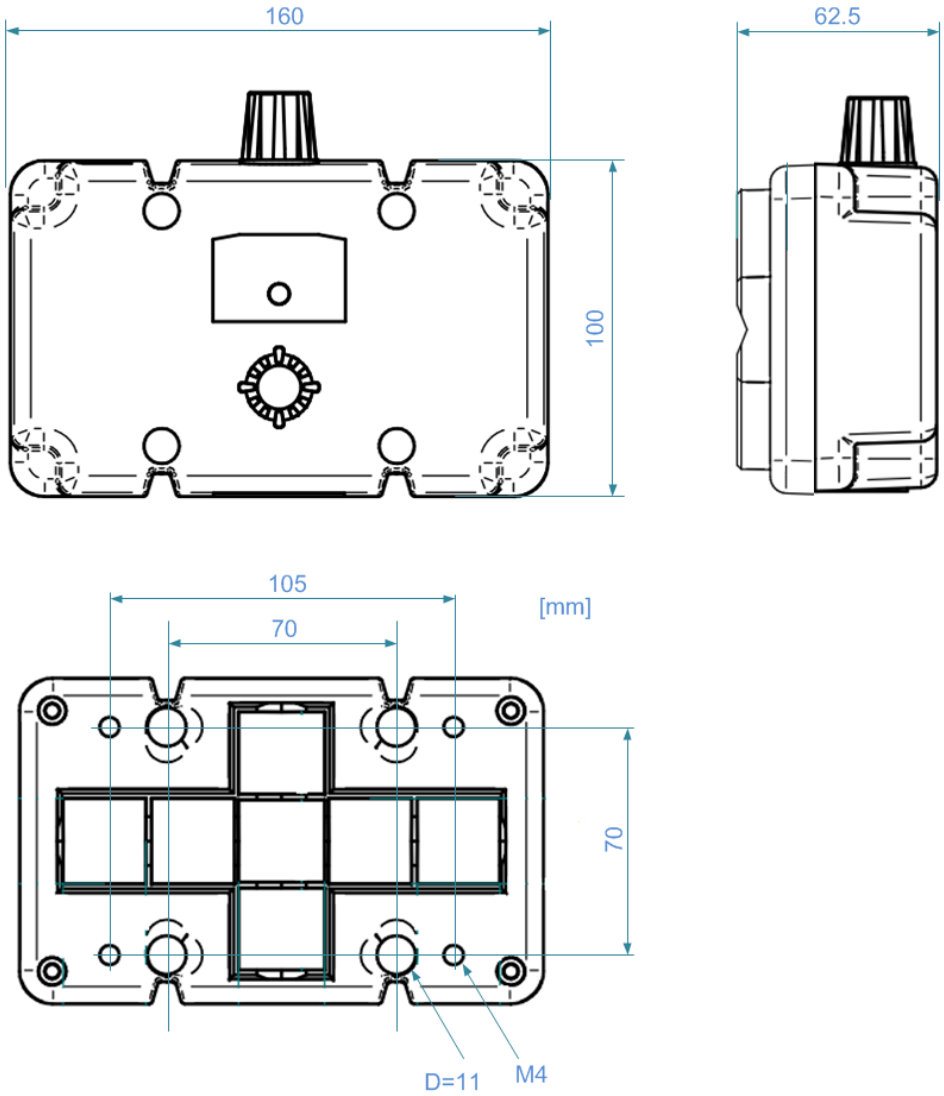
5.1 General

The receiver has a power supply and a silicone button on the front. If the receiver is connected to the power supply, the power LED lights up. However, the silicone button does not light up. The silicone button is used to register new stations or newly configured stations (see Page 21).

5.2 Housing dimensions and mounting options

The receiver housing can be mounted in different ways. Depending on the mounting option, the receiver can be mounted on a DIN rail, with tabs, on rubber bumpers, with a magnet or with U-bolts. The corresponding assembly material can be obtained from Meier Elektronik AG.

Figure 5: Receiver housing with mounting holes/thread



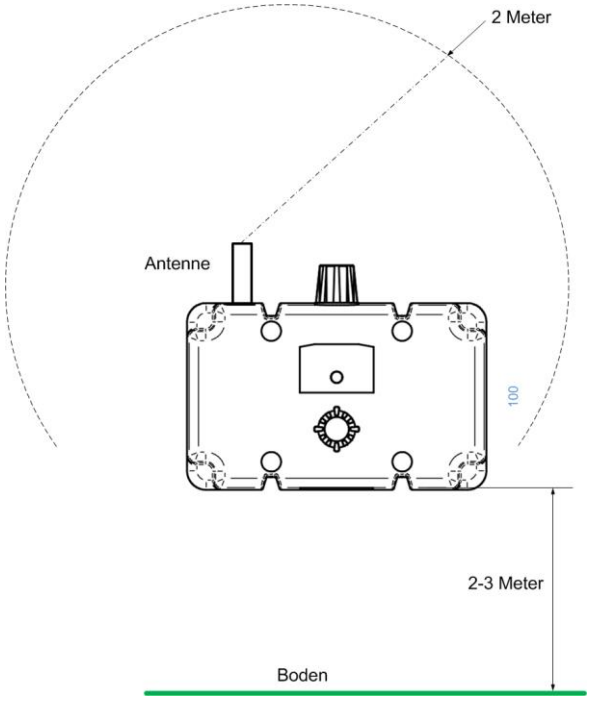
If the receiver is used outdoors, it should not be exposed to direct weather conditions so as not to unnecessarily reduce its service life.

Although the receiver is weatherproof, you should protect the receiver from splashes of water and other environmental effects.

5.3 Assembly instructions

The best reception properties can be achieved with visual contact. However, since this is usually not possible, the receiver must be placed with its integrated antenna so that the antenna can emit or receive as independently as possible.

