



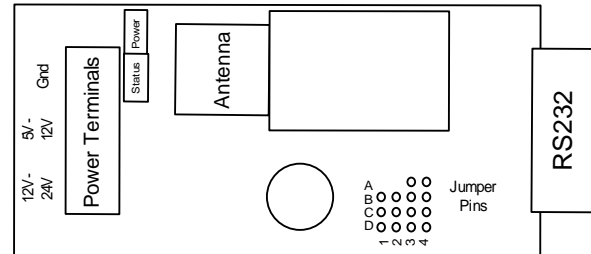
LinkMatik-232™

DIN rail RS232 to Bluetooth transceiver / Serial cable replacement system



Features

- Easy-to-use serial data interface
- Connects with Bluetooth devices (e.g. PDA's, PC's, Phones) as master or slave.
- For cable replacement applications, two LinkMatik-232s can pair permanently together one as master, the other as slave.
- Over-the-air data rate approx 50K full duplex.
- FCC / CE compliant. Does not need recertification if integral antenna used.
- Serial baud rates 9600 to 115K baud.
- Hardware flow control or no flow control.
- Bluetooth PIN code and encryption.
- Bluetooth error correction layer.
- Class I Bluetooth V2.0 radio, 100m range.
- 5-24V DC supply.
- DIN rail mounting clip.
- Integral antenna.



Summary

LinkMatik is a fully transparent serial to Bluetooth data link. It enables system designers to easily add a Bluetooth wireless to their products without the need for RF and antenna design expertise.

The module contains all RF circuitry, including integral antenna and baseband controller, and provides a simple-to-use, plug-in module with serial interface to the host application.

The module can interface with many standard Bluetooth devices, e.g. Laptop computers, PDAs, Mobile phones etc.

Operating in slave mode, it initializes itself and waits for a remote device to connect.

Operating in master mode, it looks for specific devices to connect to.

For cable replacement applications, a slave and a master are paired together.

The modules manage themselves and require no external control. Baud rate, device name, class of device, etc, can be reconfigured from a PC via the serial port.

Linkmatik-232 is available with either a female or male D9 RS232 socket. Factory-configure wedded pairs are also available for fit-and-forget cable replacement applications.

Manufactured to ISO9001:2000



Ordering Information

Part No	Description
LM-232-F	LinkMatik-232 DIN rail package, female D9 socket (see photo above)
LM-232-M	LinkMatik-232 DIN rail package, male D9 socket
LM-232-W	2 x LinkMatik-232 DIN rail package, male / female wedded pair

Installation

Power is connected to the screw terminals at the top of the Linkmatik-232 unit. Either 5V-12V DC should be connected between the terminals marked "Gnd" and "5V-12V", or 12V-24V DC should be connected between the terminals marked "Gnd" and "24V". The supply is regulated on-board but must be capable of providing 75mA. When power is correctly applied, the Power LED will light (green). With respect to the RS232 connection, the power should be floating or grounded to the same ground level as the RS232.

The radio is a 2.4GHz Class I Bluetooth device with an integral antenna. To achieve 100m free-space range, the corresponding Bluetooth device must also be Class I. LinkMatik-232 is supplied with an integral antenna. In order to realize the maximum possible range, the antenna position is of importance. During installation, consider the RF characteristics of the environment surrounding the module. Experiment with the location and orientation of the antenna and avoid locating it near large conducting materials (e.g. metal, water). If it must be placed in a metal case, try to ensure the case has some holes in it of at least 3cm in diameter.

Jumper Switches

In normal operation, four jumper connectors must be fitted according to whether the device should operate in DCE or DTE configuration. A DTE device is always connected to a DCE device and vice versa. A Windows PC is a DTE device, so to connect to a PC, LinkMatik-232 should be configured as a DCE device. If it is to replace a Windows PC, it should be configured as a DTE device.

To configure LinkMatik-232 as a DCE device, place jumper connectors vertically across the pins in rows 3 and 4, i.e. A3-A4, B3-B4, C3-C4, D3-D4, as shown in the photo on the cover page.

To configure LinkMatik-232 as a DTE device, place jumper connectors horizontally across the pins in rows 3 and 4, i.e. A3-B3, A4-B4, C3-D3, C4-D4.

The serial data is standard RS232 with 8 data bits, no parity bit and 1 stop bit. Hardware flow control is supported. If no flow control is required, RTS must be connected to CTS. To do this, remove any jumpers on pins C1, C2, D1 and D2, and fit a jumper over B1-C1. This connects CTS to RTS.

Bluetooth Operation

When shipped, LinkMatik-232 operates in Slave mode with pin code 0000 (four zeroes). You will be able to discover and connect to it from a remote device. The blue status LED will then light and you may commence serial communications.

If configured to operate in Master mode, LinkMatik-232 will actively search for devices it has been paired with. When it finds one, it will connect to it automatically. The blue status LED will then light and you may commence serial communications.

To configure two LinkMatik-232s to automatically pair with each other on power-up, one should be configured in Slave mode and one should be configured in Master mode. They must also be paired, so the master will automatically search for the slave at power-up and connect.

Device Configuration

LinkMatik-232 is configured by placing it in a special configuration mode and then sending commands via the RS232 port. You can use the HyperTerminal program supplied with Microsoft Windows in order to send the configuration commands. The commands will require the same serial settings (baud, parity, etc) as configured for the device at the time.

To place the LinkMatik-232 in configuration mode, ensure that no device can connect to it and then place a jumper over pins B1-B2. It can then accept commands. *Remove the jumper when finished otherwise data may be interpreted as commands.*

Type the command **SET <enter>**. LinkMatik will respond with a list of current settings. All of these settings may be modified, but only the most common are documented in this data sheet. For a full list of commands, please refer to the *LinkMatik 2.0 Reference DS389* document, which may be downloaded from the www.flexipanel.com.

