

Device comprising an antenna

Description

[0001] The invention refers to a device comprising an antenna according to claim 1.

- 5 [0002] The object of the invention is to provide a device where at least the antenna, more preferably an entire sensor, can easily be detached / attached and set to a certain angular orientation.

[0003] The object is solved by the features of claim 1.

[0004] The subclaims describe advantageous embodiments of the invention.

- 10 [0005] The device according to the invention comprises a mounting frame to be attached to an external part. The external part can be a wall, a post beside a barrier or a box operating a boom to which it is attached, or the like.

- [0006] The device comprises an antenna housing that houses an antenna, in particular a radar antenna. Beside the antenna, the antenna housing can house a
15 complete door sensor for controlling an automatic door or an automatic barrier.

[0007] According to the invention the antenna housing is detachably attached to the mounting frame to be rotatable relative to the mounting frame, in order to allow an orientation of the antenna relative to the mounting frame and therewith to the external part to which the mounting frame is attached.

- 20 [0008] According to the invention the mounting frame as well as the antenna housing comprise upper and lower guide structures that are circular arc-shaped around a center-axis, such that they form a portion of the circumference of a circle.

- [0009] The upper and lower guide structures are placed distant to each other in axial direction on the mounting frame. The upper and lower guide structures of the
25 mounting frame are arranged coaxially with respect to their respective center-axes. According to this arrangement the center axis of the upper guide structure and the

center axis of the lower guide structure define a common center-axis and thereby define a rotation axis of the mounting frame.

[0010] Additionally, the upper and lower guide structures of the antenna housing are arranged coaxially with respect to their respective center-axes.

5 [0011] In an assembled state of the device, in which the antenna housing is attached to the mounting frame, the upper guide structure of the antenna housing and the upper guide structure of the mounting frame interconnect in a way that they overlap axially and circumferentially and thereby form a respective upper arc-shaped bearing. The upper guide structure of the antenna housing is guided by the
10 upper guide structure of the mounting frame in a way that the antenna housing can pivot around the rotation axis of the mounting frame.

[0012] In the assembled state the lower guide structure of the antenna housing and the lower guide structure of the mounting frame interconnect in a way that they partially overlap axially and circumferentially and form a respective lower arc-
15 shaped bearing. The lower guide structure of the antenna housing is guided by the lower guide structure of the mounting frame in a way that the antenna housing can pivot around the rotation axis of the mounting frame.

[0013] The respective guide structures, namely the lower guide structure of the antenna housing, the lower guide structure of the mounting frame, the upper guide
20 structure of the antenna housing and the upper guide structure of the mounting frame are arranged in a way that the antenna housing can be inserted and detached from the mounting frame and once inserted, the antenna housing can be pivoted relative to the mounting frame around the rotation axis in an easy way.

[0014] This can be achieved when the upper guide structures overlap axially to
25 such an extent that the lower guide structures are brought into an interlocking state. In the assembled state this axial overlap of the upper guide structures is reduced as the antenna housing moves downwards, whereby the axial overlap of the lower guide structures increases.

[0015] According to a further embodiment at least one of the upper and at least
30 one of the lower guide structures extends over an angle less than 180° , in particular the lower guide structures extend over an angle of less than 90° .

[0016] By limiting the extension of the lower guide structure to a small angle, in particular less than 90° , and by using a significantly larger radius for the lower arc-shaped guide structure than for the upper arc-shaped guide structure, the depth of the mounting frame can be kept very shallow. Due to such a bearing of the antenna housing, the mounting frame can be constructed in a very compact fashion.

[0017] The radius of the lower arc-shaped guide structure is dependent on the dimensions of the antenna housing. Preferably the antenna housing can comprise a flange-like part to partially increase the radial extent of the antenna housing to provide a larger radius of the lower bearing.

[0018] Furthermore, due to using different respective upper and lower bearing radii, a space is provided between the lower end part of the antenna housing and the mounting frame. The space can advantageously be used for other purposes than bearing the antenna housing, e. g. to attach an electrical connector.