Figure 6: Receiver installation for optimum reception



It is ideal if the antenna can emit for 2-3 metres freely. As far as possible, there should be no obstacles in this area. In addition, the reception quality can be increased if the receiver is mounted 2-3 metres from the ground.

5.4 Installation without receiver round plug and without integrated 400V ~ power supply

If the receiver does not have a plug option, pass the connection cable through the M screw connection and wire the device accordingly. To do this, remove the receiver housing cover.

Check the voltage (V) on the receiver type plate with its operating voltage (see Figure 7).

Please note the equipment printout on the green circuit board for the supply of 9 ...24VDC This connection is made via screw terminals.

Figure 7: Receiver labels

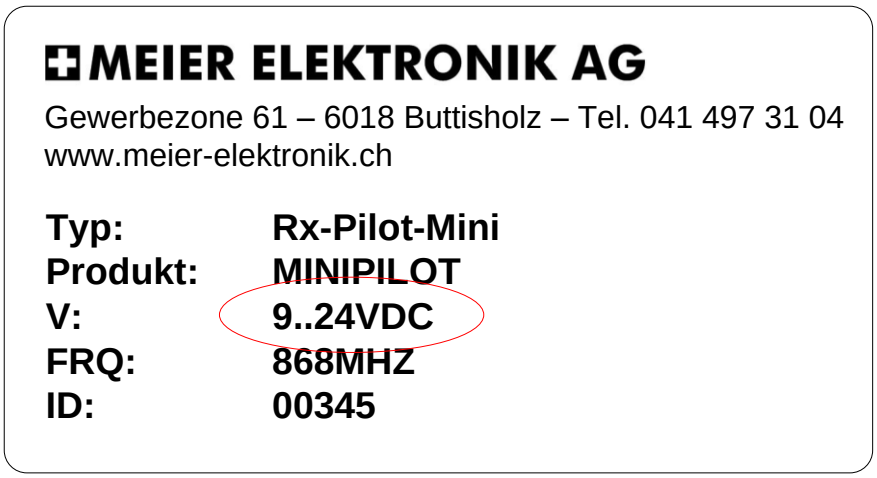


Figure 8: Connection scheme standard MiniPilot receiver

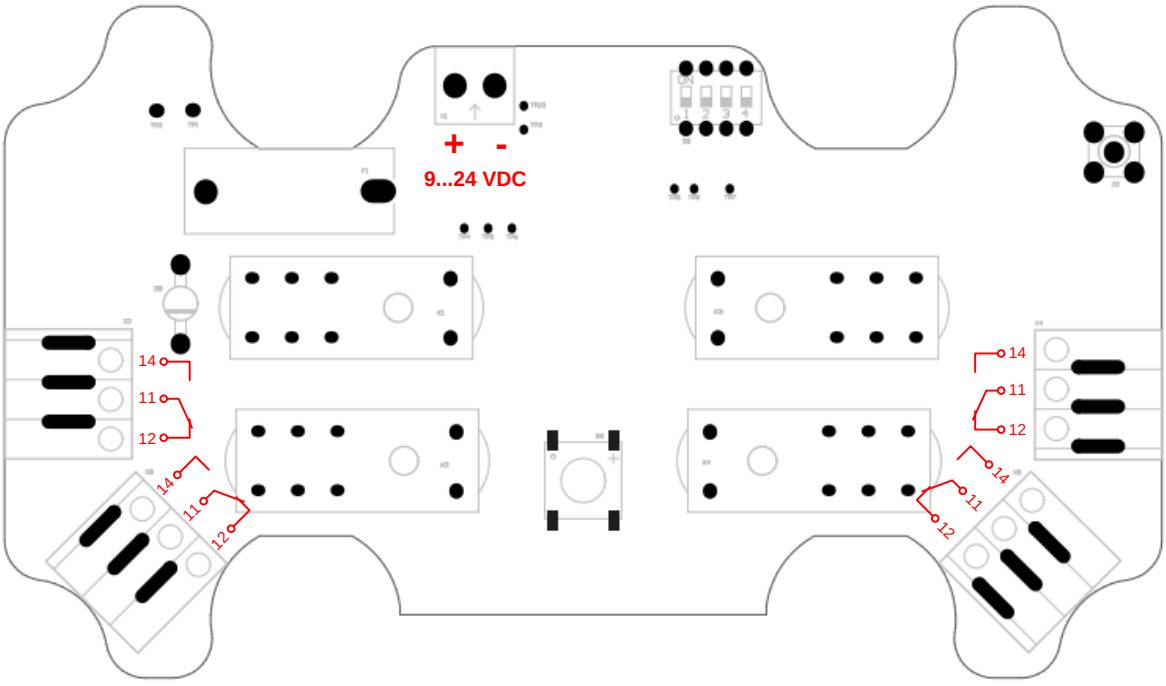
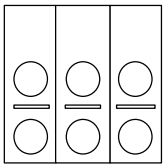
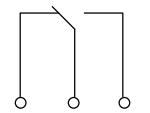


Table 1: Pin assignment





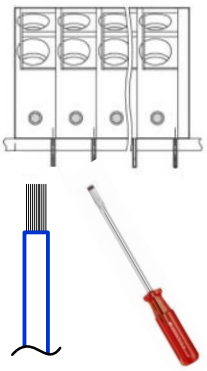
12 11 14
CH1

The receiver supports a maximum of 4 high quality relay channels. The contacts are potential-free and always designed as opener/closer (SPDT).

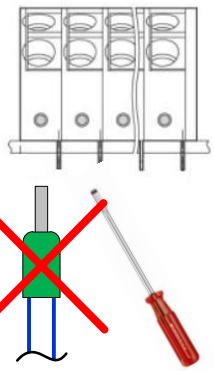
The opener is available at the pin number 12/11 and the closer at 11/14.

