# Installation manual

Version 1.0

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# 1 Introduction

This installation manual contains information about an antenna receiver for a wireless data logger located in the rumen of livestock.

A schematic illustration of the system is given in fig. 1.

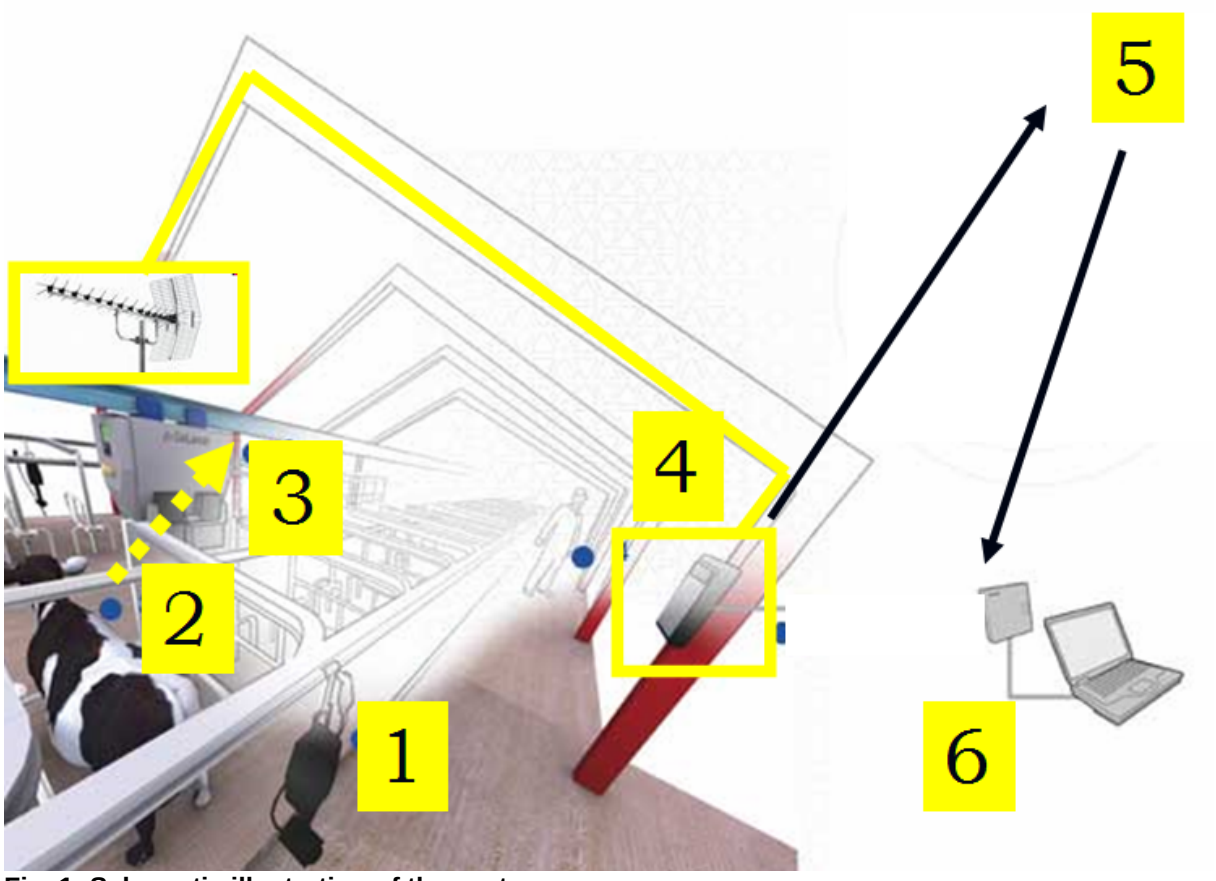



**Fig. 1: Schematic illustration of the system**

1. Pellet feeding station/milking station/massager
2. Data logger in the rumen of livestock (hereinafter referred to as bolus)
3. One/several antennas (433 MHz) receive the data from the data logger
4. Base station saves the data on a server on the Internet (**5.**)
6. Client PC accesses and interprets the measured data

Prior to installing the antenna receiver, please refer to the information about each single component. The installation instructions in the Appendix for cables and/or plugs as well as examples for positioning both the antenna and the base station in different stables should be read carefully.

# 2 Scope of supply

In addition to the parts needed for installation (see Chapter 3. Bill of materials), the packaging contains an **envelope** (including a user manual, a smaXtec USB antenna and a magnet). This envelope should be given to the farmer. The packaging further includes a termination for the antenna (model 65_N-50-0-31/133_NE by Huber+Suhner) with which the antenna cables can be tested (see Chapter 4.6 Testing the antenna cables).

# 3 Bill of materials

## *3.1 Base station*

Fig. 2 shows a picture of the base station. Up to eight antennas may be connected to it in the course of installation. In addition the base station must be connected to the network or the client PC using Power Over Ethernet adapters and an Ethernet patch cable.

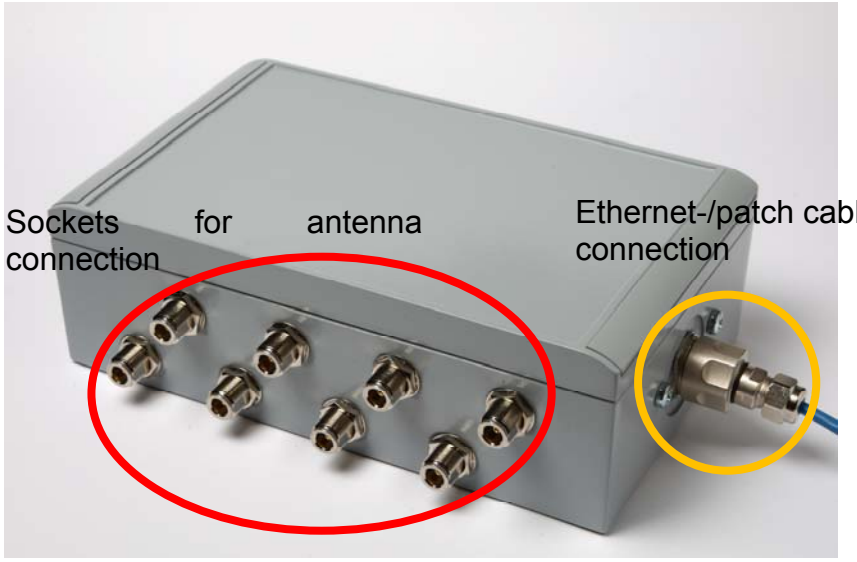



**Fig. 2: Base station**

The optional UMTS antenna connection is located laterally, on the same side as the Ethernet/patch cable socket.

