



Hardware Configuration Manual

InduBox GSM M4

V1.5i



Bausch Datacom NV can not guarantee the safety if the InduBox GSM M4 is not used within the specifications described in this manual.



Installation and service by qualified personnel only.

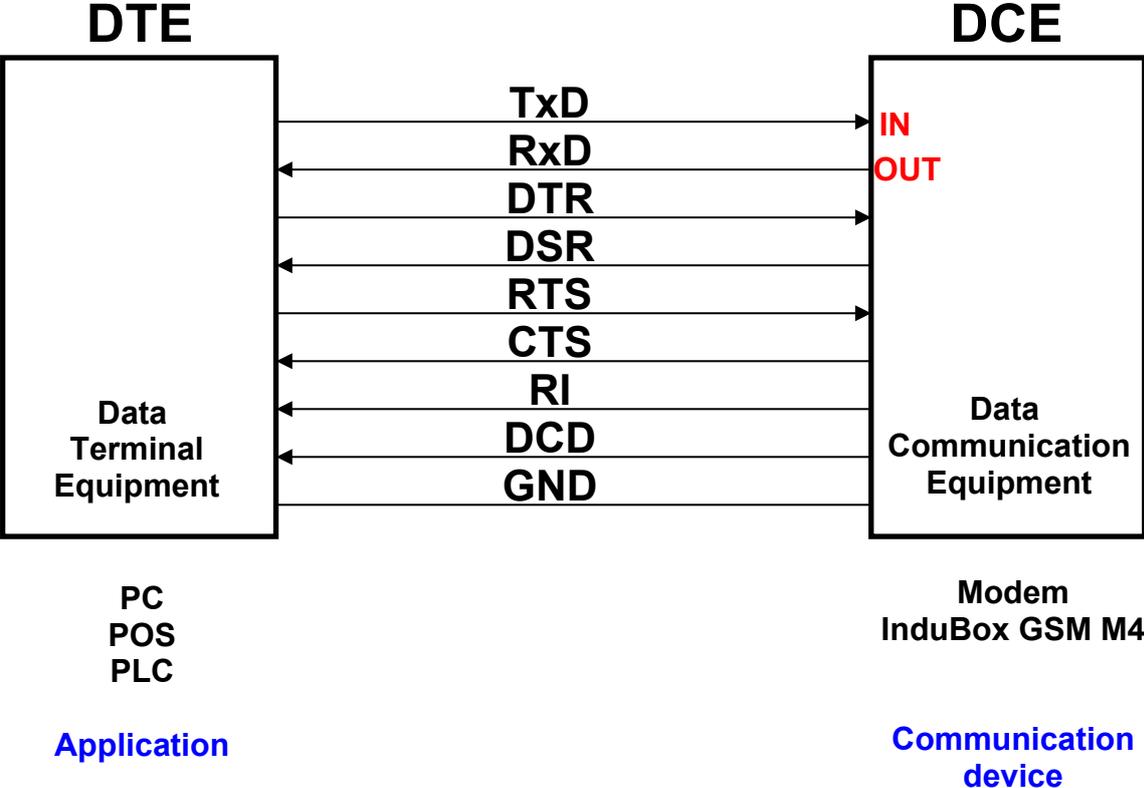
Document History

Date	Version		Auteur	
01/29/18	V1.0	Preliminary	Filip Lavaerts	Creation / V1.0 InduBox GSM M4 hardware manual
05/28/18	V1.1	Preliminary	Filip Lavaerts	Adding/edit Wouter's info about configuration
02/19/19	V1.2	Preliminary	Filip Lavaerts	Adding new GUI layout, new parameters
02/21/19	V1.2a	Preliminary	Filip Lavaerts	GUI screen shot update
	V1.2b	Preliminary	Filip Lavaerts	Spec updates
15/01/21	V1.3	Preliminary	Roel Postelmans	Sync with firmware v5.0.5
23/05/22	V1.4	Preliminary	Filip Lavaerts	IEC62368-1 safety requirements remarks added
13/07/22	V1.4a	Preliminary	Filip Lavaerts	
31/01/23	V1.5	Preliminary	Filip Lavaerts	Only hardware descriptions in this manual.
13/03/23	V1.5i	Preliminary	Filip Lavaerts	DC power

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Serial flow as used in this manual :



Disconnect the mains power before opening the InduBox GSM M4 modem enclosure!

1. Introduction

This manual is the reference when setting up the InduBox GSM M4 modem for your application. Because of the nature of this product and its field of application, some degree of technical background knowledge regarding the application and data-communication is assumed.

The InduBox GSM M4 modem is a versatile communication device designed to provide a flexible data communication solution for an industrial environment. The InduBox GSM M4 modem contains a number of options to accommodate different communication speeds, power supplies and interfaces.

This modem has an extended TCP/IP stack implementation, and is able to connect non-IP devices to an IP network over an Ethernet or GSM link.

