ID ISC.ANT1400/700
Type A, B and C
Base and Complementary Antenna
Included:

- Qty. 1 Antenna ID ISC.ANT1400/700 Type A, Type B or Type C including connecting cable
- assembling auxiliaries for the installation of the Reader ID ISC.LRM200 (only ID ISC.ANT1400/700-A)
- assembling auxiliaries for the conversation of the Tuner boards (only ID ISC.ANT1400/700-C)
- Mounting Instructions (only ID ISC.ANT1400/700-A).
- Qty. 2 cover ID ISC.ANT1400/700-CP (optional).

Note

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General information's regarding this document

- The sign ",," indicates extensions or changes of this document compared with the former issue.

- The following figure formats are used:
  - 0...9: for decimal figures
  - 0x00...0xFF: for hexadecimal figures,
  - b0...1: for binary figures.
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1. Safety Instructions / Warning - Read before start-up!

- The device has to be used only for the purpose designed by the manufacturer.
- The Installation document has to be stored available at any time and has to be handed over to each user.
- Unauthorized changes and the use of spare parts and additional devices which have not been sold or recommended by the manufacturer may cause fire, electric shocks or injuries. Such measures will lead to exclusion of any liability by the manufacturer.
- The liability-prescriptions of the manufacturer in the issue valid at the time of purchase are valid for the device. The manufacturer is not legally responsible for incorrect, unsuitable manual or automatical setting of parameters for a device or the incorrect application of a device.
- Repairs can only be executed by the manufacturer.
- Installation-, operation- and maintenance procedures should only be carried out by qualified personnel.
- Before opening the device, the power supply must always be interrupted. Make sure that the device is without voltage by measuring. CAUTION! The fading of an operation control (LED) is no indicator for an interrupted power supply or the device being without voltage!
- When working on an opened device note that the components may carry voltages of up to 1000V.
- Works at the device and its installation have to be executed according to the national legal requirements and local prescriptions.
- The user is cautioned that changes or modifications not expressly approved by the FEIG ELECTRONIC GmbH could void they our authority to operate this equipment.
- Persons with hear pacemakers should move rapidly through the gates consisting of the antennas described herein.
2. Intended application and performance features of antennas ID ISC.ANT1400/700-A Type A, (-B) Type B and (-C) Type C

The antenna ID ISC.ANT1400/700-A Antenna Type A is the base antenna used with the Reader. The latter is installed in the antenna foot during assembly. The antenna ID ISC.ANT1400/700-C Antenna Type C is the base antenna used without Reader. This antenna can be used to form gates constructed of two base antennas.

The antenna ID ISC.ANT1400/700-B Antenna Type B is the complementary antenna for the base antenna ID ISC.ANT1400/700-A Antenna Type A. The base and complementary antenna comprise a gate for personnel or product identification.

Either two antennas (one each Type A+B) for a single gate (qty. one Type A, qty. two Type B) for a double gate can be used.

In addition, the antennas may be equipped with blue side covers (cover plates) ID ISC.ANT1400/700-CP instead of the gray hoods.

Depending on the antenna configuration, from one to a maximum of three read orientations for the Smart Labels and various antenna distances (GD = gate widths) are possible.

The base antenna ID ISC.ANT1400/700-A Antenna Type A and the complementary antenna ID ISC.ANT1400/700-B Antenna Type B are “eight figure” antennas with tuning electronics and were optimized as a sending and receiving antenna for the ID ISC.LR200-B Reader. Both antennas differ only in their tuners in the middle of the antenna.

Both antennas consist of the electrical antenna loop, the housing, the tuner ID ISC.SAT.A Static Antenna Tuner Type A and ID ISC.SAT.B Static Antenna Tuner Type B and the connecting cable.
It is also possible to operate with other Readers having a transmitting frequency of 13.56 MHz and an output impedance of 50 Ω. The read ranges indicated in this document may vary however.

The antennas have been factory tuned in a magnetically neutral surrounding at a gate distance of 90 cm (35 in) to an impedance of 50 Ω. After installation in different ambient conditions the ID ISC.SAT.C-A Static Antenna Tuning Controller may be used to retune the antenna.

After tuning, the antennas will retain their settings as long as the ambient conditions remain unchanged.

The antenna can be used for identification either product or persons. It is suitable for installation either indoors or in a weather-protected outdoor area.

The complementary antenna is supplied by means of magnetic coupling with the base antenna. To optimize the read ranges, the received signal (label reply) is electrically decoupled on the complementary antenna. The connection with the second receiver of the ID ISC.LR200-B Reader is made using the included coaxial cable.

Use of the Static Antenna Controllers ID ISC.SAT.C-A is intended for the initial installation of an OBID® i-scan Long Range Application or is required when adapting the retuning the antenna due to changed ambient conditions.

There is already a cable installed for the mounting of a signal lamp on the top of the antenna. More information you will get in the Application Note „N20204-0e-ID-B.pdf".
3. Assembly and wiring

3.1. Unpacking and setting up the antennas

Mounting requires that the ID ISC.ANT1400/700 Type A and B antennas be bolted down to the floor at two attachment points per antenna.

First unpack the antennas and place them in the desired position. Be sure that all the cross pieces of the antennas face in one direction and that the antennas are parallel to each other.

Figure 1: Determining the gate width

In addition, the maximum gate widths (GD) prescribed by FEIG ELECTRONIC GmbH for the respective antenna configuration should not be exceeded (as measured inside the gate between Antenna A and Antenna B). The gate width will vary for different antenna applications.

Figure 2: Mounting bolts for the upper and lower cover

To open the cover above the antenna base, remove the 4 Phillips head screws at the four bottom corners. Then the cover can be removed by lifting up. The tightening torque for the four screws when reinstalling the cover is 0.2 Nm – 0.25 Nm.

To open the upper cover above the cross-member, remove the 4 Phillips head screws on the bottom side of the cross-member. Then the cover can be lifted up after pulling apart the side members. The tightening torque for the four screws when reinstalling the cover is 0.2 Nm – 0.25 Nm.
3.2. Installing the antenna on the floor

Once the position of the antennas has been marked or determined, the hole template can be used to drill the mounting holes and holes for the cable entry. The size and type of anchor rods used depends greatly on the strength of the base or floor. The rods should be able to withstand at least a load of 5 KN per rod for all load directions (e.g. for concrete floors Hilti adhesive anchors HVA with HAS-(E) anchor rod size M10 or Hilti HIS-N galvanized anchor rod with hexagon end size M8). The size of the mounting holes in the antenna is 12 mm. The length of the anchors / screws should be chosen so that the anchor extends at least 60 mm and no more than 80 mm from the floor.

Please follow the installation instructions provided by the anchor manufacturer!

Figure 3: Hole pattern for the antenna

![Diagram of hole pattern for the antenna]

All dimensions in mm (inches)

Two entrances have been provided for the necessary connecting cable. The thin plastic cover should be drilled using a 12 mm (0.47 in) bit before installation.

If multiple ID ISC.ANT1400/700-A antennas or gates are installed with different Readers, a minimum distance of 8 m must be kept between the antennas or gates. If shorter distances are necessary (1 m – 8 m, 3.28 – 26.2 ft), the Readers must be multiplexed. Below a distance of 2.0 m (6.56 ft) the antennas must also be shielded from each other. Otherwise significant reduction in reading range will result. See 8.7. Minimum distances between two gates

The antennas must be kept a minimum of 20 cm (7.9 in) away from all larger metal parts! At a distance of less than 50 cm (19.7 in) from the antenna to metal parts, reading ranges will be diminished.
Figure 4: Installation drawing for the position of the mounting holes in a gate set-up

Measurements in [cm]

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>W</th>
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<tbody>
<tr>
<td>A</td>
<td>85</td>
<td>72.7</td>
<td>80.1</td>
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<td>B</td>
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<td>77.7</td>
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<td>82.7</td>
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<td>D</td>
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<td>F</td>
<td>110</td>
<td>97.7</td>
<td>105.1</td>
<td>101.2</td>
</tr>
</tbody>
</table>
Figure 5: Installation drawing for ID ISC.ANT1400/700 Type A, Type B or Type C

All dimensions in mm
3.3. Connecting the antenna

The antenna is connected to the Reader using one each coaxial cable RG 58, diameter 5 mm. The cable is generally routed into the antenna from below out of the floor. Otherwise a cable channel must be milled into the floor.

To ensure optimum read ranges, the existing antenna cable should not be either shortened or lengthened (See also 8.10.). Therefore it is important to note the maximum available cable length and maximum distance between Reader and antenna!

Any power splitters or transformers used can be installed in the bottom of the antennas. See also: 3.7. Installing the Power Splitter and Transformer in the antenna base.

The antennas are connected directly to the Reader using an SMA connector. To suppress the noise typical in industrial environments, we recommend also using the ID ISC.ANT.T Antenna Transformer between Reader and base antenna.

To meet the relevant EMC regulations and to suppress any possible noise, 2 toroid cores Ø 28 mm x 20 mm are supplied with the Reader ID ISC.LR200-B. These should be installed in the antenna connection cable of the base and complementary antenna. Wind the coaxial cable at least four times tightly through the EMC toroid core as shown below. The distance between the Reader connector and the toroid core should be a maximum of 10 cm.

Figure 6: Installing the toroid core on the antenna cable

The EMC toroid core Ø 28 mm x 20 mm supplied with the Reader should be installed at the beginning of the cable. Wind the antenna cable at least four times tightly through the toroid core.

Note: Voltages of up to 1000V may be present on the antenna cable or on various components of the tuning boards. Before starting your work, disconnect the antenna from the Reader. When plugging in the ID ISC.SATC-A controller to the antenna, be sure that no components inside the housing are touched.
3.4. Installing the Reader into the base antenna

Supplied with the base antenna are the Reader, a mounting bracket and assembly parts.

