

Antennas for System BLUE

(Some practical examples)

Date 2016-05-31

Here are some simple tips and ideas to make your own antenna

We use Magnetic (H-Field) or Electrical (E-Field) antennas or both.

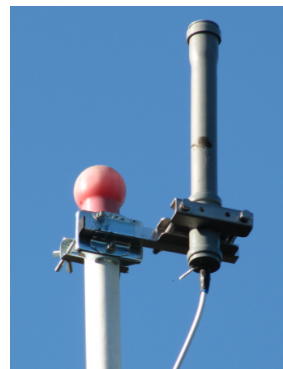
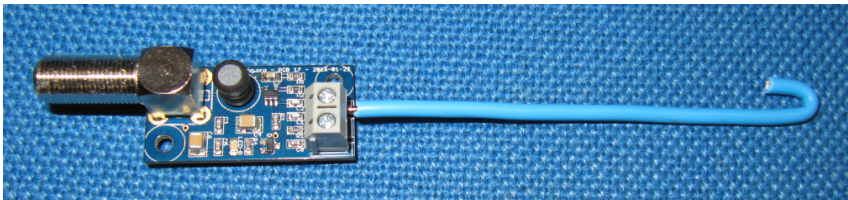
The electric (E-Field) to System BLUE is very simple, a piece of wire, 10cm is fine, (min. 1mm²)

It receives the electrical part of the signal

It should be placed high and far away from electrical installations.

Connect to Controller via 75 Ohm coax cable (TV) and F-Plug

Only one used, as it is omnidirectional.



Magnetic - either **Ferrite Antennas** or **Loop Antennas**.

Magnetic has no need to be placed high since the magnetic field is not easily attenuated.

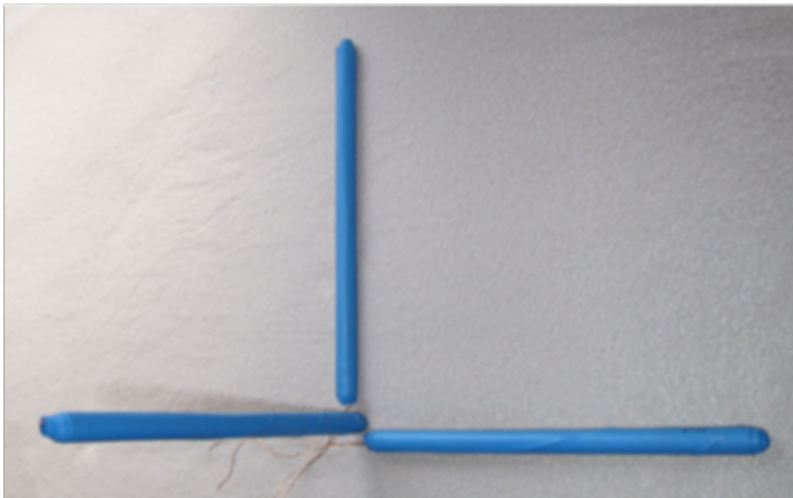
They must be minimum some meter from other electrical installations - In the garden just above the ground is ok, or attic, or balcony.

Ferrite antennas 12 or 20cm can be purchased ready-made, or you can wrap them yourself. 10-12 cm is enough . 20cm is excellent. More than 20 cm is unnecessary.

Should be mounted at right angles - cross or L-form

Electrical shielding is rarely needed as connecting to pre-amplifier is differential, and common mode signals are attenuated strongly.

We normally use 2, but BLUE allows for an extra - could be a vertical



Loop antennas can be made in many ways - in principle, it is just a conductive wire, wound as a coil.

The shape does not matter as it is the area of the total number of turns that determines the strength of the signal - Circular giving the largest area for a given length of wire, but if it is easier to make a rectangular or any other shape, You are welcome.

Magnetic signals in a loop generate a current, so the wire used should be minimum 0.75mm² and preferably thicker.

Examples

Wire Loop

3 turn, circle Ø100 (100cm diameter) ~ Area = $0.5^2 * \text{Pi} * 3 \sim 2,4\text{m}^2$

Use 0,75mm² or thicker – lacque or plastic isolated copper wire

Multi Turn.:

20 turn, Ø38cm (38cm diameter) ~ Area ~ $0.19^2 * \text{Pi} * 20 \sim 2,3\text{m}^2$ (inductance ~ 500µH)

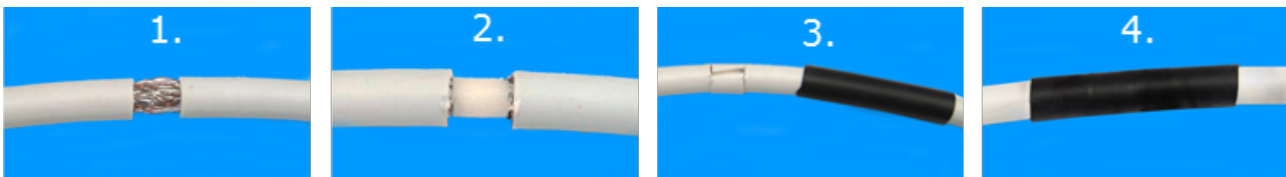
Use 1mm² lacquer or plastic insulated copper



Coax Loop

3 turn, circle Ø100 (100cm diameter) ~ Area = $0.5^2 * \text{Pi} * 3 \sim 2,4\text{m}^2$

Inner conductor to the terminal 1-2 and the screen from both ends to terminal 3 (shielding)
Screen must be interrupted on a piece about midpoint, so it does not short the signal



Möbius antenna.