[0019] According to a further advantageous embodiment, the radius of the upper arc-shaped guide structure is smaller than the radius of the lower arc-shaped guide structure. This allows a small distance from a rear wall serving as a mounting plate of the mounting frame on the upper end. This positively affects the extent of the mounting portion to the front.

[0020] In particular, the upper and lower guide structures of the antenna housing can axially extend in opposite directions. The same is then valid for the upper and lower guide structures of the mounting frame.

[0021] In a further advantageous embodiment, the lower guide structure of the antenna housing comprises an inner surface having an inner radius to the center axis and the lower guide structure of the mounting frame comprises an outer surface having an outer radius. In the assembled state the inner surface is adjacent to the outer surface. The inner radius is smaller than the outer radius. Preferably it is less than 20% smaller, more preferably less than 10% smaller. According to a most preferred embodiment the outer radius is less than 5% smaller or even equals the inner radius.

[0022] In a further advantageous embodiment, the upper guide structure of the antenna housing comprises an outer surface having an outer radius to the center axis and the upper guide structure of the mounting frame comprises an inner

surface having an inner radius. In the assembled state the inner surface lies adjacent to the outer surface. The inner radius is smaller than the outer radius. Preferably it is less than 20% smaller, more preferably less than 10% smaller. According to a most preferred embodiment, the inner radius is less than 5% smaller.

- 5 According to a further embodiment, the inner radius even equals or almost equals the outer radius.

[0023] Preferably the upper and lower guide structures of the mounting frame as well as the upper and lower guide structures of the antenna housing are placed in opposite sectors around the rotation axis. This allows the antenna housing to be
10 inserted into the mounting frame with a tilting movement. Furthermore, this allows a flexible usage of the different sectors.

[0024] In a very preferred embodiment, the mounting frame and / or the antenna housing comprise a spring element which executes a preload between the antenna housing and the mounting frame in an axial direction and is henceforth called axial
15 spring element. Due to the preload, the antenna housing is pressed against the mounting frame so that the clearance between the mounting frame and the antenna housing in the lower bearing is reduced.

[0025] According to a further improvement of the invention the mounting frame and / or the antenna housing comprise a spring element that executes a preload
20 between the antenna housing and the mounting frame in a radial direction, perpendicular to the rotation axis of the antenna housing. Said spring element is henceforth called radial spring element. Accordingly, spring force is preferably directed along a radius of the upper and lower guide structures of the mounting frame and therefore acts on the antenna housing orthogonally to the rotation axis.
25 Due to this spring effect the clearance in radial direction is reduced because the upper and lower guide structures of the antenna housing are pressed against the respective upper guide structure and lower guide structure of the mounting frame. Due to the preload between the mounting frame and the antenna housing the antenna housing is firmly interlocked and wobbling is thereby prevented.

30 [0026] To attach the antenna housing to the mounting frame the antenna component is inserted into the mounting frame against the preload of the radial spring element.

[0027] The radial spring element can be a flexible part of the mounting frame, in particular a curved finger which is acting as a spring finger. The radial spring element preferably acts on the antenna housing in that part of the antenna housing where the axial force is applied to. This adds a friction force to the respective guide structure, especially the upper bearing and thereby eases the mounting process, as it temporarily fixes the inserting position.

[0028] According to a further embodiment the mounting frame and the antenna housing comprise axially interacting resting structures that allow several angularly displaced resting positions due to a positive interlocking mechanism between the resting structures.

[0029] The angular orientation of the antenna housing relative to the mounting frame can be changed by moving the antenna housing away from the interacting resting structure. This moving direction is preferably against the preload of the axial spring element especially in axial direction. Accordingly, the angular orientation is fixed not only by gravity but also by the preload, so that further rotation is reliably prevented in the preloaded state.

[0030] According to the invention the denotations "upper" and "lower" do not necessarily correlate with the orientation of gravity. Nevertheless, in a preferred mounting position, the axial spring element acts in the direction of gravity.