The Reader is installed after attaching the antenna to the floor. The mounting bracket must be fastened in place using the mounting screws. It is important to ensure that the mounting bracket makes direct contact with the foot of the antenna and thereby provides good heat transmission to the metal sleeves.

Next the Reader and the Transformer or Power Splitter is attached to the mounting bracket. The Reader is bolted to its base plate behind the mounting bracket with the terminals facing towards the middle (use the three flathead size M4x12 screws). The Power Splitter or transformer is attached (without housing) to the front side of the mounting bracket using the two spacer bolts and the M4x6 machine screw.

Finally, the supplied ring cores must be installed for the Reader (see assembly guide for the Reader) and the cable connected to the Reader.

Fig. 7: Assembly drawing for installing the Reader in the base antenna
Fig. 8: Reader module ID ISC.LRM200-B installed in the base antenna

The connection between Reader terminal X2 and Transformer terminal X3 is made using the 130 mm short cable supplied with the antenna instead of the 7200 mm long cable.

The cables must finally be tied together in small loops. All cables must be tied together as far as possible from the antenna conductor. In no case are the cables permitted to contact the copper tube.

The antenna cables have a fixed length of 2.10 m, 3.60 m or 7.20 m (Transformer) and should not be shortened. Since the space in the foot of the base antenna is limited, the cable should be drawn into the base antenna only as much as absolutely necessary. The routing should be made as direct as possible to the terminals. Excess cable should for example be pulled back into the other antennas and bundled together in a ring using a cable tie.

Important: The Reader will operate trouble-free especially at elevated temperatures and high power only if all mechanical connections from the Reader to the antenna foot show good thermal conductivity.
3.5. Power supply for the Reader

To prevent external noise from affecting the Reader, take the following precautions:

1. The 24V power supply must meet the requirements described in the installation guide for the Reader. Recommended power supplies: see Appendix. The ring core must be installed in the cable as described in the installation guide for the Reader.

2. The cable must be twisted-pair, shielded and may not be longer than 10 m. The shielded should be connected on the power supply end only. The wire gauge depends on the length of the cable. We recommend at least 2x2x1mm² or 2x1.5mm² (Unitronic LiYCY (TP) 2x2x1mm² Lapp).

3. The supply line must be kept at least 30 cm away from parallel routed energy supply cables or noise sources.

3.6. Installing the side panels

Two panels are supplied for each antenna; both are contained in a single shipping container.

Before installing the panels, you must first remove the lower cover. Next unpack the panels and hang them on the 6 pins on each side of the antenna.

Figure 9 Installing the side panels

The two bottom pins are not yet glued in, since otherwise the lower cover could not be installed. These must then be glued in. The distance between the antenna shell and the pin head should be at least 5.5 mm (compare with the pins that are already there). Use a 2-component epoxy glue (e.e. UHU plus).

The panels have cutouts on the bottom for gripping when installing or removing.

To install, first hang the panel on the two upper pins. Then one hand can be used to hold the panel at the bottom and gently lift it. Use the other hand to carefully press the panel into the antenna.

To disassemble, again lift the panels and pull them out.
3.7. Installing the Power Splitter and Transformer in the antenna base.

The Power Splitters or Transformers can be placed in the base of the antenna. Be sure that the cables are routed as far as possible from the antenna tube. The coaxial cable should be wound into a loop and bound with a cable tie.

Figure 10: Transformer installed in antenna base
4. Typical antenna configurations

4.1. Standard personnel gate made of two antennas. Any desired label orientation

The standard configuration of a gate for 3-dimensional label orientation consists of a base antenna ID ISC.ANT1400/700-A Type A and a complementary antenna ID ISC.ANT1400/700-B Type B.

When a label is moved horizontally through the gate, it may be read at least one times depending on its orientation. This ensures high reliability for the antenna system.
4.1.1. Projecting notes

The antenna configuration described here allows identification of labels passing through the capture area of the gate in a horizontal direction. The label orientation is non-critical. The labels are read in certain areas within the antennas along a horizontal line of motion. The identification area depends on the label orientation.

The capture area of the antennas has a size indicated in the illustration below. **Note:** The overall capture area of the antenna is larger than shown in the illustration. This means there are label orientation in which the labels are detected outside the capture area. The labels that are oriented parallel to the antennas can also be detected at greater distances when next to or outside the antennas.

Therefore no product having a label may be stored in the capture area near the gate antenna. They must remain more than 0.6 m (24 inches) from the gate. Otherwise the antennas will need to be shielded to prevent unwanted pickup of extraneous tags around the gate.

If there is more than one gate installed with a short distance (<8m) to each other there will be an interdependence influence. From there the reader of the gates must be synchronised.

**Figure 11: Capture area of the antennas**

In your planning, provide for an empty pipe, slot or holes in the floor to hold the antenna cables between the base and complementary antenna! In addition, you must provide an access for the supply voltage cables and data lines.
To achieve 3-dimensional capture of the labels in the capture area drawn above, the following conditions must be met:

- The gate width (GD) must be less than 90 cm (35 in.).
- The labels should be at least ISO card size (46 mm x 75 mm [1.8 x 2.95 in]).
- The activation field strength sensitivity of the labels should less than or equal to 80 mA/m.
- The distance from label to label should be greater than 10 cm (3.9 in). The distance from label to label may be reduced if the gate width GD is reduced correspondingly. This applies especially to distances of less than 5 cm (1.9 in).
- No more than 16 labels at a time should be located in the capture area of the antenna. The number of labels may be increased by correspondingly reducing the gate width (GD) and adjusting the maximum speed accordingly.
- The maximum speed of motion of the label should not exceed 0.5 – 1 m/s (this depends on the number of labels, the number of data blocks, the required data protocol and the label type).
- The antenna should have a separation of greater than 50 cm (20 in) from metal parts.
- There should be no devices in the vicinity of the Reader that could cause noise interference. The difference between the noise levels \((U_{\text{max}} - U_{\text{min}})\) should be less than 20 mV.
- The Reader ID ISC.LR200-B should be set for an RF power of 4 watts. At an RF power of greater than 4 watts the conditions for approval according to the R&TTE directive are exceeded.
- When using ISO15963 transponders, the Readers should be adjusted as described in section “8.6. Regulatory agencies in EU countries and the USA“.
- If there is more than one gate installed with a short distance (<8m) to each other there will be an interdependence influence. From there the reader of the gates must be synchronised.
4.1.2. Required components

The Reader is included with the base antenna and is installed in the latter. The cables on the antennas are each 2 mm long. For greater distances between the Reader and the complementary antenna, the ID ISC.ANT.EC extender can be used to extend the antenna cable by 7.20 m. This will however result in a slight loss of performance. (See 8.10.)

Devices needed
1. Qty. 1 ID ISC.ANT1400/700-A
2. Qty. 1 ID ISC.ANT1400/700-B
3. Qty. 1 ID NET24VDC-A
4. (Qty. 2 ID ISC.ANT1400/700-CP)

In addition, the antennas can still be fitted with the optional blue side panels ID ISC.ANT1400/700-CP. One packaging unit per antenna is required.

Four suitable anchors with bolts are required for attaching the antenna to the floor.

Components required for commissioning:
- Qty. 1 ID ISC.SATC-A Automatic Tuning Controller
- Service software ISCStart Version 4.02 or higher on a PC running under MS Windows. The ISCStart software is contained on the OBID® i-scan CD-ROM available from FEIG ELECTRONIC GmbH.
- Qty. 1 SWR Meter with SMA sockets or adapter to SMA sockets
- Qty. 1 cable RG 58 C/U approx. 20 – 25 cm (7.9 – 9.8 in) long with 2 SMA plugs
- Qty. 1 amber blade screwdriver
- Qty. 1 Oscilloscope
- Qty. 2 test loops

For additional information on these devices, see the individual instructions or section Appendix A: Helpful tools for constructing and testing the antennas.
4.2. Double gate with 2 passages. Any desired label orientation

This configuration using two directly adjacent gates consists of one base antenna ID ISC.ANT1400/700-A Type A and two complementary antennas ID ISC.ANT1400/700-B Type B. All three antennas are connected to an ID ISC.LR200-B Reader. Both complementary antennas are connect to X1 on the Reader through the ID ISC.ANT.PS-A Power Splitter.
4.2.1. Projecting notes

The antenna configuration described here allows identification of labels passing through the capture area of the gate in a horizontal direction. The label orientation is non-critical. The labels are read at a certain point within the antennas along a horizontal line of motion. The identification point depends on the label orientation.

The capture area of the antennas has a size indicated in the illustration below. **Note:** The overall capture area of the antenna is larger than shown in the illustration. This means there are label orientations in which the labels are detected outside the capture area. The labels that are oriented parallel to the antennas can also be detected at greater distances when next to or outside the antennas.

Therefore no product having a label may be stored in the capture area near the gate antenna. They must remain more than 0.6 m (25 inches) from the gate. Otherwise the antennas will need to be shielded to prevent unwanted pickup of extraneous tags around the gate.

If there is more than one gate installed with a short distance (<8m) to each other there will be an interdependence influence. From there the reader of the gates must be synchronised.

