Serial Comms

3-wire EIA485, 5-wire EIA485, EIA232

Wiring Manual

invensys
EUROTHERM

SERIAL COMMUNICATIONS

WIRING HANDBOOK

CONTENTS

INTRODUCTION

The majority of communications problems arise from incorrect wiring. This is often the result of confusion caused by the several different terminologies used for signal names, and by the different interpretations of the same signal names, both within the Eurotherm group companies, and in some cases by the driver/receiver IC manufacturers.

This handbook is an attempt to provide a reliable reference source of communications equipment wiring in a format that is easy to use whilst actually wiring.

The book does not discuss communications strategies or performance. Neither does it give details of how to select EIA485 or EIA232 etc. nor how to switch any integral pull-up/pull-down/terminating resistors in to or out of circuit. If needed, such information must be retrieved from the documentation supplied with the instrument.

The information given in this document may complement or contradict wiring information printed in individual instrument manuals. It is the intention that this Wiring Handbook be considered definitive. Any comments regarding scope, content or presentation will be welcome. A reply paid card has been included for comments, or the company can be contacted via its web site (http://www.eurotherm.co.uk) or by e-mail (info@eurotherm.co.uk).

Notes:

1 EIA232 and EIA485 are also known as RS232C and RS485A
2 This manual uses the terminology '5-wire' and '3-wire', rather than '4-wire' and '2-wire' respectively, as it is recommended that the common (signal ground) connection be used in all cases.
3 5-wire EIA485 is sometimes known as EIA422 (RS422). EIA422 needs one pair of wires to transmit, and another pair to receive, thus requiring 5 wires (including common) for duplex operation. EIA485 can transmit and receive using only one pair of wires (+ common), although the use of two pairs (one to transmit and one to receive), improves link speed.

HOW TO USE THIS HANDBOOK

The manual is divided into three main sections:

1. 5-wire EIA 485
2. 3-wire EIA 485
3. EIA 232

Each of the above sections contains separate pages for Master and Slave equipment.
To use the manual:

1. Select the communications standard required (EIA485 5-wire, EIA485 3-wire or EIA232).
2. Select the master equipment from the pages in the top half of the book.
3. Select the 1st item of slave equipment from the lower half of the book, and follow the connections for point-to-point wiring information.
4. Repeat until all the required items of equipment have been wired.

WIRE COLOURS

The wire colours in this manual have been chosen for the purposes of clarity, and do not, other than by chance, represent any particular type of cable. It is up to the user to arrange a suitable colour coding according to the cable type available.

TERMINATION AND BIASING

Note: This information applies only to EIA485 wiring

TERMINATION

If the communication line is left open ended (that is it has only the load of the final instrument across it), the end of the cable acts as a reflector, returning what can appear to be 'true' data signals back down the line. A receiver may well not be able to distinguish between 'real' signals and reflected signals, with the result that the 'true' data is corrupted.

In order to avoid this, 'Terminating' resistors are connected across the following terminals:
5-wire system: RxA/RxB lines at both the master and the final slave.
3-wire system: 485A/485B lines at both the master and the final slave.

If the value of this resistor is equal to the characteristic impedance of the transmission line, the line will appear to be of infinite length, and thus cause no reflections. Such a value does not, however, give the best signal-to-noise ratio, so a compromise value is fitted. This manual recommends 220 Ohms (220R).

Figure 1 shows the situation for the Receive terminals of two instruments. Note that these instruments also have pull-up and pull-down resistors fitted internally.

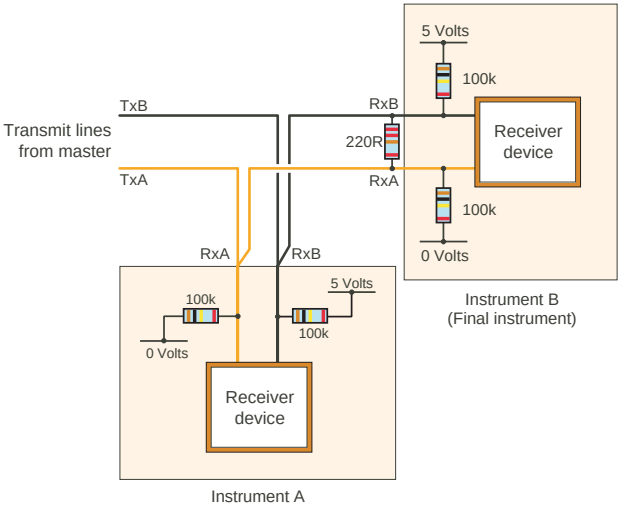


Figure 1 Terminating Resistor

TERMINATION AND BIASING (Cont.)