The main specifications of the InduBox GSM M4 are :

- InduBox wall mountable housing
- Configuration, setup and monitoring via GUI / HTML pages

- 8 x status LEDs

- 10/100 Mb Ethernet interface
- full RS-232 DCE serial interface
- galvanic isolated 2-wire RS-485 serial interface
- galvanic isolated 3-wire RS-232 serial interface

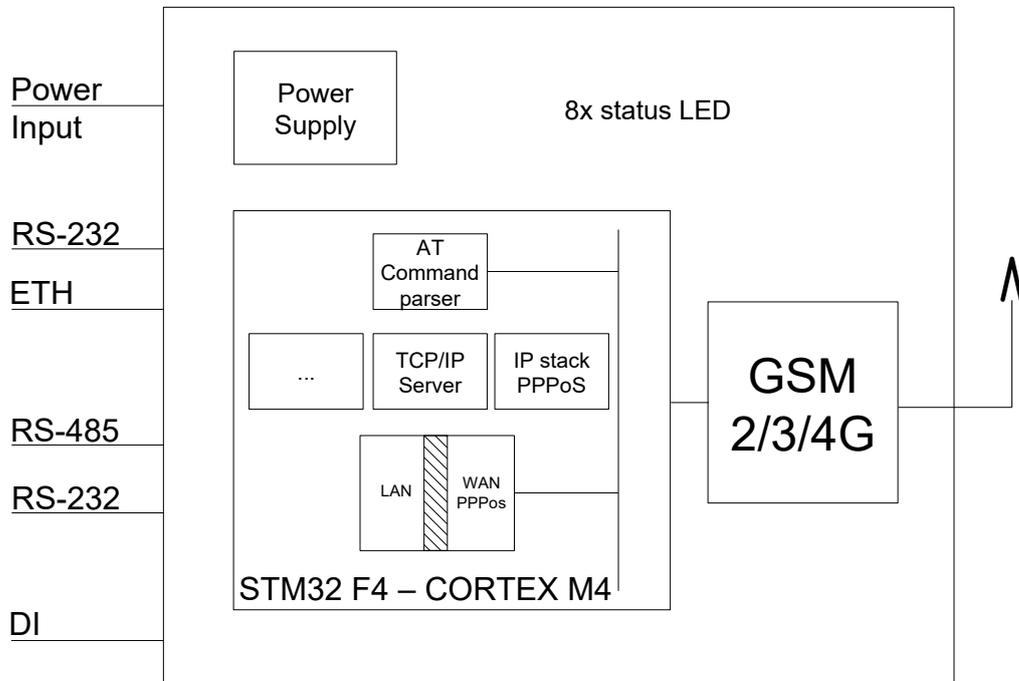
- 1 x passive galvanic isolated digital input

- Sierra Wireless HLx GSM module
- SIM card holder internally
- FME antenna connector

- Cortex M4 processor
- 64KB FRAM [8.192*8 bit]

2. Block Diagram

The block diagram below details the location and interconnection of the different functional units within the modem. The most important blocks are briefly described.



AC/DC power supply

The InduBox GSM M4 has a double isolated power supply. The mains supply (ac/dc) must be connected to the InduBox GSM M4 modem via a 2 pin terminal block with screw contacts. Make sure the voltage supplied to the modem is in the range of the InduBox GSM M4 input voltage (see chapter 3. specifications for details on voltage range).

Configuration Interface

The InduBox GSM M4 modem has one complete (TxD, RxD, DCD, DTR, RTS, CTS, RI and GND) RS-232 interface. This RS-232 interface is not isolated and can be used to configure and/or debug tracing. This interface has a RJ-45 connector.

Ethernet Interface

The InduBox GSM M4 modem has one standard 10/100 Mbit/s ethernet LAN interface. This interface can be used to configure the modem via the HTML GUI.

Isolated DTE interfaces

The InduBox GSM M4 has 2 galvanically isolated serial interfaces :

3- wire RS-232 (RxD, TxD, GND')

3- wire RS-485 (A, B, GND')

Those interfaces are galvanically separated and can be used to connect a serial device. Both interface connections are done through one RJ-45 connector.

The V' - pin can be used for external reset (V') or for powering (100 mA I_{max}) an external device (+5V'), selectable via a JP6.

8x Status LED's

The InduBox GSM M4 has 8 status LED's.

GSM module

The InduBox GSM M4 is using a Sierra Wireless CF³ footprint GSM module as WAN device. Thanks to the Sierra Wireless CF³ HL footprint for the WAN module, the InduBox GSM M4 offers the flexibility to easily migrate communication technologies, thus making it future proof. Depending on the application, the modem can be provided with standard 3GPP cellular 2G GPRS, 3G UMTS, 4G LTE, LPWA (low power wide area), LTE Cat-M1 or NB-IoT. LPWA with 3GPP 2G GPRS fallback is also possible. Most modules are available for global or NAM, EMEA and APAC only regions.