**Figure 12: Capture area of the antennas**

In your planning, provide for an empty pipe, slot or holes in the floor to hold the antenna cables between the base and complementary antenna! In addition, you must provide an access for the supply voltage cables and data lines.
To achieve 3-dimensional capture of the labels in the capture area drawn above, the following conditions must be met:

- The gate width (GD) must be less than 85 cm (35 in.).
- The labels should be at least ISO card size (46 mm x 75 mm [1.8 x 2.95 in]).
- The activation field strength sensitivity of the labels should less than or equal to 80 mA/m.
- The distance from label to label should be greater than 10 cm (3.9 in). The distance from label to label may be reduced if the gate width GD is reduced correspondingly. This applies especially to distances of less than 5 cm (1.9 in).
- No more than 16 labels at a time should be located in the capture area of the antenna. The number of labels may be increased by correspondingly reducing the gate width (GD) and adjusting the maximum speed accordingly.
- The maximum speed of motion of the label should not exceed 0.5 – 1 m/s (this depends on the number of labels, the number of data blocks, the required data protocol and the label type).
- The antenna should have a separation of greater than 50 cm (20 in) from metal parts.
- There should be no devices in the vicinity of the Reader that could cause noise interference. The difference between the noise levels (U_{\text{max}} - U_{\text{min}}) should be less than 20 mV.
- The Reader ID ISC.LR200-B should be set for an RF power of 4 watts. At an RF power of greater than 4 watts the conditions for approval according to the R&TTE directive are exceeded.
- When using ISO15963 transponders, the Readers should be adjusted as described in section “8.6. Regulatory agencies in EU countries and the USA“.
4.2.2. Installing the Power Splitter in the antennas

The base antenna contains space only for the Reader and either a Power Splitter or a Transformer. Since this configuration requires a Reader with Transformer and Power Splitter, the Power Splitter is installed not in the base antenna, but rather in the first complementary antenna.

Since the cable $L_{E2}$ is approx. 2.10 m long, it will be enough in the case of direct cabling for an antenna distance of only 90 cm or less. For greater antenna distances or when direct routing is not possible, use the ID ISC.ANT.EC extender to increase the distance by another 7.20 m. This will however result in a slight loss of performance.

If the Power Splitter is attached between the two antennas, the above may not be necessary.
4.2.3. Required components

The Reader is included with the base antenna and is installed in the latter. The cables on the antennas are each 2 mm long. For greater distances between the Reader and the complementary antenna, the ID ISC.ANT.EC extender can be used to extend the antenna cable by 7.20 m. This will however result in a slight loss of performance. (See 8.10.)

Devices needed
1. Qty. 1 ID ISC.ANT1400/700-A
2. Qty. 2 ID ISC.ANT1400/700-B
3. Qty. 1 ID ISC.ANT.PS-A
4. Qty. 1 ID NET24VDC-A
5. (Qty. 3 ID ISC.ANT1400/700-CP)
6. (Qty. 1 ID ISC.ANT.EC) (See 4.2.2. Installing the Power Splitter in the antennas)

In addition, the antennas can still be fitted with the optional blue side panels ID ISC.ANT1400/700-CP. One packaging unit per antenna is required.

Four suitable anchors with bolts are required for attaching the antenna to the floor.

Components required for commissioning:
- Qty. 1 ID ISC.SATC-A Automatic Tuning Controller
- Service software ISCStart Version 4.02 or higher on a PC running under MS Windows. The ISCStart software is contained on the OBID® i-scan CD-ROM available from FEIG ELECTRONIC GmbH.
- Qty. 1 SWR Meter with SMA sockets or adapter to SMA sockets
- Qty. 1 cable RG 58 C/U approx. 20 – 25 cm (7.9 – 9.8 in) long with 2 SMA plugs
- Qty. 1 amber blade screwdriver
- Qty. 1 Oscilloscope
- Qty. 2 test loops

For additional information on these devices, see the individual instructions or section Appendix A: Helpful tools for constructing and testing the antennas.
4.3. Personnel gate with two base antennas. One label orientation

If two ID ISC.ANT1400/700-A Type A antennas are used to construct a gate, the result is a configuration with one read direction for the labels. Depending on the current direction in the antennas and the assembled orientation of the circuit boards, the labels may be read either vertically parallel to the antennas or vertically diagonal.

If a label is moved horizontally through the gate, it can be read at least once in one orientation. Since the energy in the antennas is not distributed over all the read directions, a stronger (approx. 3 dB) field results, which in turn permits larger gates.
4.3.1. Projecting notes

The antenna configuration described here allows detection of labels moving in a horizontal direction through the capture area of the gate. The label orientation must then be either vertical, parallel to the antennas (Fig. 13, Configuration A) or vertical, diagonal to the antennas (Fig. 13, Configuration B).

The labels are detected along a horizontal line of motion in certain areas within the antennas. The detection area depends on the label orientation.

The size of the capture area of the antennas is shown in the drawing below.

**Caution:** Note that the entire capture area of the antenna is larger than the capture area shown in the drawing. This means there are label orientations in which the labels are detected outside the capture area. For example, labels oriented parallel to the antenna are also detected at greater distances next to and outside the antennas.

This means that you may not store labeled goods outside the capture area up to a distance of 0.7 m from the gate. Otherwise you must provide antenna shielding.

If there is more than one gate installed with a short distance (<8m) to each other there will be an interdependence influence. From there the reader of the gates must be synchronised.

Fig. 14: Capture area of the antennas

In your planning, provide for an empty pipe, slot or holes in the floor to hold the antenna cables between the base and complementary antenna! In addition, you must provide an access for the supply voltage cables and data lines.
To achieve 3-dimensional capture of the labels in the capture area drawn above, the following conditions must be met:

- The gate width (GD) must be less than 100 cm (35 in.).
- The labels should be at least ISO card size (46 mm x 75 mm [1.8 x 2.95 in]).
- The activation field strength sensitivity of the labels should be less than or equal to 80 mA/m.
- The distance from label to label should be greater than 10 cm (3.9 in). The distance from label to label may be reduced if the gate width GD is reduced correspondingly. This applies especially to distances of less than 5 cm (1.9 in).
- No more than 16 labels at a time should be located in the capture area of the antenna. The number of labels may be increased by correspondingly reducing the gate width (GD) and adjusting the maximum speed accordingly.
- The maximum speed of motion of the label should not exceed 0.5 – 1 m/s (this depends on the number of labels, the number of data blocks, the required data protocol and the label type).
- The antenna should have a separation of greater than 50 cm (20 in) from metal parts.
- There should be no devices in the vicinity of the Reader that could cause noise interference. The difference between the noise levels \(U_{\text{max}} - U_{\text{min}}\) should be less than 20 mV.
- The Reader ID ISC.LR200-B should be set for an RF power of 4 watts. At an RF power of greater than 4 watts the conditions for approval according to the R&TTE directive are exceeded.
- When using ISO15963 transponders, the Readers should be adjusted as described in section “8.6. Regulatory agencies in EU countries and the USA".
4.3.2. Required components

The Reader is included with the base antenna and is installed in the latter. The antenna cables are each 2 m long. For greater distances between the Reader and complementary antenna, you may use the ID ISC.ANT.EC extender to increase the antenna cable length by 7.20 m. (see 0)

Required equipment:

1. Qty. 1 ID ISC.ANT1400/700-A
2. Qty. 1 ID ISC.ANT1400/700-C
3. Qty. 1 ID ISC.ANT.PS-A
4. Qty. 1 ID NET24VDC-A
5. (Qty. 2 ID ISC.ANT1400/700-CP)

In addition, the antennas may be equipped with optional blue side covers, part number ID ISC.ANT1400/700-CP. One packing unit per antenna is required.

Four suitable anchors with bolts are required for attaching the antenna to the floor.

Components required for commissioning:

- Qty. 1 ID ISC.SATC-A Automatic Tuning Controller
- Service software ISCStart Version 4.02 or higher on a PC running under MS Windows. The ISCStart software is contained on the OBID® i-scan CD-ROM available from FEIG ELECTRONIC GmbH.
- Qty. 1 SWR Meter with SMA sockets or adapter to SMA sockets
- Qty. 1 cable RG 58 C/U approx. 20 – 25 cm (7.9 – 9.8 in) long with 2 SMA plugs
- Qty. 1 amber blade screwdriver
- Qty. 1 dummy load resistor
- Qty. 1 Oscilloscope
- Qty. 2 test loops

For additional information on these devices, see the individual instructions or section Appendix A: Helpful tools for constructing and testing the antennas.
5. Configuring and tuning a standard personnel gate from two antennas.

5.1. Antenna gate configuration

After installing the antennas, configure the wiring as follows:

Figure 15 Configuration: One Reader and a base and complementary antenna each

A = Base antenna with reader
B = Complementary antenna

Until the tuning procedure is complete, install an SWR between the Reader and base antenna in place of the ID ISC.ANT.T-A Transformer.

After installing the antennas at the floor, the reader modul has to mount into the base of the base antenna.
5.2. Tuning the antennas

The antenna has been factory tuned in a gate with one base and one complementary antenna at a distance of 90 cm. If no metal or other magnetically conducting materials are located in close proximity (< 1.00 m) to the antenna, no further tuning will be necessary.

In this case you need only to check the input impedance (8.8. Measuring the standing wave ratio (VSWR)) and the phase angle (8.9. Measuring the phase angle and checking the antenna currents).

Before tuning the base or complementary antenna, the antennas and antenna cables must be firmly attached near the antenna.

Begin tuning with the base antenna, and then tune the complementary antenna. Since the complementary antenna influences the working point of the base antenna, the latter must then be re-tuned.