BIASING

When not communicating, slave instrument outputs go into a high impedance state (to allow multi-drop connection). This causes problems if the master is not fitted with Biasing resistors, to pull these essentially open-circuit lines to their idle states as defined in the EIA485 standard.

To overcome these problems, external Biasing resistors can be fitted, as shown in figure 2 for a typical master/slave combination.

For 5-wire working, this Manual recommends fitting four resistors, each with a value of 4k7 (4700 Ohms) fitted, one each, between TxA and 0V, RxA and 0V, TxB and 5V and RxB and 5V at the Master end of the transmission line.

For 3-wire working, two 4k7 resistors should be fitted, one each between 485A and 0V and 485B and 5V.

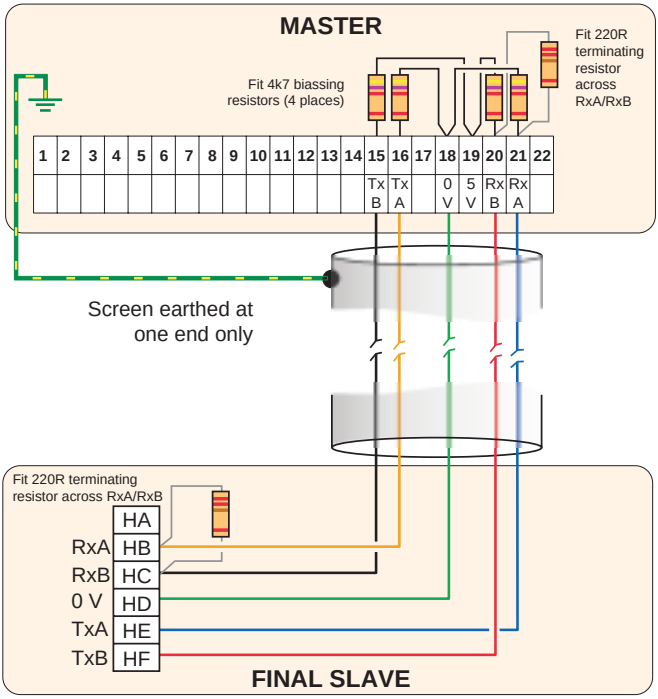


Figure 2 Typical termination and biasing - 5-wire EIA485

TERMINATION AND BIASING (CONT.)

Notes:

1. Many instruments have internal pull-up and pull-down resistors fitted. These are normally of a high value, such as 100kΩ. This manual recommends that these be supplemented by the 4k7 resistors described above, but in all cases a minimum signal differential of 200mV is the defining parameter (figure 3, below), and the selected resistor values must be chosen such that this minimum signal value is maintained.
2. Some instruments have 8-way RJ45 connectors for serial communications. In such a case, it is recommended that the transmission line be interrupted by a terminal block, inserted as closely as possible to the instrument, and that termination and Biasing resistors be fitted here.
3. Some instruments are fitted with integral terminating resistors which, by default, are left disconnected. If such resistors are fitted, they can be introduced into the circuit by one or more links, connected by the user. Refer to the documentation supplied with the instrument for details.

When not communicating, some Master instruments also go into a high impedance state, which can cause communications problems if there are no external Biasing resistors anywhere in the link.

In order to ensure successful communications, it is recommended that external Biasing resistors be fitted, even if it is necessary to fit a separate (5Vdc) power supply to provide the appropriate voltage levels.

SIGNAL LEVELS

Figure 3 defines the signal levels for EIA 485, and Figure 4 shows the signal levels for EIA232. These figures are derived from the relevant standards, and these standards should be consulted for more details.

EIA Standards are published by:
TELECOMMUNICATIONS INDUSTRY ASSOCIATION
Standards and Technology Department
2500 Wilson Boulevard,
Arlington,
Virginia.
VA22201

SIGNAL LEVELS (Cont.)

Figure 3 Signal levels for EIA485

Figure 4 Signal levels for EIA232

CABLE TYPE

Warning!

In the following discussion, the terms 'Signal Ground', 'Common' or 'Ground' refer to the instrument 0 Volts, not to Chassis Ground or Safety Earth. Chassis ground or Safety Earth should not be used for this zero volt application..

For 5-wire use, it is recommended that a cable type which has three sets of individually screened twisted pairs, all within an overall screen be used. TxA/TxB should use one twisted pair, RxA/RxB should use a second, and the third twisted pair should be shorted together at both ends and used for Signal Ground (also known as 'Common' 'Ground' or 0V).

For 3-wire EIA485, the same cable can be used but with the A and B signals using one pair, the Signal Ground using a second pair, and the third pair left unconnected. Alternatively, a cable with two twisted pairs can be used if available.

For EIA232, the same cable can be used with the Tx signal using one pair, the Rx signal using another pair and Signal ground using the third pair.

