



Installation & Configuration manual

InduBox PSTN III

! CAUTION !

ELECTRIC SHOCK HAZARD IF COVER REMOVED

SERVICE BY QUALIFIED PERSONEL ONLY

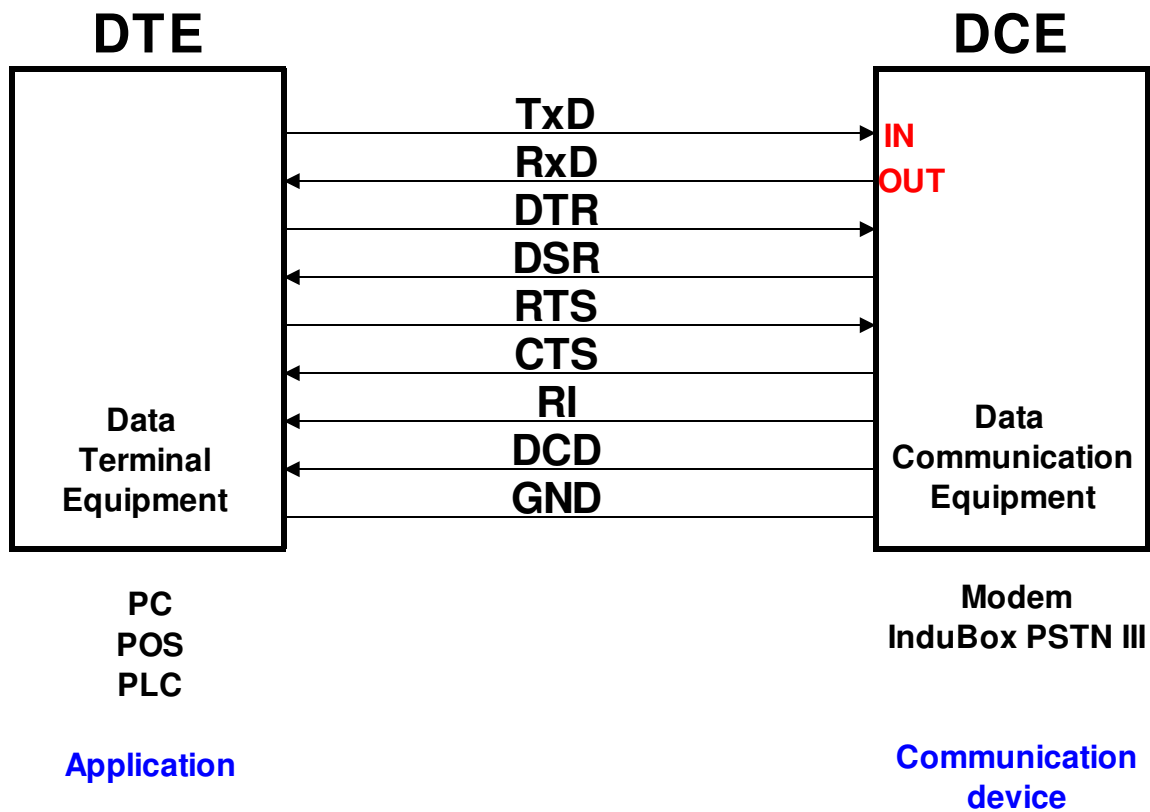
Document History

Date	Version		Auteur	
13/06/12	V1.0	Preliminary	Filip Lavaerts	Creation / V1.0 InduBox PSTN III hardware
24/08/12	V1.0a		Filip Lavaerts	Additional JP4 & 5
29/03/13	V1.0b/c		Filip Lavaerts	JP4 (RS485/pin1) indication text error

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Serial flow as used in this manual :



1. Introduction

This manual is the reference when setting up the InduBox PSTN III 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 PSTN III modem is a versatile communication device designed to provide a very flexible data communication solution for an industrial environment. The InduBox PSTN III modem contains a number of options to accommodate different communication speeds, power supplies and interfaces.

The InduBox PSTN III is designed to transmit and receive –transparent- ASCII formatted data on a analogue PSTN (Public Switched Telephone Network) line.