5.2.1. Preparations

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect the ID ISC.LR200 Reader to the PC through the RS232 or RS485 port</td>
<td>See Installation Manual ID ISC.LR200</td>
</tr>
<tr>
<td>2</td>
<td>Install the Demo Software ISC-Start</td>
<td>Located on the OBID® i-scan CD-ROM</td>
</tr>
<tr>
<td>3</td>
<td>Run the ISCStart program</td>
<td>ISCStart.exe</td>
</tr>
<tr>
<td>4</td>
<td>Open the COM port settings</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Check the COM port settings and confirm by clicking on OK.</td>
<td></td>
</tr>
</tbody>
</table>
6. Now open the menu **File – New – Reader**

7. Select **ID ISCLR** and click on **OK**

8. Select **COM: x [Baud 38400......]**

9. Click on **Commands**

10. Select **Baudrate Detection[0x52]** command

11. Click on **Send**

12. The program tests all possible baud rates. It stops as soon as the baud rate set on the Reader has been detected (default 38400 / 8E1) and confirms with **OK**

13. Click on **Configuration**

14. Select **ID ISCLRxxx Configuration**.

15. Select destination memory **EEPROM** instead of **RAM**.
<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Click on <strong>Reset [0x83]</strong> to set the Reader to the default configuration.</td>
</tr>
<tr>
<td>17</td>
<td>Click on <strong>Read</strong> to load the Reader configuration into the PC and to load the ISCStart program.</td>
</tr>
<tr>
<td>18</td>
<td>Click on <strong>Commands</strong></td>
</tr>
<tr>
<td>19</td>
<td>Select the command <strong>CPU Reset [0x63]</strong> and click on <strong>Send</strong> to send all the settings.</td>
</tr>
<tr>
<td>20</td>
<td>Click on <strong>Configuration</strong> again.</td>
</tr>
</tbody>
</table>
### 5.2.2. Tuning the base antenna

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To tune the antennas, close jumpers JP1 and JP2 in the ID ISC.ANT.T-A Transformer between Reader and base antenna, or replace the Transformer with an SWR meter. See also 8.8. Measuring the standing wave ratio (VSWR)</td>
<td>Jumpers JP1 and JP2 closed!</td>
</tr>
<tr>
<td>3</td>
<td>Turn trim capacitors C1 and C2 on the base antenna to the center position.</td>
<td>JP1, JP2, JP6 and JP7 = open R_{ges} = 0.66 \Omega</td>
</tr>
</tbody>
</table>
4 Click on **Commands** at the ISCStart Program Window

5 Select the command **[0x6F] Base Antenna Tuning** and click on **Send** to send all the settings.

6 Now plug the Static Antenna Tuning Controller ID ISC.SAT.C-A into the antenna tuner on the base antenna and press the “Start button” on the controller.

   The tuning process takes several seconds. When completed, the **green LED** will come on slowly.

   **Tuning mode**: Is activated by holding down the Start button greater than two seconds (> 2 seconds)

   **Control mode**: Is activated by briefly pressing the Start button shorter than two seconds (< 2 seconds).

7 The controller runs then automatically turns off and can then be unplugged.

   **Important:**

   **Do not unplug the controller until the green LED has gone out!**

   Now you may begin to tune the complementary antenna.
| 8 | If the tuning was not properly finished, this is indicated by the **red LED**.  
   If an error occurs at the beginning of the tuning procedure, the **LED flashes** for 4 seconds.  
   If an error occurs during or at the end of the tuning procedure, the **LED turns on** solidly for 4 seconds.  
   If the battery is low, the **yellow LED turns on** solidly for 4 seconds. |

| 9 | Click on **Commands** |

| 10 | Select the command **CPU Reset [0x63]** and click on **Send** to send all the settings. |

| 11 | **If the red LED flashes for 4 seconds,** this means there is no RF power on the antenna.  
   **Possible causes:**  
   - Reader or RF power turned off  
   - Cable between Reader and antenna defective.  
   - The SMA connectors were not properly connected to the Reader and antennas and are not properly seated on the SMA socket.  
   - The cable is not properly crimped onto the SMA connectors. The cable is pinched or shorted in the SMA plug.  
   - The controller was not properly plugged onto the board. |

| 12 | **If the red LED comes on** solidly for 4 seconds, the tuning was not properly finished.  
   **Possible causes:**  
   - Cable between Reader and antenna defective.  
   - The SMA connectors were not properly connected to the Reader and antennas and are not properly seated on the SMA socket.  
   - The cable is not properly crimped onto the SMA connectors. The cable is pinched or shorted in the SMA plug.  
   - The controller was not properly plugged onto the board.  
   - Antenna Q set too high (resistor settings).  
   - Tuner board is defective. |
### 5.2.3. Tuning the complementary antenna

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect the base antenna (X6/REF) to the complementary antenna (X6). Use the $\lambda/4$ cable supplied with the Controller. The plug with the ring core must be connected to the complementary antenna. Connect the Reader X1 to the complementary antenna X7.</td>
<td><img src="Diagram1.png" alt="Diagram showing connections and configuration of the complementary antenna." /> The end of the cable with the toroid is connected to the complementary antenna.</td>
</tr>
<tr>
<td>2</td>
<td>Jumper J7 on the base antenna should be closed.</td>
<td><img src="Diagram2.png" alt="Diagram showing the location of J7 jumper." /></td>
</tr>
<tr>
<td>3</td>
<td>The trim capacitors C37 and C38 on the complementary antenna should be turned to the center position.</td>
<td><img src="Diagram3.png" alt="Diagram showing the trim capacitors and their positions." /></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Click on the <strong>Configuration</strong> button.</td>
<td></td>
</tr>
</tbody>
</table>
| 6 | Use the ISCStart demo program to read out the complete configuration.

Then set the RF power (configuration block CFG3) to 8 Watts and turn off the modulation (CFG10, BRM=OFF).

Each change in the configuration must be written to the Reader’s EEPROM by clicking on the Write button. |
| 7 | Now plug the Static Antenna Tuning Controller **ID ISC.SAT.C-A** into the antenna tuner on the complementary antenna and press the “Start” key on the controller. |

**Tuning mode:**
is activated by holding down (> 2 seconds) the Start key greater than two seconds.

**Control mode:**
is activated by briefly pressing (< 2 seconds) the Start key shorter than two seconds. |
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>If tuning was successfully completed, this is indicated by the green LED coming on for 4 seconds. Next the controller turns itself off automatically and can then be unplugged.</td>
<td>If the tuning was not successfully completed, check all cable connections and be sure that the controller is making good contact. <strong>Important:</strong> Do not unplug the controller before the green LED has gone out!</td>
</tr>
<tr>
<td>9</td>
<td>Disconnect the reference cable</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Set the jumpers on the base and complementary antennas to the operating position. <strong>Base antenna:</strong> JP6 and JP7 open <strong>Complementary antenna:</strong> JP5 to Position 1-2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Use a 2-channel oscilloscope and two test loops to check the phase angle between the base and complementary antenna.</td>
<td>Both loops must be the same size, be exactly parallel to each other at the same point on the antennas, and be located as close to the center of the antenna surface as possible. The test cables are described in Appendix A: Helpful tools for constructing and testing the antennas. Loop on base antenna to Channel A on oscilloscope Loop on complementary antenna to Channel B on oscilloscope. <strong>Oscilloscope settings</strong> Voltage range: 5 Volt/Div. Offset channel A+B: 0 Volt Coupling: DC Sweep time: 10 ns/Div. Trigger source: Channel A Trigger Mode: Normal Trigger point: Leading edge</td>
</tr>
</tbody>
</table>
Trim capacitors C37 and C38 can be used to correct the phase of the currents between the two antennas. See also: Section: 8.9.

**Settings:**
- The amplitudes should be nearly identical. Tolerance 30%
- The phase angle should be 90° +/- 10°
  (corresponds to a time delay of 18.4 ns)
During fine tuning, be sure that both trim capacitors are adjusted evenly so that when finished, both are in the same position.

Steps 9 and 10 serve to check and optimize the tuning process. This improves the reliability of the system!

Possible problems if the antenna has not been calibrated

- No RF power on the antenna.
  - RF power not turned on (on the Reader).
  - Cable between Reader and antenna defective.
  - Transformer was switched between the Reader and antenna, and jumper JP1 or JP2 is open.
- RF power incorrectly set
- Base antenna not calibrated or defective
- Distance between base and complementary antenna too great or too short.
- Controller not correctly plugged into the board.
- Jumpers on base or complementary antenna not properly set.
- Connection between base and complementary antenna (reference cable) not properly made.
- Modulation on Reader turned on.
  - Buffered Read Mode turned on
  - Transponder read turned on (ISCStart: Test and Measurement)
- Tuner board defective.
### 5.2.4. Retuning the base antenna / fine tuning

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Now repeat the tuning procedure for the base antenna (Step 4-10)</td>
<td>Depending on the antenna coupling, the base antenna will be more or less detuned by the complementary antenna. This makes it necessary to retune the base antenna.</td>
</tr>
<tr>
<td>2</td>
<td>If the RF power deviates from the 8 W set during tuning, set the RF power</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Disconnect the test loops and oscilloscope</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wait 15 minutes until the operating temperature of the antennas has stabilized</td>
<td></td>
</tr>
</tbody>
</table>
| 5    | Trim capacitors C1 and C2 can be used for fine-tune the base antenna. | • Use the plastic screwdriver to turn both trim capacitors C2  
• Find the smallest SWR by looking at the SWR meter while turning the capacitors.  
• Use the plastic screwdriver to turn both trim capacitors C1  
• Find the smallest SWR by looking at the SWR meter while turning the capacitors.  
Each capacitor pair should be set to approximately the same capacitance.  
Use a VSWR meter between the antenna and the Reader to check the setting.  
After fine-tuning, the SWR should read \( \leq 1.3:1 \). |

---

[Diagram showing capacitor settings]
If the Transformer was previously removed, reinstall it and in any case open jumpers JP1 and JP2. Jumper JP1 and JP2 open.
6. Configuration and tuning of a double gate with 2 passages.

6.1. Configuration of the antenna gate

After installing the antennas, the configuration must be wired as follows:

Figure 16 Configuration: One Reader, one base antenna and two complementary antennas

A = Base antenna  
B = Complementary antenna

X1= SMA plug for connecting a complementary antenna  
X2= SMA plug for connecting a base antenna  
PS = Power Splitter ID ISC.ANT.PS-A  
T = Transformer ID ISC.ANT.T-A

Until the tuning procedure is completed, an SWR should be installed between the Reader and the base antenna in place of the ID ISC.ANT.T-A Transformer.

