Annex no. 5

User Manual

Date: 2012-06-11   Vers. no. 1.12

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INTEGRATION

ID ISC.LRM1002-E

Long Range Reader Modul

(English)

FEIG
ELECTRONIC

Note

Content

1   Safety Instructions / Warning - Read before start-up !

- The device may only be used for the purpose intended by the manufacturer.

- The operation manual should be kept readily available at all times for 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 unauthorized measures shall exclude the manufacturer from any liability.

- The liability-prescriptions of the manufacturer in the issue valid at the time of purchase are valid for the device. The manufacturer shall not be held legally responsible for inaccuracies, errors, or omissions in the manual or automatically set parameters for a device or for an incorrect application of a device.

- Repairs may only be undertaken by the manufacturer.

- Installation, operation, and maintenance procedures should only be carried out by qualified personnel.

- Use of the device and its installation must be in accordance with national legal requirements and local electrical codes .

- When working on devices the valid safety regulations must be observed.

- Before touching the device, the power supply must always be interrupted. Make sure that the device is without voltage by measuring. The fading of an operation control (LED) is no indicator for an interrupted power supply or the device being out of voltage!

- Special advice for wearers of cardiac pacemakers:
  Although this device doesn't exceed the valid limits for electromagnetic fields you should keep a minimum distance of 25 cm between the device and your cardiac pacemaker and not stay in the immediate proximity of the device's antenna for any length of time.

2   Performance Features of Reader Family ID ISC.LRM1002

2.1   Performance Features

The Reader has been developed for reading passive data carriers, so-called „Smart Labels", using an operating frequency of 13.56 MHz. For the operation it is necessary to connect a appropriate external antenna to the connector ANT1.

2.2   Available Reader Types

The following Reader type's are currently available:

Reader type	Description
ID ISC.LRM1002-E	Module version with RS232 / USB / LAN-Interface

Table 1: Available Reader types

3   Installation and mounting

3.1   Mounting ID ISC.LRM1002-E

The Reader Module is designed for installation on a heat sink. Mounting is accomplished using the $\varnothing$ 4.5 mm holes located on the base plate (see: Figure 1).
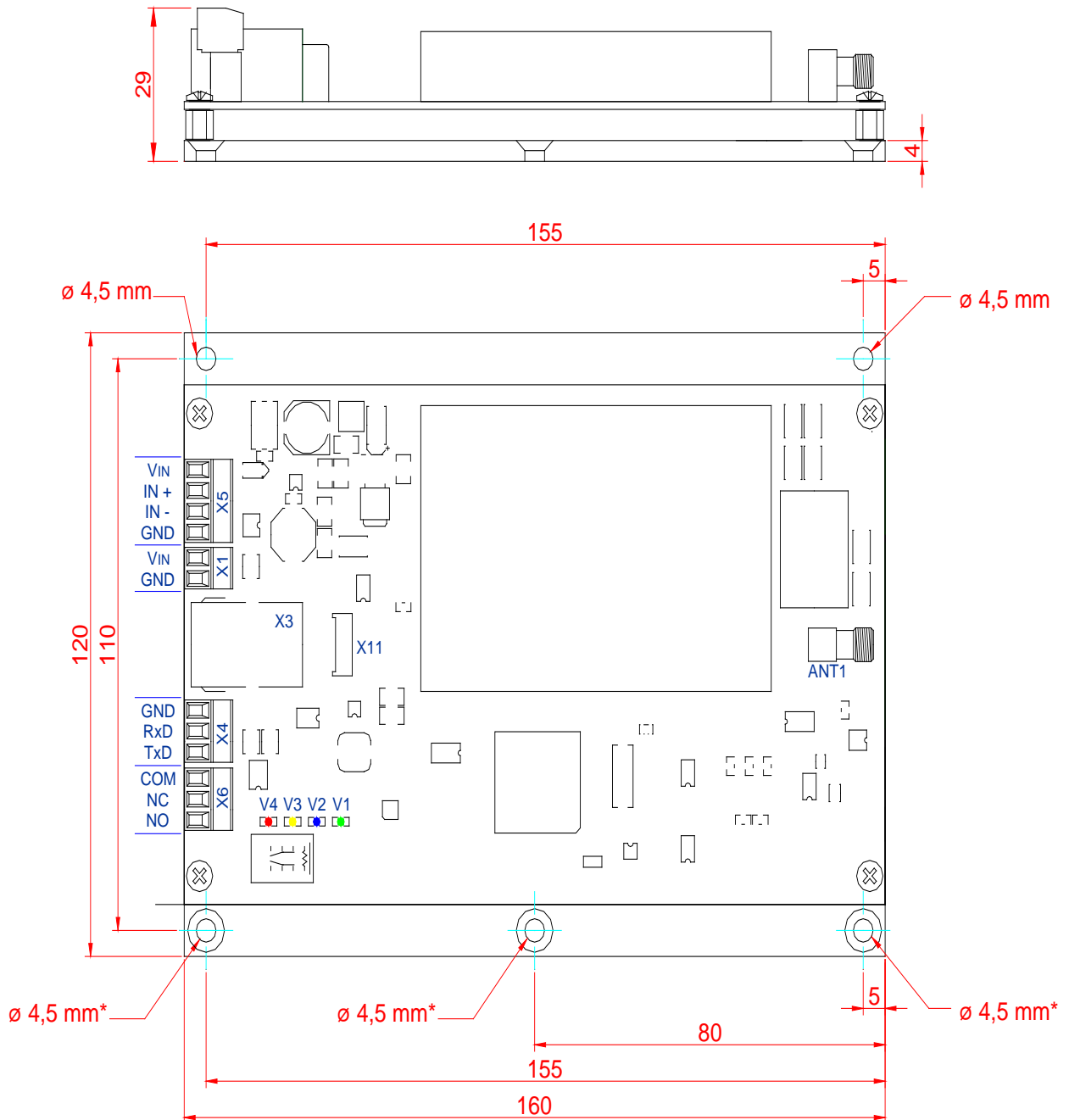
Figure 1: Scale drawing oft the Reader module ID ISC.LRM1002-E with mounting plate

To fully exploit the performance of the Reader Module, the heat sink should have a thermal resistance R_{ThK} of max. 2 K/W. When attaching the Reader Module to the heat sink you should strive for a little heat transfer resistance between the base plate and the heat sink as possible. The use of heat sink compound is recommended.

If the antenna is properly tuned and there is sufficient air convection along the mounting plate, the ID ISC.LRM1002-E can be operated without an additional heat sink at up to 2W of power. Note here however that detuning of the antenna can result in additional heating of the Reader. In such cases the Reader regulates its output power down until the upper temperature limit of its final stage fallen down again.

3.2   Terminals

Figure 5 shows the terminals and control elements of the ID ISC.LR(M)1002-E
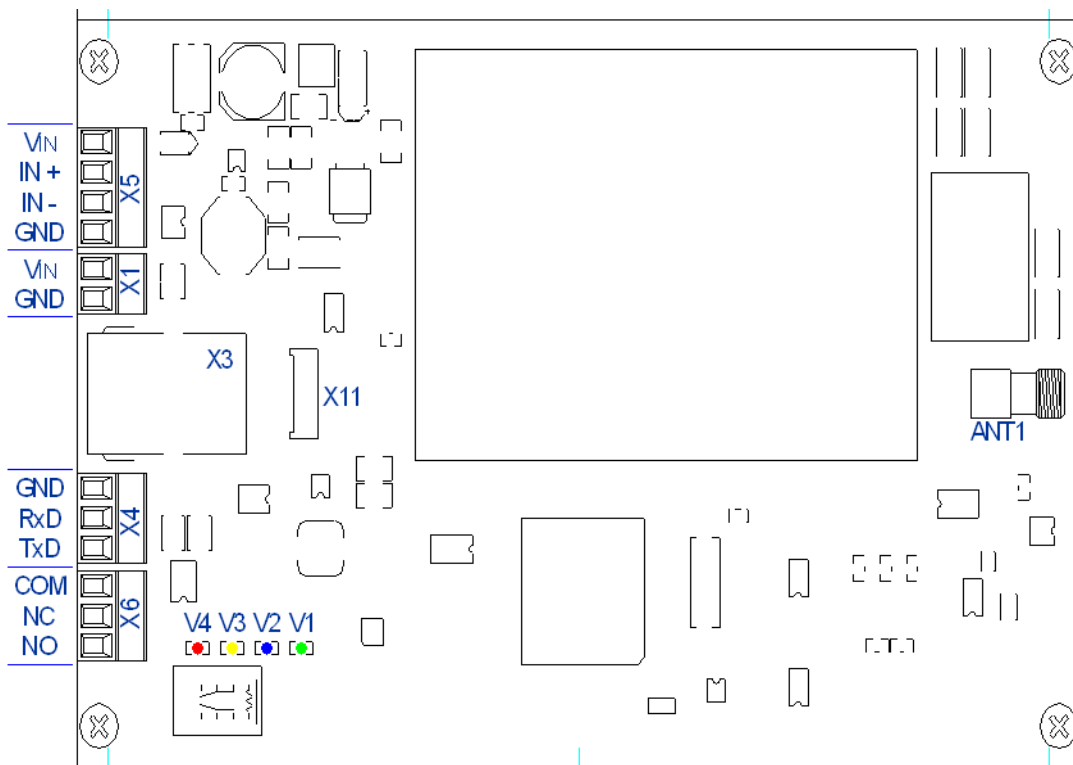
Figure 2: Reader terminals

3.2.1   Antenna connection

The SMA socket „ANT1" is located on the circuit board for connecting the antenna to the ID ISC.LRM1002.

A external LED can also be supplied with 6,5 V $\overline{\underline{\cdots}}$ through the antenna terminal.
This can be controlled by software. The maximum current draw is then not allowed to exceed 20mA.

The voltage is not sufficient to support the dynamic antenna tuning board ID ISC.DAT
See: [Connection of a ID ISC.DAT (Dynamic Antenna Tuning Board)](#)

The maximum tightening torque for the SMA socket is 0.45 Nm (4.0 lbf in).

Attention:
Exceeding the tightening torque will destroy the socket.

Terminal	Description
ANT1	For connecting the antenna (Input Impedance 50Ω)

Table 2: Antenna jack

- **The standing wave ratio VSWR for the antenna should not exceed a value of 1,3.**

- **For reaching optimal read ranges the coaxial cables between readers and antenna must have defined lengths. For all antennas of the company FEIG ELECTRONICS GmbH and for all antennas which with the tuning boards (e.g. ID ISC.DAT, ID ISC.MAT b and ID ISC.MAT s) of FEIG ELECTRONICS GmbH is made the optimal length of the coaxial cable is 1.35 m (Article No. 1654.004.00.00, Name ID ISC.ANT.C-B). See also Mounting Manual Power Splitter ID ISC.ANT.PS-B and ID ISC.ANT.MUX.**

- **The optimum operating Q factor of the antenna should be in a range of Q_{oper} = 10...30. To determine the operating Q the antenna must be supplied with a 50 Ohm source such as a network analyzer or frequency generator.**

- **To prevent external coupled noise, the antenna cable must be fitted with the included EMC ferrite ring core ∅ 28 mm x 20 mm. The antenna line must be wound around the ring core for at least 4 turns. The distance between the Reader termination and the ring core should be maximum 10 cm (see Figure 3).**

- **When connecting an antenna, ensure that it does not exceed the permissible limits prescribed by the national regulations for radio frequency devices.**

Figure 3: Antenna line with EMC ring cores

3.2.1.1 Connection of a ID ISC.DAT (Dynamic Antenna Tuning Board)

For tuning a ID ISC.DAT tuning board a DC voltage is required. This DC voltage must be provided via a power splitter (ID ISC.ANT.PS-B) or a antenna multiplexer (ID ISC.ANT.MUX)

Figure 4 shows the DC supply of the ID ISC.DAT with a power splitter.
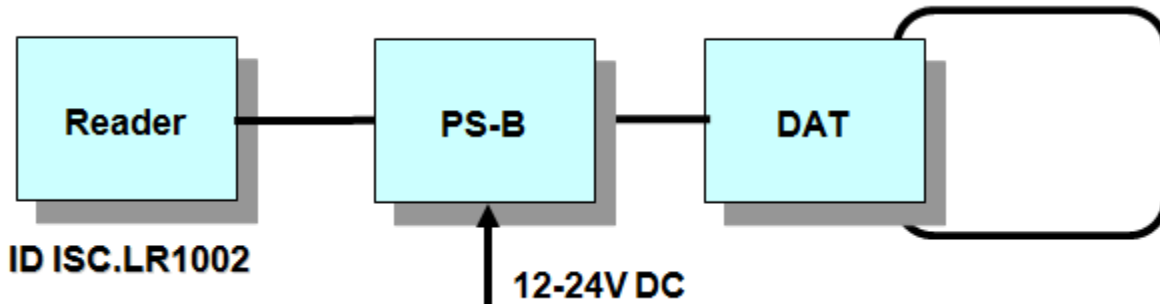
Figure 4: DC supply of a ID ISC.DAT using a power splitter ID ISC.ANT-PS-B

Figure 5 shows the DC supply of the ID ISC.DAT with a Antenna Multiplexer.
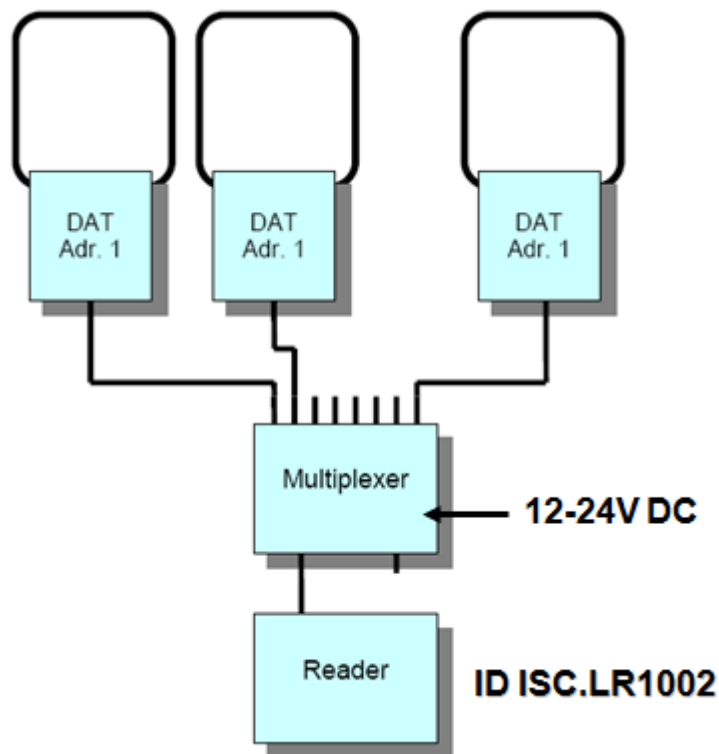
Figure 5: DC supply of a ID ISC.DAT using a ID ISC.ANT.MUX.

3.2.2 Supply voltage

The supply voltage of 24 V⎓ is connected to Terminal X1.

Terminal	Abbreviation	Description
X1	V$_{IN}$	Vcc – supply voltage + 24 V ⎓
X1	GND	Ground – supply voltage

Table 3: Pin-outs for supply voltage on X1
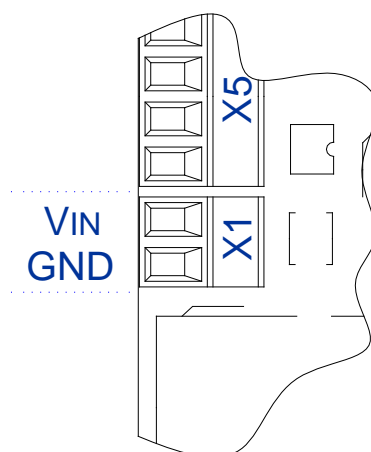
Figure 6: Position oft he connector X1 for the power supply

Note:

- **Reversing the supply voltage polarity may destroy the device.**

- **For reducing the noise the power supply line can be fitted with one EMC ring cores ⌀ 28 mm x 20 mm. The power supply line must be wound around the ring core for at least 5 turns. The distance between the Reader termination and the ring core should be maximum 10 cm.**

3.2.3   OptocouplerInputs (X5 / IN1)

The optocoupler input is available on Terminal X5.
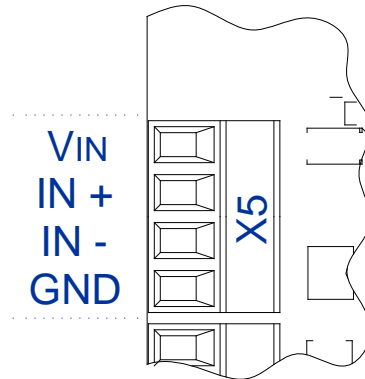
Figure 7: Optocoupler pin-outs on terminal X5

The optocoupler on terminal strips X5 is galvanically isolated from the Reader electronics and must therefore be powered externally. The external VCC voltage and GND (Ground) may however be provided by the connector VIN (24VDC) and GND from the reader. See: <u>Output 24V $---$ (X5 / VIN, GND)</u>
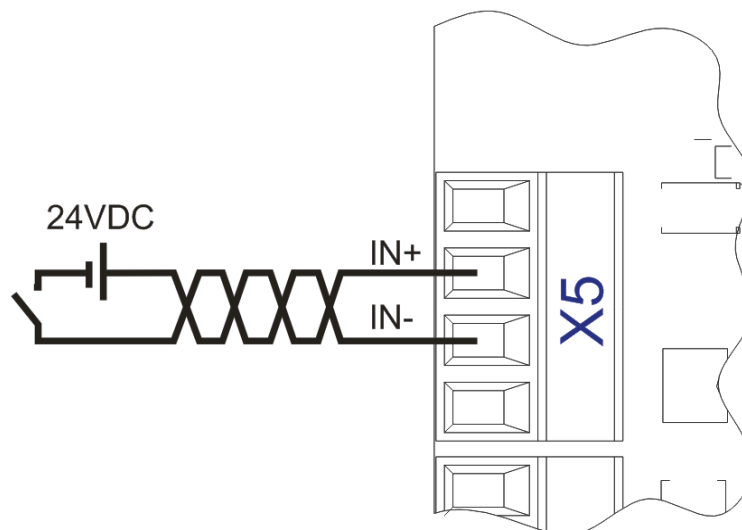
Figure 8: External power supply for the optocouplers
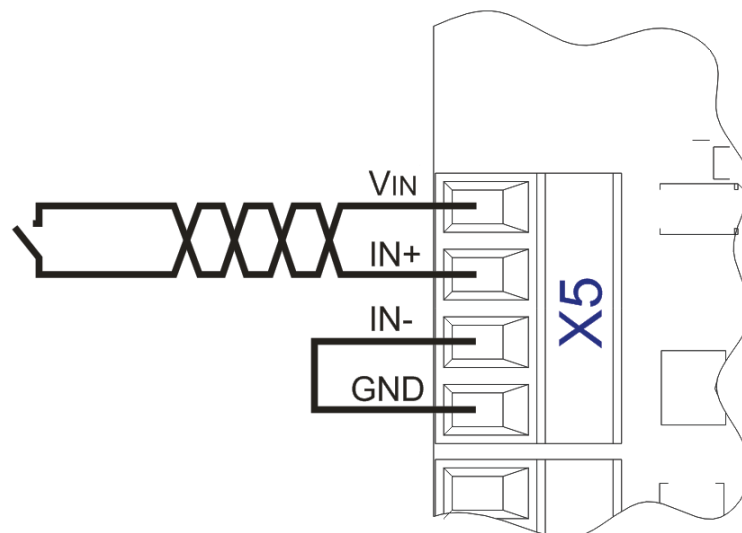
Figure 9: Possible internal power supply for the optocouplers

The input LED for the optocoupler is internally connected to a series resistor of 3,74kΩ and is limited to an input current of max. 6mA.