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

The relays can be used to directly run 1-phase motors with a maximum load of 0.3W at 230V!

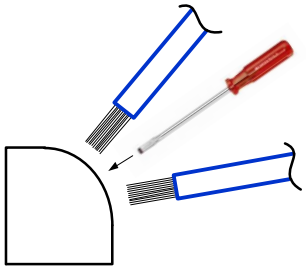


←
Use
Connect a flat-head screwdriver size 1.



←
DO **NOT** use ferrules on the receiver connection cables!

We **can** only achieve an optimal cable pressure without ferrules!



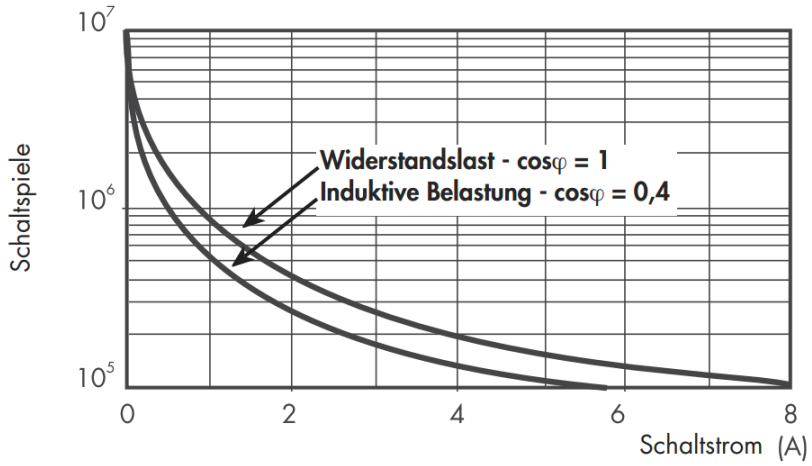
By pressing on the front of the plug notch, the press connection opens and the cables can be inserted. The upper and lower wire terminals are electrically connected to each other.

Only use one wire/cable per plug hole!

Table 2: Characteristics of data relay

Max. Continuous current/max. Inrush current [A]	8/15
Rated Voltage/(max) Switching voltage [V ~]	230/400V
Max. Switching capacity AC1 [VA]	2000
Max. Switching capacity AC15 (230V ~) [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

Figure 9: Electrical lifetime at AC



5.5 Installation with receiver round plug and integrated 400V ~ power supply

5.5.1 General

If the receiver has a plug option, it can be connected via the round socket (4 or 7 pole).

Check the voltage (V) on the receiver type plate with its operating voltage (see Figure 10).

Figure 10: Receiver labels

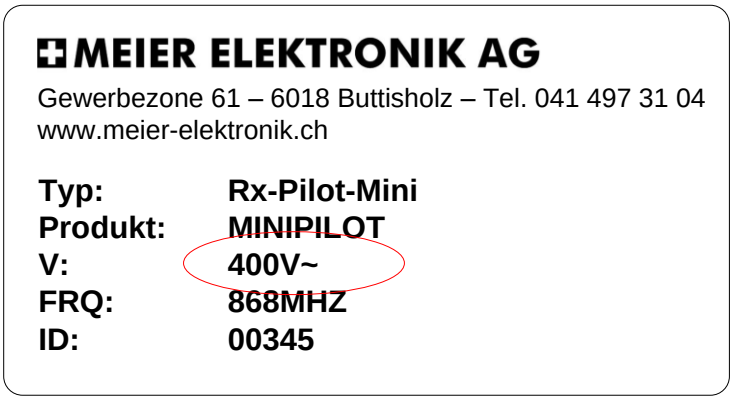
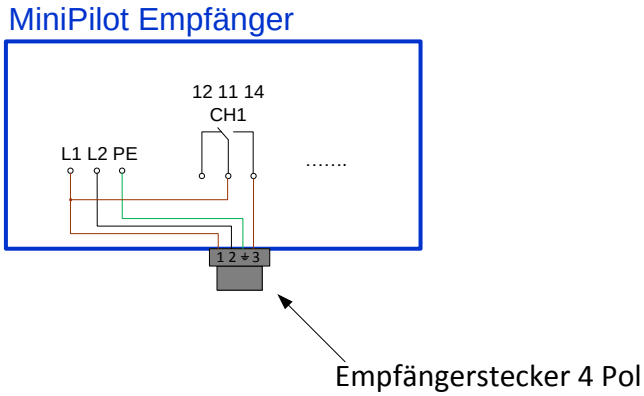


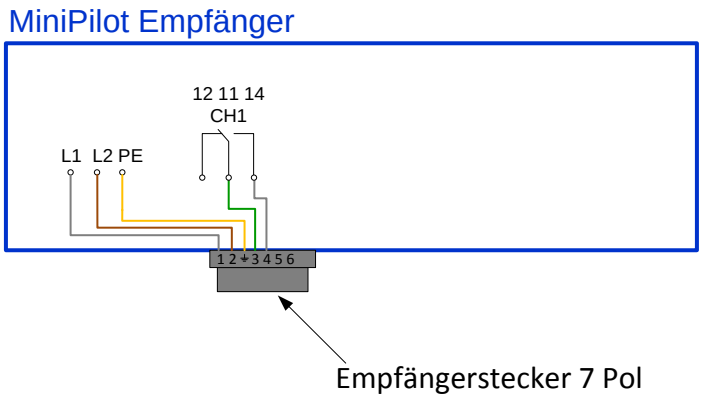
Table 3: Pin assignment 4 pole plug



Pin number on receiver plug	Function
1	Supply L1 (400V ~)
2	Supply L2 (400V ~)
3	Relay 1 (CH1) switched L1 (400V ~)
4	PE (earth)