The following options are possible (Q3 2022) :

3GPP

HL6528	Quad band GSM/GPRS & GSM Data
HL6528RD	Quad band GSM/GPRS
HL7692	Global LTE Cat-1 with dual band GSM/GPRS/EDGE fallback (*)
RC7620-1	EMEA/Australia LTE Cat-1 with 3G and 2G fallback

LPWA

HL7800	– Global LTE Cat-M1, Cat-NB1
HL7802	– Global LTE Cat-M1, Cat-NB1 with dual band GSM/GPRS fallback
HL7810	– Global LTE Cat-M1, Cat-NB2
HL7812	– Global LTE Cat-M1, Cat-NB2 with dual band GSM/GPRS fallback

(*) only with 1-SISO antenna connection

3. Specifications

3.1 Housing and Connectors

- Housing
 - Bausch InduBox IP51 housing
 - Flame retardant UL 94V-0
 - Dimensions with connector cover: 180 x 108 x 71 mm
 - Dimensions without connector cover: 145 x 108 x 71 mm
- Mounting
 - There are 3 mounting holes, see app. B for the position.
 - The InduBox GSM M4 must be mounted vertically on a flat surface within a height of maximum 2 meters above the floor level.
 - If holes are made in the connector cover for the wiring, they should be close fitted so that no penetrating opening is created.
- Connectors
 - Mains plug (screw connector) has a pitch of 5.08 mm for a maximum wiring section 2.5 mm²
 - Female RJ-45 connectors (RS-232, RS-485)
 - RJ-45 Ethernet connector
 - FME 50 ohm antenna connector



3.2 Environmental conditions

Temperature in use -20°C / + 55°C
Humidity in use 10%RH - 75%RH (non condensing)

3.3 Power Supply Specifications

Isolation double, no PE connection needed



Input voltage 220-240 Vac 50/60 Hz 5 W_{max}
 125Vdc 40mA_{max}



The InduBox GSM M4 can be permanently connected to the mains supply or via a supply cord with mains plug. There is **no** build-in over-current or short-circuit in the InduBox GSM M4 ; in both cases an **over-current and short-circuit protection** (fuse F2AH250V) device must be included in the installation.

A **disconnect device** must also be installed. When permanently connected, the circuit breaker of the building installation can be considered as the disconnect device. When connected via a supply cord, the mains plug can be considered as the disconnect device. This must be installed in the immediate vicinity of the InduBox GSM M4. The disconnect device shall have a contact separation of at least 3 mm.

Mains cabling (N and L connection) must be at least 1.5mm².



Disconnect the mains power before opening the InduBox GSM M4 modem enclosure!

4. SIM Card

Install a SIM card into the SIM card interface socket. Without a SIM card the InduBox GSM M4 will not be able to communicate over the WAN interface.

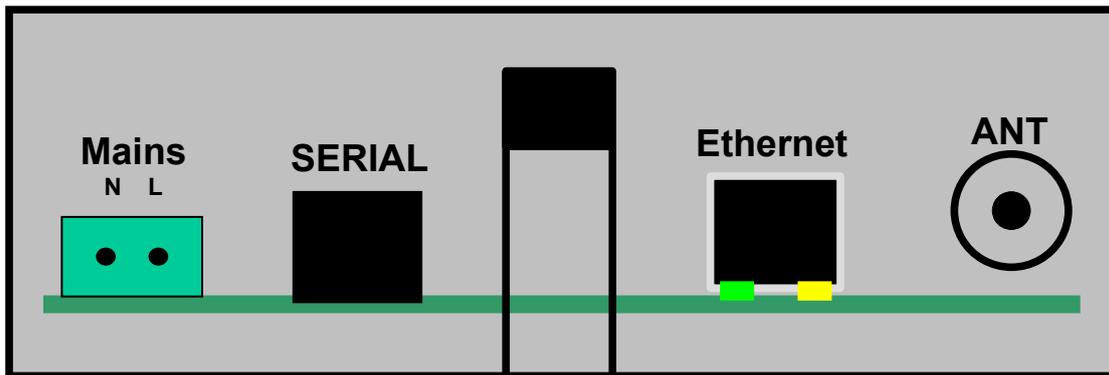
How to install the SIM card:

1. Disconnect the mains power and DTE & LAN interfaces.
2. Open the InduBox GSM M4 enclosure.
3. The SIM cardholder is placed in the upper right corner onto the PCB.
4. Slide the upper part to the LEFT position.
5. Rotate the SIM card holder upper part to the upright position.
6. Insert the SIM card into the upper part of the card holder.
7. Rotate back and close the upper part of the SIM cardholder
8. Finally slide the upper part to the right (LOCK) position.
9. Close the InduBox GSM M4 enclosure.
10. Connect mains power and DTE & LAN interfaces.

5. Interfaces and Connectors

Before you start the installation, take a moment to become more familiar with the possible connections to and from the InduBox GSM M4 modem.

The InduBox GSM M4 has three types of connectors; a mains terminal block screw connector, two RJ-45 connectors and one FME connector.