Note:

- *The input is configured for a maximum input voltage of 24 V $\overline{\cdots}$ and an input current of maximum 6mA.*
- *Reversing the polarity or overloading the input can destroy the device.*
- **Using internal and external voltage at the same time can destroy the reader.**

3.3 Relay (X6 / REL1)

The relay output has a changeover contact. These outputs, which are located on terminals X6, is galvanically isolated from the Reader electronics and must therefore be externally supplied. The external voltage may however be provided by the reader from connector X5 VIN and GND. See: Output 24V ⎓ (X5 / VIN, GND)

Figure 10: Relay Outputs on terminal X6
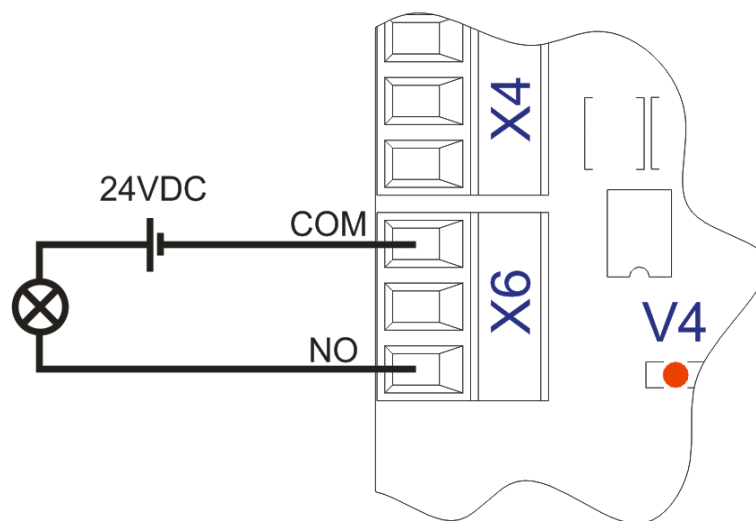
Figure 11: External wiring of the relay output's with external voltage

Notes:
- **The relay output is configured for max. 24 V ⎓ / 1 A.**
- **The relay output is intended for switching resistive loads only. If an inductive load is connected, the relay contacts must be protected by means of an external protection circuit.**
- **Using internal and external voltage at the same time can destroy the reader.**

3.3.1 Output 24V --- (X5 / Vin, GND)

The output **Vin/GND** can be used to power the optional external circuitry of the digital inputs or relay. The maximum current consumption must not exceed 1A.
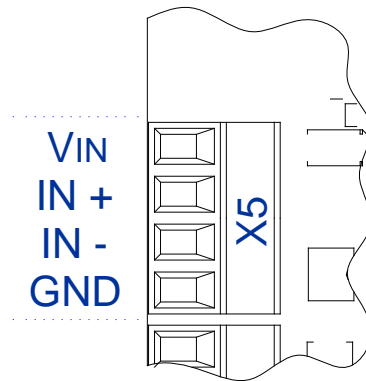
Figure 12: Optional 24V --- external voltage supply

Note:

- *For the dimensioning oft the power supply the power consumption for the external output circuitry must be additional considered to the typical reader power consumption.*

- **The internal 24V --- voltage on X5 is not protected by a fuse.**

3.4   Interfaces

3.4.1   RS232-Interface X4

The RS232 interface is connected on X4. The transmission parameters can be configured by means of software protocol.
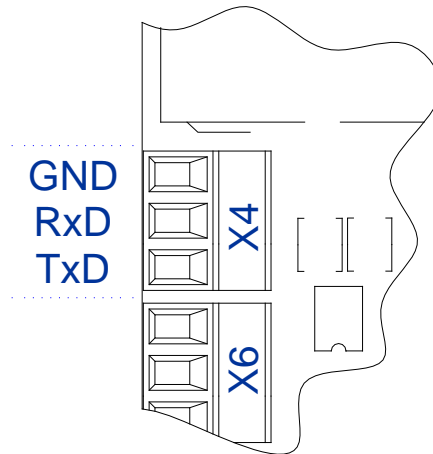
Figure 13: RS232 interface pin-outs on X4

Kurzzeichen	Description
TxD	RS232 – (Transmit)
RxD	RS232 – (Receive)
GND	RS232 – (Ground)

Table 4: Pin assignment of the RS232-Interface
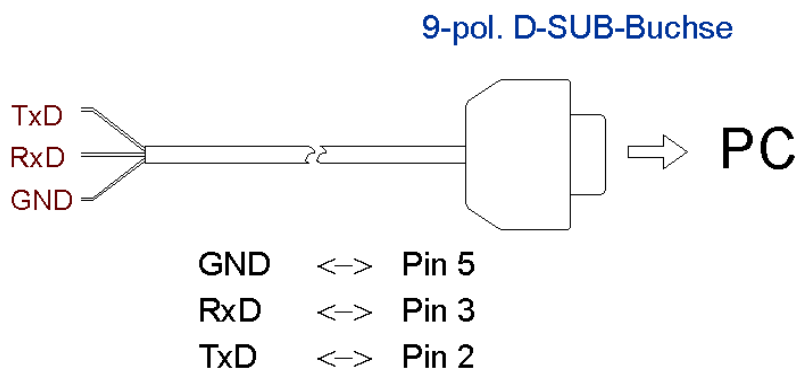
Figure 14: Wiring example for connecting the RS232 interface

3.4.2 USB – Interface X11 (Host Communication)

The USB socket on the board is terminal X11. The data rate is reduced to 12 Mbit (USB full speed). A standard USB-cable can be used.

Figure 15: USB-Interface for host communication

The Figure 19 and table shows the connection of connector X11 (5pol.) type "JST PH" RM 2 mm (vertical).

X2 Pin-No.		
1	Shielding	USB cable - shielding
2	GND	
3	USB-D PLUS	
4	USB-D MINUS	
5	VCC	+ 5 V DC ± 5 %

Figure 16: Connector „JST PH"

Optional the following USB cable can be ordered:

3541.000.00	ID CAB.USB-B Cable for Interface USB/JST PH

Note:

The length of the USB-cable can be a max. of 5m (200 inch). It is not allowed to use longer cables.

3.4.3 Ethernet-Interface on X3 (10/100 Base-T)

The Reader has an integrated 10 / 100 Base-T network port for an RJ-45. Connection is made on X3 and has an automatic "Crossover Detection" according to the 1000 Base-T Standard.

X3

Figure 17: LAN interface for host communication

With structured cabling CAT 5 cables should be used. This ensures a reliable operation at 10 Mbps or 100 Mbps.

The prerequisite for using TCP/IP protocol is that each device has a unique address on the network. All Readers have a factory set IP address.

Network	Address
IP-Adresse	192.168.10.10
Subnet-Mask	255.255.255.0
Port	10001
DHCP	OFF

Table 5 Standard factory configuration of the Ethernet connection

Note:

- *The Reader TCP/IP interface has a DHCP option.*
- *It is recommended to use a <u>shielded</u> twisted pair STP CAT5 cable.*

4 Operating and Display Elements

4.1 LEDs

Table 6 shows the LED configuration.

Abbreviation	Description
LED V1 (green)	"RUN-LED 1" - Indicates proper running of the internal Reader software (DSP) - Comes on during Reader initialization after power-on or after a reset.
LED V2 (blue)	Diagnostic 1: RF communication / EEPROM status - Short flashing indicates errorless communication with a transponder on the RF interface - Flashes alternately with V1 after a reset following a software update - Flashes alternately with V1 in case of a data error when reading the parameters after a reset
LED V3 (yellow)	Diagnostic 2: Host communication - Short flashing indicates sending of a protocol to the host on the RS232/USB and LAN-Interface
LED V5 (red)	Diagnostic 4: RF warning - Comes on when there is an error in the RF section of the Reader. The error type can be read out via software over the RS232/USB and LAN-Interface

Table 6: LED configuration

5   Radio Approvals

5.1   Europe (CE)

When used according to regulation, this radio equipment conforms with the basic requirements of Article 3 and the other relevant provisions of the R&TTE Guideline 1999/E6 dated March 99.

Equipment Classification according ETSI EN 301 489: Class 2 SRD

Declaration of Conformity

in accordance with the
Radio and Telecommunication Terminal Equipment Act (FTEG)
and
Directive 1999/5/EC (R&TTE Directive)

Product Manufacturer : **FEIG ELECTRONIC GmbH**
Lange Strasse 4
D-35781 Weilburg
Germany
Phone +49 6471 3109 0

Product Designation : **ID ISC.LR1002**
ID ISC.LRM1002

Product Description : Induktive Loop System

Radio equipment, Equipment class (R&TTE) : Class 1

FEIG ELECTRONIC GmbH declares that the radio equipment complies with the essential requirements of §3 and the other relevant provisions of the FTEG (Article 3 of the R&TTE Directive), when used for its intended purpose.

Standards applied :

Health and safty requirements pursuant to § 3 (1) 1. (Article 3(1) a))	EN 60950-1:2006/A1:2010 EN 50364:2010
Protection requirements concerning electromagnetic compatibility § 3 (1) 2. (Article 3(1) b))	ETSI EN 301489-1 V1.8.1 ETSI EN 301489-3 V1.4.1
Measures for the efficient use of the radio frequency spectrum pursuant to § 3 (2) (Article 3(2))	ETSI EN 300 330-1 V1.7.1 ETSI EN 300 330-2 V1.5.1

Weilburg, 08.08.2012
Place & date of issue

Markus Desch
Name and signature

This declaration attests to conformity with the named Directives but does not represent assurance of properties. The safety guidelines in the accompanying product documentation must be observed.

5.2   USA (FCC) and Canada (IC)

5.2.1   USA (FCC) and Canada (IC) warning notices

Product name:	**ID ISC.LRM1002-E**
Reader name:	**ID ISC.LRM1002-E**
FCC ID: **IC:**	**PJMLRM1002** **6633A-LRM1002**
Notice for USA and Canada	This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada. Operation is subject to the following two conditions. (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Unauthorized modifications may void the authority granted under Federal communications Commission Rules permitting the operation of this device. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Warning: Changes or modification made to this equipment not expressly approved by FEIG ELECTRONIC GmbH may void the FCC authorization to operate this equipment.

5.3   Label Information Reader Modul ID ISC.LRM1002-E

The following information has to be mount outside on the housing of the reader.

Contains FCC ID: PJMLRM1002
Contains IC: 6633A-LRM1002

5.3.1 USA (FCC) and Canada (IC) approved antennas

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with maximum permission gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list. Having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device

Following antennas are approved by FCC according FCC Part 15 and IC Canada according RS210

- ID ISC.ANT310/310-A
- ID ISC.ANTS370/270-A
- ID ISC.ANT1300/680-A

6   Technical Data

Mechanical Data

- **Dimensions (W x H x D)**   160 x 120 x 35 mm³
                                   6,29 x 4,72 x 1,37 inch³

- **Weight**   Approx. 0,35 kg
                                   0,77 lb

Electrical Data

- **Supply Voltage**   24 V $=$ ± 15 %
                                   Noise Ripple : max. 150 mV

- **Power Consumption**   max. 16 VA

- **Operating Frequency**   13,56 MHz

- **Transmit Power**   1W – 5 W

- **Modulation**   14%

- **Antenna Connection**   SMA Jack (50 Ω, SWR≤1.3)

- **DC Supply at Antenna Con-   6,5 V $=$ (max. 20mA)
  nector**

- **Diagnostic Options**   internal impedance monitoring
                                   internal temperature monitoring

- **Outputs
  – 1 Relay (NO)**   24 V $=$ / 1 A

- **Inputs
  – 1 Optocoupler**   24 V $=$ / 6 mA

- **Interfaces**   - RS232
                                   - USB
                                   - Ethernet (TCP/IP)

- **Protocol Modes**   - FEIG ISO HOST
                                   - BRM (Data Filtering and Data Buffering
                                   - Scan Mode
                                   - Notification Mode

- **Supported Transponders**
  - ISO15693, ISO18000-3 MODE 1
    (EM HF ISO Chips, Fujitsu HF ISO Chips,
    KSW Sensor Chips, IDS Sensor Chips,
    Infineon my-d, NXP I-Code, STM ISO Chips,
    TI Tag-it)

- **Optical Indicators**   4 LEDs for Operating Status Diagnostics

Ambient

- **Temperature Range**
  - **Operating**   -20°C to +55°C (-4°F to +131°F)
  - **Storage**   -25°C to +85°C (-13°F to +185°F)

- **Humidity**   5% - 80%, no condensation

- **Vibration**   EN 60068-2-6
  10 Hz to 150 Hz : 0,075 mm / 1 g

- **Shock**   EN 60068-2-27
  Acceleration   : 30 g

Applicable Standards

- **RF Approval**
  - **Europe**   EN 300 330
  - **USA**   FCC 47 CFR Part 15

- **EMC**   EN 301 489

- **Safety**
  - **Low Voltage Directive**   EN 60950
  - **Human Exposure**   EN 50364

INSTALLATION

ID ISC.LR1002-E
Long Range Reader

(English)

Note

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       D-35781 Weilburg-Waldhausen

       Tel.: +49 6471 3109-0

       http://www.feig.de

With the edition of this document, all previous editions become void. Indications made in this manual may be changed without previous notice.

Composition of the information in this document has been done to the best of our knowledge. FEIG ELECTRONIC GmbH does not guarantee the correctness and completeness of the details given in this manual and may not be held liable for damages ensuing from incorrect or incomplete information. Since, despite all our efforts, errors may not be completely avoided, we are always grateful for your useful tips.

The instructions given in this manual are based on advantageous boundary conditions. FEIG ELECTRONIC GmbH does not give any guarantee promise for perfect function in cross environments.

FEIG call explicit attention that devices which are subject of this document are not designed with components and testing methods for a level of reliability suitable for use in or in connection with surgical implants or as critical components in any life support systems whose failure to perform can reasonably be expected to cause significant injury to a human. To avoid damage, injury, or death, the user or application designer must take reasonably prudent steps to protect against system failures.

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Content

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Reader type	Description
ID ISC.LR1002-E	Housing version with RS232 / USB / LAN-Interface

Table 1: Available Reader types

3   Installation and mounting

3.1   Mounting ID ISC.LR1002-E (Housing)

The Reader is designed for wall mount, including outdoors. Holes are provided in the housing for wall attachment. The housing does not need to be opened for installation on a wall (see Figure 2).
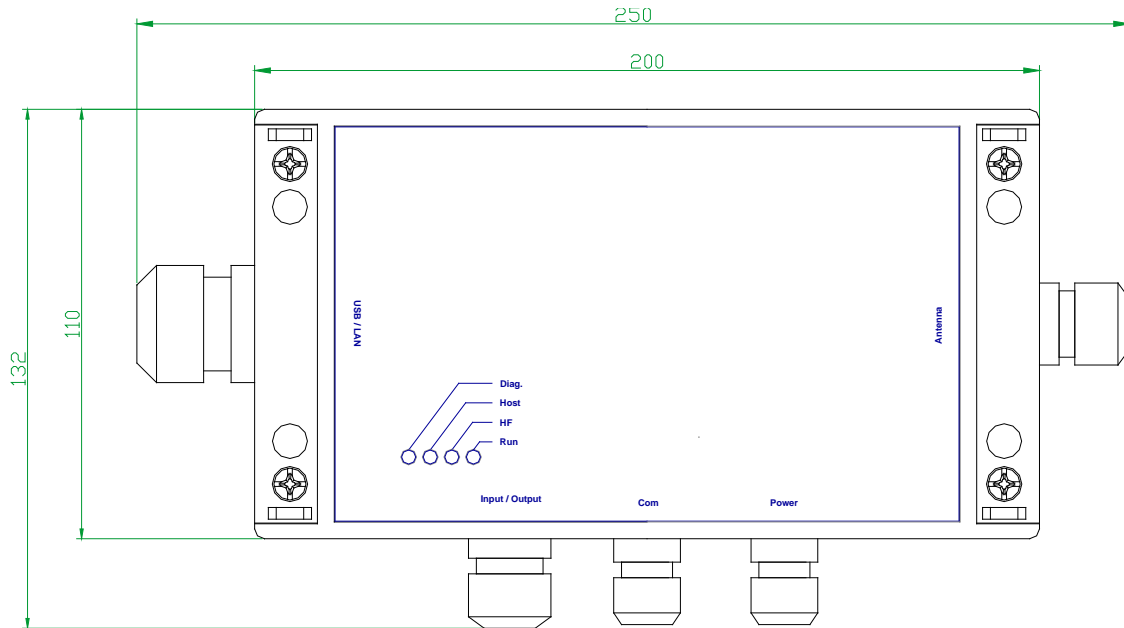
Figure 1: Housing ID ISC.LR1002-E (all dimensions in mm)

Cable gland	Size	Clamping range [mm]	Description
1	M 16	4,5 – 10	Antenna cable
2	M 12	3,5 – 7	Supply voltage
3	M 12	3,5 – 7	Interface (serial/USB)
2	M 16	4,5 – 10	Digital Input / Relais Output
6	M 25	9 – 17	Ethernet Interface

Table 2: Cable glands ID ISC.LR1002-E

3.1.1 Seal caps

The seal caps included in the scope of delivery can be used to close off unused cable fittings. Only than the protection class IP54 can be reached.