For instruments which have RJ45 termination, a screened cable suited to this sort of connector must be used. Note that some instruments need 'straight-through' cables, others need 'cross-over' cables.

GROUNDING

Grounding (i.e. tying the communications screens to safety earth) is a controversial subject, primarily because the optimum grounding arrangement for any application depends on many factors such as plant layout, and the electromagnetic environment within which the serial communications link is expected to operate. The basic rules are:

1. The safest method (as suggested later in this book) is to tie the screens together and connect them to safety ground at the master unit. This will reduce problems generated by Line Voltage radiation, and will also protect against electromagnetic spikes etc. which might be radiated by other equipment.

   Warning!
   Cables running between separate sites (i.e. sites where the local earth potentials may be different) must never have their screens connected to earth at both ends, as to do so may allow very large (circulating) currents to flow through the screen, causing heating which could lead to a fire.

2. If all the instruments are within a localised environment, such as a cabinet or rack, then the screens may be connected to safety earth at each instrument. This gives much better resistance to high frequency radiation, without the danger of circulating currents.

CONVERSION PRODUCTS

These pages show how two commonly used products - the KD485ADE 232-422 and the Model 261 can be used to convert from EIA 232 standard to EIA 485 Both products provide some degree of isolation between inputs and outputs - see specification sheet or handbook for details.

Notes:

1. The master shown in figures 5 and 6 is a PC, but the input/output connections hold true for any EIA232 master
2. The unit shown is only one of a number of similar KD485 conversion products. See the documentation supplied with the unit for wiring details.

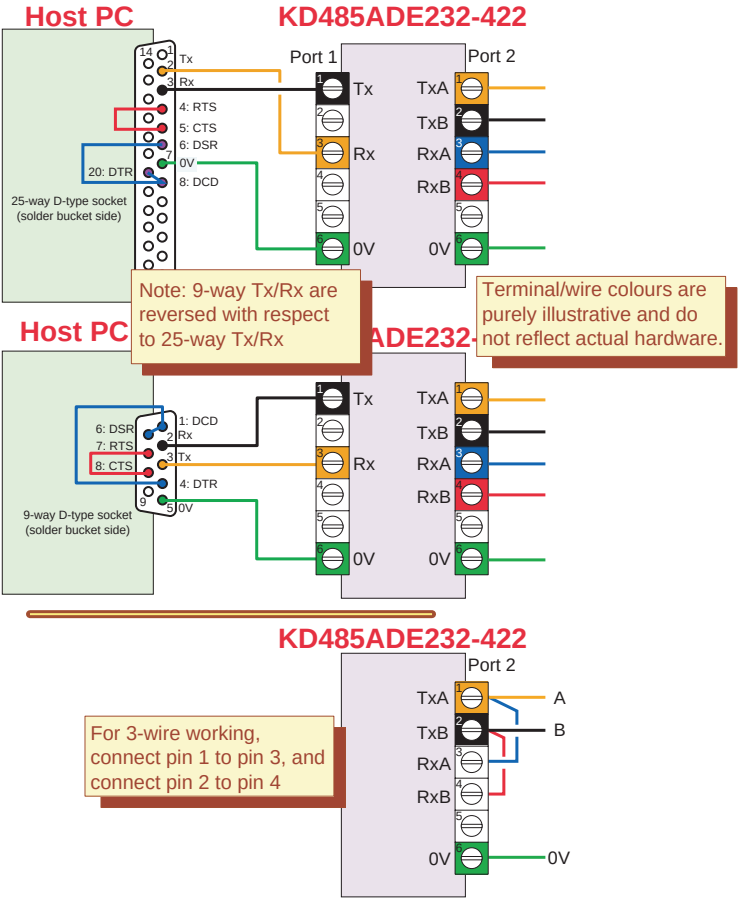


Figure 5 KD485ADE-232-422 connections

CONVERSION PRODUCTS (Cont.)