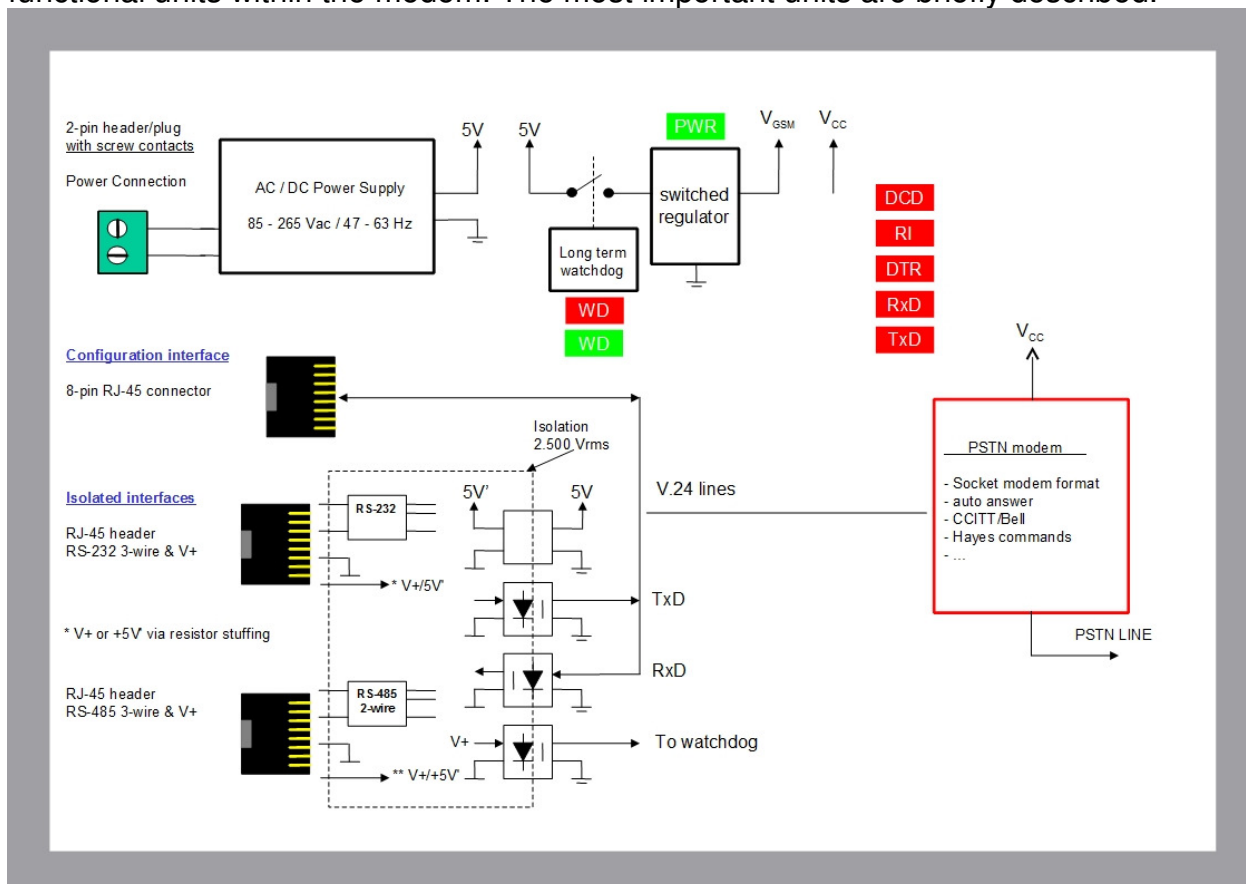
Besides serial communication using standard RS-232, other galvanically separated interfaces are available like RS-232 3-wire and RS-485 3-wire.

Besides a periodical (hard) reset, configurable between 1 and 168 hour, an external modem reset is possible via the additional 'V+'-connection to ensure a proper modem working.

The InduBox PSTN III is designed in a robust housing with different power supply options accepting a wide range of AC voltages.

2. Block Diagram

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



AC/DC power supply

The mains supply (ac) must be connected to the InduBox PSTN III 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 PSTN III input voltage (see specifications for details on voltage range).

Long Term Watchdog

A long term watchdog circuit is implemented. The modem will perform a reset each 1 to 168 hour (configurable) and/or if necessary via the external '+V'-connection to prevent a lock-up. The power supply of the PSTN socket modem module will be disconnected for a few seconds after the reset period. A 'heartbeat'-LED (green) is implemented to check the long term watchdog.

Switched regulator

To create the necessary dc-voltage to power the modem module a 0.5A step down switching regulator is implemented.

Configuration Interface

The InduBox PSTN III modem has one complete (TxD, RxD, DCD, DTR, RTS, CTS, RI and GND) RS-232 interface. This RS-232 interface is not isolated and must be used to configure and/or update the modem module. This interface has a RJ-45 connector.