Check the relay load in Table 2, page 13

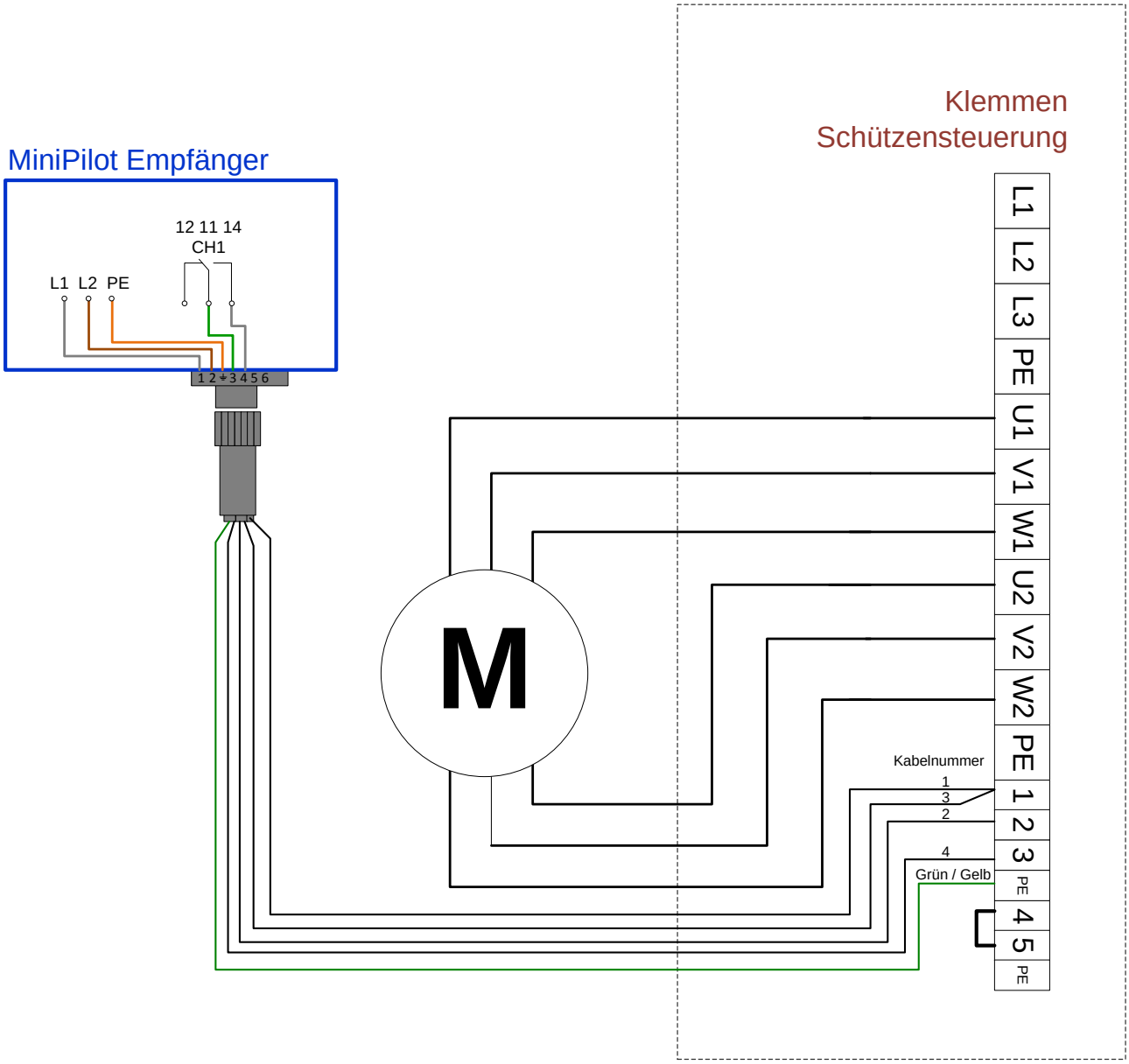
Table 4: Pin assignment 7 pole plug



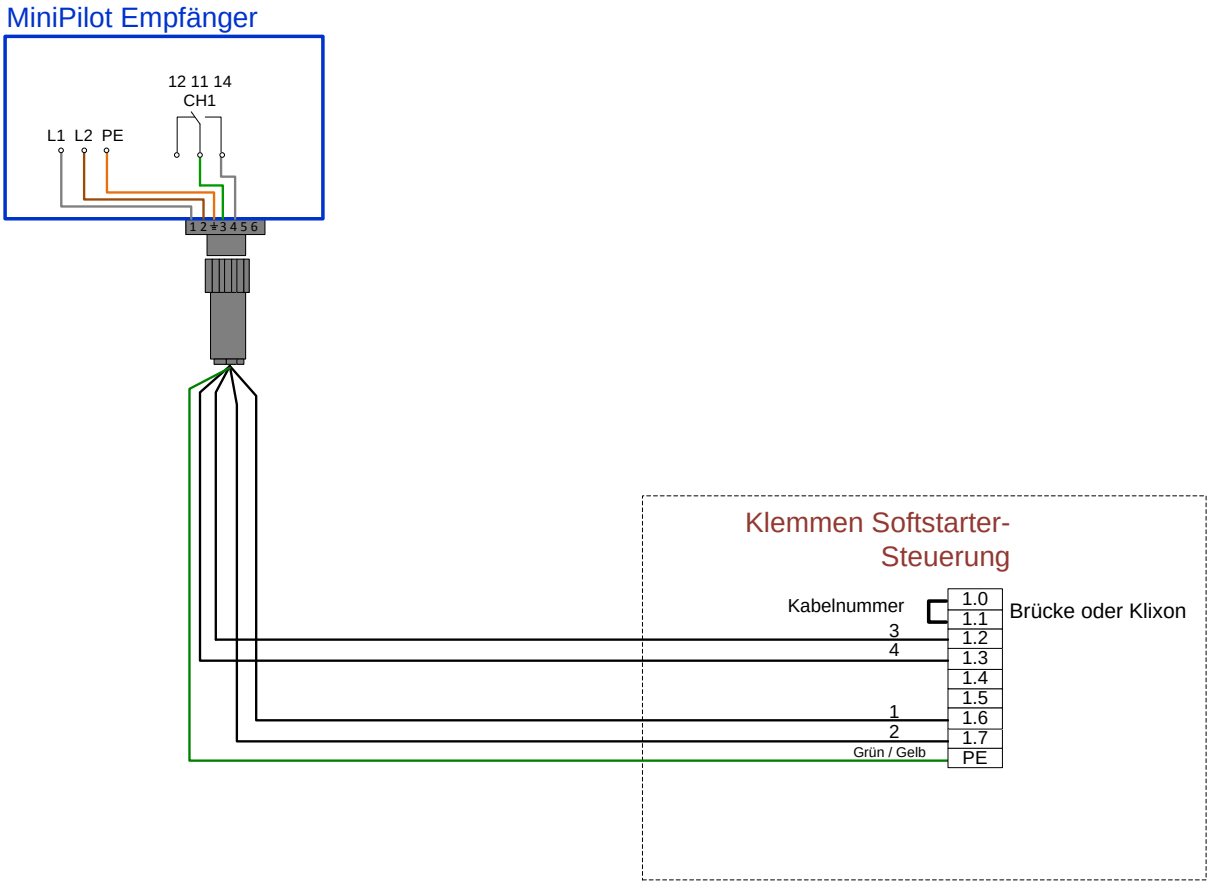
Pin number on receiver plug	Function	Cable number
1	Supply L1 (400V ~)	1
2	Supply L2 (400V ~)	2
3	Relay Common CH1	3
4	Relay close contact CH1	4
5	Not documented	5
6	Not documented	6
PE (7)	PE (earth)	7/Yellow-green

Check the relay load in Table 2, page 13