After installing the antennas at the floor, the reader modul has to mount into the food of the base antenna.
6.2. Tuning the antennas

The antenna has been factory tuned in a gate with one base and one complementary antenna at a distance of 90 cm. If no metal or other magnetically conducting materials are located in close proximity (< 1.00 m) to the antenna, no further tuning will generally be necessary. Only a fine tuning using the trim capacitors should be performed to optimize the antenna performance.

In this case you need only to check the input impedance (8.8. Measuring the standing wave ratio (VSWR)) and the phase angle (8.9. Measuring the phase angle and checking the antenna currents).

Before tuning the base or complementary antenna, the antennas and antenna cables must be firmly attached near the antenna. In addition, the jumpers JP1 and JP2 in the ID ISC.ANT.T-A for tuning the antennas must be closed. The Power Splitter ID ISC.ANT.PS-A is installed only after the tuning is complete.

Begin tuning with the base antenna, and then tune the first and second complementary antennas in that order. Since the complementary antennas influence the working point of the base antenna, the latter must then be retuned.

6.2.1. Tuning the base antenna

Tuning of the base antenna is the same as tuning the base antenna in a standard gate made up of one base and one complementary antenna.

Follow the instructions in the following two sections in the order indicated:

• Section 5.2.1. Preparations
• Section 5.2.2. Tuning the base antenna
### 6.2.2. Tuning the complementary antennas

To tune the two complementary antennas, each gate side must be tuned separately. Then the power splitter is installed and the base antenna retuned.

Perform the following steps in the order indicated:

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tune the first complementary antenna as per section: 5.2.3. Tuning the complementary antenna.</td>
<td>Connect the first complementary antenna directly to the Reader X1.</td>
</tr>
<tr>
<td>2</td>
<td>Tune the second complementary antenna as per section: 5.2.3. Tuning the complementary antenna.</td>
<td>Connect the second complementary antenna directly to the Reader X1.</td>
</tr>
<tr>
<td>3</td>
<td>Install the power splitter between Reader terminal X1 and the two antennas. Jumpers JP1 and JP2 must be closed.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Check the phase angle of the first and the second complementary antenna as per section: 5.2.3. Tuning the complementary antenna, points 10+11 and correct as necessary.</td>
<td>See also section: 8.9.</td>
</tr>
<tr>
<td>5</td>
<td>Tune base antenna as described in section 5.2.4. Retuning the base antenna / fine tuning</td>
<td></td>
</tr>
</tbody>
</table>

---

FEIG ELECTRONIC GmbH
7. Constructing and tuning a gate consisting of two base antennas

7.1. Constructing the antenna gates

After the antennas are assembled, the configuration must be wired as follows:

Fig. 17 Configuration: One Reader with two base antennas

A = base antenna with reader

C = base antenna without reader

A VSWR meter should be inserted between the Reader and antenna until the tuning process is completed. The Power Splitter is installed after tuning.

Both antennas must be oriented in the same direction, i.e. the center post of both antennas must point in the same direction.

Depending on the orientation of the labels, the circuit board for the second base antenna must remain either in the original position or moved.

If the labels are to be read diagonally to the antenna (see Fig. 13: Configuration B), no repositioning of circuit board for the second base antenna is necessary.
If the labels are to be read parallel to the antenna (see page 26, Fig. 13: Configuration A), the second base antenna must be repositioned as follows.

1. Disconnect the coax cable from the plug X7/HF.
2. Remove the 6 mounting screws on the circuit board.
3. Fasten the 4 supplied spacer bolts supplied with the antenna (M3x20) to the top side of the circuit board on the antenna terminal.
4. Rotate the circuit board by 180° so that the components on both sides of the board face outside or inside.
5. To connect the lower mounting straps to the board, use a pair of pliers to slightly bend the top straps until the board is touching the straps again below. Then use the M2.5x8 screws to attach the board to the straps.

Fig. 18 Installing the board with components facing in or out

antenna

Tuner

Controller

or

Fig. 19 Base antenna rotated by 180° using spacers
7.2. Tuning the antennas

Before tuning the base antennas, the antennas and antenna cables must be fixed in place near the antenna. The Power Splitter ID ISC.ANT.PS-A is not installed until after the antennas are tuned.

7.2.1. Tuning the base antennas

The base antennas are tuned similarly to the tuning of the base antenna on a standard gate consisting of a base and complementary antenna.

First connect the first base antenna directly to the Reader. Terminate the second antenna with a termination resistor of 50Ω.

The tuning procedure begins with the first base antenna. Then the second antenna is tuned. Since the two adjacent base antenna mutually interfere with each other, you must use the SWR meter to recheck the first base antenna and if necessary retune it as described in section 5.2.2. Tuning the base antenna.

After the tuning is completed, use the Power Splitter to connect the two individual antennas to the Reader in a gate configuration.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Reader – Antenna connection</th>
<th>Termination resistor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tune the first antenna as described in section 5.2.1. Preparations and 5.2.2. Tuning the base antenna</td>
<td>Reader -&gt; first antenna</td>
<td>Second antenna</td>
</tr>
<tr>
<td>2</td>
<td>Tune the second antenna as described in section 5.2.2. Tuning the base antenna.</td>
<td>Reader -&gt; second antenna</td>
<td>First antenna</td>
</tr>
<tr>
<td>3</td>
<td>Retune the first antenna antenna as described in section: 5.2.2. Tuning the base antenna.</td>
<td>Reader -&gt; first antenna</td>
<td>Second antenna</td>
</tr>
<tr>
<td>4</td>
<td>Install Power Splitter. See Figure 20 Installation: One Reader with two base antennas</td>
<td>Reader -&gt; SWR – Meter -&gt; Power Splitter -&gt; first and second antenna</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>At the program ISCStart. Click on the Configuration button.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Use the ISCStart demo program to read out the complete configuration. Then set the RF power (configuration block CFG3) to 8. Each change in the configuration must be written to the Reader’s EEPROM by clicking on the Write button.

**Set for 8 W RF power and save setting**

Configuration CFG3 RF-Interface 1.

<table>
<thead>
<tr>
<th>RF-POWER</th>
<th>8.00 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR100</td>
<td></td>
</tr>
<tr>
<td>LR200</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 20 Installation: One Reader with two base antennas**

A = base antenna with reader  
C = base antenna without reader

After installing the antennas at the floor, the reader modul has to mount into the base of the base antenna.

X2 = SMA plug for connecting a base antenna  
PS = Power Splitter ID ISC.ANT.PS-A  
EC = ID ISC.ANT.EC (7,2m)
7.2.2. Fine-tuning the entire gate configuration

Before fine-tuning, set the Reader to the desired RF power for continuous operation (8.3. Setting the operating parameters). Then allow the gate to heat up for approx. 15-20 minutes to allow for temperature effects. Perform the fine-tuning as follows:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Slowly turn the left-most of the two trim capacitors $C_2$ on the first antenna CW or CCW. The SWR must show a reduced reading! Always tune for the smallest reading on the SWR meter.</td>
<td><img src="image1" alt="Diagram" /></td>
</tr>
<tr>
<td>2</td>
<td>Slowly turn the left-most of the two trim capacitors $C_2$ on the second antenna CW or CCW. The SWR must show a reduced reading! Always tune for the smallest reading on the SWR meter.</td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>3</td>
<td>Alternately turn the right trim capacitor $C_2$ on the first and second antenna slowly CCW. The SWR must show a reduced reading! Otherwise slowly turn the trim capacitor CW. Continue turning until the SWR reading no longer falls.</td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
</tbody>
</table>
|   | Slowly turn the left-most of the two trim capacitors \textbf{C1 on the first antenna} CCW.  
|   | The SWR reading must fall! Otherwise slowly turn CW.  
|   | Continue turning until the SWR reading no longer falls. |
| 4 | ![Diagram](image1) |

|   | Slowly turn the left-most of the two trim capacitors \textbf{C1 on the second antenna} CCW.  
|   | The SWR reading must fall! Otherwise slowly turn CW.  
|   | Continue turning until the SWR reading no longer falls. |
| 5 | ![Diagram](image2) |

|   | The SWR meter should now read \( \leq 1.3:1 \) |
| 7 | ![Image](image3) |

|   | Now remove the SWR meter. Connect the Reader directly to the Power Splitter.  
|   | (Cable length 3.50 or 10.7 m) |
| 8 | ![Image](image4) |
8. Startup and testing of the gate

After installing and tuning the antennas, the correct function of the gate can be checked using the Reader, the ISCStart service software (V4.02 or higher), a PC running under MS Windows, and a Smart Label. The ISCStart software can be found on the OBID® i-scan CD-ROM supplied by FEIG ELECTRONIC GmbH.

8.1. Reading out the serial number

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Attach a tag to one of the antennas</td>
<td>Adhesive tape may be used</td>
</tr>
<tr>
<td>2</td>
<td>Click on Configuration</td>
<td></td>
</tr>
</tbody>
</table>
| 3    | Set the label type in the configuration block CFG3. | 1. **Set tag type**

Configuration CFG3 RF-Interface I.