5.1 Mains Power Connection

PIN	
1	N
2	L

Always disconnect the mains power before connecting or disconnecting the power plug.

Make sure the voltage supplied to the modem is within range of the InduBox GSM M4 input voltage (see specifications for details on voltage range above).



There is **no** over-current or short-circuit in the InduBox GSM M4. Therefore a circuit breaker (fuse F2AH250V) must be installed between the InduBox GSM M4 and the building installation. This must be installed in the immediate vicinity of the InduBox GSM M4.

When the InduBox GSM M4 modem is mains connected via a standard mains plug, the mains socket must be directly accessible and easy reachable.

Mains cabling (N and L connection) must be at least 1.5mm².

Note for DC mains connection: the mains input is polarity independent.

5.2 Isolated Serial DTE Interfaces

The isolated serial interfaces are galvanically separated from the main circuits of the InduBox GSM M4 ; the RxD and TxD lines are separated via an OptoCoupler, a second 5 Vdc power supply is created via an additional DC/DC convertor.

Two isolated serial interfaces are possible on the same RJ-45 connector :

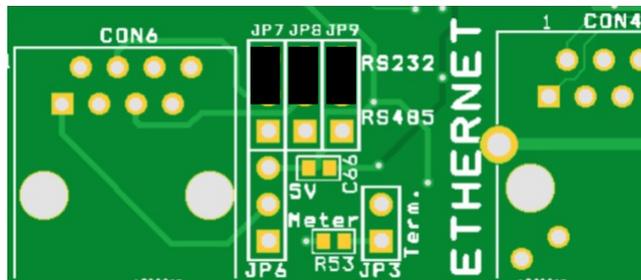
- RS-232 3-wire & '+V'
- RS-485 3-wire & '+V'

5.2.1 Isolated RS-232 interface

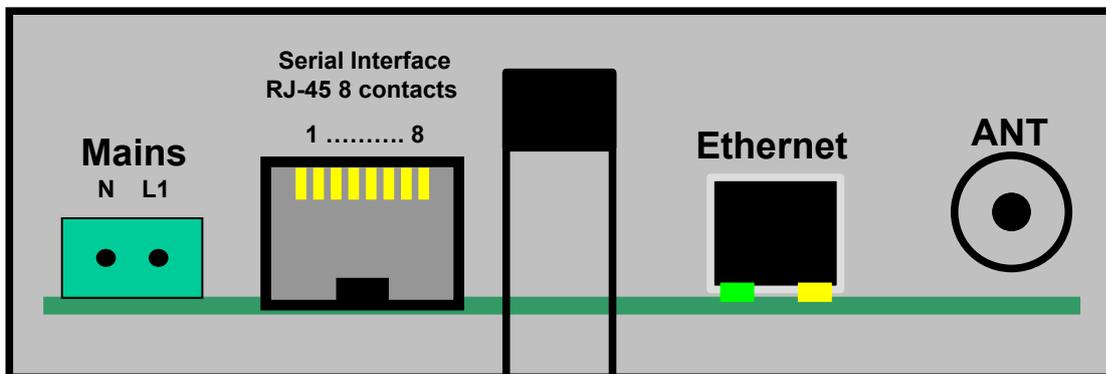
To be used when a RS-232 device must be connected to the InduBox GSM M4.

- Jumper settings

JP7, JP8 and JP9
on position 'RS232'

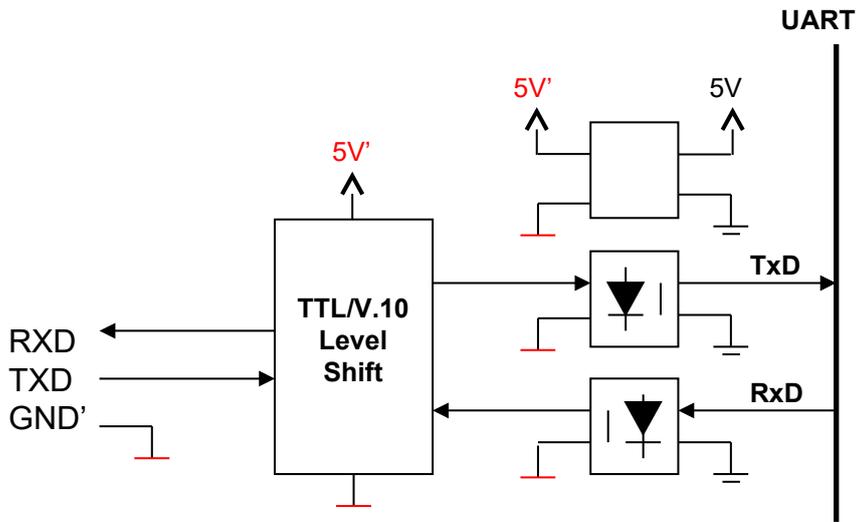


- Connection



PIN		RS-232	Direction	Level
1	+V	-	-	5~25 Vdc in OR +5V' out (JP6)
2	-	-	-	-
3	-	-	-	-
4	-	RXD	DCE → DTE	V.28
5	-	TXD	DTE → DCE	V.28
6	-	GND'	-	V.28
7	-	-	-	-
8	-	-	-	-