[0031] According to a further embodiment the resting structures comprise a pin on the mounting frame and several angularly distributed compartments on the antenna housing. The pin on the mounting frame can plunge into the antenna housing compartment in an axial direction so that once the pin is inside the compartment the antenna housing is interlocked with the mounting frame in circumferential direction. As a plurality of compartments are distributed along the circumference, a plurality of distinct angular positions can be established. Therefore, the antenna housing can easily be oriented in its angular position with respect to the mounting frame. In particular, the compartments allow for angular positions of -20° , -10° , 0° , $+10^{\circ}$ and $+20^{\circ}$.

[0032] According to a further embodiment, the device comprises a cover frame that is detachably attached to the mounting frame in a way that in the assembled state it prevents relative movement between the antenna housing and the mounting frame in the axial plunging direction of the pin, preferably against the axial preload.

By attaching the cover frame to the mounting frame, the antenna housing is no longer pivotable as the necessary axial movement is blocked due to a positive interlocking mechanism by the cover frame.

[0033] According to a further embodiment, the antenna housing comprises an electrical connector at the opposite side of the upper guide structures of the antenna housing.

[0034] A further aspect of the invention refers to a boom gate, also known as a boom barrier, to which an inventive device is connected. The device comprises a radar sensor enclosed in the antenna housing for controlling the gate. The antenna housing can easily be mounted or replaced in a mounting frame according to the invention, where the mounting frame may already be attached to a part of the boom gate. The antenna housing can easily be oriented in its angular position with respect to the mounting frame and / or the boom gate depending on the required application.

[0035] The figures show:

- Fig. 1 a perspective view of a mounting frame of a device according to the invention;
- Fig. 2 a perspective view of an antenna housing of a device according to the invention;
- Fig. 3 a perspective downside view on the lower end of the antenna housing;
- Fig. 4 a cross-sectional view of the device according to the invention comprising a mounting frame and an antenna housing in an assembled state;
- Fig. 5 a cross-sectional view V-V of Fig. 4;
- Fig. 6 a cross-sectional view VI-VI of Fig. 4;
- Fig. 7 a schematic view of the arrangement showing the distribution of guide structures;
- Fig. 8 a schematic cross-sectional view detailing the guide structures; and

Fig. 9 a schematic view of a boom gate according to the invention.

[0036] Fig. 1 and Fig. 2 show two parts of a device 10 according to the invention in a detached state. Fig. 1 refers to a mounting frame 12 of a device 10 according to the invention. The mounting frame 12 comprises an upper guide structure 14 of the mounting frame 12. The upper guide structure 14 is embodied as an almost semi-circular wall which has an inner radius R_{12_1} around the center-axis CA12. The upper guide structure 14 of the mounting frame 12 is spaced apart from a lower guide structure 16 by an axial distance. The lower guide structure 16 is embodied as a short piece of an arc-shaped wall. The arc-shaped wall has an outer radius R_{12_2} around the center axis CA12 of the mounting frame 12.

[0037] The lower guide structure 16 is built into a recess of the mounting frame 12. As explained in Fig. 2 a flange-like part 45 of an antenna housing 30 may partially protrude through the mounting frame 12. As shown in Fig. 1 the upper guide structure 14 and the lower guide structure 16 each comprise a common center axis CA12.

[0038] Accordingly, the center-axis CA12 of the guide structures 14, 16 also defines the rotation axis RA around which the antenna housing 30 can pivot.

[0039] The mounting frame 12 comprises at least one radially acting spring element that is embodied as a spring finger 20 in this example. The spring finger 20 is formed in one piece with a rear wall of the mounting frame 12 and is bent in a way such that it executes a spring force more or less perpendicular to the rear wall. This spring force is henceforth called front force FF.

[0040] Furthermore, a spring 80 which acts axially with respect to the mounting frame 12 is located close to the upper guide structure 14. The axially acting spring 80 exerts an axial force on the antenna. The axial force is henceforth called downforce.