2. **Save setting**

| 4    | Set transponder parameters:
|      | Configuration CFG8 General |
| 5    | Configure all transponder types to be used for the desired mode. |
| 6    | Select Menu: “**Test and Measurements**” |
| 7    | Select “ISO Inventory” function |
### 8.2. Checking the Noise Level

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select: “Test and Measurements” menu</td>
<td><img src="image" alt="Test and Measurements" /></td>
</tr>
<tr>
<td>2</td>
<td>Select “Noise Levels” function</td>
<td><img src="image" alt="Noise Levels" /></td>
</tr>
<tr>
<td>3</td>
<td>Click on “Start”</td>
<td><img src="image" alt="Start" /></td>
</tr>
</tbody>
</table>
| 4    | Nominal values:  
Average : 500 – 750 mV  
Maximum – Minimum < 20 mV | ![Graph](image) |

**If the nominal values are not maintained, check the following points:**

- Are all cables firmly attached and making good contact?
- Were the toroid cores installed in the antenna cable?
- Were the cables routed properly?
- Are other RFID devices installed in the area?
- Are there large metal parts located in the vicinity of the antenna? ( < 1.0 m)
- Are there noise-generating devices nearby (larger machines or RF devices)?

To determine which devices may be causing the disturbance, unplug them or power them down one at a time.
### 8.3. Setting the operating parameters

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select Configuration menu</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Configuration CFG3 RF-Interface:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Select 8 W RF power</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Activate necessary transponder drivers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Deactivate unused transponder drivers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Set FSK-transponder, FSK-RX-CHN to “0x02 both antennas”</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Set transponder parameters:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Configuration CFG8 General</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Configure all used transponder types to desired mode</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Set new parameters in Reader</td>
<td><img src="image" alt="Write" /></td>
</tr>
<tr>
<td>6</td>
<td>Select “Test and Measurements” menu</td>
<td><img src="image" alt="Test" /></td>
</tr>
<tr>
<td>7</td>
<td>Select command: “ISO Inventory”</td>
<td><img src="image" alt="Test" /></td>
</tr>
<tr>
<td>8</td>
<td>Start command: “ISO Inventory”</td>
<td><img src="image" alt="Test" /></td>
</tr>
<tr>
<td>9</td>
<td>If the tag is placed in the antenna field, the serial number and tag type will be displayed.</td>
<td><img src="image" alt="Table" /></td>
</tr>
</tbody>
</table>
8.4. Testing performance

For this performance test we will be assuming the conditions described in the section: „Projecting Notes“. The indicated ranges and read areas will change correspondingly when different labels are used.

The test begins by checking the read range outside the gate (see illustration, points ① and ②), assuming the configuration and local conditions permit. To begin, start the command ISO Inventory in the ISCStart program (see points 6-9, section 8.1. Reading out the serial number).

Assuming a parallel label orientation with respect to the antenna facing out, a read range at the center of the antenna of 50-60 cm (20 – 23.5 in) should be achievable.

Depending on the configuration, check either ③④⑤ or only ④ respectively ⑤. All three label orientations are possible in the base and complementary antenna configuration. This corresponds to line and orientation ③④⑤. In a gate consisting of two base antennas with the same current direction, check line and orientation ③. For configurations with two base antennas with opposite current direction, the label can be read on line and orientation ④.

Figure 21: Testing the antennas with a label

Now slowly move the label vertically and parallel orientation to the antenna in the gate along the line ③ from one side to the other. The label should always be read.

Next repeat this on line ④ with a vertical label orientation, diagonal to the antenna and on line ⑤ with the label horizontal. Again the label should always be read.

If one or more „read holes“ are discovered, the base antenna should be adjusted to the impedance of 50 Ω with the help of an SWR meter, and the noise levels on the Reader should be checked. Checking the function of the complementary antenna is described in section 8.9. Measuring the phase angle and checking the antenna currents.

In addition, the labels should be read inside the gate when moving horizontally through the gate in all 3 read directions.

The following problems may arise:

- Antenna incorrectly installed (orientation, distance between antennas, check cables)
- Metal in the vicinity detunes or disturbs the antennas
- The base antenna is improperly tuned (SWR ≥ 1.3)
• Noise is too high (V<sub>max</sub> – V<sub>min</sub> ≥ 20 mV)
• EMC toroid cores in the Reader or on the antenna cable not properly installed.
• Label no sensitive enough, detuned or defective
• Reader improperly configured (RF power, transponder type, modulation, transponder parameters, etc.)
• Defective cable or cable making poor contact
• Reader, Transformer, Power Splitter or Antenna defective

8.5. Switching the Reader to Buffered Read Mode

“Buffered Read Mode” is the normal operating mode for the Reader. This means the Reader reads the tag data at maximum possible speed and stores the data in a ring buffer in the Reader.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select Configuration menu</td>
<td><img src="image1" alt="Configuration" /></td>
</tr>
<tr>
<td>2</td>
<td>Set Reader to <strong>Buffered Read Mode</strong>. (Also set Anticollision Select Mode)</td>
<td><img src="image2" alt="Sys-Mode" /></td>
</tr>
<tr>
<td>3</td>
<td>Verify that the EEPROM is selected as the destination memory</td>
<td><img src="image3" alt="EEPROM" /></td>
</tr>
<tr>
<td></td>
<td>Save settings in the Reader with the Write-Button</td>
<td><img src="image4" alt="Write" /></td>
</tr>
</tbody>
</table>
8.6. Regulatory agencies in EU countries and the USA

The design and RF power of the antennas is affected mainly by the country-specific RF regulations. The entire EU geographic area is covered under uniform limits specified in the R&TTE guideline and EN 300 330. In North America this is regulated by FCC Part 15.

In EU countries the maximum permissible field strength at 13.56 MHz at a distance of 10 m is: 42dBµA/m. In the USA this is 38dBµA/m.

When commissioning the system, be sure that the permissible values as prescribed by the national regulatory agency are not exceeded.

Since FCC Part 15 prescribes a separation of 50 dB between the carrier and sidebands, the Reader may be operated in the USA only using 1 of 256 bit coding (modulation).

When using Reader ID ISC.LR200-B and under optimum ambient conditions, the antennas can be operated in the configuration as described here in EU countries using a maximum of 8 W, or 3.0 W in the USA (see Appendix A, test report from EMC Testhaus Dr. Schreiber). If the limit values are higher or lower, the RF power must be adjusted accordingly or the magnetic radiation needs to be reduced by shielding the antennas.

When commissioning the antennas, the system integrator should be sure that the installation instructions are followed, the necessary Reader settings have been made and that the limit values prescribed by the national regulatory agency are not exceeded.

Furthermore the Reader must be configured as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Europe</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF-Power – CFG 3</td>
<td>8 W</td>
<td>3.0 W</td>
</tr>
</tbody>
</table>

**ISO15693 Label**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Europe</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downlink RF Modulation – CFG 8 / ISO-MODE / MOD</td>
<td>10 %</td>
<td>10%</td>
</tr>
<tr>
<td>Downlink RF Data coding – CFG 8 / ISO-MODE / FAST</td>
<td>Fast (1/4) or Normal (1/256)</td>
<td>Normal (1/256)</td>
</tr>
<tr>
<td>Timeslots - CFG 8 / ISO-MODE / NO-TS</td>
<td>16 Timeslots</td>
<td>16 Timeslots</td>
</tr>
<tr>
<td>Inventory Command Option – CFG 8 / ISO-CMD-OPTION / BREAK</td>
<td>Complete Timeslot length at “NO TAG“</td>
<td>Complete Timeslot length at “NO TAG“</td>
</tr>
</tbody>
</table>

**I-Code 1**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Europe</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downlink RF Data coding – CFG 8 / ICODE-MODE / FAST</td>
<td>Fast Mode (1/1) or Normal Mode (1/256)</td>
<td>- Normal Mode (1/256)</td>
</tr>
</tbody>
</table>
8.6.1. Installing the toroid cores for use in the USA

To meet EMC requirements in the USA according to FCC Part 15, two toroid cores must be installed in the cables for ID ISC.ANT800/800 types A and B (see drawing below).

The EMC toroid core (Ø 28 mm x 20 mm, dia 1.1 in x 0.787 in) supplied with the Reader must be installed at the beginning of the cable. Loop the antenna cable at least four times tightly through the toroid core. The distance between the Reader connection and the toroid core should be no more than 10 cm (3.9 in). This toroid core is included with the antennas.

In addition, the Ø 41 mm x 15 mm EMC toroid core must be installed exactly in the center of the antenna cable. Loop the coaxial cable at least ten times tightly through the toroid core.

Figure 22: Installing the two toroid cores on the antenna cable
8.7. Minimum distances between two gates

If multiple antennas are located in a room, building or plant, they may mutually interfere with each other. This reduces the read range and reliability of the gates and systems. Your planning should therefore allow for a minimum separation of 8 m between the gates.

If shorter distances are necessary, you can minimize the mutual interference between the antennas by multiplexing and shielding. Multiplexing takes place several times a second, so that the user of a personnel gate will not notice it.

When the HF field is multiplexed, the Reader only turns on the RF power when a protocol is sent and a reply from the label is expected. This means the gates are not continuously on but rather are cycled on and off.

When the transmission protocol is multiplexed, the RF power is always turned on, but the Readers send and receive the protocols to and from the label in alternation. This ensures that the second Reader does not send while the first Reader is exchanging protocols with the label.

For separations of 1 m you must also install a shielding panel. This panel is placed in the middle between the gates, parallel to the antennas, and should be dimensioned to be at least as large as the antennas not including the housing.

Table 1 Minimum separations between the gates and systems

<table>
<thead>
<tr>
<th>Gate and/or system wiring</th>
<th>Setting in the Reader CFG11 field: Synchronization</th>
<th>Minimum separation between the gates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two systems without multiplexing</td>
<td>OFF</td>
<td>8 m</td>
</tr>
<tr>
<td>Multiplexing of the transmission protocols</td>
<td>Cascaded, RF stays on, Master/Slave</td>
<td>5 m</td>
</tr>
<tr>
<td>Multiplexing the HF field</td>
<td>Cascaded, RF switched off, Master/Slave</td>
<td>2 m</td>
</tr>
<tr>
<td>Multiplexing the HF field, shield between the systems</td>
<td>Cascaded, RF switched off, Master/Slave</td>
<td>1 m</td>
</tr>
</tbody>
</table>

RW : Antenna read range
A = base antenna with reader  
B = complementary antenna

Both reader modules has to be mounted into the base antenna  
ID ISC.ANT1400/700-A.