Isolated DTE interfaces

The InduBox PSTN III has 2 galvanically isolated serial interfaces :

- 3- wire RS-232 (RxD, TxD, GND') & '+V' for external reset
- 3- wire RS-485 (A, B, GND') & '+V' for external reset

Each interface has it's own RJ-45 connector and can be used in parallel.

V.24 Status LED's

The V.24 lines to and from the PSTN module have a LED indicator.

Specifications

3.1 Housing and Connectors

- Housing: Bausch InduBox housing
bottom enclosure and seal-able connector cover
ABS with self-extinguishing V0 additive
transparent cover
polycarbonate + self-extinguishing V1

dimensions with connector cover: 180 x 108 x 71 mm
dimensions without connector cover: 145 x 108 x 71 mm
- Connectors: plug and connector
pitch 5.08 mm
maximum wiring section 2.5 mm²

RJ-11 telephone line connection

3.2 Environmental conditions

Temperature in use -25°C / + 55°C
Humidity in use 10% - 75% (non condensing)

3.3 Power Supply Specifications

Input voltage range: 90 – 253 Vac
Input frequency: 47 – 63 Hz
Power: 1,8 W_{idle} 2,0 W_{max}

3.4 PSTN-module Specifications

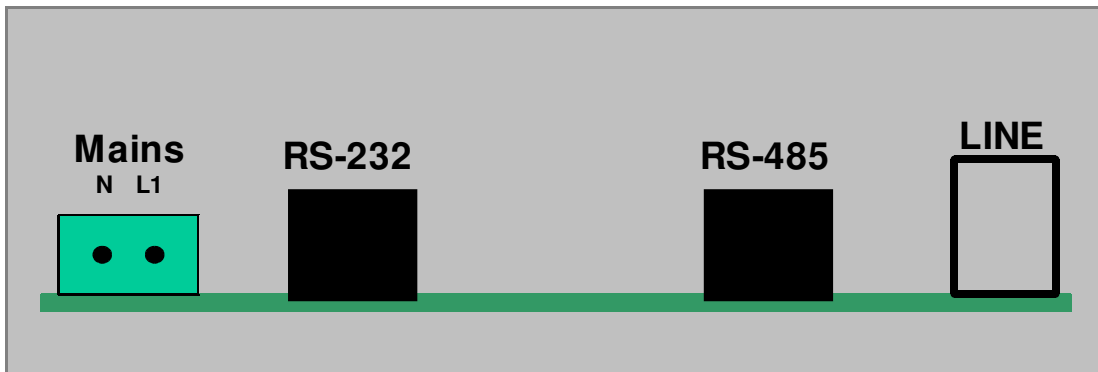
The InduBox PSTN III modem uses a Socket modem module.

See separate *SMD2404-15-34-57-93_MANUAL280205* manual for more info about the specifications of this module.

4. Ports and Connectors

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

The InduBox PSTN III has three types of connectors; a Mains terminal block screw connector, RJ-45 connectors and one RJ-11 connector.



Disconnect the mains power before connecting or disconnecting the power and/or DTE plugs !