[0041] Fig. 2 shows a perspective view of an antenna housing 30. The antenna housing 30 comprises two components, a front cover 34 and a back cover 36. The antenna housing 30 houses an antenna 32 that is shown schematically in Fig. 4. The purpose of the invention is to provide a detachable solution that allows an easy angular orientation of the antenna housing 30 relative to mounting frame 12, so as to allow a flexible orientation of the housed antenna 32 and its radiation pattern.

[0042] The antenna housing 30 comprises an upper guide structure 40 which comprises an arc-shaped front wall 42 and an arc-shaped back wall 44, where the back wall 44 of the upper guide structure 40 is embodied as the circumference of a pin-like structure. The arc-shaped back wall 44 comprises an outer wall that has an
5 outer radius R_{30_1} . This outer radius R_{30_1} is slightly larger, in particular less than 5% larger, than the inner radius R_{12_1} of the upper guide structure 14 of the mounting frame 12. The upper bearing radius can be defined as the inner radius R_{12_1} . A groove is formed between the arc-shaped back wall 44 and the arc-shaped front wall 42, which extends around the same common center axis CA_{30} as the back
10 wall 44. The size of the groove corresponds to the upper guide structure 14 of the mounting frame 12.

[0043] The upper guide structure 14 of the mounting frame 12 which, in the shown case, is embodied as an arc-shaped wall is guided between the arc-shaped front wall 42 and the circular arc-shaped back wall 44. The corresponding center
15 axes of the arc-shaped front wall 42 and the circular arc-shaped back wall 44 as well as the lower guide structure 46 are arranged coaxially to each other with respect to the center axis CA_{30} that thereby defines the rotation axis RA of the antenna housing 30. The upper bearing radius is rather small to allow some free space for the axially acting spring 80 between the upper guide structure 14 and the
20 rear wall of the mounting frame 12. Sufficient space can therefore be provided even in situations where the antenna housing 30 is set in a maximum pivoting position of $+20^\circ$ or -20° .

[0044] Fig. 3 is a perspective downside view of the antenna housing 30 as seen along the viewing direction DV which is shown in Fig. 2. In this view one can see the
25 lower guide structure 46 of the flange part 45 of the antenna housing 30. The lower guide structure 46 comprises a back wall 50 with an inner radius R_{30_2} and a front wall 48. The lower guide structure 16, as shown in Fig. 1 of the mounting frame 12, has an outer radius R_{12_2} that is slightly larger than the inner radius R_{30_2} of the back wall 50. In particular, the outer radius R_{12_2} is less than 5% larger than the
30 inner radius R_{30_2} . The lower guide structure 16 of the mounting frame 12 is guided in the groove that is formed between the back wall 50 and a front wall 48. The corresponding center axes of the arc-shaped front wall 48 and the circular arc-shaped back wall 50 are aligned coaxially to each other. The center axes lie at the center of the antenna housing 30 and define the rotation axis RA of the antenna

housing 30, as they are coaxial to the center axes of the arc-shaped front wall 42 and the circular arc-shaped back wall 44 of the upper guide structure 40.

[0045] The front wall 48 comprises recesses 62a to 62e which form compartments into which a pin 18 can plunge, where the pin 18 is located on the lower guide structure 16 of the mounting frame 12, as shown in Fig. 6. Each compartment 62a, ..., 62e corresponds to a distinct angular position of the antenna housing 30 relative to the mounting frame 12.

[0046] Fig. 4 shows a cross-sectional view of the assembled device 10 according to the invention, comprising a mounting frame 12 and an antenna housing 30. The antenna housing 30 is an assembly of the front cover 34 and the back cover 36 between which a gasket 38 is placed to increase the water resistance of the antenna housing 30.

[0047] To reach the assembled state the antenna housing 30 is inserted into the mounting frame 12 in a tilted manner and pressed against the upper spring finger 20 and the axially acting spring 80.