X1= SMA plug for connecting a complementary antenna  
X2= SMA plug for connecting a base antenna  
PS = Power Splitter ID ISC.ANT. PS-A  
T = Transformer ID ISC.ANT.T-A  
EC= ID ISC.ANT.EC

minimum distance to metal part: 50 mm  
minimum distance to metal part: 500 mm  
minimum distance to metal part: 850 mm  
minimum distance to metal part: 2,0 m
8.8. Measuring the standing wave ratio (VSWR)

Once an antenna has been calibrated or the local conditions have changed, the question arises: How well are the Reader and base antenna adjusted to each other? A useful tool for evaluating the adjustment of the antenna to the impedance of 50 $\Omega$ is the VSWR meter. This device measures the ratio between outgoing and reflected energy. A VSWR of up to 1.3:1 is considered a good value. A wattmeter is often integrated into these devices.

Figure 23: Inserting a VSWR meter into the antenna cable

The cable between the Reader and the SWR meter should either be very short (< 20 cm) or 7.20 m (RG 58=Lambda/2) long. If the VSWR is greater than 1.3:1 after tuning, use trim capacitors C1 and C2 to perform a slight adjustment.

Furthermore the VSWR meter can be used at any time to check the tuning of the base antennas. If changes in local conditions result in detuning of the antennas, this can be verified whenever desired.

In addition to the losses indicated by the SWR due to mismatching between the cable and the antenna, it happens that the Reader drives different output currents depending on the antenna impedance, resulting in power variance. This means that at 50 $\Omega$ a current of approx. 0.3 A flows. No current flows when an output is open, and when there is a short circuit the current is limited to approx. 1.0 A. Matching the antenna also has a slight effect on the noise levels.
8.9. Measuring the phase angle and checking the antenna currents

To check or fine adjust the phase angle between the base and complementary antenna, use an oscilloscope and 2 small test loops made of wire to measure the phase angle. AT 13.56 MHz and a phase shift of 90° between the base and complementary antenna, the time delay will be 18.4 ns. Figure 24 shows a printout of this measurement.

Use trim capacitors C37 and C38 to correct the phase of the currents between the two antennas. After tuning the two associated trim capacitors C37 and C38 should be set to approximately the same capacitance.

If the adjustment range of the trim capacitors is not sufficient, set for the best possible phase value. Now both trim capacitors must be set their minimum or maximum. Then turn the capacitors 180°, from either their minimum or maximum. Now you must recalibrate the antennas using the ID ISC.SAT.C controller. Then you will have double the adjustment range available.

Furthermore the antenna current in both antennas making up a gate should be the same. This can be checked by measuring the amplitude and corrected by changing the serial resistors R (JP8, JP1-4).

If both currents are the same, the RF power of the Reader will be distributed evenly between both antennas. This means that in a gate consisting of two antennas and at a RF power of 8 W, both antennas will operate at 4 W.

Important: Both test loops must be the same size, have the same cable length, be attached at the same antenna position, and be exactly parallel to each other. In addition, they should be attached as close to the center of the antenna surface as possible.
8.10. Notes on routing the antenna cable

Note the following when routing cable for individual antennas or antenna gates:

- Do the final antenna cable routing **before tuning**. If any later changes are made, use an oscilloscope to check the phase and amplitude of the currents.

- To obtain optimal read ranges, do **not shorten or lengthen** the antenna cable. If an extension is absolutely necessary, this can be done using a 50 Ω cable having a length of $\frac{\lambda}{2}$ (half a wavelength at 13.56 MHz, RG58=7.20 m). A slight loss in sensitivity will result.

- If the cable is too long, the excess cable should be wrapped into a loop having a diameter of 10-15 cm (3.9 – 5.9 in) and should be fixed as far as possible from the antenna tube.

- If the antenna cable must be routed closer to the antenna, maintain at least 20 cm (7.9 in) distance.

- The antenna cable must be kept at least 30 cm (11.8 in) from parallel routed, current carrying cables.

Figure 26: Read ranges* as a function of the antenna cable in $\frac{\lambda}{2}$ increments

*Label 46 x 75 mm (1.8 x 2.9 in) over the center of an ID ISC.ANT800/600-A antenna, sensitivity / minimum field strength $H_{\text{min}}=80$ mA/m rms, label oriented parallel to antenna, RF power 4 W.
9. Technical Data

9.1. Antenna ID ISC.ANT1400/700- Type A, B or C

### Mechanical specifications

- **Case**
  ABS plastic, UV stabilized

- **Dimensions (W x H x D)**
  776 x 1658 x 120 mm ± 5 mm

- **Weight**
  - ID ISC.ANT1400/700-A
    - approx. 22 kg
  - ID ISC.ANT1400/700-B
    - approx. 22 kg
  - ID ISC.ANT1400/700-C
    - approx. 22 kg

- **Enclosure rating**
  IP 54

- **Colors**
  - Antenna body
    - Metallic light gray
  - Upper and lower covers
    - Slate gray like RAL7015

- **Attachment**
  - Number of attachment points
    - 2
  - Recommended mounting rods
    - Ø 8 – 10 mm
  - Recommended minimum load capacity of the floor mount
    - 5000 N / rod

- **Maximum horizontal loading on the antenna top edge**
  - 250 N*

### Electrical specifications

- **Maximum RF power per antenna**
  - 8 W

- **Permissible total RF power**
  - EU countries (per EN 300 330)
    - 8.0 W
  - USA (per FCC Part 15)
    - 3.0 W

- **Operating frequency**
  - 13.56 MHz

- **Ranges / gate distance**
  - One label orientation
    - typical 120 cm**
  - All label orientations
    - typical 90 cm***

- **Antenna connection**
  - 1 x SMA plug (50 Ω)

- **Antenna cable**
  - RG58, 50 Ω, approx. 2 m long
Ambient conditions

- Temperature range
  - Operating: –25°C to +50°C
  - Storage: –25°C to +70°C

Applicable standards

- RF approval
  - Europe: EN 300 330
  - USA: FCC Part 15
- EMC: EN 300 683
- Safety
  - Europe: EN 60950 (on request)
  - USA: UL 1950 (on request)

* Plastic strain after load alleviation approx. 0.5 cm.

** 2 antennas ID ISC.ANT1400/700-A, distance between the antennas (antenna center), same current direction, label 46 x 75 mm, sensitivity / minimum field strength H_{min}=80 mA/m rms, RF power 8 W, label orientation parallel to antenna with horizontal travel through the antenna.

*** Label 46 x 75 mm, sensitivity / minimum field strength H_{min}=80 mA/m rms, RF power 8 W, aligned in all 3 dimensions with horizontal travel through the antenna.

For technical data of the reader modul ID ISC.LRM200, that is mount into the antenna ID ISC.ANT1400/700-A, see Installation document of the reader.

9.2. Side covers ID ISC.ANT1400/700-CP

Mechanical Specifications

- Material: Plastic PS Polystyrol UV stabilized
- Color: Blue, similar to RAL5022
- Dimensions (W x H x D): 437 x 1546 x 27 mm
- Weight: 7.4 kg (3.7 kg each)
- Packing unit: 2 pcs.

The side covers ID ISC.ANT1400/700-CP are to be ordered separately as needed. One packing unit per antenna, i.e. two packing units for a simple arrangement using two antennas are required.
Appendix A: Helpful tools for constructing and testing the antennas

The following equipment is recommended for tuning, troubleshooting and commissioning the antennas:

- Laptop or personal computer (PC) running under Microsoft Windows 95, 98, ME, 2000, XP.
- Service software ISCStart (V4.02 or higher). This software can be found on the OBID® i-scan CD-ROM supplied by FEIG ELECTRONIC GmbH.
- SWR and Power Meter including SMA connectors (female) or appropriate adapters.
- Qty. 1 cable RG 58 C/U approx. 20 – 25 cm (7.8 – 9.8 in) long with two male SMA plugs (generally self-assembled).
- Qty. 1 dummy load 50 Ω with male SMA plugs
- Suitable screwdriver for antenna tuning, with plastic blade, 2.4x0.5 mm.
- 2-channel oscilloscope, sweep rate at least 10 ns/Div or analog bandwidth of 100 MHz.
- Qty. 2 test loops 2.5 m long (consisting of 50 Ohm, RG58 cable with BNC plug and wire loop (diameter approx. 75 mm [3.0 in]) at the other end (generally self-assembled).