4.1 Mains Power Connection

PIN	
1	N
2	L1

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

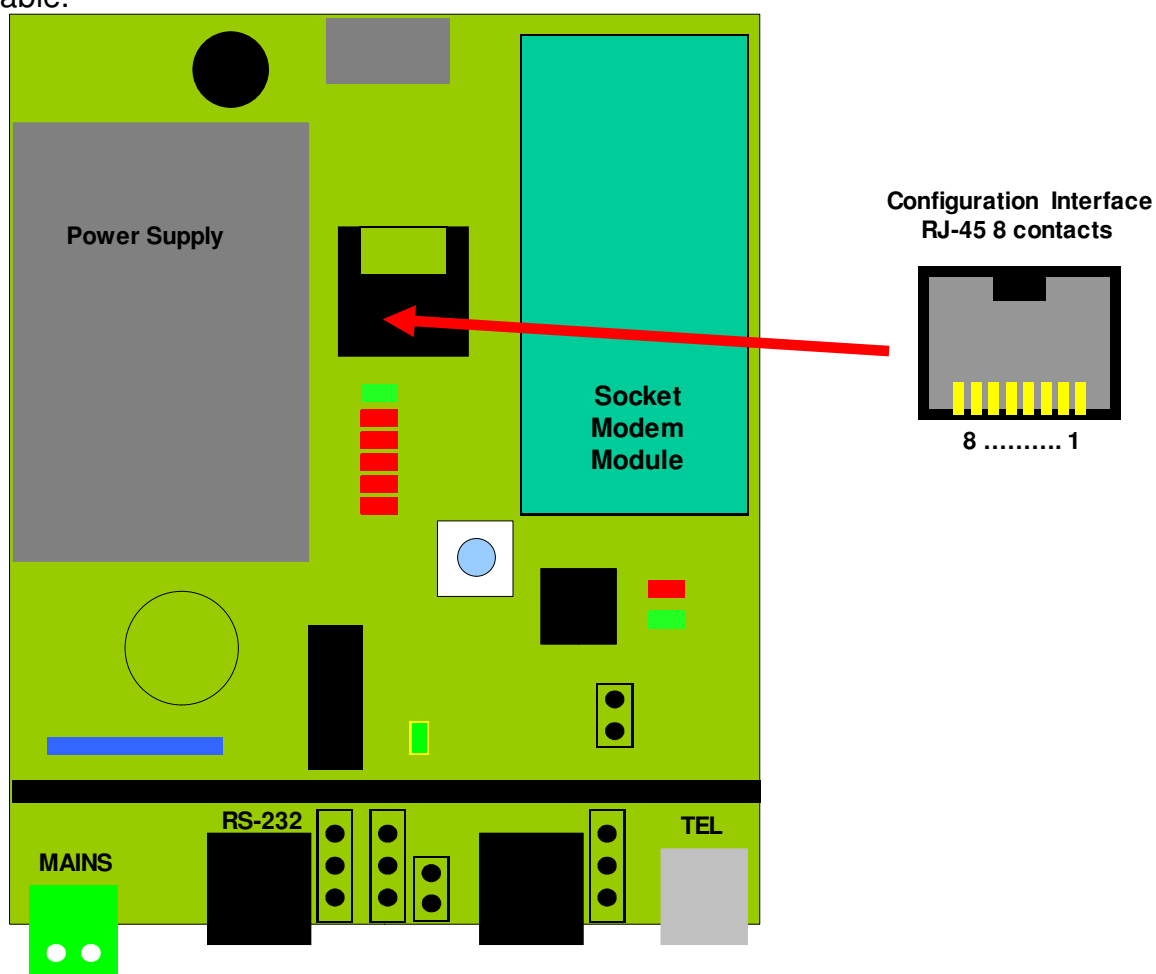
Make sure the voltage supplied to the modem is in the range of the InduBox PSTN III input voltage (see specifications for details on voltage range).

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

4.2 Non isolated DTE Interface

Only devices which conform with the safety regulations can be connected to the DTE port!

This interface must be used to configure and upload firmware to the PSTN modem module. This interface is accessible via a RJ-45 8-pin connector, is not isolated and has all standard V.24 interface lines. A RJ-45 to a standard female DB-9 connector cable is available.



PIN	V.24	Description	Direction	Level
1	DCD	Data Carrier Detect	DCE → DTE	V.28
2	RXD	Receive Data	DCE → DTE	V.28
3	TXD	Transmit Data	DTE → DCE	V.28
4	DTR	Data Terminal Ready	DTE → DCE	V.28
5	GND	Ground	-	-
6	RI	Ring Indicator	DCE → DTE	V.28
7	RTS	Request to Send	DTE → DCE	V.28
8	CTS	Clear to Send	DCE → DTE	V.28

4.3 Isolated DTE Interfaces

Only devices which conform with the safety regulations can be connected to the DTE port!

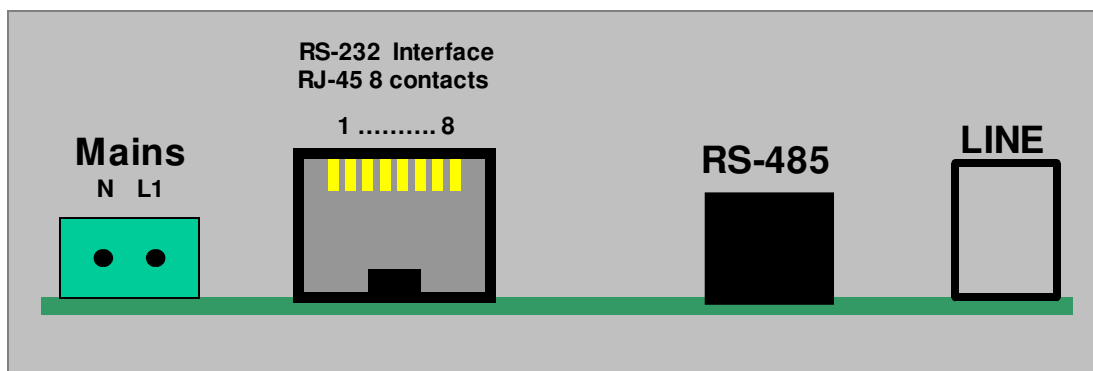
The isolated interfaces are galvanically separated from the main functions of the InduBox PSTN III ; RxD and TxD are separated via an OptoCoupler, a second 5 Vdc power supply is created via an additional DC/DC convertor.