- Schematic overview

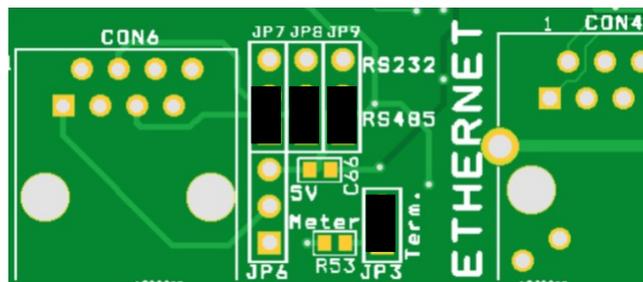


5.2.2 Isolated RS-485 interface

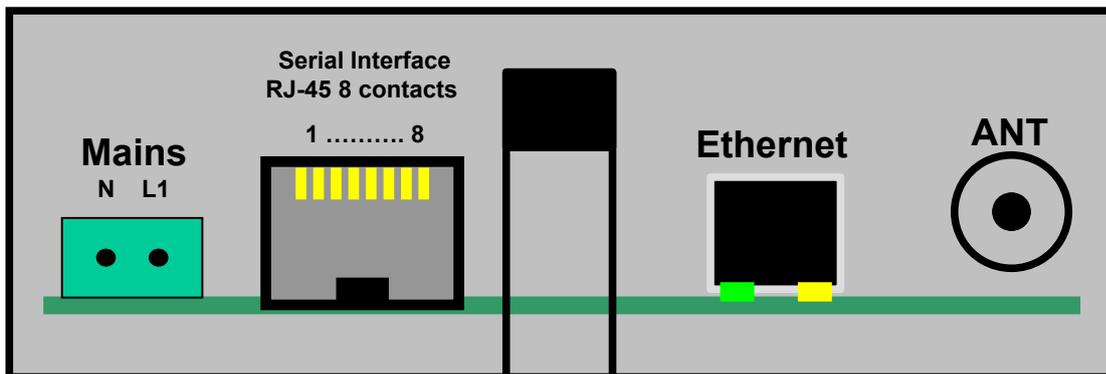
To be used when a RS-232 device must be connected to the InduBox GSM M4.

- Jumper settings

JP7, JP8 and JP9
on position 'RS485'



