# Integrity Instruments

# 485-25A
# High Speed
## RTS Enabled
## RS-232 to RS-485
# Converter

## 485-25A wiring



A

B

shield

GND

+V
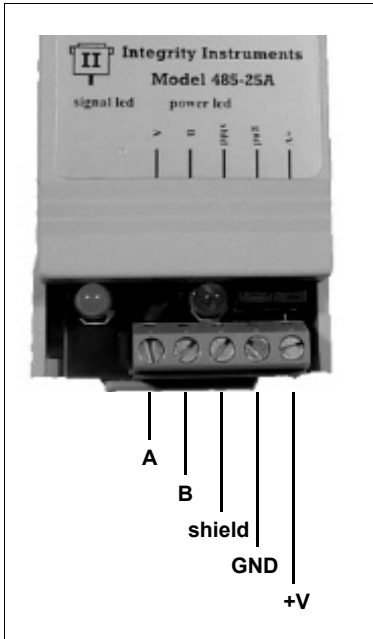
# RS-485 Cabling & Pinout

The **485-25A** is designed to operate in a Multi-Drop RS-485 LAN configuration. In a half-duplex mullti-drop environment all RS-485 nodes share the same data lines. A single pair of data lines act as both Transmit and Receive wires.

## RS-485 Cabling Notes:

1) **Gnd** and **Shld** are connected internally within the **485-25A**

2) Cable termination is important for long distance and high-speed applications
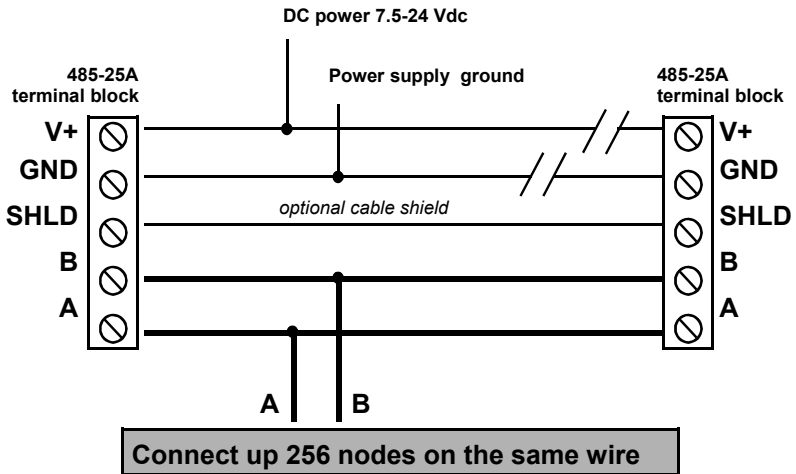
3) **Suggested cable:** 24 awg stranded twisted pair with shield for cable runs in excess of 200 feet.

4) **Multiple power supplies:** Make sure that multiple power supply +V outputs are **not** wired together.

**!**  **Data lines (A/B) are the only wires required between RS-485 nodes. All RS-485 nodes need not share the same V+ and GND.**

## Performance Characteristics

| | |
|---|---:|
| DC input voltage min. (+V) | 7.5 Vdc |
| DC input voltage maximum. (+V) | 24 Vdc |
| DC input  current  nominal (+V) | 40 ma |
| DC input current max. (+V) | 250 ma |
| ESD static discharge (A/B) | 1500 V |
| | |
| Baud Rate maximum | 115.2 Kbps |
| Baud Rate minimum | 110 bps |
| | |
| Number of RS-485 nodes | 256 |
| Maximum cable length | 4000 feet + |
| Termination resistance | 120 ohms |
| RS-485 line driver - LOW EMI | LTC1487 |
| Transmit/Receive turn-around time | < 1µs |

**DC power 7.5-24 Vdc**

| 485-25A terminal block | Power supply  ground | 485-25A terminal block |

**V+**     **V+**
**GND**     **GND**
**SHLD**   *optional cable shield*   **SHLD**
**B**     **B**
**A**     **A**

**A      B**

**Connect up 256 nodes on the same wire**

## RS-232 Cabling & Pinout

The **485-25A** uses a DB25 female connector (DB25F).  It is designed to connect to DTE devices like an IBM-PC and expects the RS-232 transmitted data to be present on pin 2 of the DB25 connector.  Conversely, the received data is output from the **485-25A** on pin 3 of the DB25 connector.  If DCE wiring is needed, use a **NULL MODEM** adapter or cable to switch the TxD and RxD signals as well as the RTS and CTS lines.

> **RS-232 TxD transmit (output):   DB25 pin 2**
> **RS-232 RxD receive (input):     DB25 pin 3**
> **RS-232 RTS (output):            DB25 pin 4**
> **RS-232 CTS (input):             DB25 pin 5**

**Check www.rs-485.com/specs.html for more info.**

## LED Operation

The **485-25A** provides a power indication LED and an bi-color signal status LED to aid in cabling problems and general operation. Since the signal status LED is powered only when data is present, it may be illuminated for somewhat brief periods. Also, if transmit and receive are closely spaced, the bi-colored LED may take on an orange hue when rapidly switching from RED to GREEN.