Two isolated interfaces are present :

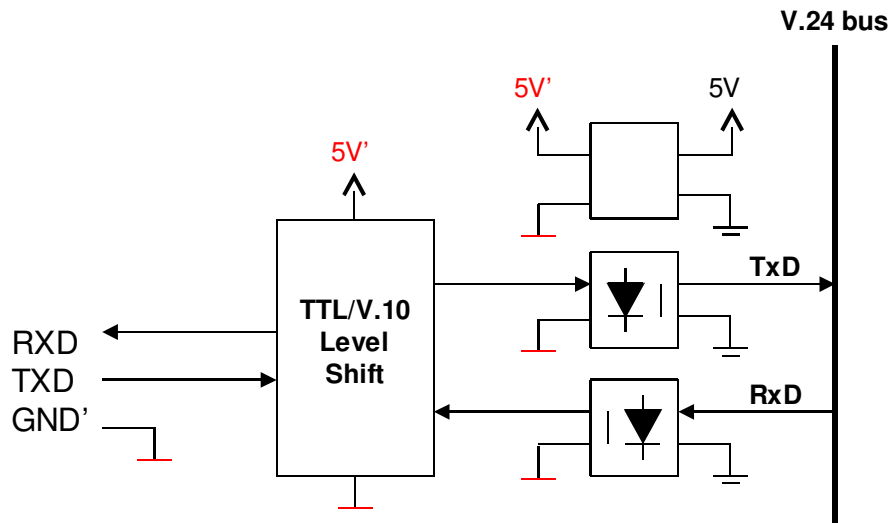
- RS-232 3-wire & '+V'
- RS-485 3-wire & '+V'

4.3.1 Isolated RS-232 interface

- RS-232 Hardware Configuration



PIN		RS-232	Direction	Level
1	+V	-	-	5~25 Vdc in OR +5V' out (JP5)
2	-	-	-	-
3	-	-	-	-
4	-	RXD	DCE → DTE	V.28
5	-	TXD	DTE → DCE	V.28
6	-	GND'	-	V.28
7	-	-	-	-
8	-	-	-	-



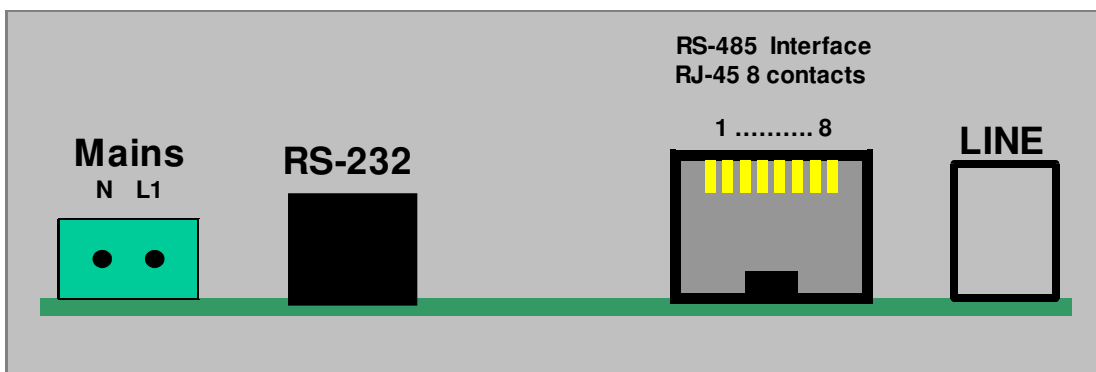
- RS-232 Software Configuration

This interface is full duplex and can be used on all possible baudrates up to 115200 bps. This interface uses only RxD and TxD. DTR and RTS are not used, thus inactive. Be sure to disable those signals in the configuration of the InduBox PSTN III ;