The following tools are optional but helpful:
- HF Impedance Analyzer (for 13.56 MHz)
Recommended equipment and possible sources:

1. **VSWR – Meter**

Alan CTE International VSWR & Power – Meter KW 220  
*Vendors:*
- CB Funkshop Rößner, 91637 Wörnitz, Tel.09868/932945, [http://www.cb-funkshop.de](http://www.cb-funkshop.de)  
- Garant – Funk, 53879 Euskirchen, Tel. 02251/55757

Alan CTE International VSWR and Wattmeter K155  
*Vendor:*
- Conrad Electronic

2. **Antenna analyzer**

MFJ HF/UHF SWR Analyzer
- Model MFJ-259B, 1.8 – 170 MHz  
*Vendors:*
- Austin Amateur Radio Supply, USA 1-800 423 2604  
- VHT – Impex, Ecke, Germany, Tel.: 05224/9709-0

CIA – HF Complex Impedance Analyzer 5012 – 5000  
*Vendors:*
- Garant – Funk, 53879 Euskirchen, Tel. 02251/55757

3. **Adapter : UHF-> BNC, BNC-SMA, SMA-SMA, Abschlußwiderstand 50 Ω**  
*Vendors:*
- Bürklin OHG, [http://www.buerklin.com](http://www.buerklin.com)  
- Conrad.com AG, [http://www.conrad.de](http://www.conrad.de)  
- Farnell Electronic Components GmbH, 82041 Oberhaching, [http://www.farnell.com](http://www.farnell.com)

4. **Amber / Tuning screwdrivers with plastic blade**  
Blade size: 2.4x0.5mm  
*Vendors:*
- Bürklin Bestellnummer 06 L 8364
5. Oscilloscope
Tektronix TDS 210 or a model from the TDS2xx or TDS3xx series
Agilent 54622D or a model from the 546xx series
Voltcraft 100 MHz- Oscilloskope 6100

Vendors:
- DataTec GmbH, 72770 Reutlingen, http://www.datatec.com

6. EMC ferrite toroid cores
Diameter da=28, di=16, l=20, B.Nr.742 701 4
Diameter da=40,6 di=27,4 l=15, B.Nr.742 701 5

Vendor
Würth Elektronik GmbH & Co.KG
Riedenstraße 16
74635 Kupferzell
Tel.: 07944 / 91 93 0
www.wuerth.de oder www.wuerth.com

7. Power Supply for the reader modul ID ISC.LRM200 230V/24V or 110/24V
1. ID ISC.24VDC-A Power Supply Unit 24V.
   article number: 1753.000.00
   Vendor:
   FEIG ELECTRONIC GmbH

2. DRP-60-I
   Vendor:
   LAMDA Electronics GmbH
   Josef-Hund-Str.1
   D-77855 Achern
   Tel.:+49 (0) 7841 50 00

3. Silverline SL2.5
   Vendor:
   PLUS GmbH
   Arabellastraße 15
   D-81925 München
   +49 (0) 89 9278 0
Appendix B: Test report from EMC Testhaus Dr. Schreiber GmbH

Following is the test report from EMC Testhaus Dr. Schreiber GmbH for this application

H-Field Emission at 13.56 MHz (Carrier)

H-Field Emission at 27.12 MHz (1 Harmonic)
TEST OBJEKT: Longrange-Antenna ID ISC.ANT1400/700-A,B
tested on

Electromagnetic Compatibility

<table>
<thead>
<tr>
<th>EMC REQUIREMENTS</th>
<th>FULFILLED</th>
</tr>
</thead>
</table>

CUSTOMER
FEIG ELECTRONIC GmbH
Mr. Wolfgang Meißner
Lange Straße 4
35781 Weilburg

EMC TestHaus Dr. Schreiber GmbH, Siegen
accredited acc. DIN EN45001
DAR Reg.Nr. TTI-P-G022/97-00
Tel: 0271 382702
Fax: 0271 382758
E-mail:0271 382702-0001@t-online.de

Dr.-Ing. Dieter Schreiber
General Manager

Date of receipt Aug. 23.2001
Test finalized Aug. 23.2001
Date of Distribution: Aug. 24.2001

Note: Without written permission of our company the report may not be reproduced in parts.
## Test Report 22/14

**TEST OBJEKT:** Longrange-Antenna ID ISC.ANT1400/700-A,B

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</tr>
<tr>
<td>Configuration B</td>
<td>4</td>
</tr>
<tr>
<td>Configuration C</td>
<td>5</td>
</tr>
<tr>
<td>Testplan</td>
<td>6</td>
</tr>
<tr>
<td>Photo</td>
<td>7-9</td>
</tr>
</tbody>
</table>

### EN300330-2 Emission

<table>
<thead>
<tr>
<th>Test Object</th>
<th>Page</th>
<th>Test Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN300330-2</td>
<td>10-12</td>
<td>Yes</td>
</tr>
</tbody>
</table>
TEST OBJEKT: Longrange-Antenna ID ISC.ANT1400/700-A,B

CONFIGURATION A

EQUIPMENT UNDER TEST:

- Longrange-Antenna ID ISC.ANT1400/700-A
- Transformer ID ISC.ANT.T-A
- Reader ID ISC.LR200-B

Dimensions of unit under test (gate): about 1400 x 700 x 1000 mm
CONFIGURATION B

EQUIPMENT UNDER TEST:

- Longrange-Antenna ID ISC.ANT1400/700-B
- Longrange-Antenna ID ISC.ANT1400/700-A
- Longrange-Antenna ID ISC.ANT1400/700-B
- Power splitter ID ISC.ANT.PS
- Transformer ID ISC.ANT.T
- Reader ID ISC.LR200-B

Dimensions of unit under test (gate): about 1400 x 700 x 2000 mm
TEST OBJEKTT: Longrange-Antenna ID ISC.ANT1400/700-A,B

CONFIGURATION C

EQUIPMENT UNDER TEST:

- Longrange-Antenna ID ISC.ANT1400/700-A
- Power splitter ID ISC.ANT.PS
- Reader ID ISC.LR200-B
- 230 VAC

Dimensions of unit under test (gate): about 1400 x 700 x 2000 mm
TEST OBJEKT: Longrange-Antenna ID ISC.ANT1400/700-A,B

Testplan

Equipment under test

The unit under test is a Longrange-Antenna which is operated with a Longrange-Reader for identification of Smart Labels.
The unit under test is used e.g. in department stores or industry.
The carrier frequency of the antenna is 13,56 MHz.

Testmode:

On, normal operating conditions with transmitting power of 10W.
There are tested several configurations.

Testequipment:

The used devices are maintained and calibrated according handbook of quality systems of EMC TestHaus Dr. Schreiber GmbH.

About the results:

The results are valid only for the sample tested. The manufacturer is responsible for the documentation of the tested configuration.
TEST OBJEKT: Longrange-Antenna ID ISC.ANT1400/700-A,B

Photo of EUT Config. A
TEST OBJEKT: Longrange-Antenna ID ISC.ANT1400/700-A,B

Photo of EUT Config. B
TEST OBJEKT: Longrange-Antenna ID ISC.ANT1400/700-A,B

Photo of EUT Config. C
TEST OBJEKT: Longrange-Antenna ID ISC.ANT1400/700-A,B

MEASURING PROCEDURE

H-Field Emission according EN300330-2

The unit under test is measured at his carrier frequency, which is of the range 9 kHz - 30 MHz, with an antenna distance of 10 meters in the free field. The object under test is rotated by 360°. The rotation is stopped if a maximum of emission is found. After that the H-Field-antenna is rotated by 360° to find the definitive maximum level. The measured values are Quasi-Peak values in dBµV. For calculation in dBµA/m the frequency-independent antenna-factor 20 dB [1/m] of the H-Field-antenna is added and the logarithmus of the wave impedance $Z_0$ (51,5 dB) is subtracted.

Used Equipment

<table>
<thead>
<tr>
<th>Inv.No.</th>
<th>Device</th>
<th>Tolerance</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2</td>
<td>ESH3 receiver</td>
<td>± 1,5 dB</td>
<td>R &amp; S</td>
</tr>
<tr>
<td>E10</td>
<td>antenna HFH2-Z2</td>
<td>± 1,0 dB</td>
<td>R &amp; S</td>
</tr>
<tr>
<td>X1</td>
<td>free field</td>
<td>± 3,9 dB</td>
<td></td>
</tr>
</tbody>
</table>
**EMC TestHaus Dr. Schreiber GmbH, Eiserfelderstr. 316, Siegen**

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**TEST OBJEKT:** Longrange-Antenna ID ISC.ANT1400/700-A,B

**EMISSION - H-Field acc. EN300330-2**

Limits kept

- Range: 9 kHz - 30 MHz
- Date: 23.08.01   Operator: C.H.

**Configuration A**

<table>
<thead>
<tr>
<th>Frequency in MHz</th>
<th>QP Emission in dBμV</th>
<th>Antenna-factor in dB</th>
<th>Angle Antenna</th>
<th>Angle EUT</th>
<th>Limit in dBμA/m</th>
<th>Value in dBμA/m</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.56</td>
<td>71</td>
<td>20</td>
<td>0°</td>
<td>90°</td>
<td>42</td>
<td>39.5</td>
</tr>
<tr>
<td>1.Harmonic</td>
<td>28</td>
<td>20</td>
<td>0°</td>
<td>90°</td>
<td>-3.5</td>
<td>-3.5</td>
</tr>
<tr>
<td>27.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Configuration B**

<table>
<thead>
<tr>
<th>Frequency in MHz</th>
<th>QP Emission in dBμV</th>
<th>Antenna-factor in dB</th>
<th>Angle Antenna</th>
<th>Angle EUT</th>
<th>Limit in dBμA/m</th>
<th>Value in dBμA/m</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.56</td>
<td>73.5</td>
<td>20</td>
<td>0°</td>
<td>0°</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>1.Harmonic</td>
<td>28</td>
<td>20</td>
<td>0°</td>
<td>0°</td>
<td>-3.5</td>
<td>-3.5</td>
</tr>
<tr>
<td>27.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TEST OBJEKT: Longrange-Antenna ID ISC.ANT1400/700-A,B

EMISSION - H-Field acc. EN300330-2 Limits kept

Range: 9 kHz - 30 MHz
Date: 23.08.01 Operator: C.H.

**Configuration C**
(equal current direction)

<table>
<thead>
<tr>
<th>Quality-factor = 27, output power 10 W</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency in MHz</strong></td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>13.56</td>
</tr>
<tr>
<td>27.12</td>
</tr>
</tbody>
</table>

**Configuration C**
(opposite current direction)

<table>
<thead>
<tr>
<th>Quality-factor = 27, output power 10 W</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency in MHz</strong></td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>13.56</td>
</tr>
<tr>
<td>27.12</td>
</tr>
</tbody>
</table>

Result:

**H-Field Emission acc. EN300330-2:** passed