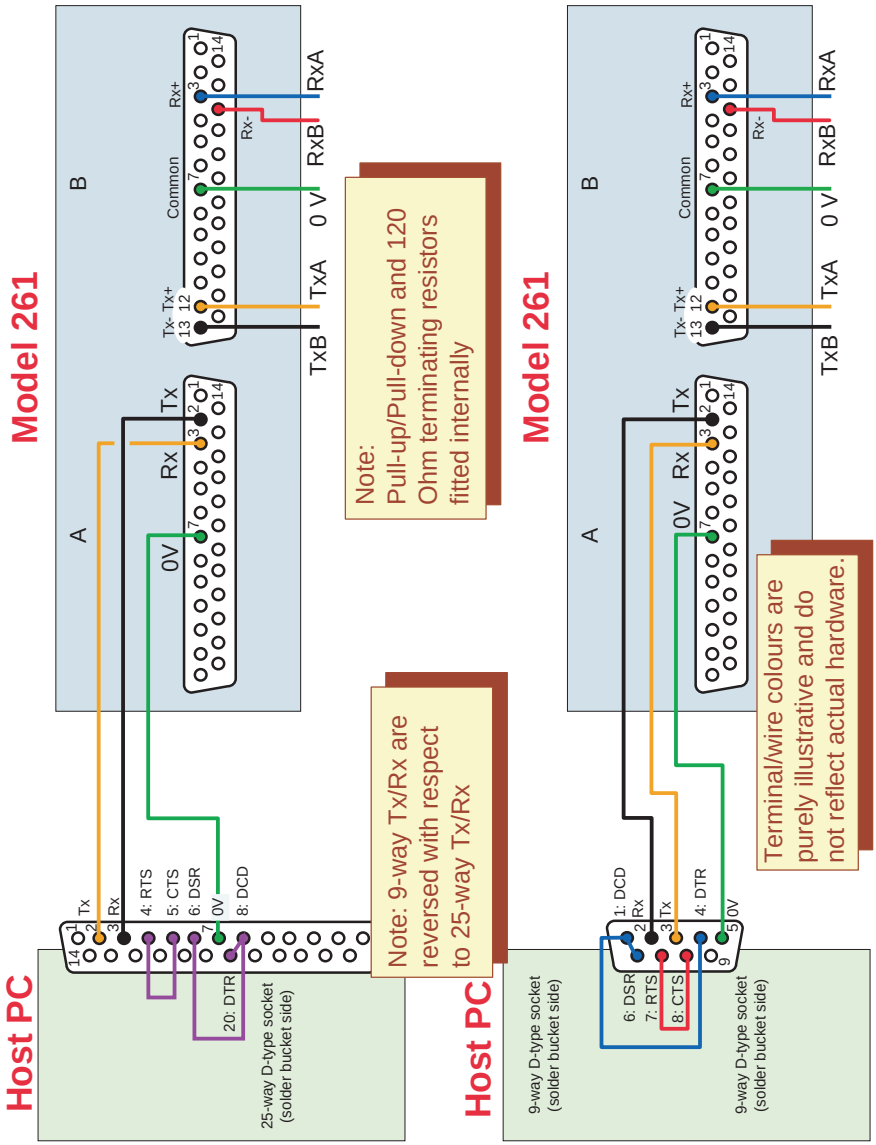


Figure 6 Model 261 input/output connections

User Notes:

EIA 485 Modbus Wiring

(5-wire)

5 - WIRE EIA485

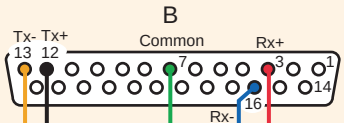
EIA485 5-wire Masters

A

5-wire EIA485

261 Master

Port A	Port B
Fit Link 1 to place a 120R terminating resistor across the receive lines	Fit Link 9 to place a 120R terminating resistor across the receive lines
Place link 4 in position A if none of the slaves has biassing resistors. Otherwise, place in position B.	Place link 6 in position A if none of the slaves has biassing resistors. Otherwise, place in position B.



Screen earthed at one end only

Twisted pair

Twisted pair

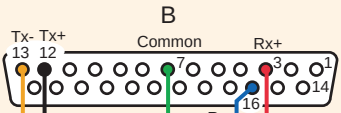
TxB TxA 0V RxB RxA

A

5-wire EIA485

261 Master

Port A	Port B
Fit Link 1 to place a 120R terminating resistor across the receive lines	Fit Link 9 to place a 120R terminating resistor across the receive lines
Place link 4 in position A if none of the slaves has biassing resistors. Otherwise, place in position B.	Place link 6 in position A if none of the slaves has biassing resistors. Otherwise, place in position B.