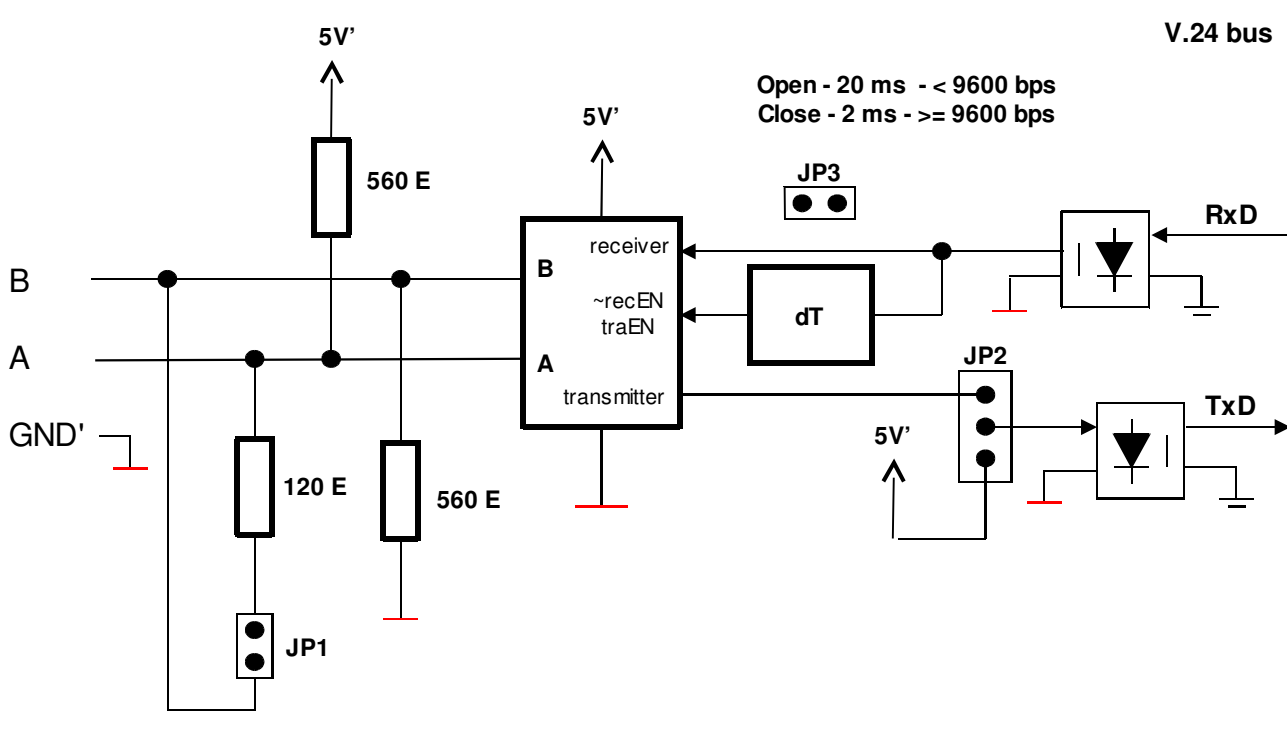
at&k0	no RTS/CTS flow control
at&d0	no DTR signal present

4.3.2 Isolated RS-485 interface

- RS-485 Hardware Configuration



PIN		RS-485	Level
1	+V	-	5~25 Vdc in OR +5V' out (JP4)
2	-	B	V.11
3	-	-	-
4	-	A	V.11
5	-	A	V.11
6	-	GND'	-
7	-	B	V.11
8	-	-	-



The following jumpers must be set for RS-485 :

JP2	“dis” (down) closed	RS-485 disabled
	“en” (up) closed	RS-485 enabled
JP1	“Term” open	no 120 ohm termination between A and B
	“Term” closed	120 ohm termination between A and B
JP3	“Delay” open	20 ms delay → <9600 bps
	“Delay” closed	2 ms delay → >=9600 bps

- RS-485 Software Configuration

This interface is half duplex and can be used from 300 to 115200 bps. This interface uses only RxD and TxD. DTR and RTS are not used, thus inactive. Be sure to disable those signals in the configuration of the InduBox PSTN III ;