Configuring Slave Mode

To configure LinkMatik for Slave mode, send the following commands:

```
SET CONTROL AUTOCALL
SET BT PAGEMODE 4 2000 1
```

Configuring Master Mode

The following commands set up Master mode:

```
SET CONTROL AUTOCALL 1101
SET BT PAGEMODE 0 2000 1
```

In Master mode, LinkMatik-232 searches for a device it is already paired with and connects to it. If more than one device is paired, LinkMatik will connect to the first paired device it detects and is able to connect to.

To operate in Master mode, LinkMatik-232 must be paired with the devices it is to connect to. You can do this by pairing from the remote device. Alternatively you can use commands to discover a remote device and pair with it. This is detailed in the Wedded Pairs section.

Configuring Wedded Pairs

To create a wedded pair, one device must be the master and the other the slave. Set the same PIN code on both devices. Then place the first device in Slave mode.

Place the second device in Master mode. It will have nothing paired with it initially. To set up its pair, use the **I** command to scan for the slave device.

Example: **I 8 N**

Response example:

```
INQUIRY_PARTIAL 01:23:45:67:89:AB DEVCLS
INQUIRY 1
INQUIRY BTADDR DEVCLS "" RSSI
NAME BTADDR DEVNAME
```

When the inquiry command is complete, connect to the Auto-Slave device using the **C** command, referring to the Bluetooth address reported in the *INQUIRY* response obtained during the scan.

Format: **C BTADDR 1101 RFC**

Example: **C 01:23:45:67:89:AB 1101 RFC**

Response: **CALL LINKID**
 CONNECT LINKID RFCOMM

The devices will now be paired. When both devices power up, they will connect together automatically.

Setting the Baud Rate

Format: **SET CONTROL BAUD RATE,8PS**

Example: **SET CONTROL BAUD 9600,8N1**

This command sets the Rx/D / Tx/D baud rate. *There must be no spaces between the arguments.* The baud rate change takes effect immediately. The baud rate must be changed with care. If you set it incorrectly by accident, you may no longer be able to communicate with LinkMatik.

Only 8 bit data is permitted, with or without parity; however, 7-bit data with odd or even parity may be transmitted as 8-bit, no parity. Note that baud rates below 9600 baud are somewhat inaccurate.

The following values are permitted for the *RATE*, *P* and *S* parameters

RATE 1200 = 1200 baud (+1.73% error)
 2400 = 2400 baud (+1.73% error)
 4800 = 4800 baud (+1.73% error)
 9600 = 9600 baud (-0.82% error)
 19200 = 19200 baud (+0.45% error)
 38400 = 38400 baud (-0.18% error)
 57600 = 57600 baud (+0.03% error)
 76800 = 76800 baud (+0.14% error)
 115200 = 115200 baud (+0.03% error)
 230400 = 230400 baud (+0.03% error)
 460800 = 460800 baud (-0.02% error)
 921600 = 921600 baud (0.00% error)
 1382400 = 1382400 baud (-0.01% error)
 1843200 = 1843200 baud (0.00% error)
 2765800 = 2765800 baud (0.00% error)

P N = no parity bit
 E = even parity bit
 O = odd parity bit

S 1 = one stop bit
 2 = 2 stop bits

Configuring the Bluetooth Name

Format: **SET BT NAME DEVNAME**

Example: **SET BT NAME My Bluetooth Device**

This command sets the Bluetooth device name. The name can be up to 256 ASCII characters long, but not all remote devices will be able to display that many.

Set PIN Code Security

Format: **SET BT AUTH * [PIN]**

Example: **SET BT AUTH * 0000**

This command sets the PIN code security settings. If the optional *PIN* argument is specified, this becomes the pin code used to pair with other devices.

If the optional *PIN* argument is not specified, security and PIN codes are disabled. This is not recommended as some devices require PIN codes and connection will therefore not be possible.

The PIN code may be up to 16 characters long. Note that many mobile phones can only specify the digits 0-9 as PIN codes.

To remove all paired devices, send the following command:

Format: **SET BT PAIR ***

Technical Specifications

Max operating temperature	-20°C to +75 °C
Max storage temperature	-30°C to +85 °C
Dimensions L x W x H	78mm x 34mm x 42mm

Electrical

Supply Voltage Vcc	5V – 24V
Average current, Idle	15mA
Average current, connected as slave	22mA
Average current, connected as master	36mA
Average current, connected, transmitting	38mA
Average current, connected, receiving	48mA

Radio

Max RF output power	Class I = 100mW = +20dBm
RF frequency range	2402MHz to 2480MHz
RF channels	79
Frequency hopping	1600 Hz
Range	100m free space 20m-40m typical in-building range
Communication latency, serial to serial via two LinkMatik radios	10ms to 20ms typical

Bluetooth qualification & logos and trademarks

The radio has been pre-qualified and is listed in the Bluetooth Qualified Products as B03005. FlexiPanel Ltd is registered as an Adopter Member with the Bluetooth SIG, Inc. OEMs wishing to re-brand FlexiPanel Ltd Bluetooth products and use the Bluetooth logos and trademarks must register as Adopter Members. Membership is free, refer to www.bluetooth.org for details.

FCC and CE modular approval

The radio has 'modular approval' for USA and certain European countries, so it may be repackaged by OEMs without requalification. The CE mark on the module indicates that it does not require further R&TTE certification. If OEM-packaged so that the FCC-ID marking is no longer visible, the exterior of the product should be marked as follows:

Contains Transmitter Module FCC ID: QOQWT11

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