The reducing ring provided is intended for the network connection. The slotted reducer is placed over the network cable and then fixed in place in the cable gland.

3.1.2 Cover stays

The two cover stays can be used to attach the cover to the housing. The cover stays are inserted into the openings provided for this purpose.
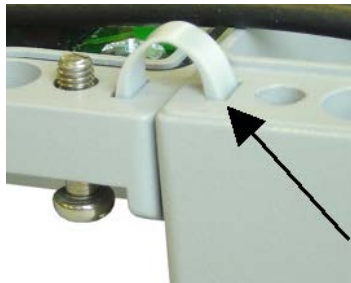

Figure 2: Cover stay

3.1.3 Decorative covers

The decorative covers are attached after installing the Reader.

The slot on the long side of the cover is used for disassembling the cover. Use a screwdriver to remove the cover.

Figure 3: Decorative cover

3.2 Terminals

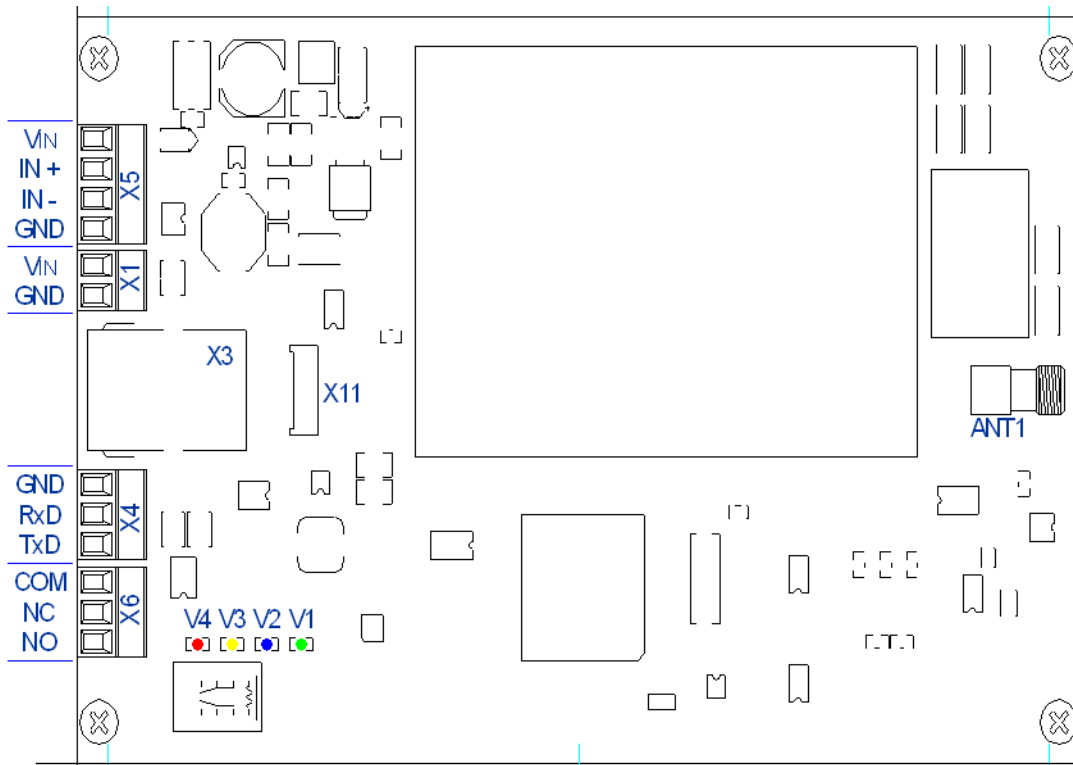Figure 5 shows the terminals and control elements of the ID ISC.LR(M)1002-E

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A external LED can also be supplied with 6,5 V $\overline{}$ through the antenna terminal.
This can be controlled by software. The maximum current draw is then not allowed to exceed 20mA.

The voltage is not sufficient to support the dynamic antenna tuning board ID ISC.DAT
See: Connection of a ID ISC.DAT (Dynamic Antenna Tuning Board)

The maximum tightening torque for the SMA socket is 0.45 Nm (4.0 lbf in).

Attention:
Exceeding the tightening torque will destroy the socket.

Terminal	Description
ANT1	For connecting the antenna (Input Impedance 50Ω)

Table 3: Antenna jack

- **The standing wave ratio VSWR for the antenna should not exceed a value of 1,3.**

- **For reaching optimal read ranges the coaxial cables between readers and antenna must have defined lengths. For all antennas of the company FEIG ELECTRONICS GmbH and for all antennas which with the tuning boards (e.g. ID ISC.DAT, ID ISC.MAT b and ID ISC.MAT s) of FEIG ELECTRONICS GmbH is made the optimal length of the coaxial cable is 1.35 m (Article No. 1654.004.00.00, Name ID ISC.ANT.C-B). See also Mounting Manual Power Splitter ID ISC.ANT.PS-B and ID ISC.ANT.MUX.**

- **The optimum operating Q factor of the antenna should be in a range of Q_{oper} = 10...30. To determine the operating Q the antenna must be supplied with a 50 Ohm source such as a network analyzer or frequency generator.**

- **To prevent external coupled noise, the antenna cable must be fitted with the included EMC ferrite ring core ⌀ 28 mm x 20 mm. The antenna line must be wound around the ring core for at least 4 turns. The distance between the Reader termination and the ring core should be maximum 10 cm (see Figure 6).**

- **When connecting an antenna, ensure that it does not exceed the permissible limits prescribed by the national regulations for radio frequency devices.**

Figure 5: Antenna line with EMC ring cores

3.2.1.1 Connection of a ID ISC.DAT (Dynamic Antenna Tuning Board)

For tuning a ID ISC.DAT tuning board a DC voltage is required. This DC voltage must be provided via a power splitter (ID ISC.ANT.PS-B) or a antenna multiplexer (ID ISC.ANT.MUX)

Figure 7 shows the DC supply of the ID ISC.DAT with a power splitter.
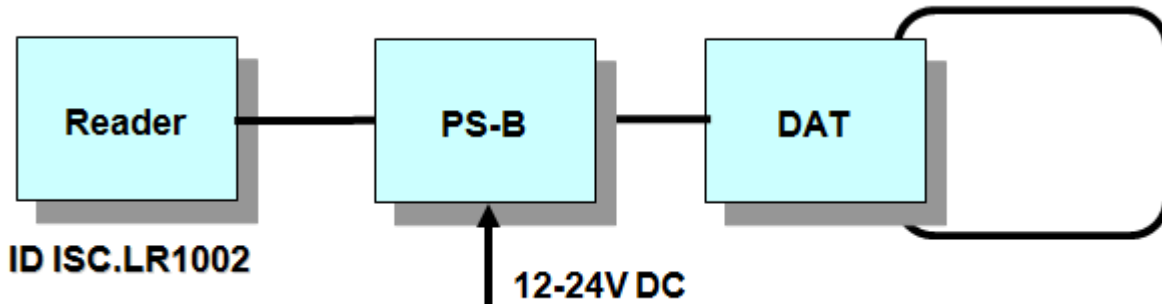
Figure 6: DC supply of a ID ISC.DAT using a power splitter ID ISC.ANT-PS-B

Figure 8 shows the DC supply of the ID ISC.DAT with a Antenna Multiplexer.
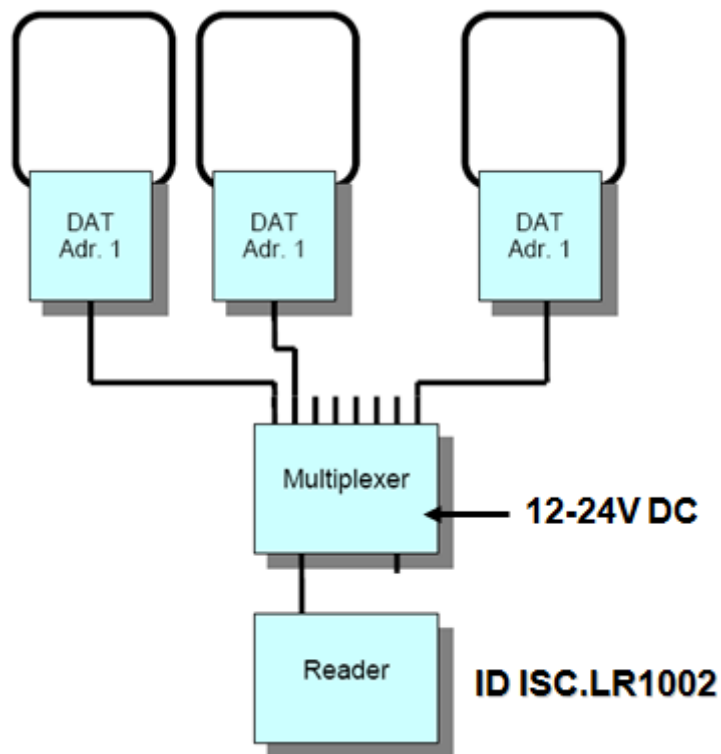
Figure 7: DC supply of a ID ISC.DAT using a ID ISC.ANT.MUX.

3.2.2   Supply voltage

The supply voltage of 24 V⎓ is connected to Terminal X1.

Terminal	Abbreviation	Description
X1	V$_{IN}$	Vcc – supply voltage + 24 V ⎓
X1	GND	Ground – supply voltage

Table 4: Pin-outs for supply voltage on X1
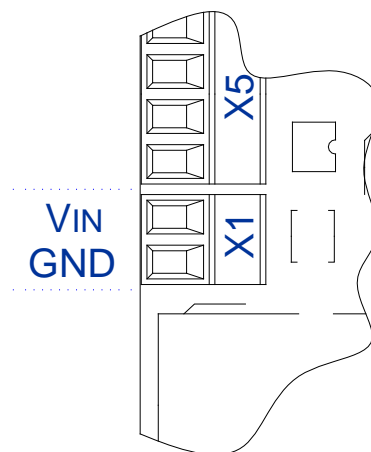
Figure 8: Position oft he connector X1 for the power supply

Note:

- **Reversing the supply voltage polarity may destroy the device.**

- **For reducing the noise the power supply line can be fitted with one EMC ring cores ⌀ 28 mm x 20 mm. The power supply line must be wound around the ring core for at least 5 turns. The distance between the Reader termination and the ring core should be maximum 10 cm.**

3.2.3 OptocouplerInputs (X5 / IN1)

The optocoupler input is available on Terminal X5.
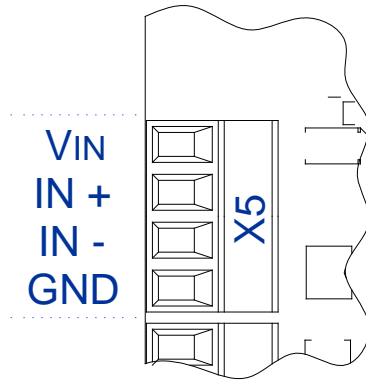
Figure 9: Optocoupler pin-outs on terminal X5

The optocoupler on terminal strips X5 is galvanically isolated from the Reader electronics and must therefore be powered externally. The external VCC voltage and GND (Ground) may however be provided by the connector VIN (24VDC) and GND from the reader. See: Output 24V === (X5 / VIN, GND)
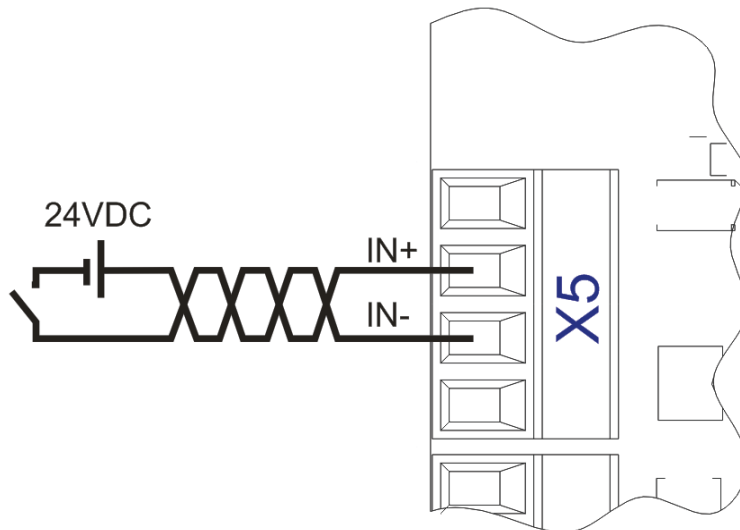
Figure 10: External power supply for the optocouplers
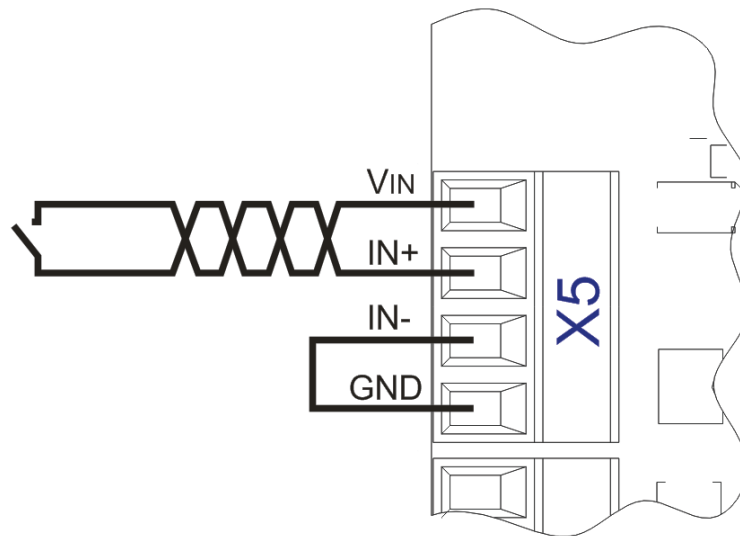
Figure 11: Possible internal power supply for the optocouplers

The input LED for the optocoupler is internally connected to a series resistor of 3,74kΩ and is limited to an input current of max. 6mA.

Note:

- *The input is configured for a maximum input voltage of 24 V $\overline{---}$ and an input current of maximum 6mA.*
- *Reversing the polarity or overloading the input can destroy the device.*
- **Using internal and external voltage at the same time can destroy the reader.**

3.3 Relay (X6 / REL1)

The relay output has a changeover contact. These outputs, which are located on terminals X6, is galvanically isolated from the Reader electronics and must therefore be externally supplied. The external voltage may however be provided by the reader from connector X5 VIN and GND. See: Output 24V ⎓ (X5 / VIN, GND)

Figure 12: Relay Outputs on terminal X6
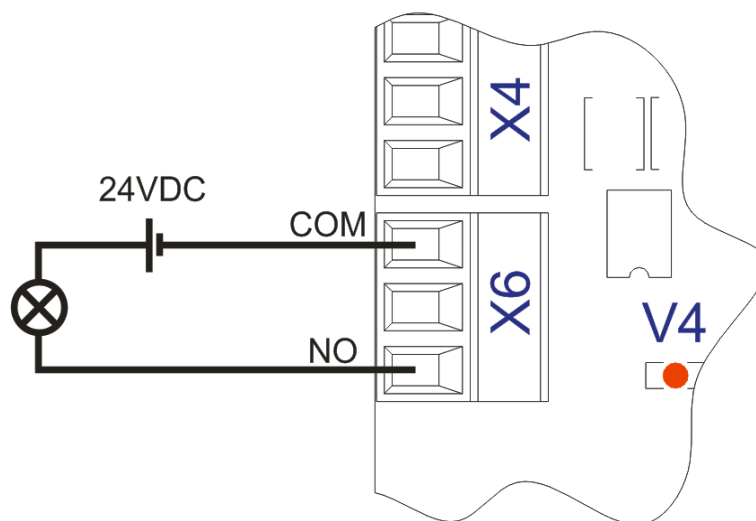
Figure 13: External wiring of the relay output's with external voltage

Notes:
- **The relay output is configured for max. 24 V ⎓ / 1 A.**
- **The relay output is intended for switching resistive loads only. If an inductive load is connected, the relay contacts must be protected by means of an external protection circuit.**
- **Using internal and external voltage at the same time can destroy the reader.**

3.3.1 Output 24V ⎓ (X5 / VIN, GND)

The output **VIN/GND** can be used to power the optional external circuitry of the digital inputs or relay. The maximum current consumption must not exceed 1A.