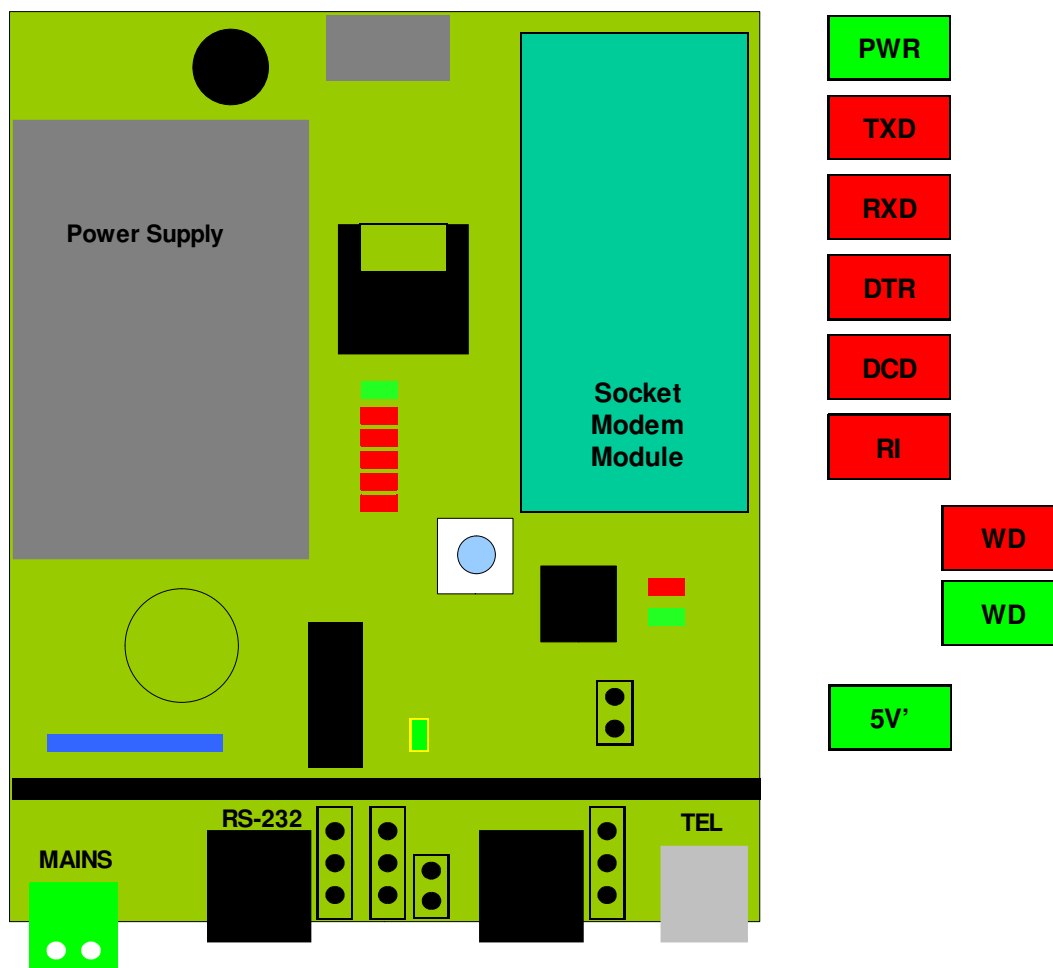
at&k0	no RTS/CTS flow control
at&d0	no DTR signal present

RxD and TxD info is transmitted onto the same 2 wires. To avoid a double echo during command mode, the modem echo should be disabled ;

ate0	disable modem echo
------	--------------------

5. LED Indicators

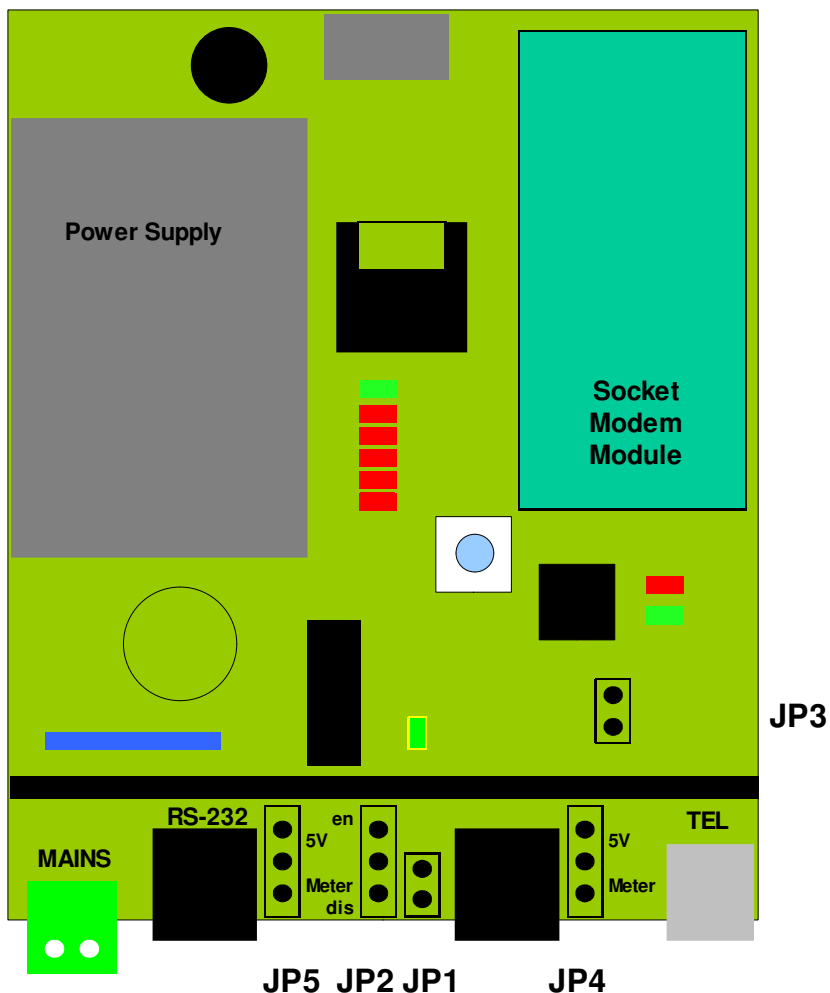
There are 9 LED's implemented onto the InduBox PSTN III modem printed circuit.