5.5.2 Connecting MiniPilot with 7 pole plug to the star-delta control



5.5.3 Connection MiniPilot with 7 pole plug to the softstarter control



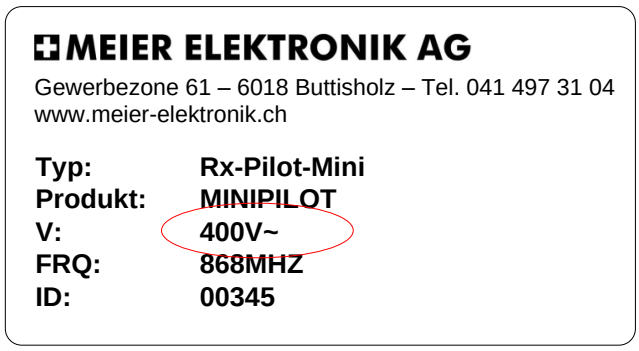
5.6 Installation with receiver round plug and integrated 400V ~ power supply

5.6.1 General

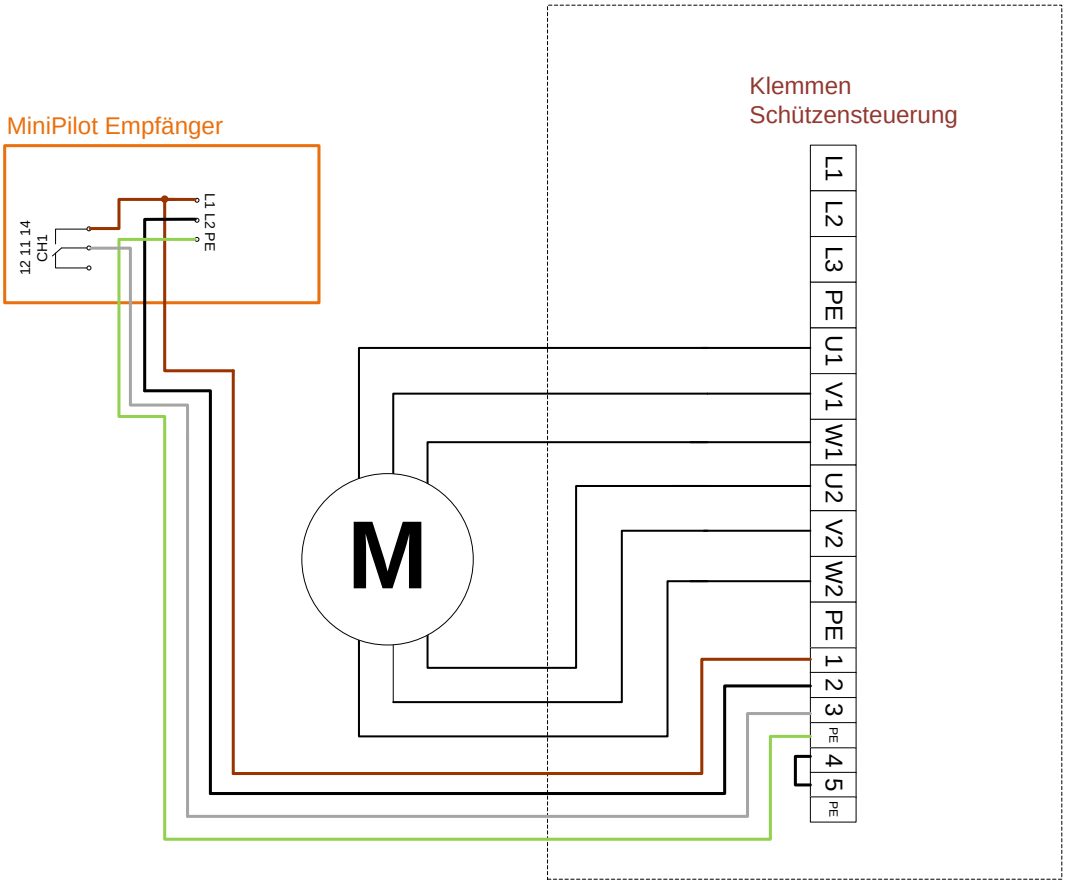
If the receiver does not have a plug option, but an integrated 400V ~ power supply, the MiniPilot must be connected according to the following instructions.