VIN
IN +
IN -
GND

X5
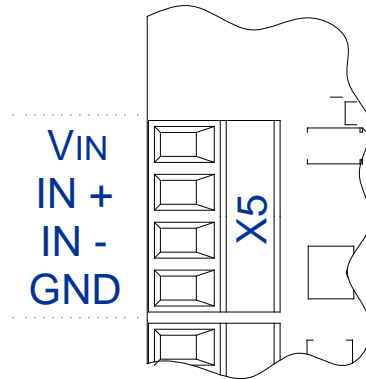
Figure 14: Optional 24V ⎓ external voltage supply

Note:

- *For the dimensioning oft the power supply the power consumption for the external output circuitry must be additional considered to the typical reader power consumption.*

- **The internal 24V ⎓ voltage on X5 is not protected by a fuse.**

3.4 Interfaces

3.4.1 RS232-Interface X4

The RS232 interface is connected on X4. The transmission parameters can be configured by means of software protocol.
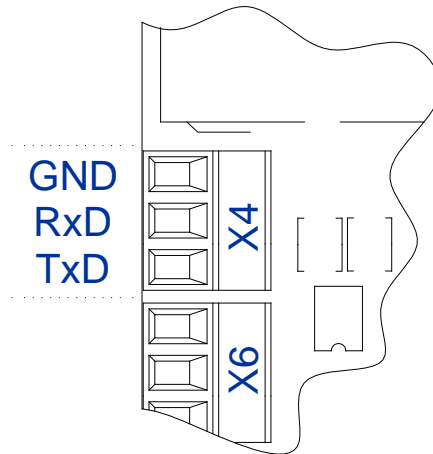
Figure 15: RS232 interface pin-outs on X4

Kurzzeichen	Description
TxD	RS232 – (Transmit)
RxD	RS232 – (Receive)
GND	RS232 – (Ground)

Table 5: Pin assignment of the RS232-Interface

9-pol. D-SUB-Buchse

TxD
RxD
GND

PC

GND   <–>   Pin 5
RxD   <–>   Pin 3
TxD   <–>   Pin 2
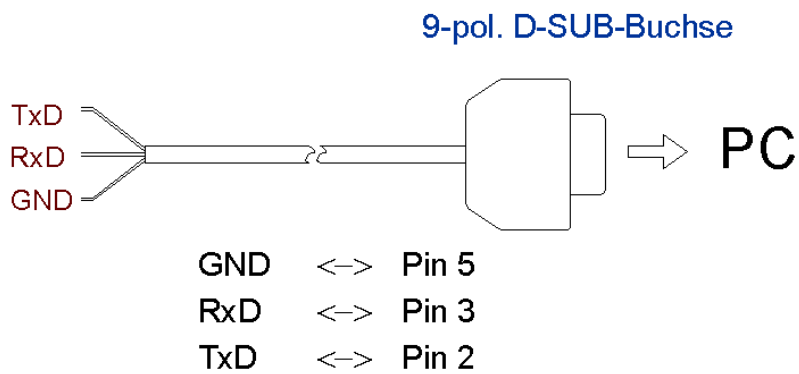
Figure 16: Wiring example for connecting the RS232 interface

3.4.2 USB – Interface X11 (Host Communication)

The USB socket on the board is terminal X11. The data rate is reduced to 12 Mbit (USB full speed). A standard USB-cable can be used.
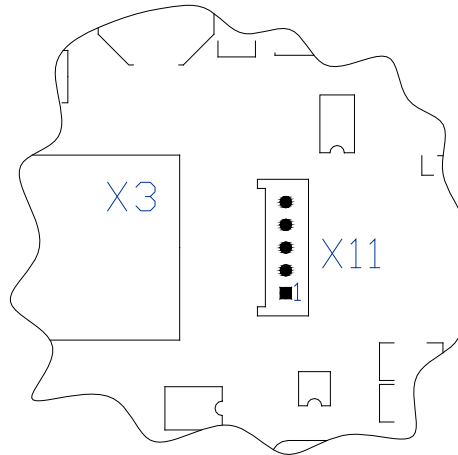
Figure 17: USB-Interface for host communication

The Figure 19 and table shows the connection of connector X11 (5pol.) type "JST PH" RM 2 mm (vertical).

Figure 18: Connector „JST PH"

X2 Pin-No.		
1	Shielding	USB cable - shielding
2	GND	
3	USB-D PLUS	
4	USB-D MINUS	
5	VCC	+ 5 V DC $\pm$ 5 %

Optional the following USB cable can be ordered:

3541.000.00	ID CAB.USB-B Cable for Interface USB/JST PH

Note:

The length of the USB-cable can be a max. of 5m (200 inch). It is not allowed to use longer cables.

3.4.3 Ethernet-Interface on X3 (10/100 Base-T)

The Reader has an integrated 10 / 100 Base-T network port for an RJ-45. Connection is made on X3 and has an automatic "Crossover Detection" according to the 1000 Base-T Standard.

X3
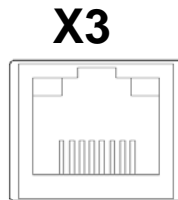
Figure 19: LAN interface for host communication

With structured cabling CAT 5 cables should be used. This ensures a reliable operation at 10 Mbps or 100 Mbps.

The prerequisite for using TCP/IP protocol is that each device has a unique address on the network. All Readers have a factory set IP address.

Network	Address
IP-Adresse	192.168.10.10
Subnet-Mask	255.255.255.0
Port	10001
DHCP	OFF

Table 6 Standard factory configuration of the Ethernet connection

Note:

- *The Reader TCP/IP interface has a DHCP option.*
- *It is recommended to use a <u>shielded</u> twisted pair STP CAT5 cable.*

4   Operating and Display Elements

4.1   LEDs

Table 7 shows the LED configuration.

Abbreviation	Description
LED V1 (green)	"RUN-LED 1" - Indicates proper running of the internal Reader software (DSP) - Comes on during Reader initialization after power-on or after a reset.
LED V2 (blue)	Diagnostic 1: RF communication / EEPROM status - Short flashing indicates errorless communication with a transponder on the RF interface - Flashes alternately with V1 after a reset following a software update - Flashes alternately with V1 in case of a data error when reading the parameters after a reset
LED V3 (yellow)	Diagnostic 2: Host communication - Short flashing indicates sending of a protocol to the host on the RS232/USB and LAN-Interface
LED V5 (red)	Diagnostic 4: RF warning - Comes on when there is an error in the RF section of the Reader. The error type can be read out via software over the RS232/USB and LAN-Interface

Table 7: LED configuration

5   Radio Approvals

5.1   Europe (CE)

When used according to regulation, this radio equipment conforms with the basic requirements of Article 3 and the other relevant provisions of the R&TTE Guideline 1999/E6 dated March 99.

Equipment Classification according ETSI EN 301 489: Class 2 SRD

Declaration of Conformity

in accordance with the
Radio and Telecommunication Terminal Equipment Act (FTEG)
and
Directive 1999/5/EC (R&TTE Directive)

Product Manufacturer : **FEIG ELECTRONIC GmbH**
Lange Strasse 4
D-35781 Weilburg
Germany
Phone +49 6471 3109 0

Product Designation : **ID ISC.LR1002**
ID ISC.LRM1002

Product Description : Induktive Loop System

Radio equipment, Equipment class (R&TTE) : Class 1

FEIG ELECTRONIC GmbH declares that the radio equipment complies with the essential requirements of §3 and the other relevant provisions of the FTEG (Article 3 of the R&TTE Directive), when used for its intended purpose.

Standards applied :

Health and safty requirements pursuant to § 3 (1) 1. (Article 3(1) a))	EN 60950-1:2006/A1:2010 EN 50364:2010
Protection requirements concerning electromagnetic compatibility § 3 (1) 2. (Article 3(1) b))	ETSI EN 301489-1 V1.8.1 ETSI EN 301489-3 V1.4.1
Measures for the efficient use of the radio frequency spectrum pursuant to § 3 (2) (Article 3(2))	ETSI EN 300 330-1 V1.7.1 ETSI EN 300 330-2 V1.5.1

Weilburg, 08.08.2012
Place & date of issue

Markus Desch
Name and signature

This declaration attests to conformity with the named Directives but does not represent assurance of properties. The safety guidelines in the accompanying product documentation must be observed.

5.2 USA (FCC) and Canada (IC)

Product name:	**ID ISC.LR1002-E**
Reader name:	**ID ISC.LRM1002-E**
FCC ID: **IC:**	**PJMLRM1002** **6633A-LRM1002**
Notice for USA and Canada	This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada. Operation is subject to the following two conditions. (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Unauthorized modifications may void the authority granted under Federal communications Commission Rules permitting the operation of this device. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Warning: Changes or modification made to this equipment not expressly approved by FEIG ELECTRONIC GmbH may void the FCC authorization to operate this equipment.

6   Technical Data

Mechanical Data

- **Dimensions (W x H x D)**   255 x 135 x 65 mm³
  10,03 x 5,31 x 2,55 inch³

- **Weight**   Approx. 1,1kg
  2,42 lb

Electrical Data

- **Supply Voltage**   24 V $---$ ± 15 %
  Noise Ripple : max. 150 mV

- **Power Consumption**   max. 16 VA

- **Operating Frequency**   13,56 MHz

- **Transmit Power**   1W – 5 W

- **Modulation**   14%

- **Antenna Connection**   SMA Jack (50 Ω, SWR≤1.3)

- **DC Supply at Antenna Connector**   6,5 V $---$ (max. 20mA)

- **Diagnostic Options**   internal impedance monitoring
  internal temperature monitoring

- **Outputs**
  – 1 Relay (NO)   24 V $---$ / 1 A

- **Inputs**
  – 1 Optocoupler   24 V $---$ / 6 mA

- **Interfaces**   - RS232
  - USB
  - Ethernet (TCP/IP)

- **Protocol Modes**   - FEIG ISO HOST
  - BRM (Data Filtering and Data Buffering
  - Scan Mode
  - Notification Mode

- **Supported Transponders**
  - ISO15693, ISO18000-3 MODE 1
    (EM HF ISO Chips, Fujitsu HF ISO Chips,
    KSW Sensor Chips, IDS Sensor Chips,
    Infineon my-d, NXP I-Code, STM ISO Chips,
    TI Tag-it)

- **Optical Indicators**   4 LEDs for Operating Status Diagnostics

Ambient

- **Temperature Range**
  - **Operating**   -20°C to +55°C (-4°F to +131°F)
  - **Storage**   -25°C to +85°C (-13°F to +185°F)

- **Humidity**   5% - 80%, no condensation

- **Vibration**   EN 60068-2-6
  10 Hz to 150 Hz : 0,075 mm / 1 g

- **Shock**   EN 60068-2-27
  Acceleration   : 30 g

Applicable Standards

- **RF Approval**
  - **Europe**   EN 300 330
  - **USA**   FCC 47 CFR Part 15

- **EMC**   EN 301 489

- **Safety**
  - **Low Voltage Directive**   EN 60950
  - **Human Exposure**   EN 50364

OBID®

OBID i-scan® HF

ID ISC.ANT1300/680
Type A and Type B / BL

Version: **Reader Module ID ISC.LRM1002, manual tuning board**

FEIG
ELECTRONIC

Note

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> http://www.feig.de

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Tag-it™ is a registered trademark of Texas Instruments Incorporated.

General information's regarding this document

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

- If bits within one byte are filled with "-", these bit spaces are reserved for future extensions or for internal testing- and manufacturing-functions. These bit spaces must not be changed, as this may cause faulty operation of the reader.

- The following figure formats are used:
  0...9:   for decimal figures
  0x00...0xFF: for hexadecimal figures,
  b0...1   for binary figures.

- The hexadecimal value in brackets "[ ]" marks a control byte (command).

Contents

---

1   Safety Instructions / Warning - Read before Start-Up !

- The device may only be used for the intended purpose designed by for the manufacturer.

- The operation manual should be conveniently kept available at all times for 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 unauthorized measures shall exclude 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 shall not be held legally responsible for inaccuracies, errors, or omissions in the manual or automatically set parameters for a device or for an incorrect application of a device.

- Repairs may only be executed by the manufacturer.

- Installation, operation, and maintenance procedures should only be carried out by qualified personnel.

- Use of the device and its installation must be in accordance with national legal requirements and local electrical codes .

- When working on devices the valid safety regulations must be observed.

- Please observe that some parts of the device may heat severely.

- Before touching the device, the power supply must always be interrupted. Make sure that the device is without voltage by measuring. The fading of an operation control (LED) is no indicator for an interrupted power supply or the device being out of voltage!

- For installation and dismantling you should wear suitable safety gloves, because parts of an-tenna housing could be sharp-edged.

⚠ **CAUTION! The Antenna-Tuner and the Antenna conductor carry voltages up to 1000V.**

Special advice for wearers of cardiac pacemakers:

- Although this device doesn't exceed the valid limits for electromagnetic fields you should keep a minimum distance of 25 cm between the device and your cardiac pacemaker and not stay in an immediate proximity of the reader's antennas for any length of time.

2　Performance Features of the ID ISC.ANT1300/680 Antennas

The ID ISC.ANT1300/680-A antenna is a version with integrated Manual Antenna Tuning Board ID ISC.MAT , Long Range Reader ID ISC.LRM1002, Power Splitter Module ID ISC.PSM, Alarm LED and Sounder mounted.

The ID ISC.ANT1300/680 Type B antenna is a version with Manual Tuning Board ID ISC.MAT mounted.

The ID ISC.ANT1300/680 Type BL antenna is a version with Manual Tuning Board ID ISC.MAT and Alarm LED mounted.

Up to

- two antennas with reader and power splitter as a single gate,

can be operated.

Depending on the antenna configuration, one, two or all three read orientations of the Smart Tags and various antenna spacing (gate widths) are possible.

The ID ISC.ANT1300/680 –A/-B/-BL is a „figure-of-eight" antenna with tuner and have been optimized as transmitting and receiving antennas for the ID ISC.LRM1002 Reader. It is however also possible to operate them with other Readers at a transmission frequency of 13.56 MHz and an output impedance of 50 Ω. The read ranges indicated in this document and the tuning procedures may however then vary.

The antennas comprise the electrical antenna conductor, the housing, the ID ISC.MAT *Manual Antenna Tuner* and the connection cable. The antennas are factory tuned to an impedance of 50 Ω in a magnetically neutral environment at a distance of 90 cm. When installing in different ambient conditions the antenna can be retuned using a suitable measuring device (e.g. SWR-Meter). After tuning the antennas will retain their settings as long as the ambient conditions remain unchanged.

The antennas can be used for detecting both product and persons. It is suitable for installation indoors or outdoors if weather-protected.

2.1　Available Antenna Types

The following products are currently available:

Antenna Type	Description
ID ISC.ANT1300/680-A	Antenna with Reader, Power Splitter and manual tuning board, Alarm LED and Sounder and power supply
ID ISC.ANT1300/680-BL	Antenna with manual tuning board ID ISC.MAT and Alarm LED
ID ISC.ANT1300/680-B	Antenna with manual tuning board ID ISC.MAT
ID ISC.ANT1300680-SIG	Light signal with mounting material
ID ISC.ANT1300680-GPC	External People Counter

Table 1: Available Antenna Types and accessories

3   Installation and Wiring

3.1   Dimensions of antenna

The outside dimensions of the antenna are shown in Fig. 1
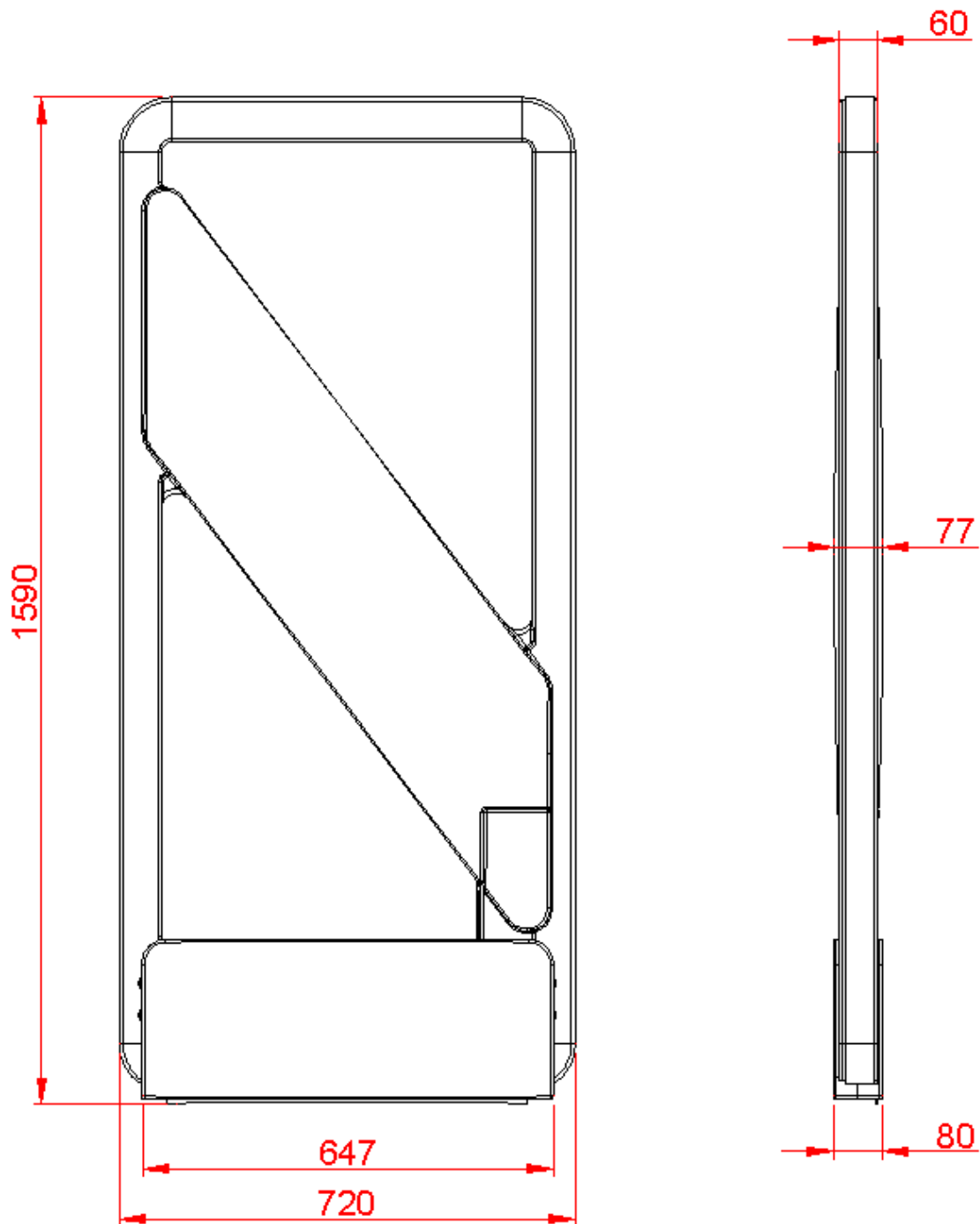
Fig. 1: Antenna outside dimensions

All dimensions are in mm with general tolerance to ISO 2768 m (mean).