## 3.2 Ethernet/patch cable

For the connection between the base station and the Power Over Ethernet adapter as well as for the connection between the Power Over Ethernet adapter and the network (client PC), an Ethernet/patch cable, model

- CAT 5e – UTP

should be used. Cabling must be done in accordance with the TIA/EIA-568-B standard (regarding length, bending radius etc.).

## 3.3 Ethernet/patch cable connection

To ensure a secure connection between the Ethernet/patch cable and the base station, a cable connector model Han Max-M should be used. For the corresponding assembly instructions please refer to Appendix 7.3.

## 3.4 Antenna cables

The following antenna cables should be used

For an antenna cable length of up to 50 m, a coaxial cable RG_223_/U from Huber+Suhner should be used. Make sure not to exceed the maximum bending radius during assembly (static case). This radius must be five times the outer diameter, in this case 30 mm. Lengths > 50 m should be avoided.

## 3.5 Cable connector model 21_N-50-3-8/133_N (female) for antenna cable RG_223_/U or alternative cable G_03212_D-01

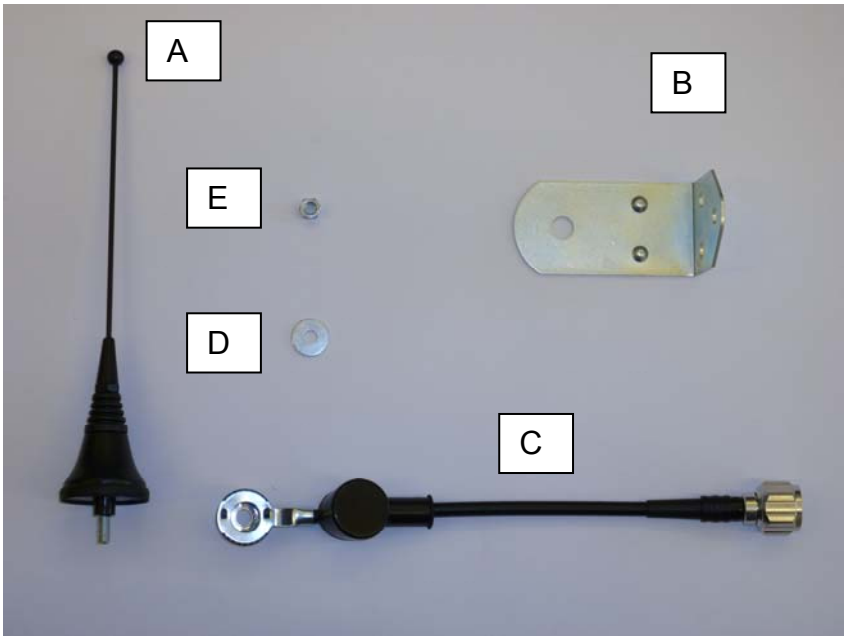
Connect the cable connector 21_N-50-3-8-/133_N to the one end of the antenna cable RG_223_/U or alternative cable G_03212_D-01 (connection to antenna). For the corresponding assembly instructions refer to Appendix 7.1.

## 3.6 Cable connector model 11_N-50-3-29 (male) for antenna cable RG_223_/U or alternative cable G_03212_D-01

Connect the cable connector 11_N-50-3-29 to the other end of the antenna cable RG_223_/U or alternative cable G_03212_D-01 (connection to base station). For the corresponding assembly instructions, refer to Appendix 7.2.

## 3.7 Antenna AS433 (AUREL)

The antenna (including washer and screw nut) is supplied with a 20 cm long antenna cable RG_223_/U (or G_03212_D-01) Huber+Suhner, a coaxial cable and a 11_N-50-3-29 (male) Huber+Suhner coaxial cable connector. Mounting brackets for installing the antennas in the stables are included with the antenna (Fig. 3). To install the antenna, so-called mounting brackets are used.




**A: Antenna**

**B: Mounting Bracket**

**C: Antenna Cable**

**D: Washer**

**E: Screw Nut**

**Fig. 3: AS433 Antenna parts**

## 3.8 Power supply

Power to the base station is supplied via a Power Over Ethernet (PoE) adapter. For installation, only the specified adapter should be used (see Fig. 4).


**Fig. 4: Passive Power Over Ethernet adapter**

The PoE adapter comes with a mains adapter from wattac electronics (see Fig. 5).

**PLASE NOTE:** This passive Power Over Ethernet adapter does NOT comply with the norm IEEE 802.3af.


**Fig. 5: Mains adapter wattac electronics**

Mains adapter specifications:

Manufacturer: Wattac Electronics
Model: BA0241C1-180-A03
Input: 100-240 V ~, 50/60 Hz, 0.7 A MAX
Output: 18 V --- 1200 mA

**PLEASE NOTE:**
**The PoE adapter and the mains adapter are not subject to IP norms concerning water protection, e.g. they must be by all means kept dry!**

If necessary, a 230V shock-proof female plug should be used for connecting the mains adapter that supplies the base station with power via the mains cable.

# 4 Assembly

## *4.1 General*

When installing the cables, please refer to the forthcoming European Norm EN62305 (outdoor and indoor protection against lightning) which is especially important for cables leading from the interior to the exterior of a building (e.g. UMTS antenna). Such conductions should be protected from overvoltage.