[0048] The upper guide structure 14 of the mounting frame 12, in this case embodied by the semi-circular wall, is inserted into the upper guide structure 40 of the antenna housing 30, which provides an arc-shaped groove that is delimited by an arc-shaped front wall 42 and a circular arc-shaped back wall 44. The upper guide structure 14 of the mounting frame 12 and the upper guide structure 40 of the antenna housing form an arc-shaped upper bearing.

[0049] The lower guide structure 16 is built into a recess of the mounting frame 12, whereas the lower guide structure 46 of the antenna housing 30 provides a groove that is formed between a back wall 50 and a front wall 48 of the lower guide structure 46. The lower guide structure 16 of the mounting frame 12 is guided in the groove between the back wall 50 and a front wall 48. The lower guide structure 46 of the antenna housing 30 is embodied as a protruding flange part 45 that extends beyond the main body of the antenna housing 30. The flange part 45 protrudes into or partially through the mounting frame 12 when the device 10 is assembled.

[0050] The spring finger 20 formed in one piece with a rear wall of the mounting frame 12 exerts a spring force perpendicular to the back wall, namely the front force FF which acts on the antenna housing 30. Due to the front force FF exerted by the

spring finger 20 the back wall 50 of the lower guide structure 46 of the antenna housing 30 is pressed against the lower guide structure 16 of the mounting frame 12. Due to the front force FF the back wall 44 of the upper guide structure 46 of the antenna housing 30 is pressed against the upper guide structure 14 of the mounting frame 12. This reduces the clearance in the upper arc-shaped bearing and in the lower arc-shaped bearing in radial direction.

[0051] As the back wall 44 of the upper guide structure 40 and the back wall 50 of the lower guide structure 46 are both part of the back cover 36, the front force FF only acts on the back cover 36. According to this configuration the front cover 34 is not subjected to the front force FF, so that no stress is executed on the interface between the front cover 34 and the back cover 36, where the interface is sealed by the gasket 38.

[0052] Furthermore, the mounting frame 12 comprises the axially acting spring 80 that exerts a force parallel to the rotation axis RA on the antenna housing 30. This force is called down force DF and preloads the antenna housing 30 against the lower guide structure 16 of the mounting frame 12.

[0053] As described above, the front wall 48 comprises recesses 62a to 62e into which the pin 18 can plunge. Due to the downforce DF pin 18 and recesses 62a to 62e are pressed against each other. Therefore, the angular position of the antenna housing 30 is fixed relative to the mounting frame 12 due to the preload of the axially acting spring 80.

[0054] Accordingly, a change in position, namely moving another recess to the pin 18, can only take place by moving the antenna housing 30 axially against the axially acting spring 80, before pivoting it to the new angular position.

[0055] According to the invention the antenna housing 30 can easily be inserted into the mounting frame 12, can be rotated and can be reliably fixed in a certain angular position with respect to the mounting frame 12.

[0056] Fig. 5 shows a cross-sectional view V-V of Fig. 4 through the upper guide structures 14, 40 at a pivot angle of 10° . Due to the front force FF, the back wall 44 of the antenna housing 30 is pressed against the guide structure 14. The back wall 44 is part of the back cover 36 of the antenna housing 30, as can also be seen in Fig. 4. The front wall 42 is part of the front cover 34, where the front wall 42 is not

subjected to preload but improves guidance during rotation of the antenna housing 30. The inner radius R12_1 of the upper guide structure 14 of the mounting frame 12 is very slightly larger than the outer radius R30_1 of the back wall 44 to precisely define a rotation axis RA. The bearing radius of the upper bearing is given by the
5 inner radius R12_1 of the upper guide structure 14 of the mounting frame 12.

[0057] Fig. 6 shows a cross-sectional view VI-VI of Fig. 4 through the lower guide structures 16, 46. In this view the angular orientation is set to 0° as the pin 18 plunges into the centrally positioned compartment 62c. This view shows that the back wall 50 is pressed against the lower guide structure 16 of the mounting frame
10 12 due to the front force FF. The inner radius R30_2 of the back wall 50 is slightly smaller than the outer radius R12_2 of the lower guide structure 16. Slightly smaller means $R12_2 / R30_2 > 0,95$. The lower bearing radius in this case is given by the outer radius R12_2.