3.2 Mounting preparation

For assembly the antenna must be carefully unpacked. This is done as described in the following steps:

1. Place the packed antenna on the floor with the top side facing up. Carefully open the box and then remove the antenna.

Fig. 2: Antenna in its packaging

2. After that the antenna has to be placed carefully again on the floor. Now you must remove the two fastening screws (hexagon socket width A/F2,5) of the antenna base cover and remove it upwards. Fig. 3

Step 1	Step 2

Fig. 3: Opening the antenna base

3.3   Installing the antenna

Notes:

Before installing the antennas please read 4.1 **Project Notes** *. The spacing of the antennas in a gate depends on the antenna configuration.*

If multiple antennas or gates are connected to different Readers, a minimum separation of 8 m must be kept between the antennas or gates. For shorter distances the antennas must be shielded from each other. Otherwise the Reader range will be significantly reduced. The antennas must have a minimum distance of 20 cm from all larger metal parts! At a distance of less than 50 cm between the antenna and metal parts the Reader range will be significantly reduced.

3.3.1 Drilling the Mounting Holes

If the position of the antennas has been marked or determined, the antenna base ①, which has to be used as a hole template, can be used to mark and drill the mounting holes and the holes for the cable entry. The dimensions are shown in Fig. 4:
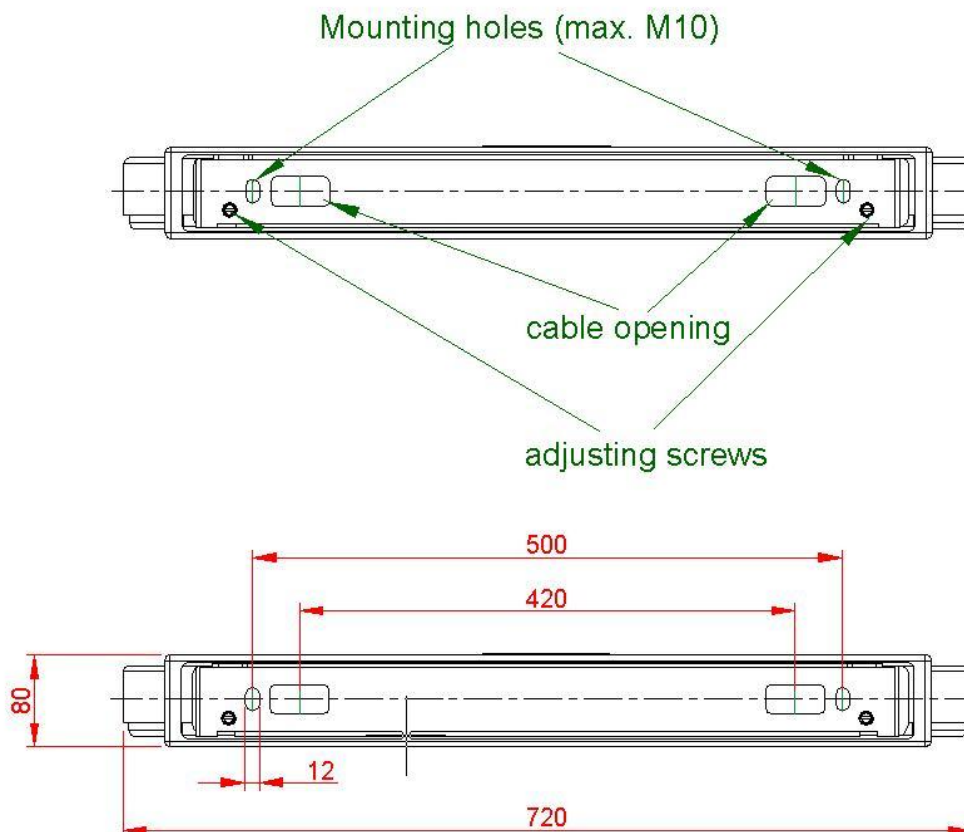

Fig. 4: Floor plate dimensions ①

All dimensions are in mm with general tolerance to ISO 2768 m (middle).

The size and type of the screw anchors depends considerably on the strength of the base or floor. The anchors should be capable of withstanding a permissible load of at least 5 kN per anchor for all load directions (e.g. for concrete floor Hilti HVA anchors with HAS-(E) M8 threaded rod or Hilti HIS-N M8 (5/16") threaded inserts). The size of the mounting holes in the antenna is 10 mm (.39"). The length of the anchors or bolts should be selected such that they extend at least 50 mm (2.0") and a maximum of 65 mm (2.6") from the floor.

Please follow the mounting instructions of the anchor manufacturer!

Two cable openings are provided for the necessary connection cable (see Fig. 4). The cable openings are dimensioned such that up to 10 cables having a diameter of 6 mm can be passed through each opening.

We recommend routing the antenna cables through the cable opening on the Power-Splitter or Multiplexer side. All other cables such as the supply voltage and multiplexing cable should be routed through the cable opening on the Reader side.

Alternatively the cables can be routed at the sides of the antenna bas like shown in Fig. 5

Fig. 5 Cable routing at the antenna sides
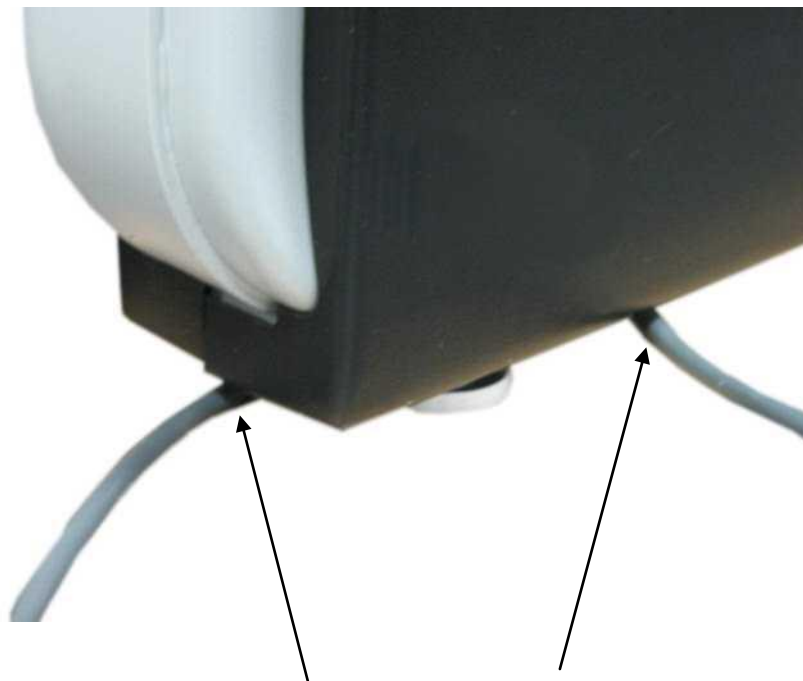
3.3.2 Installing the Antenna Base and Antenna Body

The antenna will be screwed on the floor. Use the adjusting screws (Fig. 6) to align the antenna vertically.

Adjusting screws (hexagon socket width A/F5)

Fig. 6: Attaching and aligning the antenna

3.3.3 Connection of components

To built a gate configuration, you use one antenna Type A and one antenna Type B or BL.

4   Typical Antenna Configuration (Gate Antenna with two Antennas)

The standard configuration of a gate with three-dimensional tag orientation consists of one
ID ISC.ANT1300/680-A with reader and power splitter and one ID ISC.ANT1300/680-B or BL. If a
tag moves, at horizontal line, through the gate, it can be read at least once. This ensures high
reliability of the antenna system.

4.1   Project Notes

The antenna configuration as described allows detection of a tag moving horizontally through the
capture area of the gate. The tag orientation is non-critical. The tags are detected along a
horizontal axis of motion in certain regions within the antennas. The area of detection depends on
the tag orientation.

The size of the three-dimensional capture area of the antennas is shown in the sketch below.
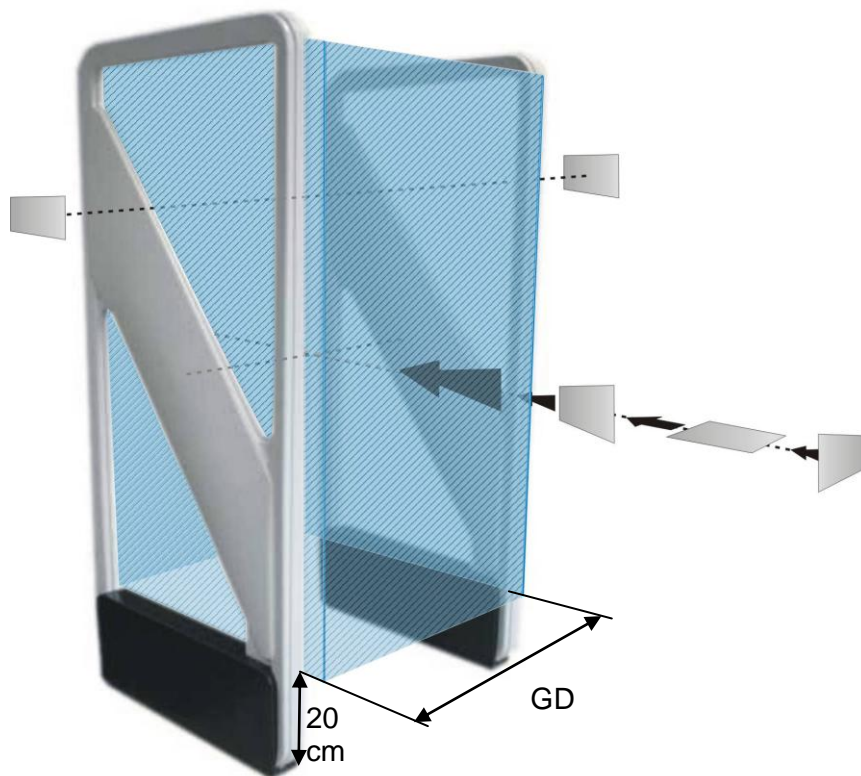

Fig. 7: Capture area and tag orientation

Notes:

***Note that the entire capture area of the antenna is larger than the three-dimensional area
shown in the drawing (Fig. 8). This means there are tag orientations in which the tag can be
detected outside the capture area.***

To get a optimal performance the reader has to be configured and run in one of the Automatic Modes (Buffered Read, Notification or Scan Mode).

If multiple gates are arranged with short distances between each other, these will mutually interfere with each other which could cause a loss of read performance. This could be reduced by installing a suitable shielding.
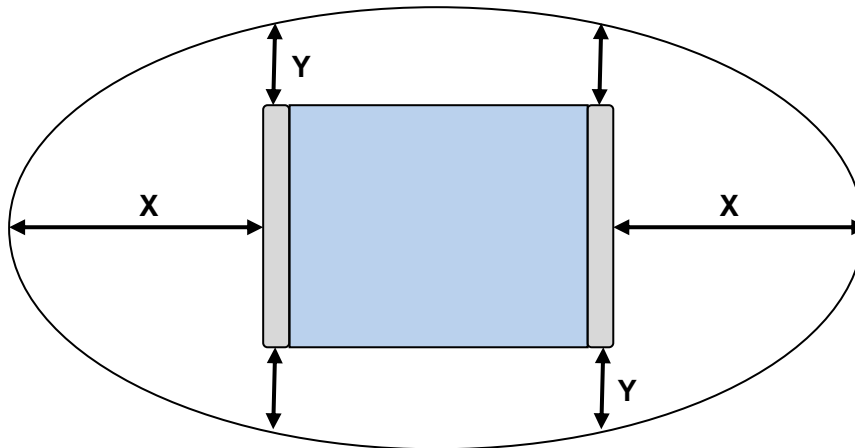
Fig. 8: Top view, capture area outside of the antenna gate

Direction	Minimum Distance
right, left (X=)	60 cm
front, behind (Y=)	25 cm

Table 2: Capture area, unintentional detection

To achieve three-dimensional capture of the tag in the capture area drawn above, the following conditions must be met:

- The gate distance GD depends on the antenna configuration (see Table 4: Design notes).

- The tags should be at least ISO card size (46 mm x 75 mm).

- The activation field strength of the tags should be less than or equal to 60 mA/m.

- The distance from tag to tag should be greater than 10 cm. If the tag to tag distance is reduced, the gate distance GD must be reduced correspondingly. This applies in particular to distances under 5 cm.

- The maximum number of tags (serial number or data) depends on the traverse speed with which the tags are brought through the capture area of the gate (see Table 4: Design notes). The number of tags may be increased in the gate distance GD is correspondingly reduced and the maximum speed adjusted accordingly.

- The antenna should be at least 50 cm from metal parts.

- The minimum distance between the antennas of a gate and antennas of RFID work station or terminals (transmitting frequency 13,56 MHz) should be:

Transmitted output power	Minimum Distance
< 0.5 W	1 m
0.5 W-1.0 W	2 m
1.1 W – 2.0 W	3 m
> 2 W	4 m
>= 4 W	8 m

Table 3: Minimum Distances

- There should be no interference of the Reader from other electrical devices in the environment. The Noise Level difference should be less than 20 mV.

- The ID ISC.LRM1002 Reader should be set to an RF power of 5 watts.

- When using ISO 15693 transponders, the Readers should be set as described in **4.2.6 Reader Configuration** with Power Splitter.

- If multiple gates are operated at the same time at a distance of less than 8 m, a loss of read performance due to high interferences could happen. This could be reduced by installing a suitable shielding.

	Gate with antenna Type A and Type B/BL
Gate distance GD	≤ 90 cm
Number of tags at traverse speed 1 m/s - Read serial number - Read data	 16 8

Table 4: Design notes

Supplementary equipment (e.g. light barrier, lighting, etc.), mounted directly on the antenna or in the immediate vicinity of the antenna can interference with the functioning of the system.
A minimum distance of 20 cm is required.

Electrical cable, directly at the antenna or in the immediate vicinity of the antenna, can be cause interference. A minimum distance of 20 cm is required.

A minimum distance of 65cm between the two gate antennas is required.

4.2   Gate Configuration and Setup using Antennas Type –A and Type –B/-BL

4.2.1 Required Components

To construct the gate you need the following components:

- Qty. 1 ID ISC.ANT1300/680 Antenna Type A
  (Incl. Qty. 1 ID ISC.NET24V-B Power Supply Unit)

- Qty. 1 ID ISC. ANT1300/680 Antenna Type B or BL

- Power cable, interface cable and connection cable for the DC power supplies (2-wire, twisted)

- Mounting materials (screws, anchors)

To calibrate the Reader you will need the software

- ISOStart Version 2012 Version 9.02 or newer

on a personal computer running under Microsoft® Windows®.

and for tuning the antennas a suitable measuring device (e.g. SWR-Meter)

The service can be downloaded at the Download Area of the Homepage www.feig.de.

4.2.2 Configuration of a Gate antenna with Power Splitter

Connect the components as shown in

Fig. 9. Nearly, all cable should be mounted already. Normally, the antenna cable from antenna Type B has to connect to Output X3 at the power splitter and the 24V DC power supply to X11 of the terminal board only. Optional the alarm LED of the antenna Type BL could be connected to X12/LED2 of the terminal board.
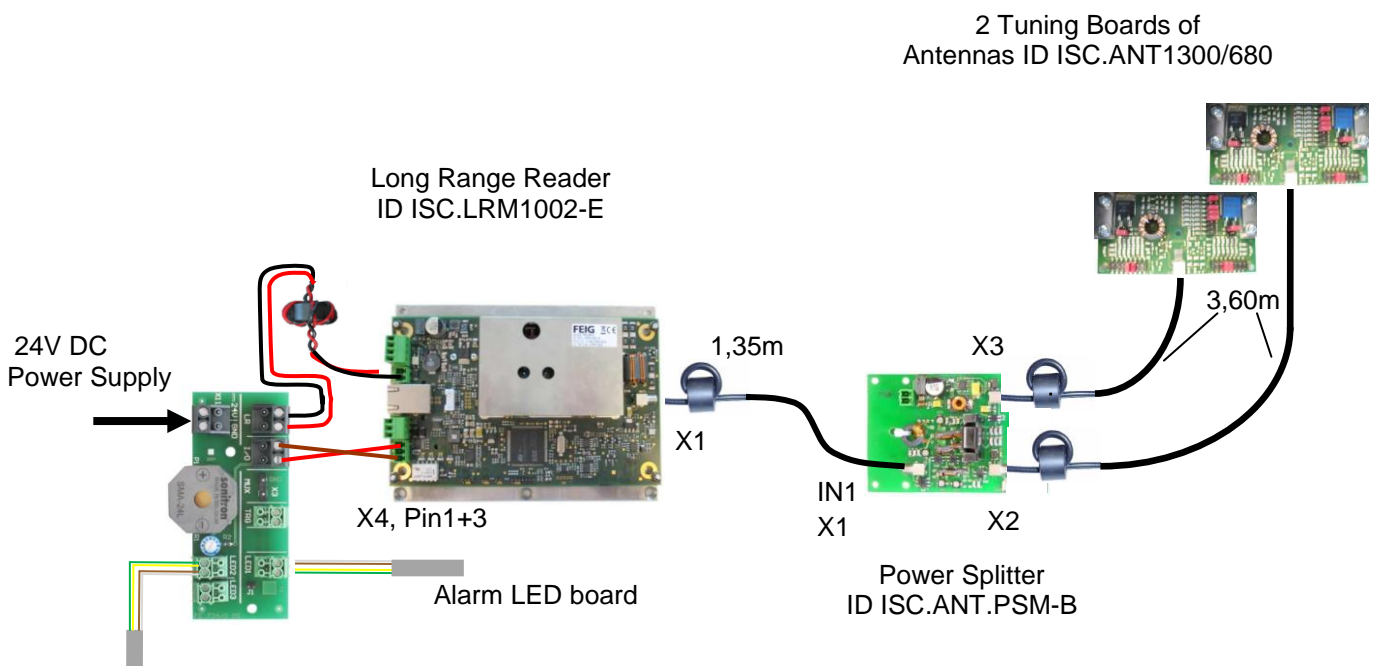
Fig. 9: Connecting the components for a gate consisting of two antennas, reader and power splitter

Fig. 10:Terminal board

An overview of the terminal board assignment is given in 6.Annex A

Note:

- **A reverse polarity could damage the device or the In-/Outputs.**

The coax cables have fixed lengths and may not be shortened and therefore need to be tied into small loops (see). Tie all cables as far away from the antenna conductor as possible. The cables must never be allowed to contact the antenna conductor. The cable from antenna type B/BL to the antenna type AL should preferably be connected shortly. Unused cable lengths are possible should be tied in antenna B/BL type.