Screen earthed at one end only

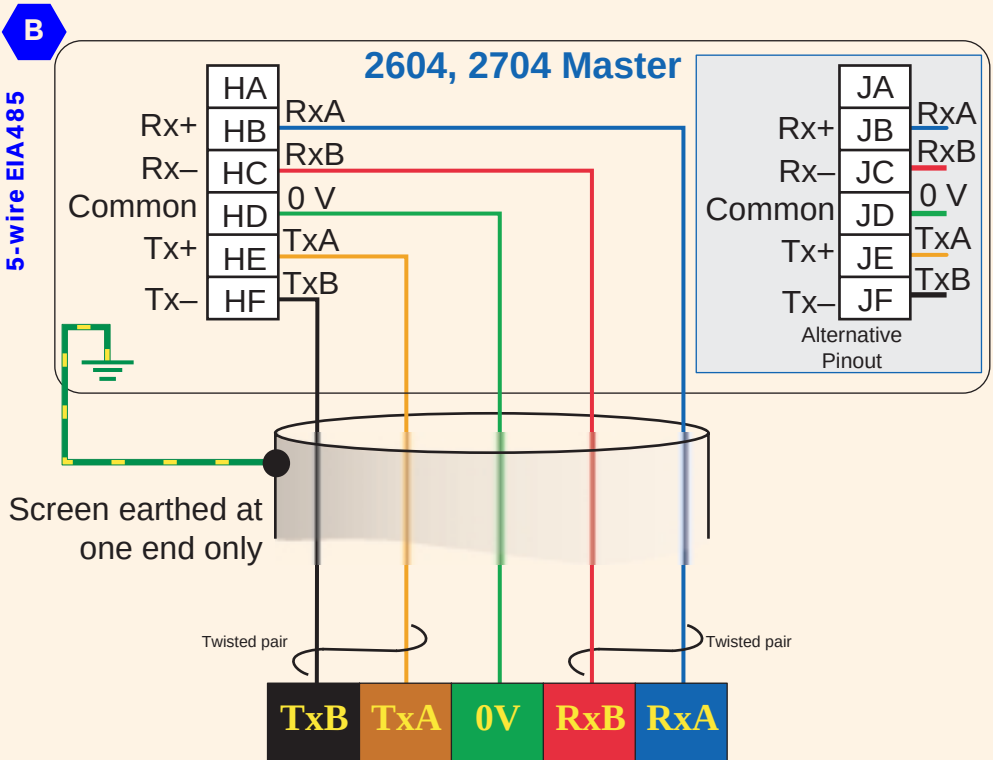
Twisted pair

Twisted pair

TxB TxA 0V RxB RxA

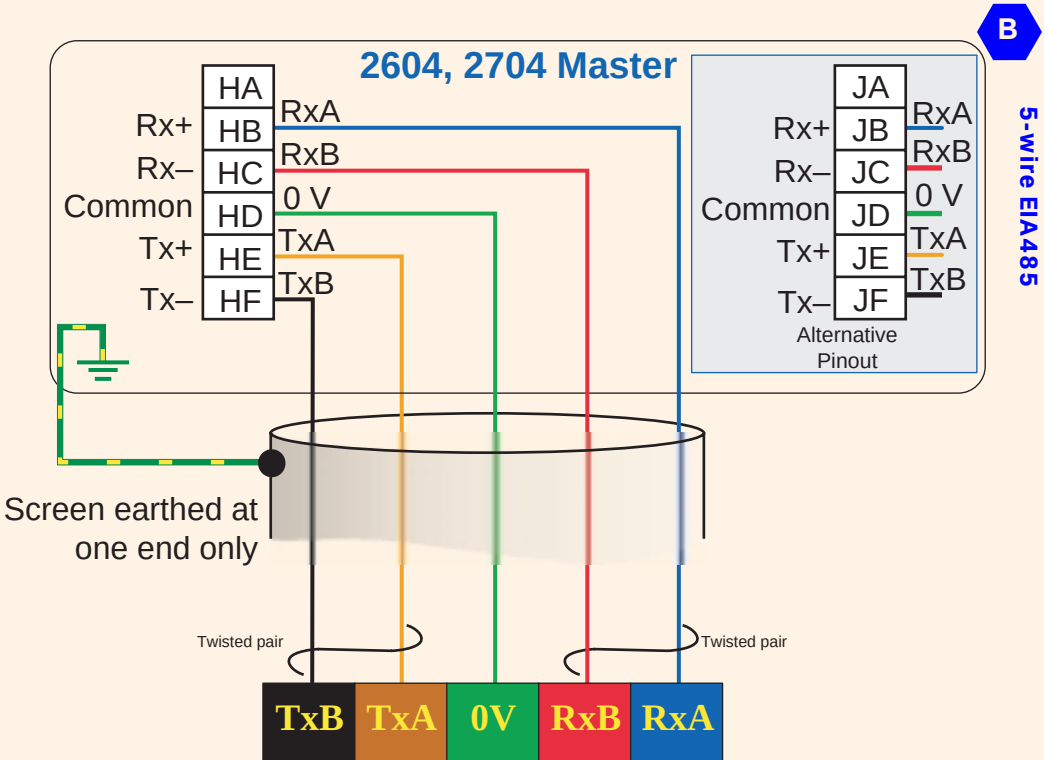
B

5-wire EIA485



B

5-wire EIA485