[0058] A basic guidance is given by these two structures. Nevertheless,
15 additionally there is a front wall 48 that allows for some clearance in the lower bearing. The back wall 50 is also part of the back cover 36. Accordingly, the axial preload as well as the radial preload in the assembled state of the device 10 only acts between the back cover 36 and the mounting frame 12. This allows for the front cover 34 to be free of an external force.

[0059] Fig. 7 shows a schematic view of the circumferential distribution of the upper guide structure 14 and the lower guide structure 16 of the mounting frame 12, as well as the upper guide structure 40 and the lower guide structure 46 of the antenna housing 30. According to this example the upper guide structure 14, 40 and the lower guide structures 16, 46 are oriented on opposite axial ends of the device
20 10. The upper guide structures 14, 40 have a smaller bearing radius and are oriented to the front, away from an external part to which the device 10 may be attached, whereas the lower guide structures 16, 46 have a larger radius and are oriented to the back, i. e. towards the external part to which the device 10 may be attached.
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[0060] The upper guide structures 14, 40 extend over an angle of almost 180° ,
30 whereas the lower guide structures 16, 46 extend over an angle of only 30° . The arc-shaped guide structure 40, in particular the back wall 44 can extend over an angle of more than 180° to reduce clearance between the upper guide structure 14

that extends over an angle of less or equal 180° , especially in the maximum angular positions.

[0061] Fig. 8 shows a cross-sectional functional schematic view of Fig. 7, which basically shows a similar situation as Fig. 2. Furthermore, the device 10 comprises a
5 cover frame 70 that is attached to the mounting frame 12. The cover frame 70 stretches between an upper part of the mounting frame 12 and the antenna housing 30 so that an axial movement of the antenna housing 30 is prevented. Accordingly, the angular position of the antenna housing 30 relative to the mounting frame 12 can no longer be changed once the cover frame 70 is attached. The cover frame 70
10 may additionally protect the antenna housing 30 from rain.

[0062] Fig. 9 shows an automatic boom gate 100, also called boom barrier. The boom gate 100 comprises a pole 120 that is pivotably attached to a box 110 comprising a boom drive. A device 10 according to the invention is attached to the box 110 which houses the boom drive.

15 [0063] Preferably the device 10 according to the invention comprises a sensor to provide input signals to control the boom gate 100.

List of reference signs

[0064]

10	device
12	mounting frame
14	upper guide structure of the mounting frame
16	lower guide structure of the mounting frame
18	pin
20	spring finger
30	antenna housing
32	antenna
34	front cover
36	back cover
38	gasket
40	upper guide structure of the antenna housing
42	front wall
44	back wall
45	flange part
46	lower guide structure of the antenna housing
48	front wall
50	back wall
62a-e	compartment
70	cover frame
80	spring
100	boom gate
110	box
120	pole
CA12	center axis mounting frame

CA30	center axis antenna housing
DF	downward force
FF	front force
R12_1	upper guide radius
R12_2	lower guide radius
R30_1	upper guide radius
R30_2	lower guide radius
RA	rotation axis