Fig. 11 Connection of the components in an antenna Type A

Fig. 12 Unused coaxial cables are tied in antenna Type B/BL

4.2.3 Setting the Power Splitter

Set the jumpers on the Power Splitter as shown in Table 5:Power Splitter setting. More information about setting the ID ISC.ANT.PSM-B Power Splitter can be found in the corresponding installation manual (M40402-xde-ID-B).

Table 5:Power Splitter setting

Trans-former	Power Splitter	Phase shifter	JP1	JP3	JP4	JP5	JP6
not used	X	X	3-5 4-6	2-4	1-2	1-2	1-2 3-4

Power Splitter with 90° phase shifter X1: Reader X2: Antenna X3: Antenna X4: 12-24V DC for Antenna with dyn. antenna tuner ID ISC.DAT	

Fig. 13 Jumper Settings for Power Splitter

4.2.4 Setting the Antenna Tuner

To check the settings of the antenna tuner the antenna base has to be opened. For that, remove the two fastening screws (hexagon socket width A/F2,5) of the antenna base cover and move it upwards. Fig. 14

Step 1	Step 2

Fig. 14: Opening of the antenna base

Now remove the to fastening screws (hexagon socket width A/F2,5) of the antenna tuner cover and move it downwards. Fig. 15

Step 3	Step 4

Fig. 15 Removing the antenna tuner cover

The ID ISC.ANT1300/680 antennas are factory set to the best value of impedance Z= 50 +/-5 Ohms and Phase =0° +/-5°

Table 6: Jumper settings for Antenna Tuner

Function	Jumper	Position
0,5Ω Q resistor	**JP10**	open
	JP8	closed
1Ω Q resistor	**JP9:**3-4	closed
Capacitor C1 => **JP1 + JP 2**	1-2, 3-4, 9-10, 11-12, 13-14, 15-16	open
	5-6, 7-8	closed
Capacitor C2 => **JP3**	1-2, 3-4, 5-6, 13-14, 17-18, 7-8, 9-10,11-12, 15-16	open
		closed

The factory settings of the capacitor jumpers C1 and C2 could be different as shown in this table/figure due to parts tolerances.
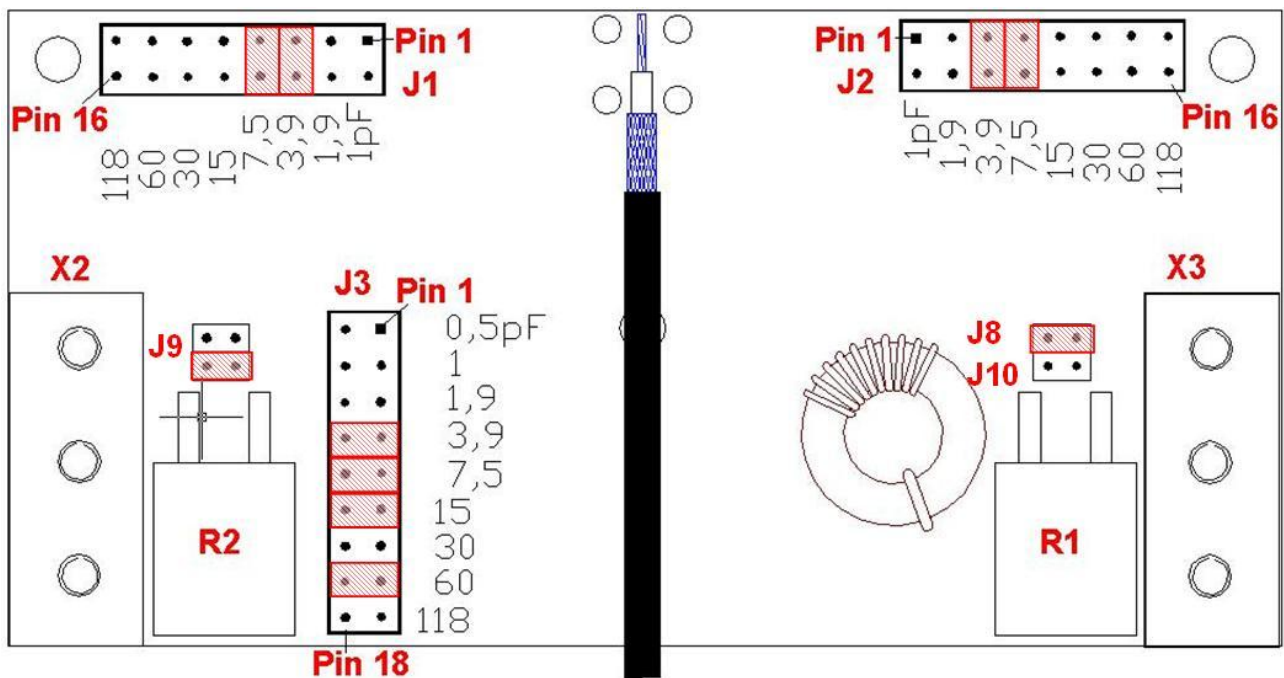

Fig. 16 Jumper Settings for Tuning Board MAT

Verify these settings with a suitable measuring device (e.g. SWR-Meter) after installing the antennas. More on setting the ID ISC.MAT antenna tuner can be found in the corresponding installation manual (M70101-xe-ID-B).

4.2.5 Interface Connections

4.2.5.1 RS 232

The RS232 interface is connected on X4. The transmission parameters can be configured by means of software protocol.
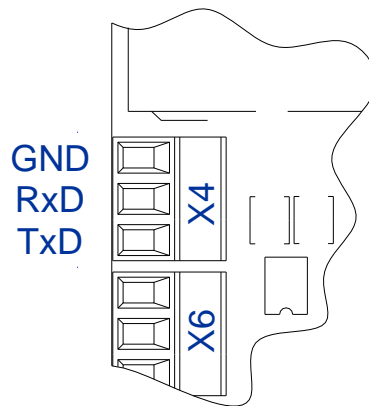
GND
RxD
TxD
X4

X6

Figure 1: RS232 interface pin-outs on X4

Kurzzeichen	Description
TxD	RS232 – (Transmit)
RxD	RS232 – (Receive)
GND	RS232 – (Ground)

Table 7: Pin assignment of the RS232-Interface

9-pol. D-SUB-Buchse

TxD
RxD
GND

⇒ PC

GND <–> Pin 5
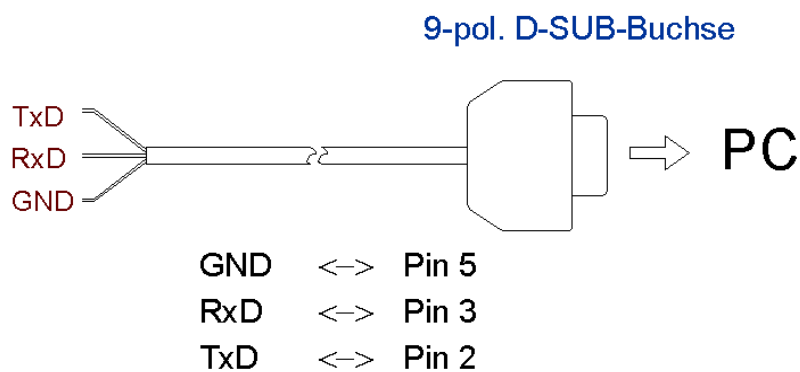RxD <–> Pin 3
TxD <–> Pin 2

Fig. 17: Wiring example for connecting the RS232 interface

Note:
If there is an USB/RS232 converter used on the PC/Notebook side, we recommend to increase the „Char Timeout Multiplier" parameter in the COM-Port settings from „1" to about „5".

4.2.5.2 LAN / TCP/IP

The Reader has an integrated 10 / 100 Base-T network port for an RJ-45. Connection is made on X3 and has an automatic "Crossover Detection" according to the 1000 Base-T Standard.
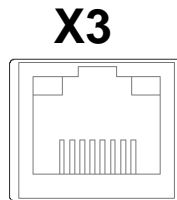
X3

Figure 2: LAN interface for host communication

With structured cabling CAT 5 cables should be used. This ensures a reliable operation at 10 Mbps or 100 Mbps.

The prerequisite for using TCP/IP protocol is that each device has a unique address on the network. All Readers have a factory set IP address.

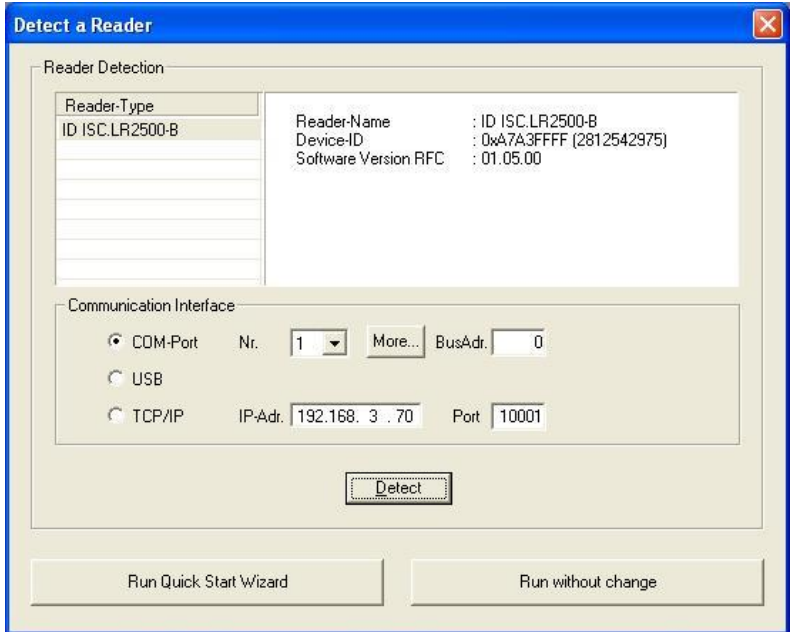| Network	Address
IP-Adresse	192.168.10.10
Subnet-Mask	255.255.255.0
Port	10001
DHCP	OFF

Table 8 Standard factory configuration of the Ethernet connection
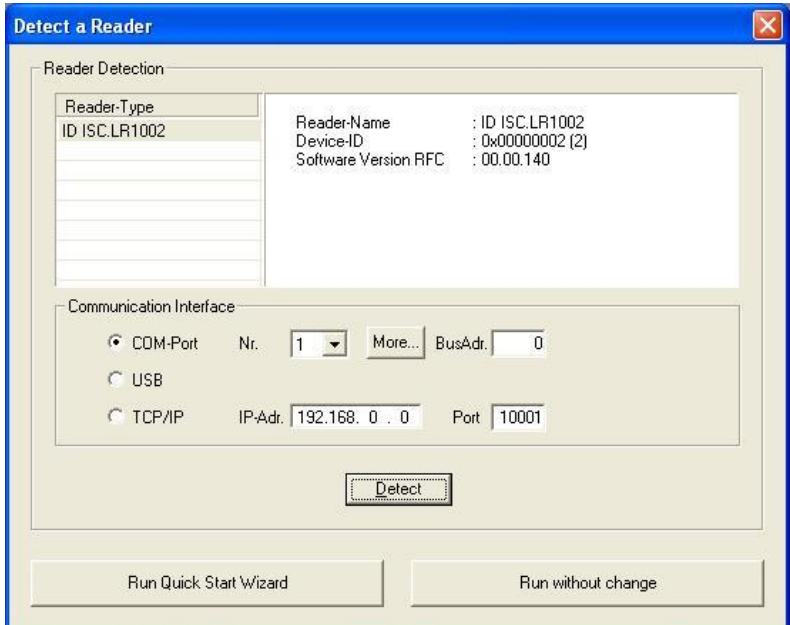
Note:

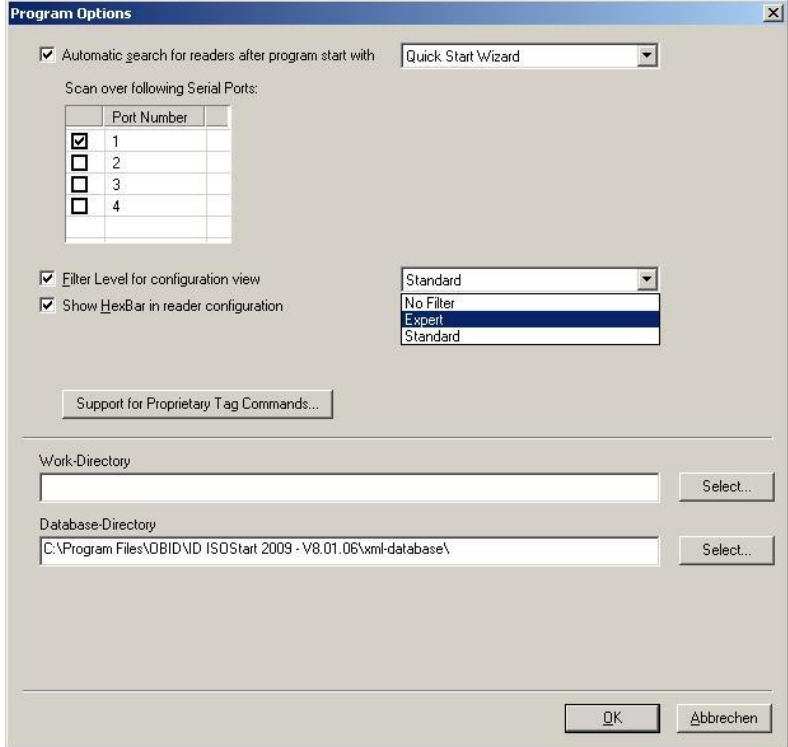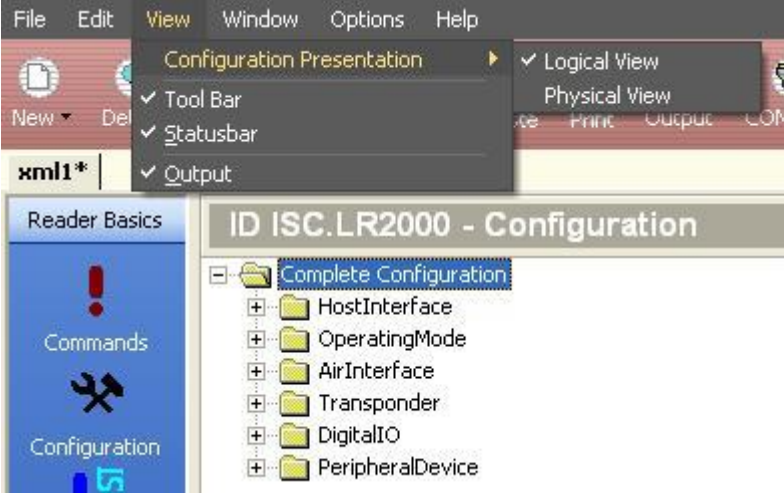- ***The Reader TCP/IP interface has a DHCP option.***

It is recommended to use a <u>shielded</u> twisted pair STP CAT5 cable.

More Information about the interfaces you will find in the manual **M20413-xde-ID-B** of the reader.
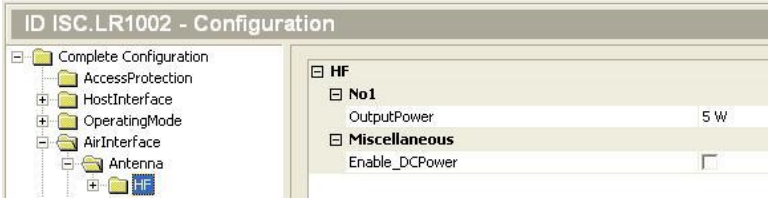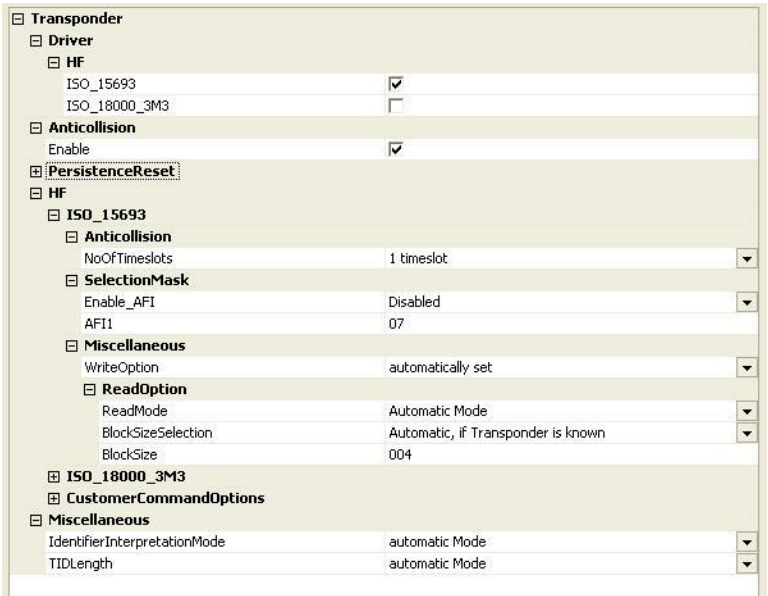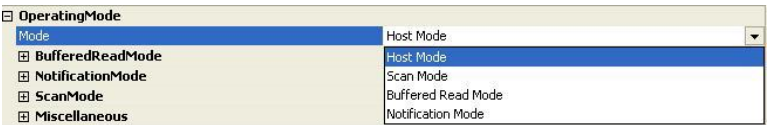
4.2.6 Reader Configuration with Power Splitter

To tune the antennas, open the ISOStart software and read out the current configuration of the Reader:

Step	Action	Note
1	Start ISOStart Software	 *(ISOStart.exe icon)* ISOStart.exe
2	Select „Detect"	**Detect a Reader** Reader Detection Reader-Type: ID ISC.LR2500-B Reader-Name : ID ISC.LR2500-B Device-ID : 0xA7A3FFFF (2812542975) Software Version RFC : 01.05.00 Communication Interface ⊙ COM-Port Nr. 1 More... BusAdr. 0 ○ USB ○ TCP/IP IP-Adr. 192.168. 3 . 70 Port 10001 Detect Run Quick Start Wizard Run without change
3	Select „Keep Configuration unchanged and exit Wizard" and click on „Exit" Note: This has to be done at each start of ISO-Start program otherwise the configuration of the reader will be changed by the wizard.	**Detect a Reader** Reader Detection Reader-Type: ID ISC.LR1002 Reader-Name : ID ISC.LR1002 Device-ID : 0x00000002 (2) Software Version RFC : 00.00.140 Communication Interface ⊙ COM-Port Nr. 1 More... BusAdr. 0 ○ USB ○ TCP/IP IP-Adr. 192.168. 0 . 0 Port 10001 Detect Run Quick Start Wizard Run without change

Step	Action	Note
4	Select „Options => Program"	
5	Select „Expert Mode" and confirm with OK.	
6	Select "Logical View"	

Afterwards set the operating power, Transponder Parameters and ISO Host Mode:

Step	Action	Note
1	Select "Configuration"	
2	**Air Interface:** "Output -Power" = 5W	
3	Set by clicking on „Apply".	
4	**Transponder:** Configure the parameters as following: • „Driver" – here ISO 15693 • „Anticollision" – enable • „No of Timeslots" – 1 timeslot • „Data Coding" – 1 of 4 • „AFI" – Disabled	 Note: National RF regulations may require different settings. 4.6 Configuring the Reader in accordance with national RF regulations
5	Set by clicking on „Apply".	
6	**Operating Mode:** For antenna tuning the reader has to be set to „Host Mode".	
7	Set by clicking on „Apply".	