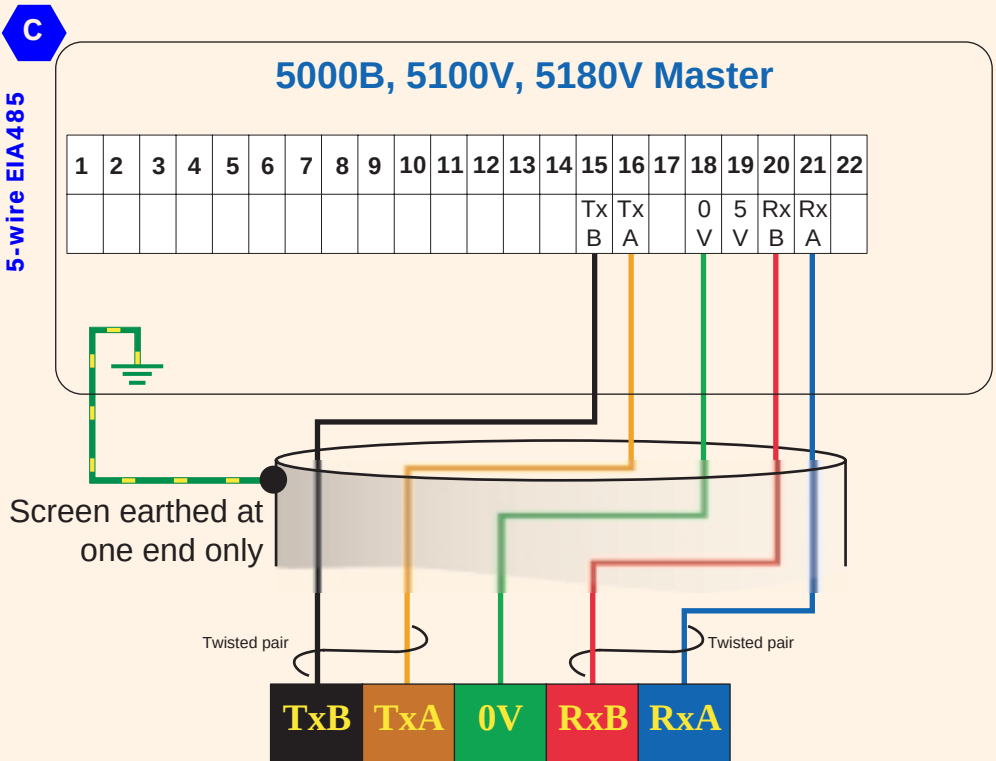


C

5-wire EIA485

5000B, 5100V, 5180V Master

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
														Tx B	Tx A		0 V	5 V	Rx B	Rx A	