Claims

1. Device (10), comprising a mounting frame (12) to be attached to an external part, where the device furthermore comprises an antenna housing (30) that houses an antenna (32), where the antenna housing (30) is detachably attached to the mounting frame (12) to be rotatable relative to the mounting frame (12), where each of the mounting frame (12) and the antenna housing (30) comprise an upper guide structure (14, 40) and a lower guide structure (16, 46) that are circular arc-shaped around a center-axis (CA12, CA30), where the upper guide structure (14, 40) and the lower guide structure (16, 46) are placed distant to each other in axial direction, the respective upper guide structure (14) and lower guide structure (16) of the mounting frame (12) are arranged coaxially with respect to their center-axis (CA12), the respective upper guide structure (40) and lower guide structure (46) of the antenna housing are arranged coaxially with respect to their center-axis (RA), where in an assembled state, the upper guide structure (40) of the antenna housing (30) and the upper guide structure (14) of the mounting frame (12) interconnect by overlapping axially and circumferentially and in the assembled state the lower guide structure (46) of the antenna housing (30) and the lower guide structure (16) of the mounting frame (12) interconnect by overlapping axially and circumferentially.
2. Device according to claim 1, **characterized in that** at least one of the upper guide structures (14, 40) and at least one of the lower guide structures (16, 46) extend over an angle equal or less than 180° , in particular the lower guide structures (16, 46) extend over an angle of less than 90° .
3. Device according to claim 1 or 2, **characterized in that** the upper guide structure (14, 40) has an upper guide radius (R12_1, R30_1) with respect to the center-axis (CA12, CA30) and the lower guide structure (16, 46) has a lower guide radius (R12_2, R30_2) with respect to the center-axis (CA12,

CA30), where the upper guide radius (R12_1, R30_1) is smaller than the lower guide radius (R12_2, R30_2).

4. Device according to claim 2 or 3, **characterized in that** the upper guide structure (14, 40) and the respective lower guide structure (16, 46) of the mounting frame (12) as well as of the antenna housing (30) are placed in different, preferably opposite, sectors around the center axis (CA12, CA30).
5. Device according to one of the preceding claims, **characterized in that** the upper guide structure (14) of the mounting frame (12) comprises a circular arc-shaped inner wall (42) having an inner radius, where the upper guide structure (40) of the antenna housing (30) comprises a circular arc-shaped outer wall (44) having an outer radius, where the inner radius (R12_1) and the outer radius (R30_1) of the outer wall (44) have a ratio of $1 \geq \text{inner radius} / \text{outer radius} > a$, where a is 0,8, more preferably 0,9, more preferably 0,95.
6. Device according to one of the preceding claims, **characterized in that** the lower guide structure (16) of the mounting frame (12) comprises a circular arc-shaped front wall (48) surface, having an outer radius (R12_2), where the lower guide structure (46) of the antenna housing (30) comprises a circular arc-shaped back wall (50) surface having an inner radius (R30_2), where the inner radius (R30_2) and the outer radius (R12_2) of the front wall (48) have a ratio of $1 \geq \text{inner radius} / \text{outer radius} > a$, where a is 0,8, more preferably 0,9, more preferably 0,95.
7. Device according to one of the preceding claims, **characterized in that** the mounting frame (12) and / or the antenna housing (30) comprise a spring element (80) that executes a preload between the antenna housing (30) and the mounting frame (12) in an axial direction.
8. Device according to one of the preceding claims, **characterized in that** the mounting frame (12) and / or the antenna housing (30) comprise at least one spring element (20) that executes a preload between the antenna housing (30) and the mounting frame (12) in lateral direction, where the

antenna component (30) can be inserted into the mounting frame (12) against the preload of the spring element (20).

- 5 9. Device according to one of the preceding claims 6 or 7, **characterized in that** the mounting frame (12) and the antenna component (30) each comprise axially interacting resting structures (18; 62a,..., 62e) that allow several angularly displaced resting positions, where the resting position can be altered by moving the antenna housing (30) against the axial preload and where rotation of the antenna housing (30) is prevented in the preloaded state.
- 10 10. Device according to claim 9, **characterized in that** the resting structures (18, 62a,..., 62e) comprise a pin (18) on the mounting frame (12) and angularly distributed compartments (62a,..., 62e) on the antenna housing (30).
- 15 11. Device according to any one of the preceding claims, **characterized in that** a cover frame (70) is detachably attached to the mounting frame (12) in a way that it prevents relative movement between the antenna housing (30) and the mounting frame (12) in axial direction, particularly against the axial preload.
- 20 12. Boom gate (100) comprising a pole (120) to which a device (10) according to one of the preceding claims is attached to provide an input to control the movement of the pole (120).