## *4.2 Fixation of the mounting brackets*

Please separate the screw nut and the washer from the antenna (Chapter 3.7, Fig. 3)

Now apply the mounting bracket to the antenna as shown in Fig. 6.

**Fig.6: Antenna Assembly (Step 1)**

Plug the antenna cable with the jagged side up (Fig. 7) on the antenna (Fig. 8).

**Fig. 7: Antenna Cable with Jagged Side Up**

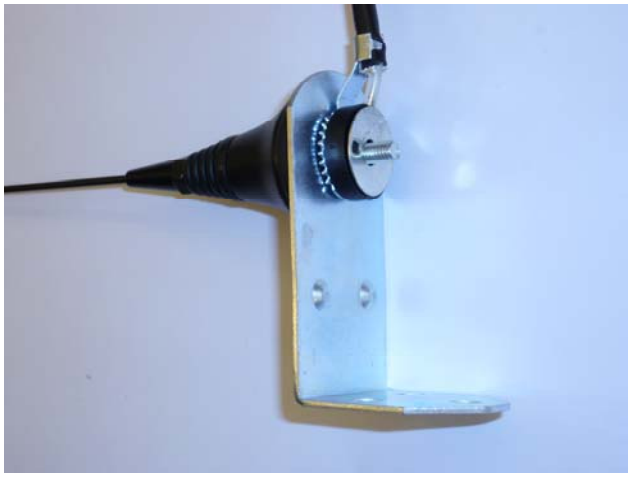


**Fig. 8: Antenna Assembly (Step 2)**

Apply the washer (Fig. 9) and afterwards the screw nut (Fig. 10) to the antenna and screw it together

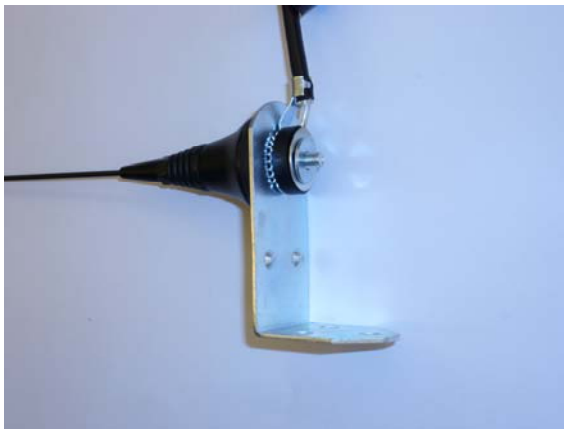


**Fig. 4: Antenna Assembly (with washer, Step 3)**

**Fig. 10: Antenna Assembly (with screw nut, Step 4)**

As the last step put the protection cap over the screw connection (Fig. 11).

**Fig. 11: Antenna Assembly (Step 5)**

## *4.3 Positioning the antennas*

It is possible to connect up to eight antennas to one base station. The antennas should be mounted in a place where the livestock rest for an extended period of time. The anntenas read out the boli in the livestock within a radius of 5 m.

Typical locations are:

- **Milking station**
- **Feeding station**
- **Massaging station**
- **Rest stop in front of milking station**

Antennas may be mounted at a height of 1 to 2 meters above the animal. The antenna must always be mounted to the left of the animal.

Antennas placed behind or in front of the animal should be mounted parallel and in the viewing direction of the animal.

Wherever the antennas are mounted directly above the animal (in any case to its left-hand side), the viewing direction of the antenna should correspond to the viewing direction of the animal. This would mean that the antenna points from above directly down to the animal (not parallel to it, but at an angle of 90°). Fig. 13 shows an antenna installed at an angle of 90° above livestock that are directly underneath.

Fig. 14 shows a bar parallel to the animal, which is why the antenna was also mounted parallel to it.

**Fig. 13: Antenna oriented 90 degrees downwards**

**Fig. 14: Antenna running parallel**

Wherever antennas are mounted to iron bars and/or electrically conductive bars, please make sure to insulate the mounting brackets using the supplied plastic pieces (see e.g. Fig. 15, Fig. 16).

When using universal strap clamps, make sure to insulate them from the antenna mounts. Universal strap clamps are preferrable to PVC cable ties due to their reduced material fatigue.

**Fig. 15: Insulated mounting bracket fastened to an electrically conductive bar with insulating tape**

**Fig. 16: Insulated mounting bracket with piece of wood**

## *4.4 Positioning the base station*

The base station should be mounted in such a way that a cable with a maximum length of 50 m suffices to connect the antennas to the corresponding base station. Four screws are necessary to ensure a stable position. The width of the screw head must be between 8 and 8.4 mm in order to fit into the corresponding borings. Make sure to use stainless steel screws (V4A) since galvanized screws tend to corrode after a few years. The openings intended for assembly must be covered with special cover strips. These cover strips are included in the base station packaging.

Fig. 17 and Fig. 18 show possible locations for the base station.

**Fig. 17: Base station mounted to wall**

**Fig. 18: Base station mounted to pillar**

The base station in Fig. 18 was mounted to a pillar using a perforated metal plate (Fig. 19).

**Fig. 19: Fixation using perforated metal plate**

## *4.5 Laying the antenna cables*

When laying the cables, make sure to avoid any pressure on them, e.g. from brackets or clamps etc. Cables connected to the base station and to antennas must not be taut and should neither hang by more than 1 m nor be under direct tension. An optimum solution would be to have a small loop before the actual connection point. In doing so, adhering to the bending radius instructions is essential. (see Chapter 2.4) Laying the cables inside empty tubes or cable trays etc. has also proven to be effective.

As described in Chapters 2.5 and 2.6 above, the antenna cables RG_223_/U oder alternative G_03212_D-01 must be crimp-connected on one end with the cable connector model 21_N-50-3-8-/133_N (female), and on the other end with the cable connector model 11_N-50-3-29 (male). It is essential to use the crimping tool model 76_Z−0−0−15 (large) or model 75_Z−0−3−4/B2 (small) of Huber+Suhner, otherwise no liability may be assumed for successful cable contact.