2 turn with a diameter of 1m gives a total area of $0.5 * 0.5 * 3.141 * 4 \sim 3,14\text{m}^2$

(The cable is cut midway and the shield from one end soldered to the inner conductor at the other end and vice versa - that way there will be 4 active turns)

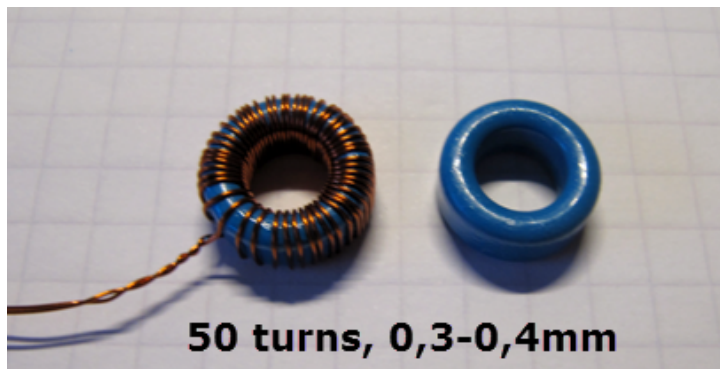
Antenna w/Transformers

Whether we use 4 turns of 1mm² or 1 turn with 4mm² is in principle the same result if we use a current transformer.

It may be convenient to use a thick copper pipe or copper bar for external antenna
This provides a relatively large current to be transformed to adapt the pre-amplifier.

If we use 50-turn, it gives a relative area magnification of approximately 7 times

A loop of Ø=38cm made of 5mm brake pipe gives a relative area of $0,38^2 * \text{Pi} * 7 \sim 3,2\text{m}^2$



TDK

R 12.5 × 7.50 × 5.00

B64290L0044

■ Epoxy coating

R 12.5 × 7.50 × 5.00 (mm)

R 0.492 × 0.295 × 0.197 (inch)

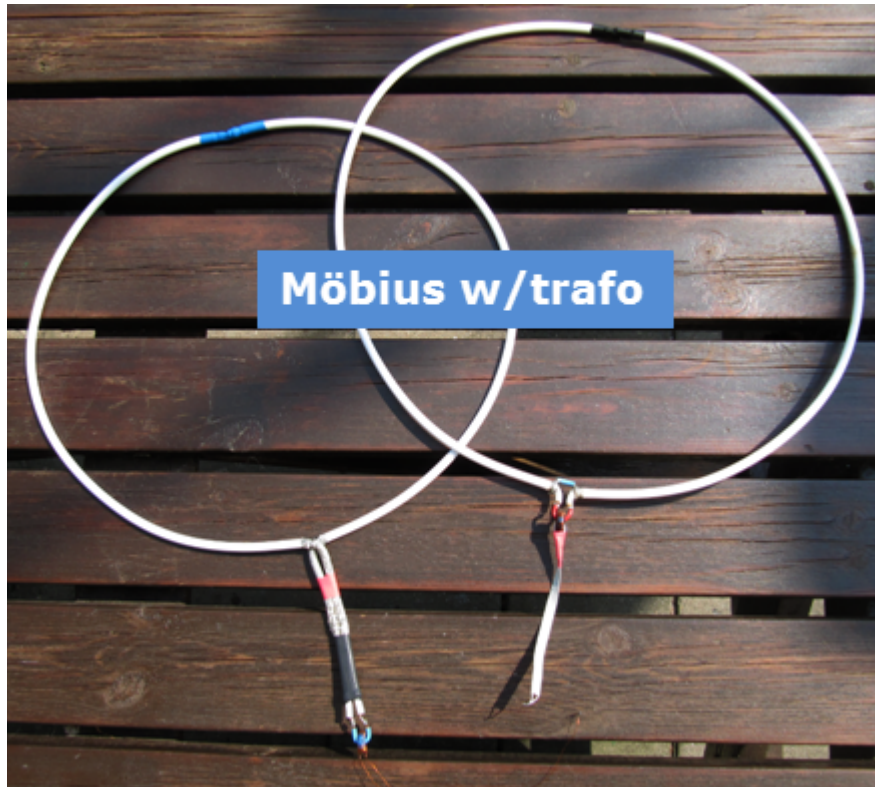
Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
12.5 ± 0.3	7.5 ± 0.2	5.00 ± 0.15	0.492 ± 0.012	0.295 ± 0.008	0.197 ± 0.005	uncoated ¹⁾
13.6 max.	6.5 min.	5.95 max.	0.535 max.	0.256 min.	0.234 max.	coated