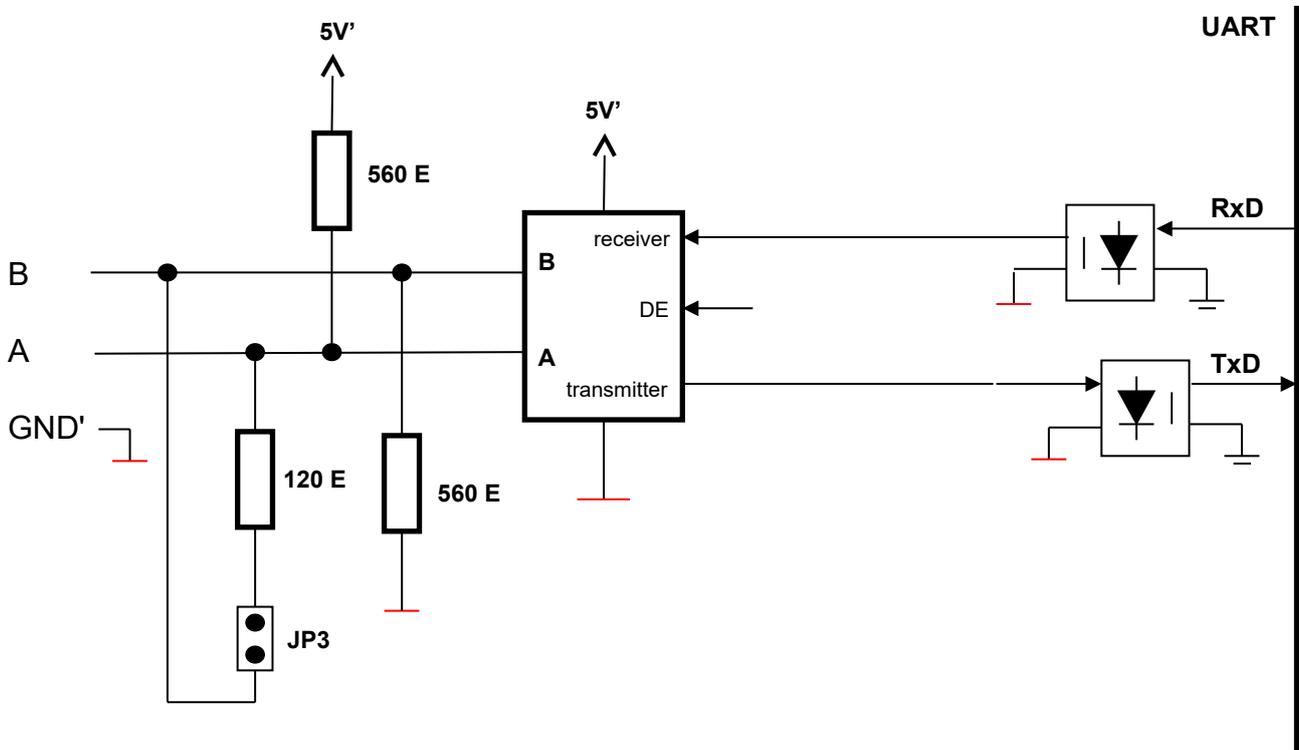
- Connection



PIN		RS-485	Level
1	+V	-	5~25 Vdc in OR +5V' out (JP6)
2	-	B	V.11
3	-	-	-
4	-	A	V.11
5	-	A	V.11
6	-	GND'	-
7	-	B	V.11
8	-	-	-

JP3 "Term" open no 120 ohm termination between A and B
 "Term" closed 120 ohm termination between A and B

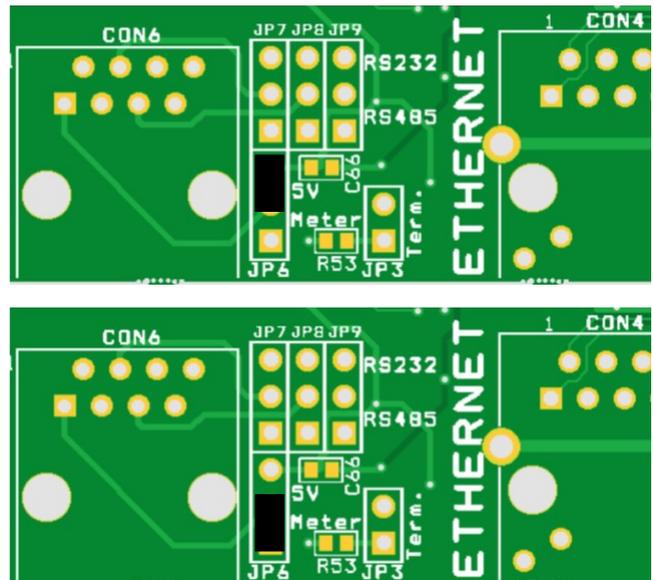
- Schematic overview



5.2.3 Pin 1

Pin 1 of the RJ-45 connector can have 3 functions, available in the RS-485 and RS-232 configurations.

- No connection (default)
 When JP6 is not placed, pin1 is not connected.
- 5Vdc outgoing
 To have 5 Vdc (maximum 100mA) onto pin 1.
- Input (reset) function



Pin 1 is connected to a DI (digital input via an optocoupler). An input voltage of 5 to 25Vdc is needed to activate the DI.

Depending on the firmware this can be used to reset the InduBox GSM M4.

5.3 Ethernet interface

This 10/100 Mbit/s LAN interface is primarily used to configure the InduBox GSM M4.

Default IP address is **192.168.1.44** / 255.255.255.0.

HTML is available on standard port 80.

5.4 Antenna interface

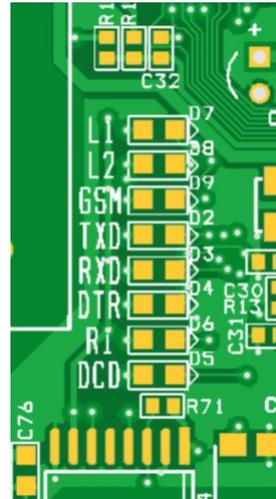
The GSM antenna must be connected on the GSM modem via a cable, depending on the application and the GSM RF field strength at the site. The antenna interface connector is FME (male).



**Never use the InduBox GSM M4 modem
without a proper antenna attached!**

6. LED Indicators

There are 8 LED's located onto the InduBox GSM M4 modem printed circuit.



L1	green	RSSI: Received Signal Strength, indicating the received power level. A higher number indicates a better connection.	DCE	Always ON : +CSQ==99 1 periodical flash: +CSQ >10 2 periodical flash: +CSQ 10-14 3 periodical flash: +CSQ 15-19 4 periodical flash: +CSQ 19-23 : 5 periodical flash: +CSQ >23 (2G RSSI levels)
L2	green	WAN TCP/IP connection	DCE	OFF: No connection Slow flash: WAN IP received ON: TCP socket open
GSM	yellow	GSM Network service	DCE	<u>ON</u> : not registered on the network <u>Slow flash (2 s. OFF)</u> : registered on the network <u>Quick flash (600 ms OFF)</u> : communication in progress
TXD	red	Transmit Data	DTE → DCE	TXD signal of the GSM module
RXD	red	Receive Data	DCE → DTE	RXD signal of the GSM module
DTR	red	Data Terminal Ready	DTE → DCE	DTR signal of the GSM module
DCD	red	Data Carrier Detect	DCE → DTE	DCD signal of the GSM module
RI	red	Ring Indicator	DCE → DTE	RI signal of the GSM module
DC	green	Isolated 5Vdc power supply	-	OFF: no voltage present ON: voltage present