4.2.7 Tuning the Gate Antenna with Power Splitter

For tuning the antennas you will need a suitable measuring device (e.g. SWR-Meter or SWR-Analyzer) The SWR-Meter has to be looped in between power splitter and antenna with a 30cm coax cable RG58. (see Fig. 18) The reader must be set to ISO-Host Mode. If necessary the antennas could be tuned by setting or removing the jumpers of the capacitors C1 and C2. You should start the tuning with the lowest values of the capacitors and then to use the next higher values. First start with capacitor C2. If there is no change anymore you should continue with capacitor C1.The standing-wave ratio should be at least 1:1,2 or better. .50 +/-5 Ohm Phase 0° +/-5° at the SWR-Analyzer.

This has to be done for both antennas.

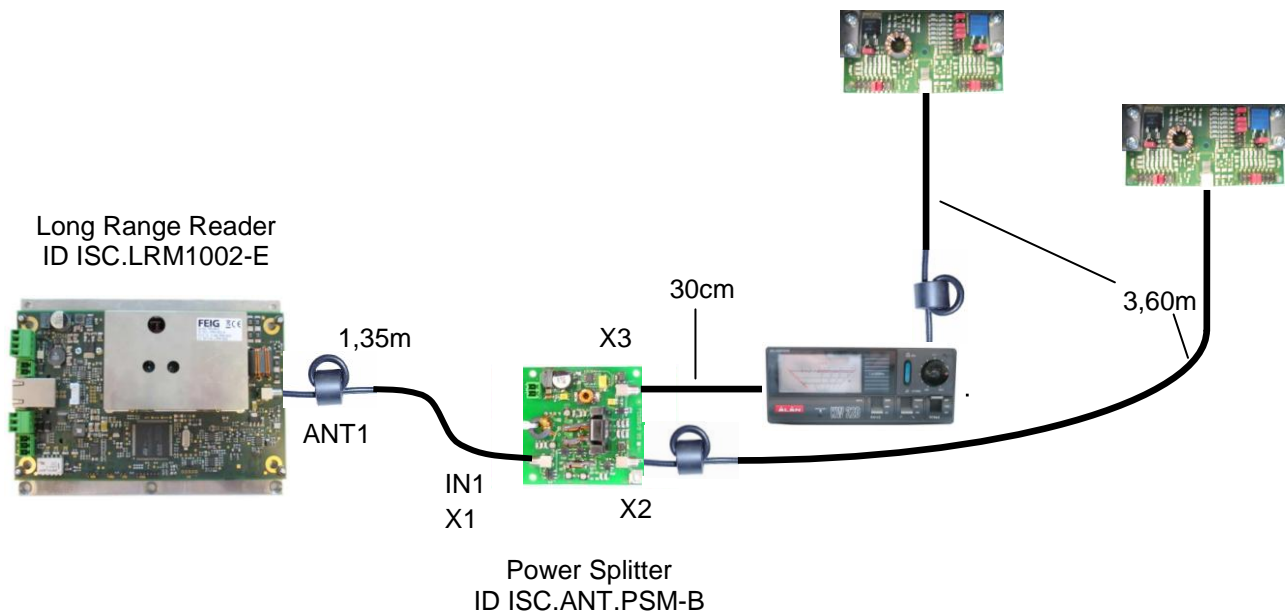Fig. 18 Tuning the antennas with a SWR-Meter

If you tune antennas with a SWR-Analyzer, you must connect the antennas directly to the SWR-Analyzer. The reader should be switched off during the tuning. The tuning has to be done as described above.
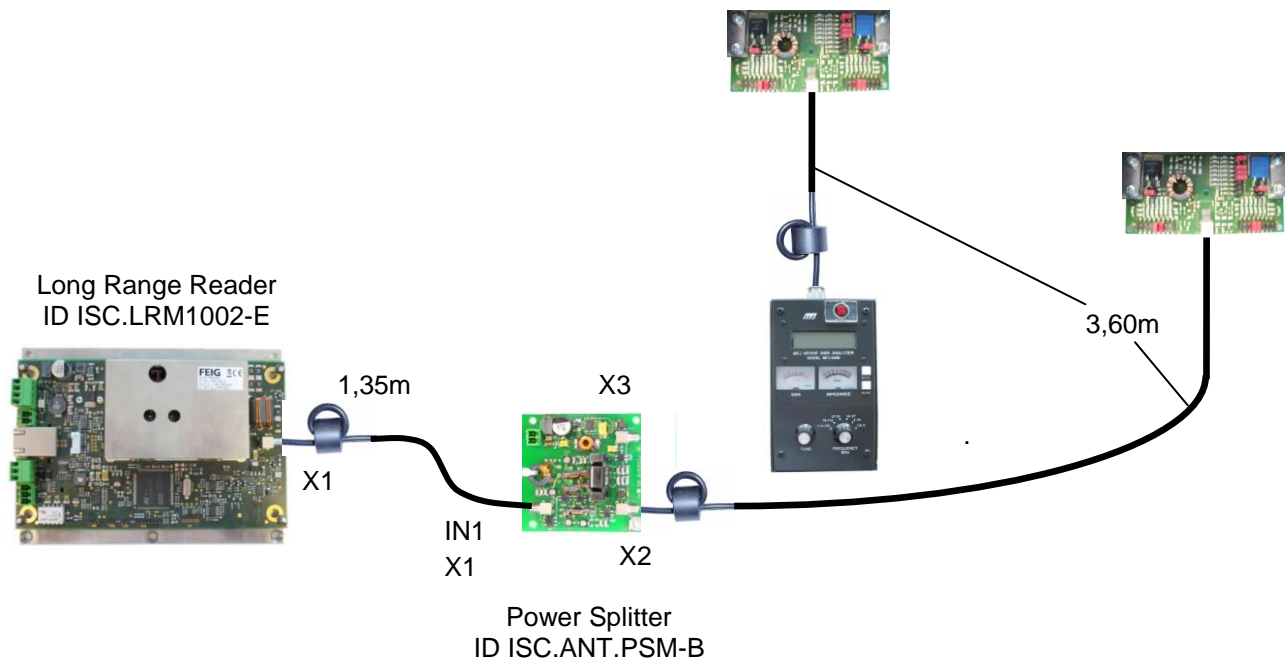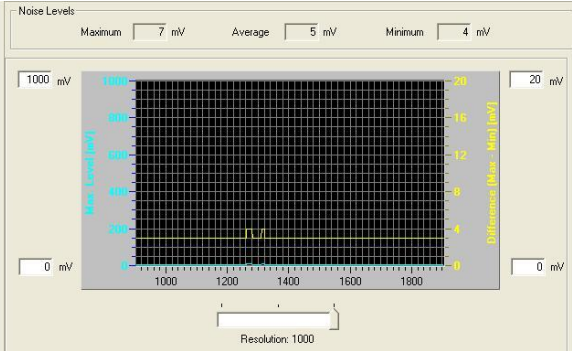

Fig. 19 Tuning the antennas with a SWR- Analyzer

For recommended devices and possible vendors see: 6.2 Sources of supply measuring instruments and accessories

4.3 Testing the Gate Antenna

After tuning the gate antenna, you can check for proper function using a Reader, the ISOStart service software and a Transponder. Here the Noise Level and performance of the gate are tested.

4.3.1 Checking the Noise Level
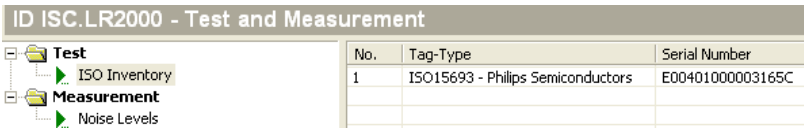
Step	Action	Note
1	Activate "Test and Measurement"	
2	Select „Noise Level" and start by clicking on „Start"	
3	Normal Noise Level values: Average: < 30mV Difference (Max-Min): < 20mV	

If the values are not met, check the following:

- Are all cables pulled tight and do they make good contact?
- Were the ring cores installed in the antenna cable?
- Were the cables routed as specified?
- Are other RFID systems installed nearby?
- Are there large metal parts near the antenna (distance < 1.0 m)?
- Are there devices nearby which may emit noise interferences (larger machines or wireless devices)?
- Are there interferences from the mains?

To determine which devices may be disturbing the gate, briefly disconnect them from the mains.

4.3.2 Reading a Serial Number

Step	Action	Note
1	Attach a tag to an antenna	Use adhesive tape, for example
2	Select „Test and Measurement"	
3	Select „ISO Inventory" function and activate by clicking on „Start". The serial number and tag type will be shown in the display.	
4	Repeat Step 1 to 3 for the opposite antenna	

4.3.3 Testing the performance

For testing the performance you must switch the reader to one of the Automatic Modes.
See 4.5 Activating the Automatic Mode

A read transponder will be displayed by a blue LED on the reader or by the LED light and the Sounder of the antenna. See also 4.4 Connecting and Setting the

In this test the capture area of the gate antenna described in 4.1 Project Notes is checked. For other tags or other configurations the indicated ranges and read areas may differ accordingly.
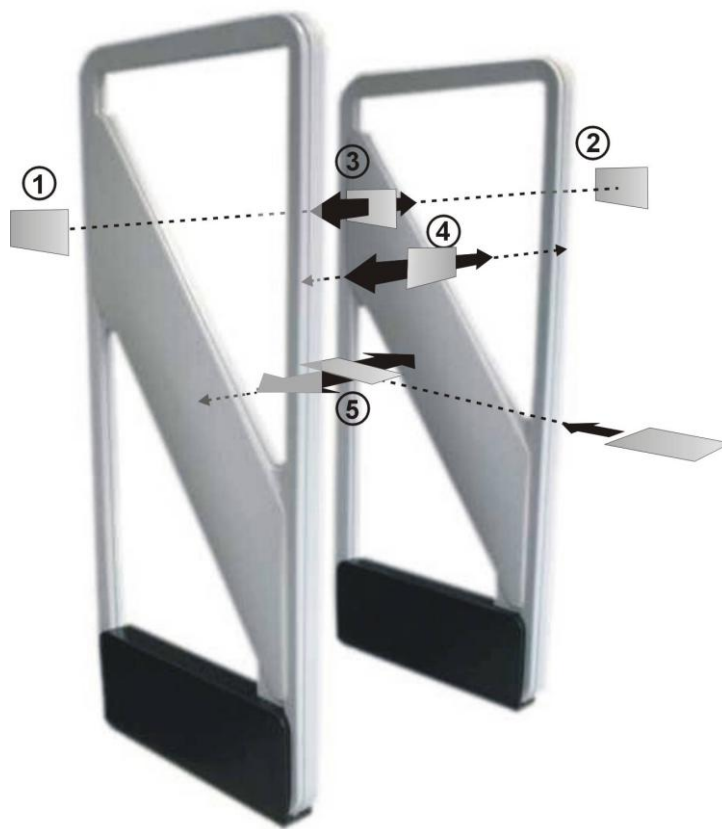
Fig. 20: Performance Test of the gate antenna

The test begins by checking the read range outside the gate (see Fig. points ① and ②), assuming the configuration and locality permit it. If the tag is oriented parallel to the antenna towards the outside, a read range of 65 to 75 cm should be achieved.

The three tag orientations are checked inside the gate. This corresponds to the lines and orientations ③④⑤. Now slowly move the tag in the vertical and parallel direction with respect to the antenna along the line ③ from one side to the other. The tag should always be read.

Then repeat this along the line ④ in the vertical tag direction transverse to the antenna and on the line ⑤ in the horizontal tag orientation. Here again the tag should always be read.

The tag should be read within the gate when moving horizontally through the gate in all three read orientations.

If one or more „holes" are detected, check the noise values on the Reader (see 4.3.1 Checking the Noise Level) .

The following may result in faulty readings:

- Antenna improperly installed (orientation, antenna distance, check cabling)

- Metal near the antennas is detuning or interfering with them.

- The antennas are not properly tuned.

- Noise level too high (Vmax – Vmin $\geq$ 20 mV)

- Transponder too insensitive, detuned or defective

- Reader improperly configured (transmitting power, transponder type, modulation, transponder parameters, etc.).

- A cable is defective or has a poor contact.

- Reader, Power Splitter or antenna defective.

4.4   Connecting and Setting the Indicators

The solution provided here presumes that all alarm indicator (Sounder and LED) are wired in parallel and switched through the relay X6 on the ID ISC.LRM1002 Reader. The pulse duration can be set (Digital IO/RELAY NO1) between 100 ms and 65535 s by adjusting the Reader configuration. Relay X11 provides a changeover contact for low voltages.

The acoustic indicator, the sounder, is installed on the terminal board as shown in Fig. 21. The volume can be adjusted with the potentiometer on the terminal board.

Jumper J1 on the terminal board has to be set to activate the sounder and the alarm LED simultaneous by the relay.
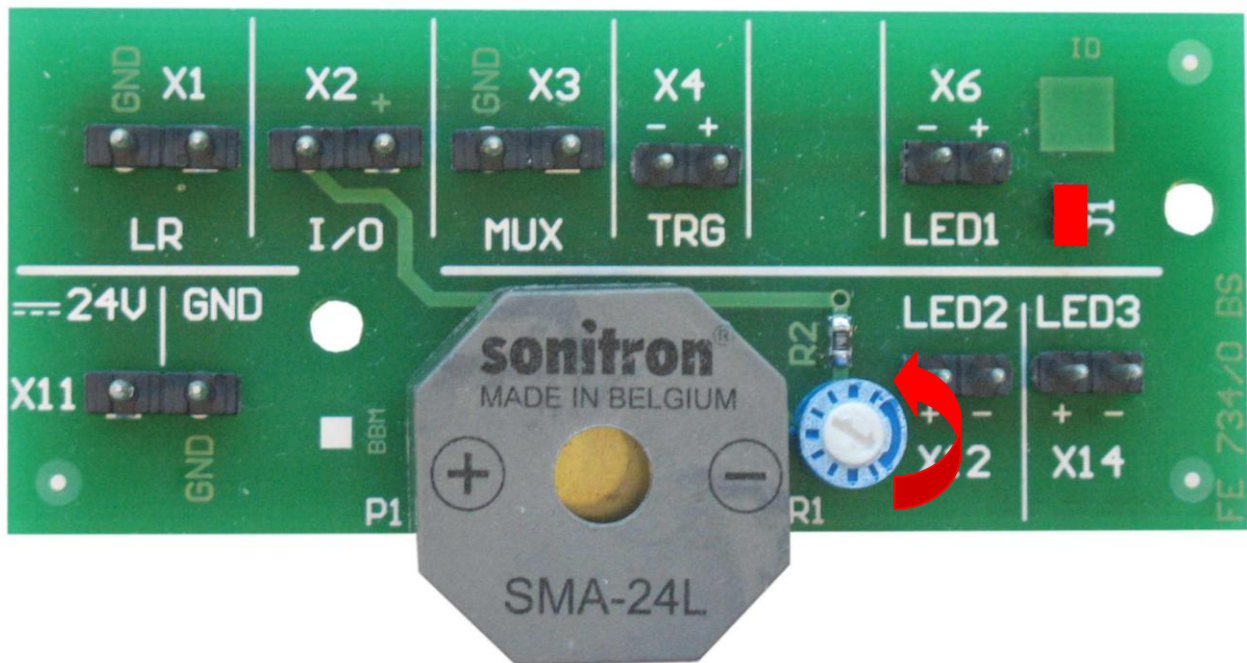
Fig. 21: Volume adjusting

The mounting of the light signal ID ISC.ANT1300680-SIG is described in M90800-xde-B.pdf

4.4.1 Connecting the Alarm LED

The Alarm LED of the antenna Type BL must be connected with X2/LED2 on the terminal board. Attention! Take care of polarity.

Notes:

The relay outputs are dimensioned for max. 24 V DC / 1 A.

The relay outputs are intended only for switching resistive loads. If an inductive load is used, the relay contacts must be protected by an external protection circuit.

Reversing the polarity or overloading the outputs will destroy them.

See also Installation Manual M20413-xde-ID-B.pdf ID ISC.LRM1002

4.4.2 Reader Setting for Indicator

The ISOStart software can be used to set the Reader configuration so that relay X11 opens or closes when a Transponder is read.