Check the voltage (V) on the receiver type plate with its operating voltage (see Figure 10).

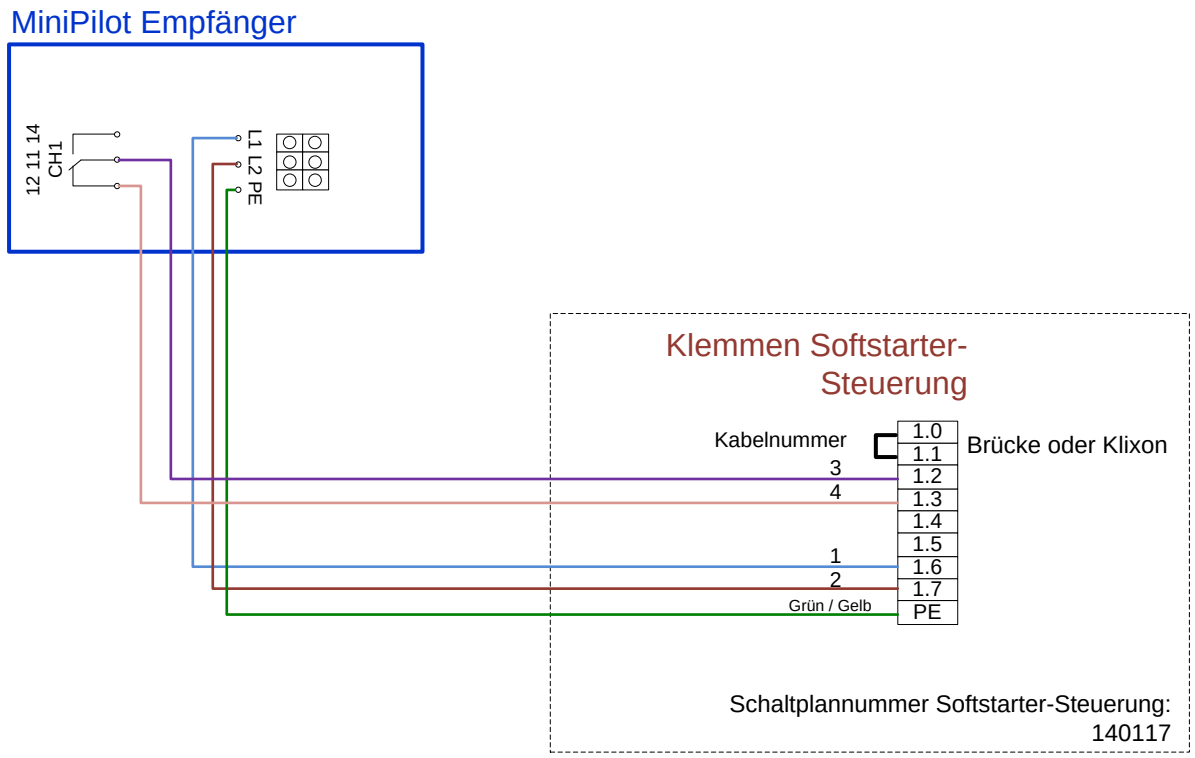
Figure 11: Receiver labels



5.6.1 Connecting MiniPilot with 7 pole plug to the star-delta control



5.6.1 Connection MiniPilot with 7 pole plug to the softstarter control



5.7 Configuration

5.7.1 Commonly available functions

The MiniPilot radio system can be adapted independently to your needs. The following modifiable functions are available:

- Switching the increased range on/off (if the increased range is switched on, the transmitter has a higher power consumption and therefore you have to change the battery sooner).
- Switching the key lock on/off (if the key lock is switched on, the hand transmitter can only be switched on if key 5 was pressed first).
- Choice of four different function programs for the relays (momentary, latching or switching).

5.7.2 DIP switch settings

In order to configure the MiniPilot radio remote system, you must remove the receiver cover and adjust the DIP switches accordingly (see Figure 12 page 21).

Never open the receiver lid under voltage!

Figure 12: DIP switch for configuration

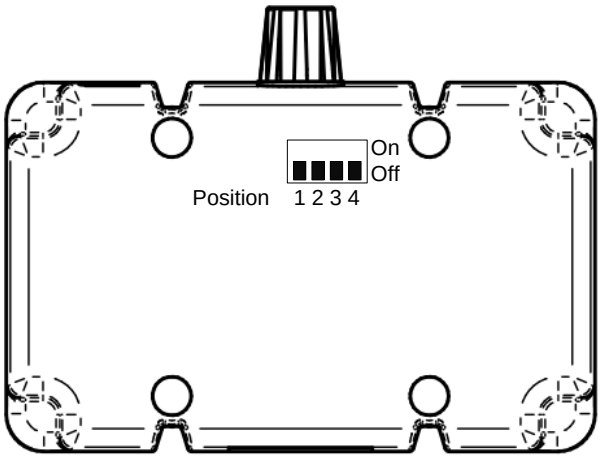


Table 5: DIP switches function explanation

DIP switch position	Function	Comments
1	Increased range on/off	For the takeover you have to log the transmitter in again. See 5.7.3 page 22
2	Key lock on/off	For the takeover you have to log the transmitter in again. See 5.7.3 page 22
3	Function program Bit0	See Table 6 page 21
4	Function program Bit1	See Table 6 page 21