The cable connector model 21_N-50-3-8-/133_N (female) is connected to the antenna, and the cable connector model 11_N-50-3-29 (male) to the base station.
Please note which antennas were connected to which socket of the base station. Fig. 20 shows the numberings at the base station.

**Fig. 20: Numberings of base station**

Antenna cables should not be mounted together with electric cables or other cables.

## *4.6 Testing the antenna cables*

Before connecting the antennas to the base station, it is necessary to test the cables. First connect the antenna cable to the termination (supplied by smaXtec) instead of the base station, and then test it using a multimeter. Approx. 50 Ohm should register between the internal and the external conductor. When unplugged, the termination should have infinite impedance.

## *4.7 Laying the Ethernet/patch cable*

The Ethernet cable model 5e–UTP is connected to the base station using the Han Max-M cable connector. To do this, refer to the assembly instructions in Appendix 5.3. For assembly, a crimp tool (model Ethernet Crimp Tool – CAT 5e UTP) should be used.
The Ethernet/patch cable from the base station must be connected to the PoE adapter socket “POE”. Now ensure the “LAN“ connection with the network or client PC. To ensure the power supply of the PoE adapter the corresponding mains adapter (Fig. 6) must be connected to the “DC“ socket. The PoE adapter thus functions as interface to ensure the power supply to the base station by means of the Ethernet/patch cable. For a schematic illustration, see Fig. 21. We recommend installing the PoE adapter in the server room or in the room of the client PC (rather than the stables) in order to keep it dry.
The Ethernet/patch cable should not be connected together with other conductions (e.g. electric cables etc.).

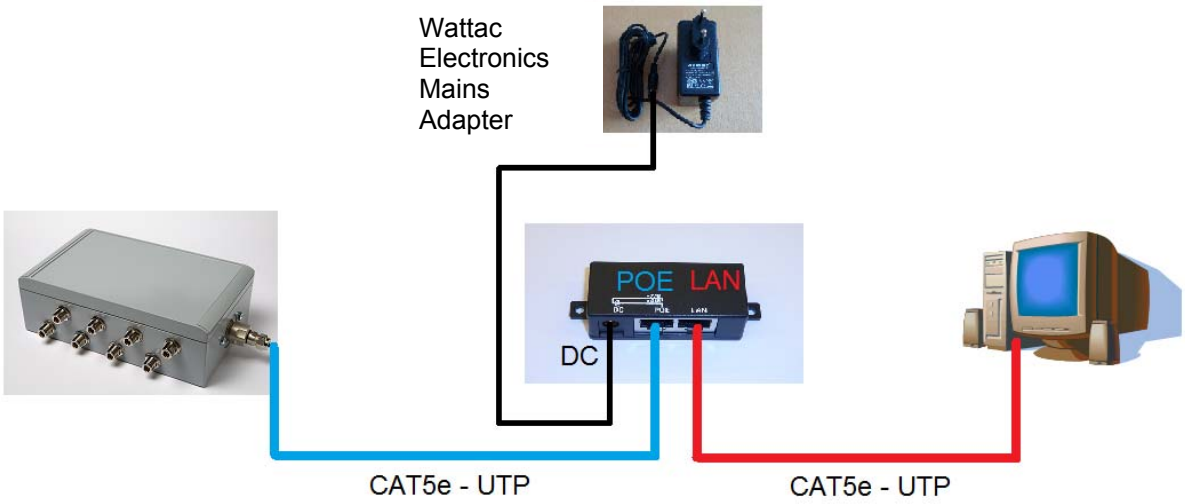



**Fig. 21: Schematic illustration of the Ethernet cabling**

Cabling must comply with the norm TIA/EIA-568-B.

## *4.8 Starting- up the system*

The base station has been programmed beforehand and may be used once it is connected. The acceptance test is done using a testing programme supplied by smaXtec. To run this test, the base station must be integrated into the network – the necessary steps are described in the following chapter (Internet connection).

# 5 Internet connection

For the connection of the base station to the Internet, the following requirements must be met:

- **A DHCP router connected to the Internet must be installed on the base station network.**
- **The DHCP service of the router must be activated and correctly set (usually with the default parameters of the router).**
- **High ports (from 1024 upward) must NOT be blocked (the base station uses Port 1194 UDP).**

In order to test the Internet connection, download the connection test software from www.smaxtec-animalcare.com/install/Verbindung.zip and execute the file Verbindungstext.exe. This software will conduct the following tests:

- Connection between client PC and base station
- Connection between base station and switch (Internet connection to server)

A functioning connection will be indicated by “OK”.

If the connection between client PC and base station is “NOT OK“, check the following aspects:

- If the LEDs at the base station are not lit (green should be on permanently and yellow should be blinking), check if the PoE adapter has been correctly installed (see Chapter 3.5) and replace it, if necessary.
- Check the Ethernet cable from the client PC to the base station for defects.
- Check Windows Firewall settings (either deactivate or set them correctly).
- Check the DHCP settings of the router.

If the connection between base station and switch is “NOT OK“, check the following aspects:

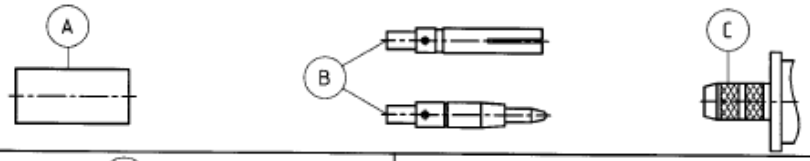
- First check whether the Internet connection to your provider is working (using a PC or laptop computer).
- Verify the DHCP settings of the router.
- Check the Firewall settings of the router, e.g. whether ports from 1024 upwards connect through (e.g. if it is possible to unlock them for the public network and back).
- Check the NAT settings of the router (they must be activated).