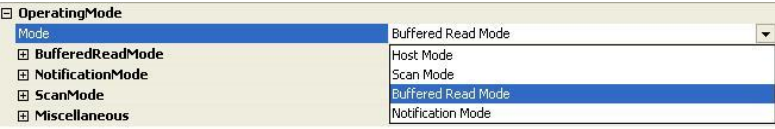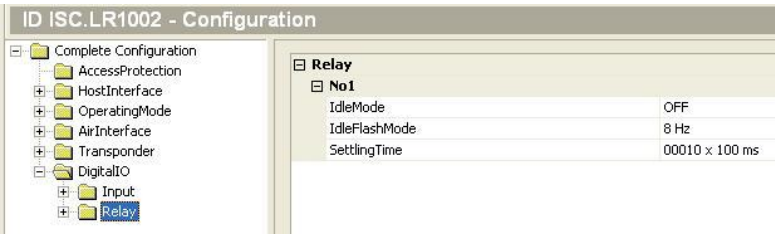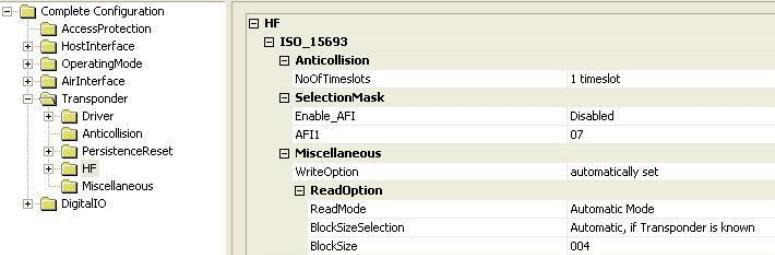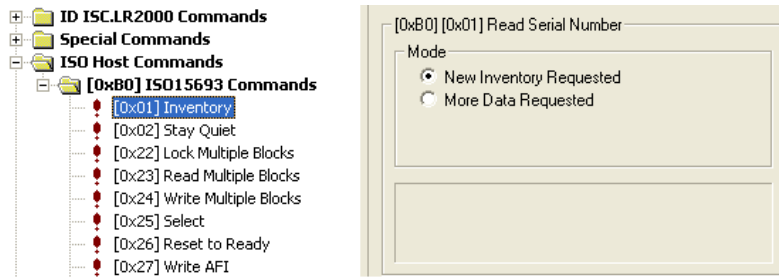| Step	Action	Note
1	Start ISOStart Software	ISOStart.exe
2	Select "Configuration" and click on "Read" to read the complete configuration.	Configuration [0x80] Read
3	**Operating Mode** Select Buffered Read Mode.	OperatingMode — Mode — Buffered Read Mode BufferedReadMode NotificationMode ScanMode Miscellaneous Host Mode / Scan Mode / Buffered Read Mode / Notification Mode

4	**Digital IO:**
	Output Idle Mode: OFF
	Idle Flash Mode: 1Hz
	Setting Time:
	   with „Setting Time" set time of relay 1 for alarm duration.
	   (10 means 1 second)
	   (e.g. 10 x 100ms)
		ID ISC.LR1002 - Configuration
		Complete Configuration / AccessProtection / HostInterface / OperatingMode / AirInterface / Transponder / DigitalIO / Input / Relay
		Relay — No1 — IdleMode OFF — IdleFlashMode 8 Hz — SettlingTime 00010 x 100 ms

5	Set by clicking on „Apply".	Apply
6	**Transponder** If the alarm should occur by a transponder with valid AFI byte, you have to configure the reader as follow: ISO-15693 – Selection Mask Set "Enable AFI" Set the value for the AFI in field "AFI1" (e.g. 07) Note: Up to four different AFI values could be set.	Complete Configuration / AccessProtection / HostInterface / OperatingMode / AirInterface / Transponder / Driver / Anticollision / PersistenceReset / HF / Miscellaneous / DigitalIO HF — ISO_15693 — Anticollision — NoOfTimeslots 1 timeslot — SelectionMask — Enable_AFI Disabled — AFI1 07 — Miscellaneous — WriteOption automatically set — ReadOption — ReadMode Automatic Mode — BlockSizeSelection Automatic, if Transponder is known — BlockSize 004

7	**Operating Mode** If the alarm should occur by an EAS, you have to configure the reader as follow: Set "EAS"	
8	Set by clicking on „Apply"	

4.4.3 Programming a Transponder with the AFI Byte

If the Transponders will remain on the object when leaving the storage location, they must first be cancelled. This is generally done by writing to a particular area of the Transponder.

The AFI byte (Application Family Identifier) is useful for this purpose, since it is contained in nearly all Transponder models in the ISO15693 family. To cancel, simply write a different code to the Transponder than for valid Transponders which trigger an alarm.

Step	Action:	Note:
1	Select „Commands"	
2	Place the Transponder in the antenna field (Antenna 1) Select [0x01] Inventory Mode: New Inventory Requested	
3	Read UID by clicking on „Send"	

4	The serial number, DSFID and Transponder type are displayed in a window.
	
	Write down the serial number of the Transponder
		`[0xB0] [0x01] Read Serial Number`
		`Statusbyte: 0x00 (OK)`
		`1 Transponder in Protocol`
		`  1. Transponder`
		`    TR-TYPE....: 0x03 (ISO15693 - Philips Semiconductors)`
		`    DSFID......: 0x00`
		`    SNR........: E00401000003165C`

5	Select „[0x27] Write AFI" ADR: 1: addressed Serial Number: Select Transponder UID AFI: Desired AFI Number (not equal to 00)	
6	Write AFI byte on to the transponder by click on „Send"	
7	To verify, read AFI byte by using the command [0x2B] Get System Information	

4.5   Activating the Automatic Mode

⚠️   **The gate has to be used in one of the Automatic Modes (Buffered Read, Notification or Scan Mode) to get a maximum performance. Otherwise the reading speed will be significantly reduced.**

For more information, see System Manual **H20411-xe-ID-B.pdf** *ID ISC.LRM1002*
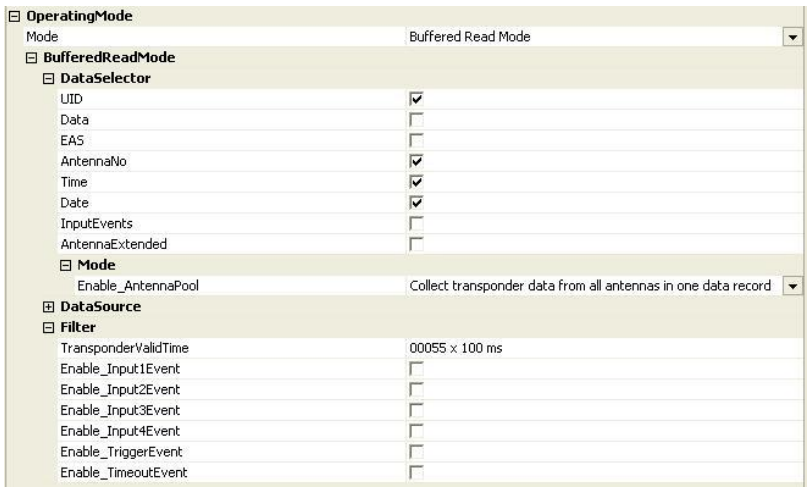
Which mode the most suitable is for your application has to be defined in advance.

In this example it is described how to activate the Buffered Read Mode.

In the automatic modes, the tags are read at maximum speed and the information is stored in the ring buffer of the reader. This Data set can be read by the host.
Due to the automatic alarm features at the automatic mode, the reader/gate can also run without any interface connection (Serial, Ethernet).

To activate „Buffered Read Mode" proceed as follows:

Step	Action	Note
1	Select „Configuration"	
2	**Operation Mode:** „Mode" - Buffered Read Mode „Data Selector" -UID -Antenna No -Time -Date „Filter" Set Transponder Valid Time. (e.g. 55 x 100ms)	
3	Set clicking on „Apply"	

Note:

The configuration of the Notification or Scan Mode are similar (See System Manual of the reader)
To test the function of the Gate in the Buffered Read Mode, the BRM Window of ISOStart or the BRMDemo program can be used.

4.6 Configuring the Reader in accordance with national RF regulations

Configuration of the RFID Readers and the maximum transmitting power of the antennas are affected mainly by the country-specific RF regulations. For the entire EU the limits are set forth in the R&TTE Directive and EN 300 330. In North America this is regulated by FCC Part 15 (USA) and by the RSS-210 (Canada).

The ID ISC.ANT1300/680 antenna with the ID ISC.LRM1002 Reader, when used as intended, complies with the basic requirements of Article 3 and the other relevant clauses of the R&TTE Directive 1999/5/EG of March 99. This means that operation in the 29 EU countries and the EFTA countries (EU countries plus Switzerland, Norway and Iceland) is possible with a maximum field strength of <u>42 dBµA/m</u> at 10 m distance.

RF approval (at a maximum field strength of <u>42 dBµA/m</u> at 10 m) for the ID ISC.ANT1300/680 antenna with ID ISC.LRM1002 Reader has been granted in accordance with FCC Part 15 for the USA and the RSS-210 for Canada

RF approval in accordance with EN 300 330 is still possible in all 46 CEPT countries.

The CEPT countries are:

Albania (ALB), Andorra (AND), Austria (AUT), Azerbaijan (AZE), Belarus (BLR), Belgium (BEL), Bulgaria (BUL), Bosnia and Herzegovina (BIH), Croatia (HRV), Cyprus (CYP), Czech Republic (CZE), Denmark (DNK), Estonia (EST), Finland (FIN), France (F), Germany (D), Greece (GRC), Hungary (HNG), Iceland (ISL), Ireland (IRL), Italy (I), Latvia (LVA), Liechtenstein (LIE), Lithuania (LTU), Luxembourg (LUX), Malta (MLT), Former Yugoslav Republic of Macedonia (MKD), Moldova (MDA), Monaco (MCO), Netherlands (HOL), Norway (NOR), Poland (POL), Portugal (POR), Romania (ROU), Russian Federation (RUS), San Marino (SMR), Slovak Republic (SVK), Slovenia (SVN), Spain (E), Sweden (S), Switzerland (SUI), Turkey (TUR), Ukraine (UKR), United Kingdom (G), Vatican City (CVA) and Yugoslavia.

<u>The following restrictions are in effect (as of: October 2009):</u>

1. Outside the EFTA countries RF approval must in all cases be applied for. The existing measuring protocols in accordance with EN 300 330 are generally sufficient.

When placing the antennas in service, the systems integrator must ensure that the prescribed mounting instructions are followed, the necessary Reader settings are made and permissible limits according to the national regulations are not exceeded.

The Reader needs to be configured as follows depending on the installation location:

Parameter	USA / Canada / Europe
Air Interface	
RF-Power:	maximum 5 W
RF Modulation:	15%
Transponder	
RF Modulation / ISO-MODE / MOD	10%
RF Data coding ISO-MODE:	Fast (1/4)
Timeslots ISO-MODE / NO-TS	1 or 16 Timeslots
ISO Option – BREAK:	Complete Timeslot length at „NO TAG"

5   Technical Data

5.1   Antenna ID ISC.ANT1300/680 - Type A and Type B

Mechanical Data

- **Housing**   UV stabilized ABS

- **Dimensions (W x H x D)**
  – Antenna   720 mm x 1590 mm x 80 mm ± 3 mm
  – Packing   800 mm x 1720 mm x 160 mm ± 10 mm

- **Weight**
  – ID ISC.ANT1300/680-A   Approx. 16 kg without / 21 kg with packing
  – ID ISC.ANT1300/680-B/-BL   Approx. 15 kg without / 20 kg with packing

- **Enclosure rating**   IP 43

- **Color**   Antenna frame: light grey RAL 7035
                                                             Antenna base: signal black RAL 9004

- **Mounting**
  – No. of attaching points   2
  – Recommended anchors   ∅ 10 mm
  – Recommended minimum load   5000 N / anchor
  capacity of the floor fastener

- **Maximum horizontal load on the top**   250 N*
  edge of the antenna

Electrical Data**

- **Supply Voltage**   24 V ⎓ ± 15 %
                                                            Noise Ripple : max. 150 mV

- **Power Consumption**   max. 32 VA

- **Operating Frequency**   13,56 MHz

- **Transmit Power**   2 W to 5 W
                                                           (250 mW Step - Software)

- **Maximum transmitting power per**   5 W
  antenna

- **Permissible overall transmitting power per antenna gate**
  - **EU-territory (per EN 300 330) and other CEPT nations**   **maximal 5,0 W**
  - **USA (lt. FCC Part 15)**   **maximal 5,0 W**
  - **Canada (lt. RSS210)**   **maximal 5,0 W**

- **Outputs**
  - **1 Relay (1 x Changeover)**   **24 V ⎓ / 1 A for Alarm Kit**

- **Inputs**
  - **1 Optocoupler**   **Max. 24 V ⎓/ 20 mA**

- **Interfaces**   **RS232**
  Ethernet (TCP/IP)

- **Protocol Modes**   **FEIG ISO HOST**
  BRM (Data Filtering and Data Buffering)
  Notification Mode (TCP/IP)

- **Supported Transponders**   **ISO 15693, ISO 18000-3-A, (EM HF ISO Chips, Fujitsu HF ISO Chips, KSW Sensor Chips, Infineon my-d, NXP I-Code , STM ISO Chips, TI Tag-it)**
  NXP I-Code 1

- **Ranges / pass-through width in gate with power splitter**
  - **One tag orientation**   **approx. 120 cm****
  - **All tag orientations**   **approx. 90 cm*****

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

- **Antenna connector cable Type B**   **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**
  - **Canada**   **RSS 210**

- **EMC**   **EN 301 489**

- **Safety**
  - **Low Voltage Directive**   **UL 60950-1**
  - **Human Exposure**   **EN 50364**

* Persistent deformation after load release approx. 1 cm.

** Qty. 2 ID ISC.ANT1300/680-A/-B antennas, antenna spacing (antenna center), same flow direction, Tag 46 mm x 75 mm ISO15693, sensitivity / minimum field strength H_{min}=60 mA/m rms, transmitting power 5 W, tag orientation parallel to antenna for horizontal movement through the antenna. The detection performance also depending of the strength of the Transponder answer signal !

*** Tag 46 mm x 75 mm ISO 15693, sensitivity / minimum field strength H_{min}=60 mA/m rms, transmitting power 5 W, aligned in all 3 dimensions for horizontal movement through the antenna. The detection performance also depending of the strength of the Transponder answer signal !

5.2   Approval

As per Section 4.6 **Fehler! Verweisquelle konnte nicht gefunden werden.**!

5.2.1 Europe (CE)

This RF equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC dated March 99.

$$C \in$$

Equipment Classification according to ETSI EN 300 330 and ETSI EN 301 489: Class 2

The technical data of the ID ISC.LRM1002 Reader module built into the ID ISC.ANT1300/680-A antenna can be found in the Installation Manual which is included with the device.

5.2.2 USA (FCC) and Canada (IC)

Product name:	**ID ISC.ANT1300/680**
Antenna name:	**ID ISC.ANT1300/680 Type A**
Reader name:	**ID ISC.LRM1002**
FCC ID: **IC:**	**PJMLRM1002** **6633A-LRM1002**
Notice for USA and Canada	This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada. Operation is subject to the following two conditions. (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Unauthorized modifications may void the authority granted under Federal communications Commission Rules permitting the operation of this device. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Further information and technical data of the ID ISC.LRM1002 Reader module built into the ID ISC.ANT1300/680 antenna can be found in the Installation Manual which is included with the device.

6   Annex A

6.1   Terminal assignment "Terminal Board"

Terminal	Acronym	Description
X1 / LR		**24V DC Reader**
X1 / Pin 1		+24 V DC Reader
X1 / Pin 2	GND	GND Reader
X2 / I/O		**24V DC Input/Output**
X2 / Pin 1		+24 V DC Input/Output
X2 / Pin 2	GND	GND Input/Output
X3 / MUX		**24V DC Multiplexer/Power Splitter (optional)**
X3 / Pin 1		+24 V DC Multiplexer
X3 / Pin 2	GND	GND Multiplexer
X4 / TRG		**Trigger Input (optional)**
X4 / Pin 1	+	TRG Trigger
X4 / Pin 2	-	GND Trigger
X6 / LED1		**Connection LED / Alarm LED 1. Antenna**
X14 / Pin 1	+	+24V DC LED1
X14 / Pin 2	-	GND LED1
X11		**24V DC Power Supply**
X11 / Pin 1	24V	Power Supply +24 V DC
X11 / Pin 2	- / GND	Ground – Power Supply
X12 / LED2		**Connection LED / Alarm LED 2. Antenna**
X12 / Pin 1	+	+ 24 V DC LED2
X12 / Pin 2	-	GND LED2
X14 / LED3		**Connection LED / Alarm LED 3. Antenna**
X14 / Pin 1	+	+24V DC LED3
X14 / Pin 2	-	GND LED3

Table 9: Pin-Configuration X1-X14 Terminal Board

6.2   Sources of supply measuring instruments and accessories

1.   SWR Meter, Antennen Analyzer

Diamond VSWR & Power – Meter KW220, SX -600 or SX1100

Supplier:

- WiMo Antennen und Zubehör : + 49 7276-96680, www.wimo.de
- Conrad Electroinc : www.conrad.de

MFJ HF/UHF SWR Analyzer

Model MFJ-259B, 1.8 – 170 MHz

Supplier:

- WiMo Antennen und Zubehör : Tel.: +49 7276-96680, www.wimo.de
- MFJ Enterprises, Inc : Tel.: +1-800-647-1800, http://www.mfjenterprises.com

VIA or CIA – HF Complex Impedance Analyzer 5012 – 5000

Supplier:

- Heinz Bollig AG Nachrichtentechnik, Tel.: + 41 71 335 0723, www.hbag.ch
- TransmitteRus, Phone.: +44 (0)7971-053067, www.transmitterus.com
- AEA Technology Inc., +1-800-258-7805, http://www.aeatechnology.com

2.   Adapter : SMA/PL, 50 Ohm dummy load, koaxiale cable with connector

Supplier:

- WiMo Antennen und Zubehör : Tel.: + 49 7276-96680, www.wimo.de
- Conrad Electroinc : www.conrad.de
- Farnell GmbH www.farnell.com
- Digi-Key Corporation, www.digikey.com