Table 6: Function programs

Bit0 (DIP3) = OFF Bit1 (DIP4) = OFF	Button 1 → Relay 1 on Button 2 → Relay 1 off Button 3 → Relay 2 off, relay 3 off Button 4 → Relay 2 on, relay 3 off Button 5 → Relay 2 off, relay 3 on Push button 6 → relay 4 boost
Bit0 (DIP3) = OFF Bit1 (DIP4) = ON	Button 1 → Relay 1 on Button 2 → Relay 1 off Button 3 → Relay 2 Button 4 → Relay 2 off Button 5 → Relay 3 pulse Push button 6 → relay 4 pulse
Bit0 (DIP3) = ON Bit1 (DIP4) = OFF	Button 1 → relay 1 pulse Button 2 → relay 2 pulse Button 3 → Relay 3 pulse Push button 4 → Relay 4 pulse Button 5 → no function Button 6 → no function
Bit0 (DIP3) = ON Bit1 (DIP4) = ON	Button 1 → Relay 1 on Button 2 → Relay 1 off Button 3 → Relay 2 on Button 4 → Relay 2 off Button 5 → Relay 3 on/off Button 6 → Relay 4 on/off

5.7.3 Log in a transmitter

If you want to log a new transmitter into the receiver or adopt changed functions according to Table 5, page 21 , proceed as follows:

1. Check that the receiver is switched on.

2. Press the silicone button on the front of the receiver and keep the button pressed.

3. Simultaneously press button 5 on the transmitter. If the key lock is active, you have to release button 5 briefly and then press again.

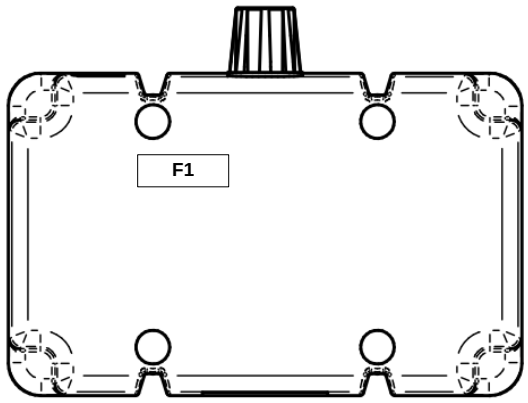
4. If the transmitter was able to be logged into the receiver, all the push-button LEDs on the transmitter will light up for about 5 seconds.

5. The transmitter is then ready for operation with the receiver.

5.8 Replacing fuses

If the operating LED on the receiver housing does not light up, even though the supply voltage is applied, the internal fuses must be checked.

Never work on the terminals or on the controller under voltage!



Fuse change receiver:

If you open the receiver cover of the housing box, you can get to the fuse holder (F1). You can pull them out with pliers

Check the **1A inactive** fuse for its functionality and replace it if necessary.

The fuse can be obtained from the company Meier Elektronik AG or in specialist shops.

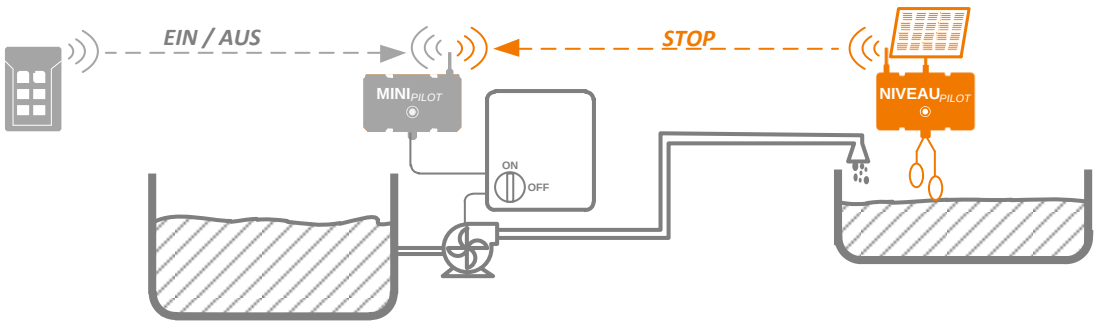
6 System extension with a NiveauPilot (optional)

Existing MiniPilot systems can be extended with a so-called NiveauPilot.

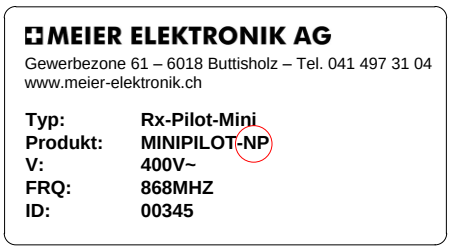
The NiveauPilot was developed to monitor smaller pumping stations easily and cost-effectively. By means of float switch, it continuously monitors the filling level of the hydro-dynamic bearing, which is to be filled. The measured level is continuously transmitted by radio to the MiniPilot receiver. This switches off the pump as soon as the maximum level is reached.

The NiveauPilot itself works autonomously and does not require any electrical connections. The NiveauPilot provides itself with energy via a solar cell and an integrated battery around the clock. If a radio break occurs during operation, the pump switches off automatically. Safety is thus guaranteed.

Figure 13: System construction MiniPilot + NiveauPilot



The MiniPilot receiver of the existing system must be of the type "MINIPILOT-NP", so that the system can be supplemented with a level pilot.
→ See label



The detailed procedure for a system extension with a NiveauPilot is described in the operating manual "NiveauPilot". The instructions and installation guidelines contained therein must be observed.