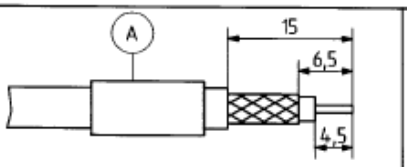
# 6 Appendix

## *6.1 Assembly instructions 21_N-50-3-8/133_N*

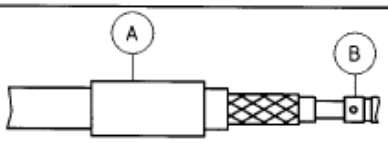
# Assembly instruction Series N/C AB 01.11.01 4605/GLS No. 03063

| | | | | | |
|---|---|---|---|---|---|
| Tools and materials required :<br>Stanley blade<br>Scissors<br>Crimp tool (see table below) | | straight connectors for flexible cabel<br>Cabel entry : SUHNER Full-Crimp<br>Connector types : (e.g.) | | | |
| | | 25 N-50-3-6<br>24 N-50-3-11<br>21 N-50-3-7<br>11 N-50-3-12<br>11 C-50-3-7 | 25 N-50-3-7<br>24 N-50-3-12<br>21 N-50-3-8<br>11 N-50-3-33<br>11 C-50-3-8 | 21 N-50-4-3<br>21 N-75-4-8<br>11 N-75-4-8 | 21 N-75-4-9<br>11 N-75-4-9 |
| This connector is supplied in 3 parts. | suitable cables e.g. : | RG 58C/U | RG 223/U | RG 59B/U | G 04233 D |
| | Centre contact : | cavity 2 | cavity 2 | cavity 2 | cavity 2 |
| | Braid : | cavity B | cavity B | cavity C | cavity C |
| | Crimp tool : | 2 B (orange) | 2 B (orange) | 2 C (yellow) | 2 C (yellow) |

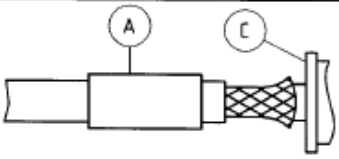


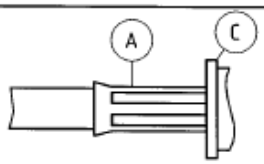

Slide ferrule A onto cabel.
Prepare cabel according to diagram.
CAUTION: Do not damage braid, dielectric and inner conductor of cable!




Push contact B over inner conductor to abut cable dielectric and crimp.




Splay out braid and insert cable in connector body C until contact B engages perceptibly. Ensure that braid lies above the crimp neck.



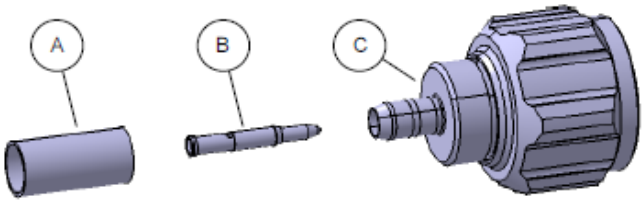

Slide ferrule A over braid and crimp as close to connector body C as possible.

## 6.2 Assembly instructions 11_N-50-3-29

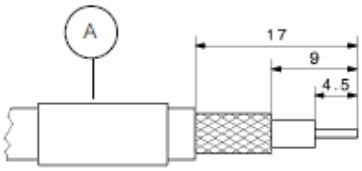
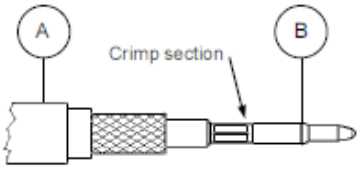
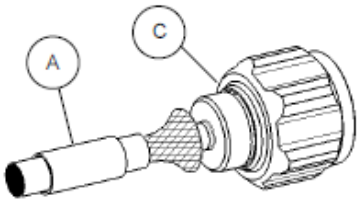
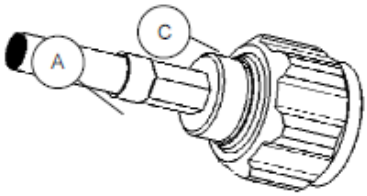
# Assembly instruction Series N 0000215553

| | | | |
|---|---|---|---|
| Connector type: | 11 N-50-3-29 , 11 N-50-3-129 | Inner conductor contact: | Crimped (Cavity 2) |
| Suitable cables: | RG 223/U , RG 142 B/U | Outer conductor contact: | Crimped (Cavity B) |

**Parts list connector:**




**Assembly steps:**

| Picture | Process | Feature / Check | Tools required |
|---|---|---|---|
|   | Slide ferrule A onto cable. Prepare cable according to diagram | Do not damage braid, dielectric and inner conductor of cable | Stanley blade scissors |
|   | Push contact B over inner conductor of cable and crimp | Contact B flush to dielectric | Crimp tool : Cavity 2 For large crimp tool and table press use insert 76 Z-0-3-1. For small crimp tool use insert 76 Z-0-3-51 |
|   | Splay out braid and insert contact B into body C until stop | Ensure that braid lies above crimp neck | |
|   | Slide ferrule A over braid and crimp | Crimp as close to connector body C as possible | Crimp tool : Cavity B For large crimp tool and table press use insert 76 Z-0-3-1. For small crimp tool use insert 76 Z-0-3-51 |

The cable assembly of R.F. connectors can only be done by well trained assembly stuff and suitable assembly equipment.
Huber+Suhner's skilled stuff and specialised equipment are available to carry out complete R.F. lead-assembly on your behalf.
We mount your connectors on cables at economic prices! Please contact our representative for further details of this service.

| | |
|---|---|
| Revision | A |
| Date | 06.04.04 |
| Initiator | 4186/MAP |

## 6.3 Assembly instructions Han Max-M cable connector

**Han-Max**

### Installation manual for Han-Max connector, male, shielded

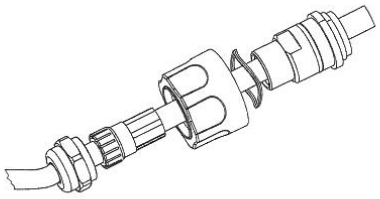
#### Scope of application

This installation manual is to be used when installing the Han-Max connector, male, shielded (part no. 09 15 300 0402) with cable type STP according to ISO/IEC 11 801 resp. DIN EN 50 173 Class D, Class E.