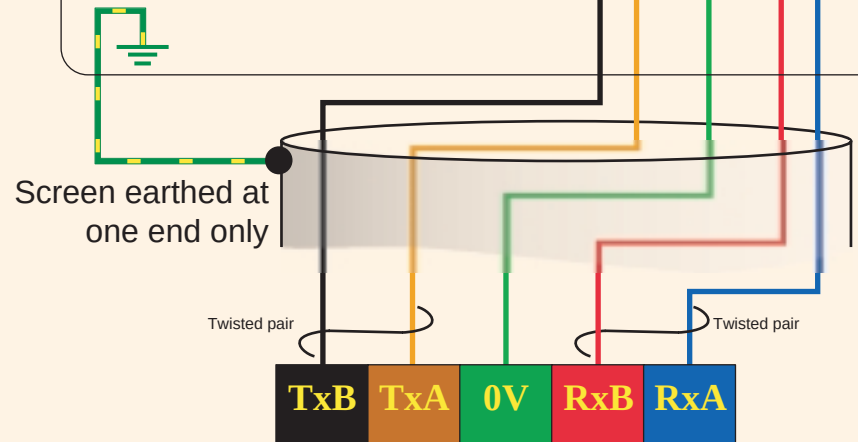


C

5-wire EIA485

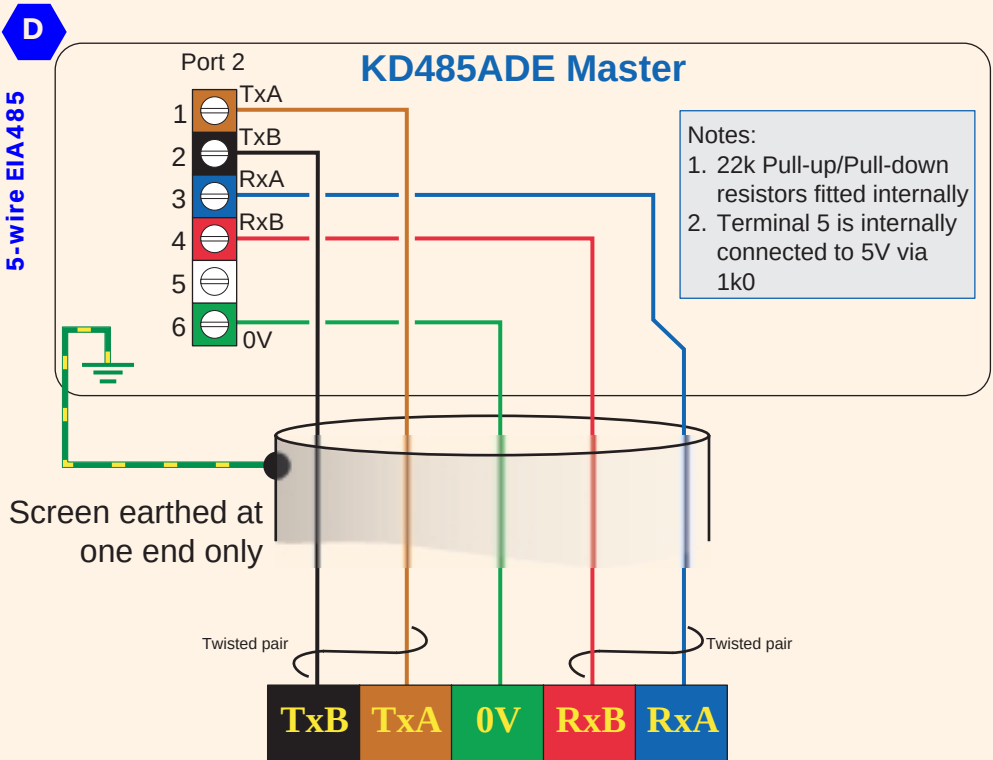
5000B, 5100V, 5180V Master

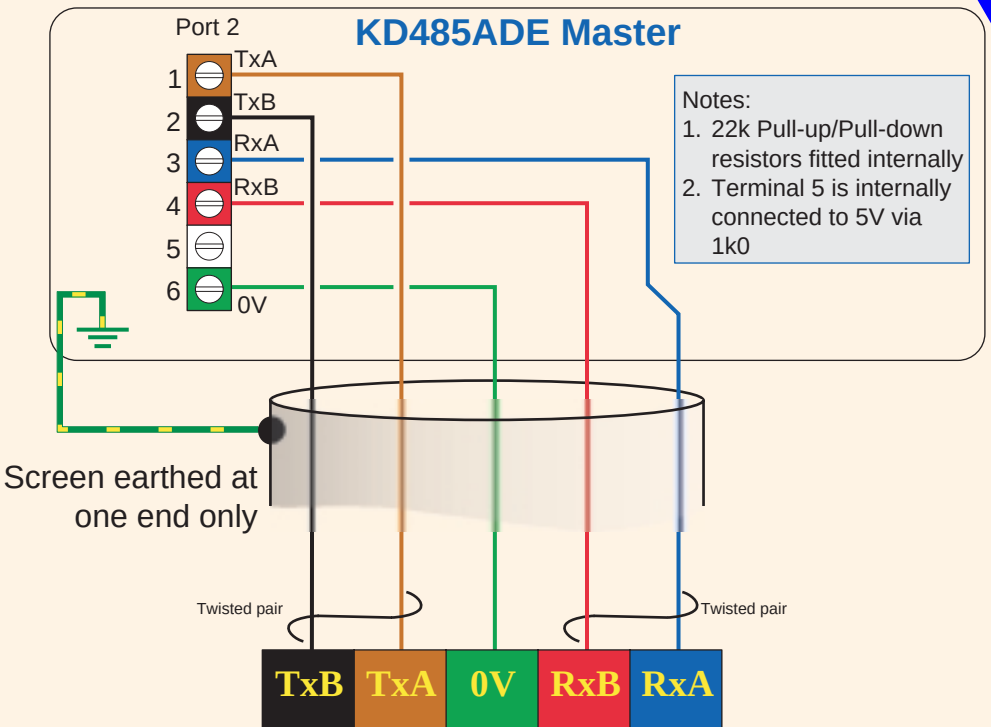
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
														Tx B	Tx A		0 V	5 V	Rx B	Rx A	



D

5-wire EIA485

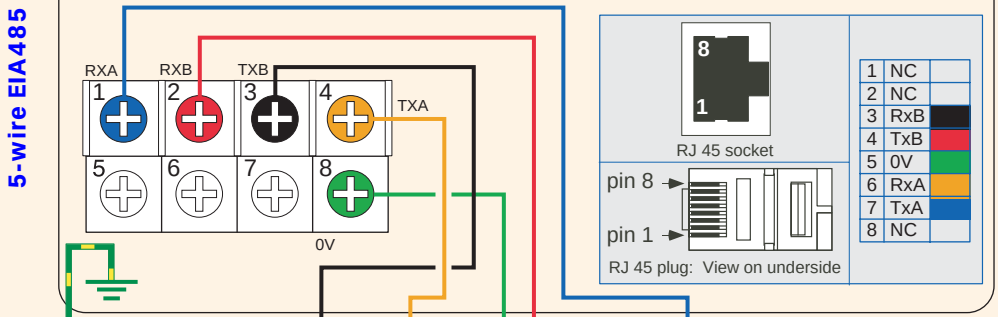



Port 2
KD485ADE Master
1
2
3
4
5
6
TxA
TxB
RxA
RxB
0V
Notes:
1. 22k Pull-up/Pull-down resistors fitted internally
2. Terminal 5 is internally connected to 5V via 1k0
Screen earthed at one end only
Twisted pair
Twisted pair
TxB
TxA
0V
RxB
RxA