7 Troubleshooting

The following list will help you troubleshoot if the device stops working or only partially works:

Never work on the terminals or on the controller under voltage!

Table 7: Error list

Number	Problem	Possible error
1	Receiver LED does not light up, even though the supply voltage is applied	Check the device fuses (see chapter 5.8)
2	Poor radio contact	Check the antenna location (see chapter 5.3) or activate the range extension (see Table 5)
3	Pressed button flashes	Receiver is not switched on or transmitter is out of reception range or transmitter is not logged into the receiver.
4	All transmitter LEDs flash every 5 seconds.	Display low battery. Please change the battery.

8 Intended use

The radio is versatile and can be used for automation tasks in industry, in the agricultural sector and in business.
The product can be used to turn on/off pumps, agitators, generators, power units, etc. where no permanent radio connection is required.

This product is **NOT** intended for use in safety-critical applications where a defect or malfunction of the product may endanger persons or cause serious material damage.

9 Technical specifications

Table 8: Technical Data MiniPilot hand-held transmitter

Frequency [MHz]	869.525MHz
Transmission power (without RF-boost./with RF-boost)	+10mW/+50mW (+10 dBm/+17 dBm)
Communication	Bidirectional for displaying the feedback
Reception sensitivity	-123 dBm
Maximum link budget	+140 dBm
Antennae	Externally with SMA socket
Addressing	A 16 bit unique code will be applied to the receiver when logging on
Keyboard	2 x 3 illuminated push buttons Switch on with button 5 (if key lock is active)
Standby	After 10s, the transmitter automatically goes into standby mode
Power supply	2 x 1.5 batteries AAA/LR3 (alkaline)
Electricity consumption	Max. 10mA (transmit mode @ 10mW) Max. 50mA (transmission operation @ 50mW)
Battery life	10 hours in continuous operation
Battery life	2-3 years with normal use
Maximum battery storage	3 years at ambient temperature inserted in a transmitter (alkaline, 1.5V)
Housing	Plastic ABS, IP65
Temperature range	- 15..+50 °C
Storage temperature	15..25°C/<90% RH
Moisture	< 90% RH
Dimensions	57 x 87 x 20 mm (without antenna)
Conformity	CE, Class II type B, IEC/EN 60950

Table 9: Technical Data Receiver MiniPilot

Frequency [MHz]	869.525MHz
Transmission power (without RF-boost./with RF-boost)	+10mW/+50mW (+10 dBm/+17 dBm)
Communication	Bidirectional for displaying the feedback
Reception sensitivity	-123 dBm
Maximum link budget	+140 dBm
Antennae	Internal
Addressing	16 bit unique code, factory setting fixed
Configuration	Via integrated DIP switches
Power supply	Option A: 9..24VDC (see rating plate) Variant B: 400V ~ +/- 10% (see rating plate)
Electricity consumption	Max. 10mA @ 400V ~, 50Hz Max. 200mA @ 12VDC
Relay contact load	8A rated @ 400VAC, (Stronger relay outputs possible on request)
Housing	Plastic (ABS), IP65 black with mounting aids for DIN rails, magnetic, tab or rubber buffer mounting
Dimensions	160 x 150 x 60 mm (without antenna)
Temperature range	- 15..+50 °C
Storage temperature	15..25°C/<90% RH
Moisture	< 90% RH
Conformity	CE, Class II type B, IEC/EN 60950

10 CE Declaration of Conformity

Device: Radio remote control

Trade mark: MiniPilot

Type: MiniPilot 9..24VDC (700919)
MiniPilot 200 ... 460VAC (701941, 700953, 701561, 700962, 701942)

Further information: See technical data sheet and operating instructions

The undersigned, acting as Authorised Representatives, declare that the equipment mentioned above complies with the following Radio Equipment, EMC and Electrical Safety Requirements

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

DIRECTIVE 2014/30 / EU Electromagnetic Compatibility (EMC)

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

DIRECTIVE 2011/65 / EU Restriction of Hazardous Substances (RoHS)

The following standards were applied:
ETSI EN 300 220-1 V3.1.1 (2017-02)
ETSI EN 300 220-2 V3.1.1 (2017-02)
EN 301 489-1 V2.1.1 2017-02
EN 301 489-3 V2.2.1 2017-03
EN 60950-1: 2006 + A2: 2013
EN 60669-2-1: 2004/A12: 2010

Test laboratory: *EMC-TESTCENTER AG, Moosäckerstrasse 77, CH-8105 Regensdorf*

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

Authorised representative:	Buttisholz	02.07.2019	
	Place	date	Kurmann Markus CEO

11 Test certificates

emc testcenter.zürich.ag

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8105 Regensdorf
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Phone +41 44 302 45 00
E-mail info@emc-testcenter.com
Website www.emc-testcenter.com

Accredited according to ISO / IEC 17025 by:
Swiss Accreditation Service SAS
Registration number 0034

TEST REPORT REF.	EMCKP3835A
PROJECT NO.	EMCK3835
DATE OF ISSUE	2019-07-26
MANUFACTURER	Meier Elektronik AG
TRADE MARK	MEIER ELEKTRONIK AG
EQUIMENT UNDER TEST (E.U.T.)	ModemPilot with option ZP-RF-868 MiniPilot Option ZP-RF-868 can also used with the following products: AgroPilot, MultiPilot, IoTPilot, Profipilot, NiveauPilot
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) (Non Harmonised) ETSI EN 301 489-3 V2.1.1 (2017-03) (Non Harmonised)
TEST RESULT	Complied according to test table on pages 2 and 3
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