It is recommended, that these installation instructions are observed. All limit values specified for electromagnetic radiation are only if these installation instructions have been adhered to.

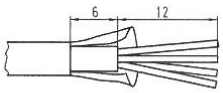
#### Step 1

- Push the single parts of the connector housing over the end of cable as shown.



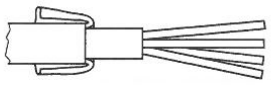
#### Step 2

- Strip min. 18 mm (0.71 inch) of sheathing
- Pull back braiding.
- Remove the inner jacket and foil leaving 6 mm (0.25 inch) of inner jacket and foil.
- Fan pairs into proper color code (see Step 4).
- Trim the conductors leaving 12 mm (0.47 inch) extending from the innner jacket.




#### Step 3

- Form braidiing into two pigtails.
- Stripped cable should look like figure:



#### Step 4

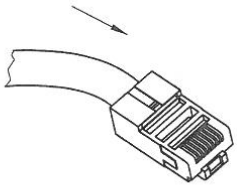
- Place the modular plug over wire ends being sure to maintain color code (EIA/TIA 568-A / EIA/TIA 568-B).

| Signal | Wire color according | | RJ45 |
|---|---|---|---|
| | EIA/TIA 568-A | EIA/TIA 568-B | Pin number |
| TD + | White-Green | White-Orange | 1 |
| TD - | Green | Orange | 2 |
| RD + | White-Orange | White-Green | 3 |
| | Blue | Blue | 4 |
| | White-Blue | White-Blue | 5 |
| RD - | Orange | Green | 6 |
| | White-Brown | White-Brown | 7 |
| | Brown | Brown | 8 |

Table: Color code according EIA/TIA 568

#### Step 5

- Insert the wire all the way into the modular plug including the inner jacket and foil.
- The inner jacket should be directly under the plug's strain relief tab.



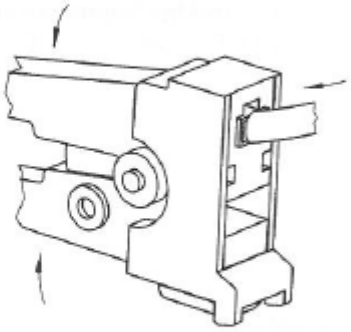
All datas given are in line with the actual state of art and therefore not binding.
HARTING reserves the right to modify designs without giving the relevant reasons.

09 15 300 0402/99

## Han-Max

### Step 6

- Use a standard crimp tool for terminating the modular plug to the cable.



### Step 7

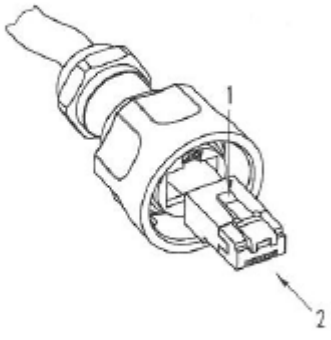
- Cut the braid pigtails as close to the back of the plug as possible.

### Step 8

- Slide the plug housing up the cable and align with the modular plug.

### Step 9

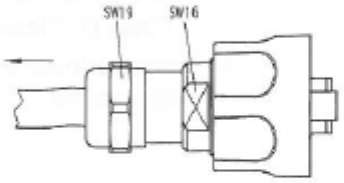
- Insert the modular plug into the plug housing.
- Align the latch with the LATCH slot.
- Depress the latch (1) and insert the plug into plug housing (2).




- Press the modular plug into the plug housing until it bottoms out.

### Step 10

- While maintaining inward pressure on plug or keeping dust cover engaged, tighten compression nut to 0.56 Nm (5 in-lbs).

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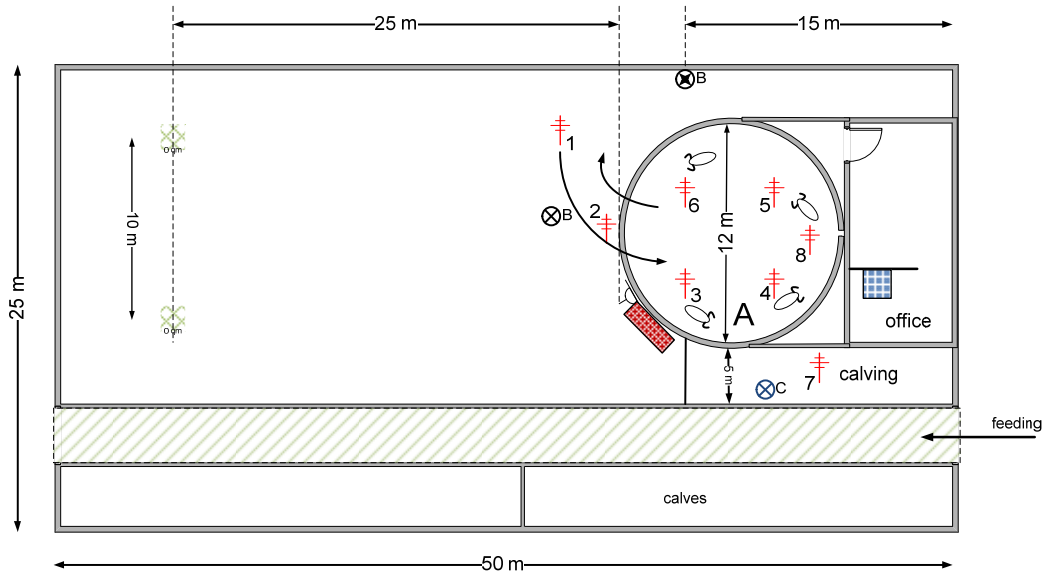
2005-01