Characteristics and ordering codes

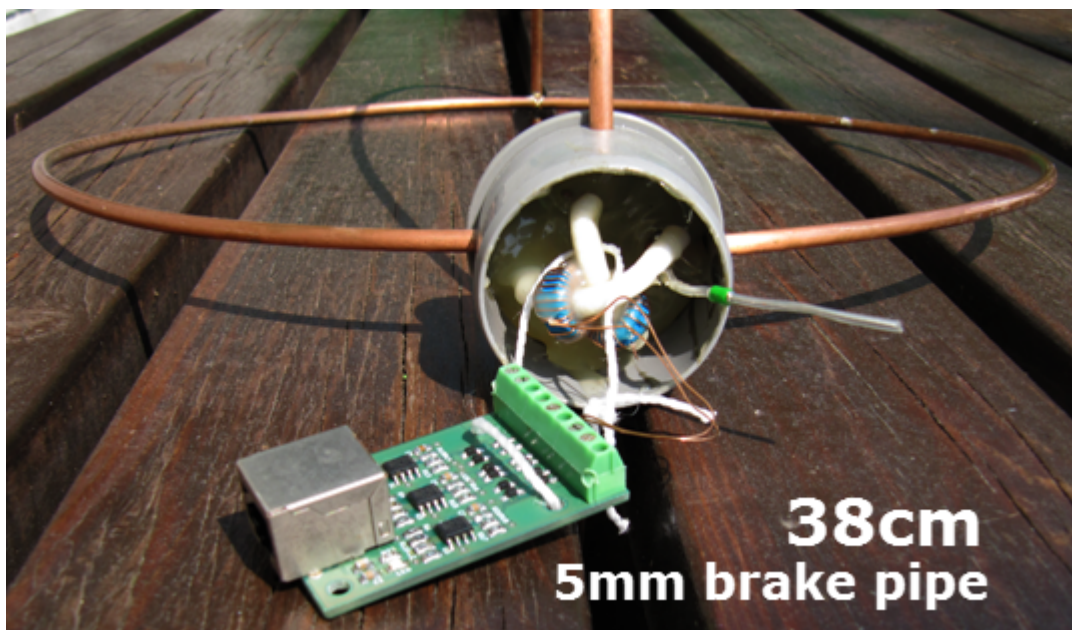
Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma I/A$ mm ⁻¹	l_e mm	A_e mm ²	V_e mm ³	
N49	$660 \pm 25\%$	1300	B64290L0044X049	2.46	30.09	12.23	368	1.8
N87	$1120 \pm 25\%$	2200	B64290L0044X087					
N30	$2200 \pm 25\%$	4300	B64290L0044X830					
T65	$2400 \pm 30\%$	4700	B64290L0044X065					

Möbius antennas w/Transformer



Möbius w/trafo

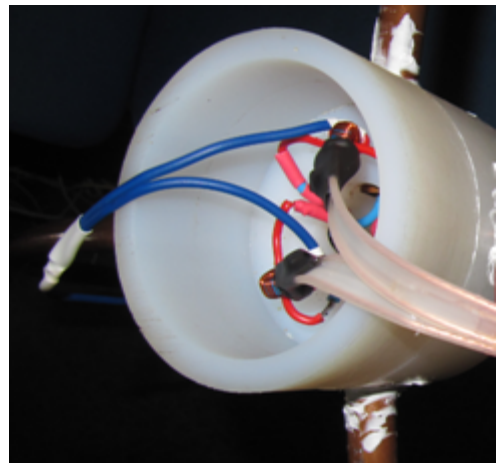
Ø=38cm



38cm
5mm brake pipe



My first outdoor 90 cm antenna
Now rebuilt to Möbius antenna



General information about antennas.

Preamplifiers are now so good that large antennas are not necessary.

Eg. the H-Field pre-amplifier has differential inputs and common mode signals (electrical) now has much less influence. Moreover, it has a gain of 10 times (5 times since adaptation to the input of the Controller via cable eats half, while providing excellent adaptation to the transmission cable and Controller input)

Connection to H-Field preamplifier .:

The preamplifier is supplied with an input impedance of 2k - suits Ferrite antennas and antennas with transformer.

Other antennas connected 75Ohm – use solder bridges on the back side of the PCB.

Coax cable and coax cable

For loops *without* transformer you can use the cheap sat-cable with copper-plated iron wire

For loops *with* transformer, it must be coax with pure copper and heavy shielding (75 Ohm 8mm cable as used for radio and TV-set for decades.)

No antennas must be grounded at the antenna.

It may be a good idea to ground the Controller.

One or more antennas

Your receiver works fine with either H-Field or E-Field antenna.

Both types have their advantages and disadvantages

You can easily start with one of them, and then install the other later, or settle for one.