PWR	green	Power ON indicator	-	OFF : no voltage present ON : voltage present
TXD	red	Transmit Data	DTE → DCE	Reflects the state of the TXD signal
RXD	red	Receive Data	DCE → DTE	Reflects the state of the RXD signal
DTR	red	Data Terminal Ready	DTE → DCE	Reflects the state of the DTR signal
DCD	red	Data Carrier Detect	DCE → DTE	Reflects the state of the DCD signal
RI	red	Ring Indicator	DCE → DTE	Reflects the state of the RI signal
WD	green	Watchdog "Tick"	-	Reflects the state of the Watchdog
WD	red	ON during reset cycle	-	
5 V'	green	Isolated 5Vdc power supply	-	OFF : no voltage present ON : voltage present

6. Jumper Settings

The InduBox PSTN III modem has 5 jumpers. The functions of the jumpers will be described in the paragraphs below.



Jumper	Position	Description
JP2	"dis"(able) "en"(able)	RS-485 disabled RS-485 enabled
JP1	"Term" Open "Term" Closed	no 120 ohm termination between A and B 120 ohm termination between A and B
JP3	"Delay" Open "Delay" Closed	20 ms delay → <9600 bps 2 ms delay → =>9600 bps
JP5	No Jumper "Meter" "5V"	RS-232 pin1 : no connection RS-232 pin1 : '+V' 5~25 Vdc in (reset function) RS-232 pin1 : +5V' out
JP4	No jumper "Meter" "5V"	RS-485 pin1 : no connection RS-485 pin1 : '+V' 5~25 Vdc in (reset function) RS-485 pin1 : +5V' out

7. Watchdog Functionality

To prevent a “total lock-up” of the InduBox PSTN III a long term watchdog is implemented. This function is created with a separate microcontroller. The microcontroller itself is guarded with it’s own internal watchdog (+/- 1 second refresh / green WD LED flash).

This long term watchdog has 2 possible ways to reset the modem :

1. configurable periodically reset
2. external reset triggered by the '+V'-connection (JP4 and/or 5 on 'Meter' position)

7.1 Periodically reset

The power supply will be disconnected during 20 seconds after the selected reset period **IF** the modem is NOT connected (inactive DCD signal).

If the reset period is ended **and** the modem is connected to a remote host (active DCD signal) the reset will not be conducted. If the reset period is ended + 10 minutes **and** the watchdog already past a reset, because of an active DCD signal, the reset will be conducted! Otherwise, the InduBox PSTN II can be “locked-up” with an active DCD signal the watchdog will never be able to reset the WAN module.

Time is programmable via the serial setup menu of the modem.

This menu is accessible via the RJ-45 serial interface (9600 bps 8N1) after hitting the blue 'push'-switch located next to the reset processor onto the modem printed circuit board.

```
| -- START --  
|  
| Bausch Datacom DinBox setup [V2.0]  
|  
| Reset period time select [currently 24 hour]  
| Do you want to change this [y/n] :
```

Enter 'y' if you want to change the default 24 hour to another value. The new value will automatically be stored in non volatile RAM.

7.2 External reset

The power supply will be disconnected during 20 seconds when a negative slope (5-25V to 0V) is detected on the '+V'-input.

There is no DCD check done in this reset mode.

8. AT Command Interface

More information about the **commands** to, and the **responses** from the InduBox PSTN III modem, are described in the SMD2404-15-34-57-93_MANUAL280205 manual.

This manual can be found onto the CD-ROM delivered with the InduBox PSTN III modem.

9. 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