7 Configuration & Setup

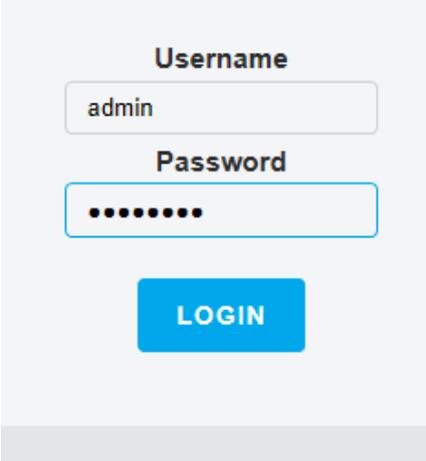
Configuration of the InduBox GSM M4 can be done through a GUI via HTML.

The default ip address of the modem is **192.168.1.44**.

Username : **admin**

Password : **password**

Click on “login” to enter the configuration pages of the modem.



A screenshot of a login form. It features a light gray background. At the top, the word "Username" is centered in bold black text. Below it is a white input field with a thin gray border containing the text "admin". Underneath, the word "Password" is centered in bold black text. Below that is a white input field with a thin blue border containing ten black dots. At the bottom of the form is a blue rectangular button with the word "LOGIN" in white, bold, uppercase letters.

More information about the configuration and/or setup of the InduBox GSM M4 is described in the Setup & Configuration manual.

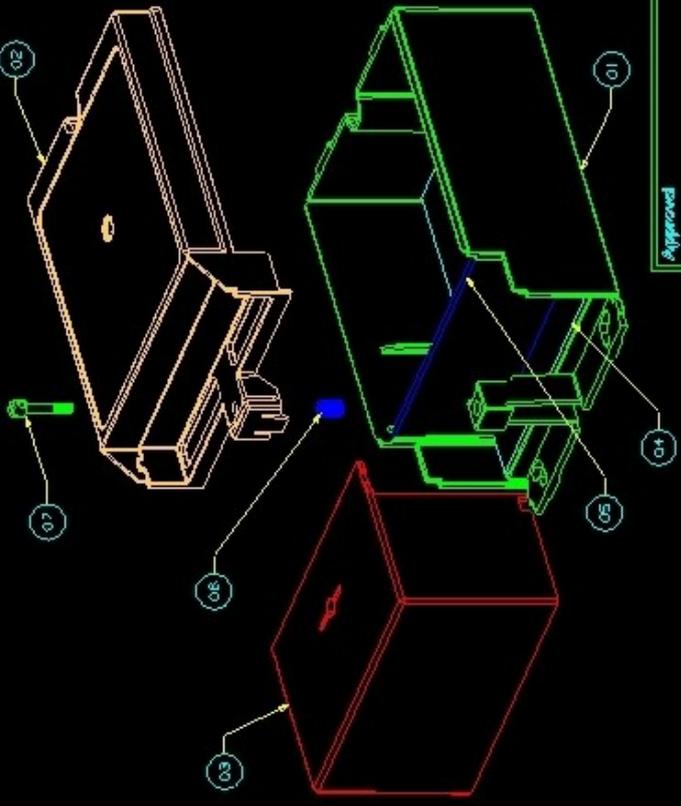
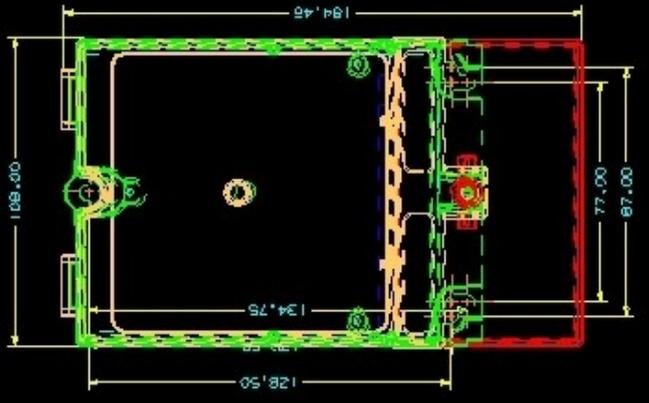
A. EC-Declaration of conformity

standard CE + TST25-3 (additional extended immunity tests)