**SIGNAL LED OFF:**        No receive or transmit data present
**SIGNAL LED RED:**        RS-232 ➜ RS-485 transmit data
**SIGNAL LED GREEN:**      RS-485 ➜ RS-232 receive data
**POWER LED YELLOW:**      Power On

## Power Supply

The **485-25A** requires an external power supply for proper operation. We suggest a 9 Vdc 400 ma power supply. Power must be in the voltage range 7.5 Vdc to 12.0 Vdc.

## RS-485 Transmit Enable (Send Data Control)

Since RS-485 is half-duplex, special control is required to switch the **485-25A** between transmit and receive modes. When transmit is enabled, the RS-232 data is converted to RS-485 and transmitted out the RS-485 A/B signal lines. Conversely, when transmit is disabled (receive mode) the RS-485 data is converted to RS-232 and presented on RS-232 receive DB25 pin3.

> **RTS ON (+12v):**      RS-485 transmit is enabled (RS-232 data is transmitted RS-485)
> **RTS OFF (-12v):**      RS-485 receive is active (RS-485 data is received RS-232)

**RS-232 data transmitted when RTS is OFF will be ignored**


## RS-485 Transmit Enable Device Drivers

Integrity Instruments provides device drivers for DOS, Windows 95, Windows 98, and Windows NT that automatically control RTS during transmit.

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Drivers are found on our website at:
**www.integrityusa.com**
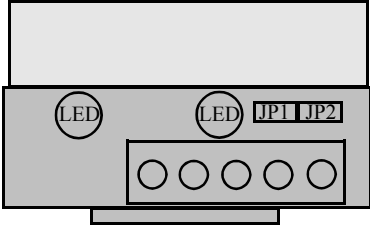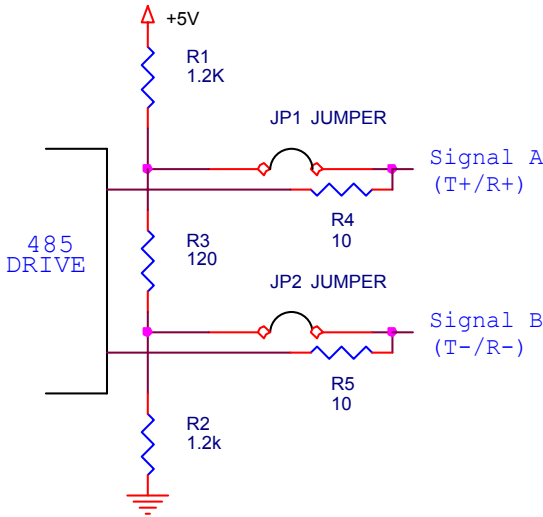
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## BUS Termination Jumpers

The **485-25A** is manufactured with jumpers to enable and disable termination. The two RS-485 nodes at the extreme ends of the cable require termination.

**Jumpers Installed:**  Installing JP1 and JP2 provides both active termination (R1/R2) and passive termination (R3) as seen in the schematic. *Active termination is important as it guarantees a stable RxD signal and no false start bits!*

**Jumpers Removed:**  No termination is provided at the converter.

> **!** **Ensure that only the two ends of the cable are teminated. Excessive termination will result in extreme line load and thereby adversely affect data transmission.**

+5V

R1
1.2K

JP1 JUMPER

Signal A
(T+/R+)

485
DRIVE

R3
120

R4
10

JP2 JUMPER

Signal B
(T-/R-)

R5
10
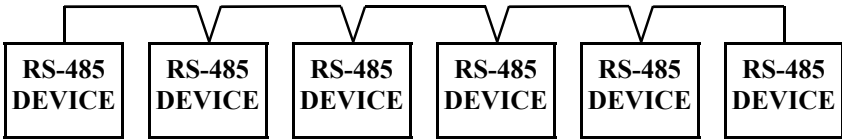
R2
1.2k



## Win32 'C' Comm Functions to control RTS

The following Win32 'C' library functions are used to control the RTS signal line for Windows 95, Windows 98, and Windows NT applications code.

EscapeCommFunction(hFile,  SETRTS);      // RTS ON for comport handle hFile
EscapeCommFunction(hFile,  CLRRTS);      // RTS OFF for comport handle hFile

### Cabling Notes:

1) Gnd and Shld are connected internally within the **485-25A**.
2) Cable termination is important for long distanceand high-speed applications
3) Suggested cable: 24 awg stranded twisted pair with shield for cable runs in excess
   of 200 feet. See also Belden cable #9841 and #9463.
4) The normal connection method is the "Daisy Chain" type shown below. there are other kinds of connections, but this is considered as the standard.
5) The end units (**A**) and (**B**) should be terminated. All other units should not.

| RS-485 DEVICE | RS-485 DEVICE | RS-485 DEVICE | RS-485 DEVICE | RS-485 DEVICE | RS-485 DEVICE |

**DAISY CHAIN**

**RS-485 Wire**

| Belden Caable Number | Number of pairs | DC Resistance ohms | Impedance ohms | Capaci-tance Pf per foot | Wire gauge | O.D. / shield |
|---|---|---|---|---|---|---|
| 9841 | 1 | 24 ohms/ 1000 ft | 120 | 12.8 | 24(7x32) | .232 / yes |
| 9463 | 1 | 9.5 ohms/ 1000 ft | 78 | 19.7 | 20(7x28) | .243 / yes |