## 6.4 Positioning antennas and base station in different stables

Example 1




Internet connection

antenna

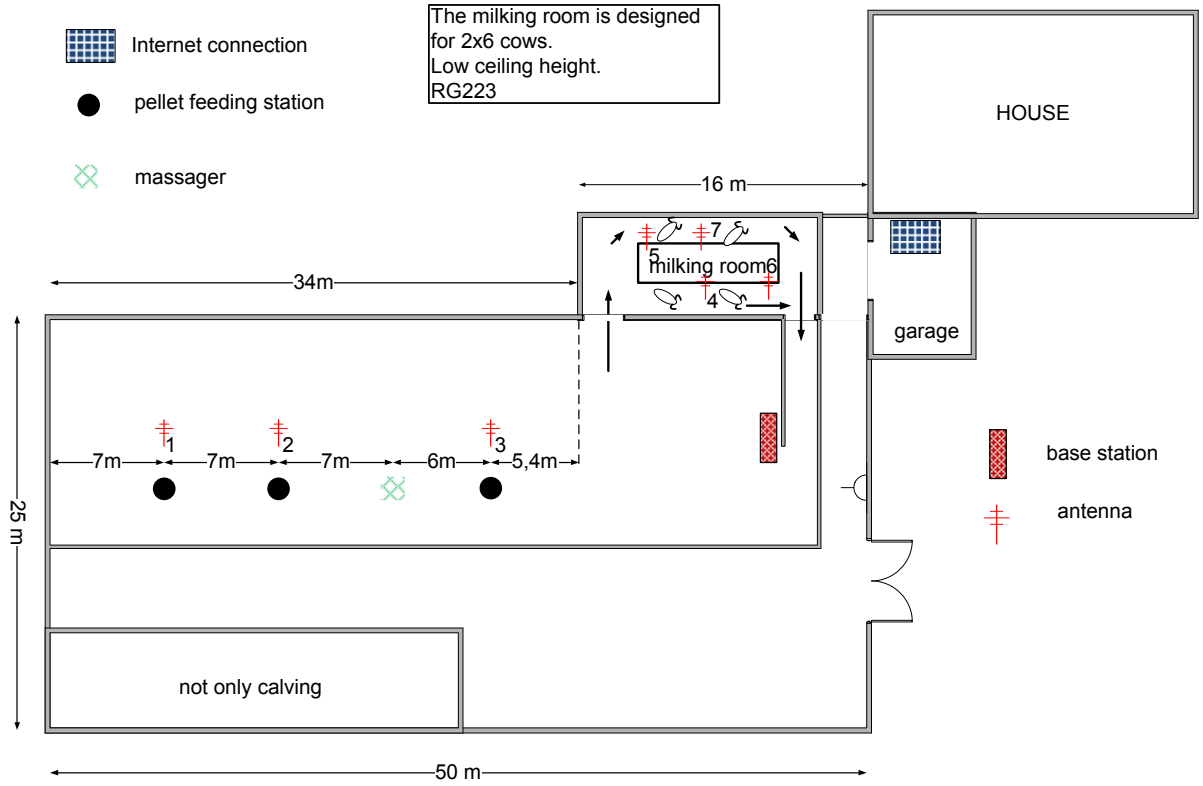
massager

camera

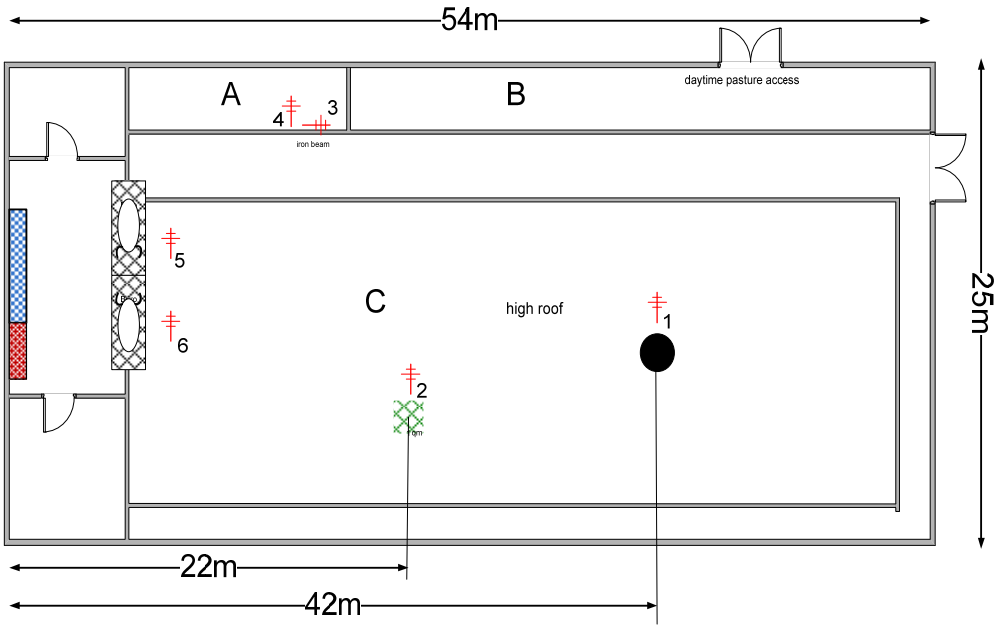
base station
(on roof of carousel)

A...Westfalia carousel for 24 cows

Example 2


Internet connection
pellet feeding station
massager
The milking room is designed for 2x6 cows.
Low ceiling height.
RG223
HOUSE
16 m
34m
milking room
garage
1
2
3
4
5
6
7
7m
7m
7m
6m
5,4m
25 m
base station
antenna
not only calving
50 m

Example 3




A...2 days before calving + 2 days after calving (longer, if disease)
B...6 weeks before calving
C...lactating cows