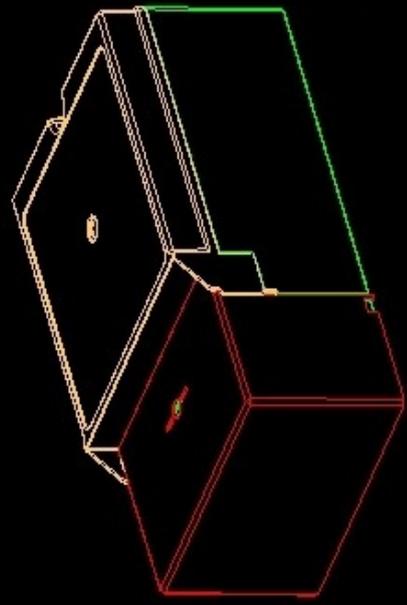
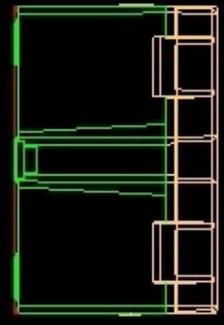
EN61000-3-2	Electromagnetic compatibility, part 3, section 2 Limits for harmonic current emissions.
EN61000-3-3	Electromagnetic compatibility, part 3, section 3 Limitations of voltage fluctuation and flicker.
EN61000-4-2	Electromagnetic compatibility, part 4, section 2 Electrostatic discharge immunity test. CISPR24 : 4 KV contact / 8 KV air TST25-3 : 8 KV contact (20 +/- contacts) / 15 KV air (20 +/- discharges)
EN61000-4-3	Electromagnetic compatibility, part 4, section 3 Radiated fields immunity test. CISPR24 : 10 V/m 80 MHz - 2000 Mhz, mod. AM 80% 1KHz TST25-3 : 30 V/m 80 MHz - 2000 Mhz, mod. AM 80% 1KHz
ENV50204	Electromagnetic compatibility, Basic immunity standard, Radiated Electromagnetic field from <u>digital radio telephones</u> immunity test. CISPR24 : 10 V/m 890-2400 MHz, 1% freq step, 1s dwell, 50% duty, 200 Hz repetition time TST25-3 : 30 V/m 890-2400 MHz, 1% freq step, 1s dwell, 50% duty, 200 Hz repetition time
EN61000-4-4	Electromagnetic compatibility, part 4, section 4 Electrical fast transient/burst immunity test. CISPR24 : 0.5 KV and 1 KV 5/50 ns, 5 Khz rep. freq on AC mains TST25-3 : 2 KV and 4 KV, 5/50 ns, 5 Khz rep freq on AC mains
EN61000-4-5	Electromagnetic compatibility, part 4, section 5 Surge immunity test. CISPR24 : 10 pulses 1 KV 1,2/50 µs (5+ 5-) on AC mains TST25-3 : 6 KV pulses
EN61000-4-6	Electromagnetic compatibility, part 4, section 6 Conducted immunity test. CISPR24 : 3 V 0.15 MHz - 80 MHz, mod. 80% at 1 Khz on mains TST25-3 : 10 V 0.15 MHz - 80 MHz, mod. 80% at 1 Khz on mains
Magnetic fields	applied to all accessible surfaces 1000 At (ampere turns) – 1A on 1000 turns
EN61000-4-8	Electromagnetic compatibility, part 4, section 8 Power frequency magnetic field immunity test.

CISPR24 levels

- EN61000-4-11 Electromagnetic compatibility, part 4, section 11
Voltage dips, short interruptions and voltage variations immunity test.
CISPR24 levels
- EN61000-4-18 Oscillatory waves
1 MHz 2,5 KV, rep rate 400 Hz applied on mains in common mode
100 Khz 2,5 KV, rep rate 40Hz applied on mains in common mode
1 MHz 1KV, rep. Rate 400 Hz applied on mains in differential mode
100 MHz 1KV, rep. Rate 40 Hz applied on mains in differential mode
- EN55022 Limits and methods of measurement of radiodisturbance characteristics of ITE-equipment.
EN55022 class B limits (AV - QP)
Radiated emission : 30 - 1000 MHz
Conducted emission (CISPR16) : 0.15 - 30 MHz
- EN55024 performance criteria for immunity tests
- EN61000-6-3 performance criteria for emission tests
- IEC62368-1 Audio/Video, information and communication technology equipment
Part1: Safety Requirements



Approved
 Company Name :
 Name :
 Date :
 Signature :



Lotus 01	Revisi 1	Desain 3D Model	Barry
Lotus 02	Revisi 1	Desain 3D Model	Barry
Lotus 03	Revisi 1	Desain 3D Model	Barry
Lotus 04	Revisi 1	Desain 3D Model	Barry
Lotus 05	Revisi 1	Desain 3D Model	Barry
Lotus 06	Revisi 1	Desain 3D Model	Barry
Lotus 07	Revisi 1	Desain 3D Model	Barry
Lotus 08	Revisi 1	Desain 3D Model	Barry
Lotus 09	Revisi 1	Desain 3D Model	Barry
Lotus 10	Revisi 1	Desain 3D Model	Barry

PROJEKSI	P20025JB
PROJEKSI	Modembox
PROJEKSI	P20025JB_00
PROJEKSI	1/1