Lely Astronaut + carpet

pellet feeding station

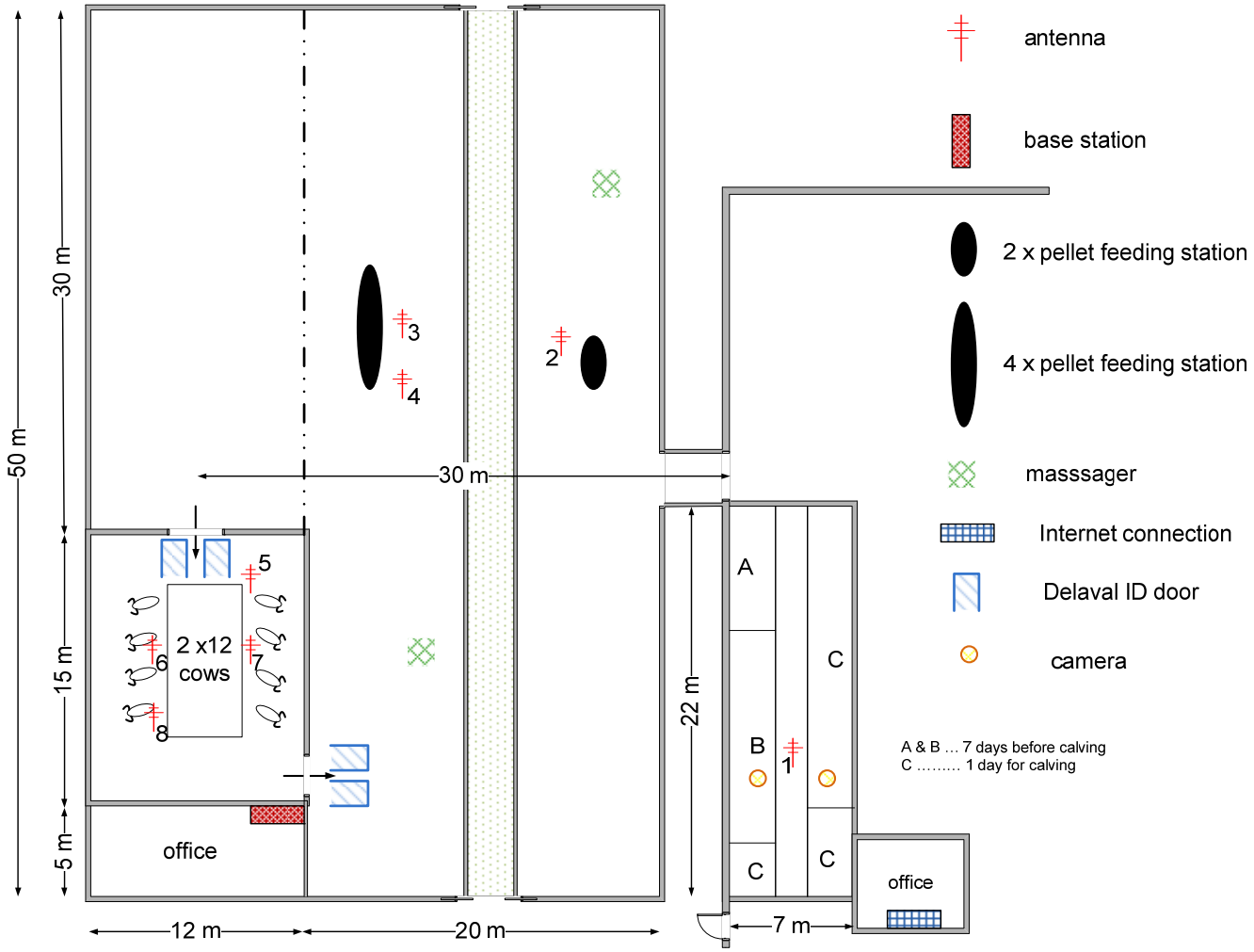
massager

PC + Internet (switch)

base station

antenna

Example 4


antenna
base station
2 x pellet feeding station
4 x pellet feeding station
masssager
Internet connection
Delaval ID door
camera
A & B … 7 days before calving
C …… 1 day for calving
50 m
30 m
15 m
5 m
30 m
22 m
2 x12
cows
office
office
A
B
C
C
C
1
2
3
4
5
6
7
8
12 m
20 m
7 m

## 6.5 Necessary material for the installation

For cabling of the base station the installation company must use and provide following material:

- Coax cable RG223/U or alternative cable G_03212_D-01 (ca. 150 m per barn)
- Cable connector model 11_N-50-3-29 (max. 8 per base station)
- Cable connector model 21_N-50-3-8-/133_N (max. 8 per base station)
- Crimping tool (model 76_Z−0−0−15 (large) or model 75_Z−0−3−4/B2 (small)) for mounting the cable connectors (model 11_N-50-3-29 and model 21_N-50-3-8-/133_N) with the coax cable RG223/U or alternative cable G_03212_D-01 (Cavity B2).
- Ethernet cable (CAT5e-UTP)
- Crimping tool (standard) for ethernet cable-connector

The coax cable RG223/U (or alternative the cable G_03212_D-01), the cable connectors (model 11_N-50-3-29 and model 21_N-50-3-8-/133_N) and the crimping tool can be order by the company Huber + Suhner.

Homepage and the contact person for German and Austrian customers you can find under:

http://www.hubersuhner.com/
juergen.schaefer@hubersuhner.com
+49 (0) 89 612 01-256 phone

Jürgen Schäfer
HUBER+SUHNER GmbH
Mehlbeerenstraße 6
D- 82024 Taufkirchen, Germany

The contact persons in other countries:

- France (Mrs. Capra: +41 71 353-4668)
- Netherlands (Mrs. Capra: +41 71 353-4668)
- Denmark (Mrs. Hofstetter: +41 71 353-4032)
- Italy (Mrs. Capra: +41 71 353-4668)
- Finnland (Mrs. Hofstetter: +41 71 353-4032)