E

5-wire EIA485

Lantronix Masters: CoBox-DR1 AND DSTniXPress DR



RJ 45 socket

RJ 45 plug: View on underside

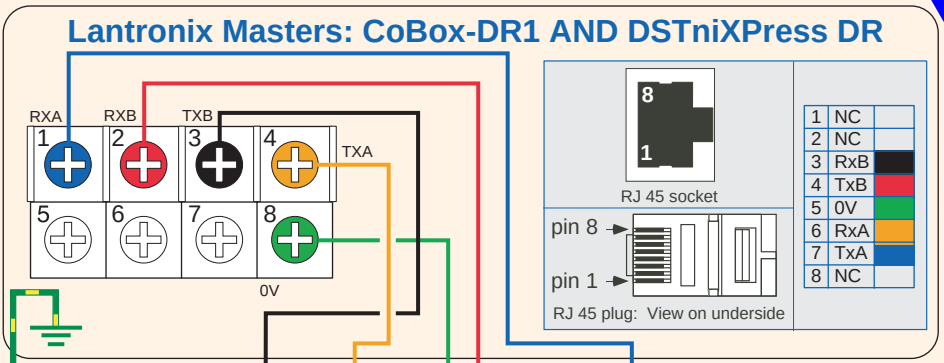
1	NC
2	NC
3	RxB
4	TxB
5	0V
6	RxA
7	TxA
8	NC

Screen earthed at one end only

Twisted pair

Twisted pair

Lantronix Masters: CoBox-DR1 AND DSTniXPress DR



Screen earthed at one end only

Twisted pair

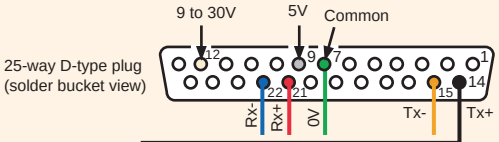
Twisted pair

TxB TxA 0V RxB RxA

F

5-wire EIA485

Lantronix Uds-10 Master



Pin 9 internally connected to regulated 5V

Pin 12 internally connected to unregulated 9 to 30 V

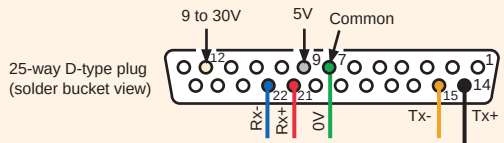
Screen earthed at one end only

Twisted pair

Twisted pair

TxB	TxA	0V	RxB	RxA

Lantronix Uds-10 Master



Pin 9 internally connected to regulated 5V

Pin 12 internally connected to unregulated 9 to 30 V

Screen earthed at one end only

Twisted pair

Twisted pair

TxB	TxA	0V	RxB	RxA

G

5-wire EIA485

PC3000 Master (LCM, LCM+, ICM)

Pull-up/Pull down resistors fitted internally.
Internal 100 Ohm terminating resistor can be inserted into circuit by fitting a link, as described in the manual HA022231.

Connector details
Ports A to D

RxB	5	1	NC
RxA	6	2	NC
0V	7	3	TxB
0V	8	4	TxA

Screen earthed at one end only

Twisted pair

Twisted pair

TxB TxA 0V RxB RxA

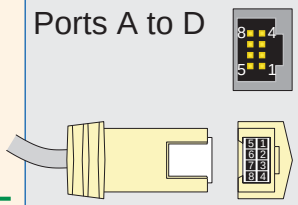
Common master wire colours

1	NC	Brown
2	NC	Orange
3	TxB	Red
4	TxA	Black
5	RxB	Green
6	RxA	Blue
7	0V	Grey
8	0V	White

PC3000 Master (LCM, LCM+, ICM)

Pull-up/Pull down resistors fitted internally.
Internal 100 Ohm terminating resistor can be inserted into circuit by fitting a link, as described in the manual HA022231.

Connector details
Ports A to D



RxB	5	1	NC
RxA	6	2	NC
0V	7	3	TxB
0V	8	4	TxA

Screen earthed at one end only

Twisted pair

Twisted pair

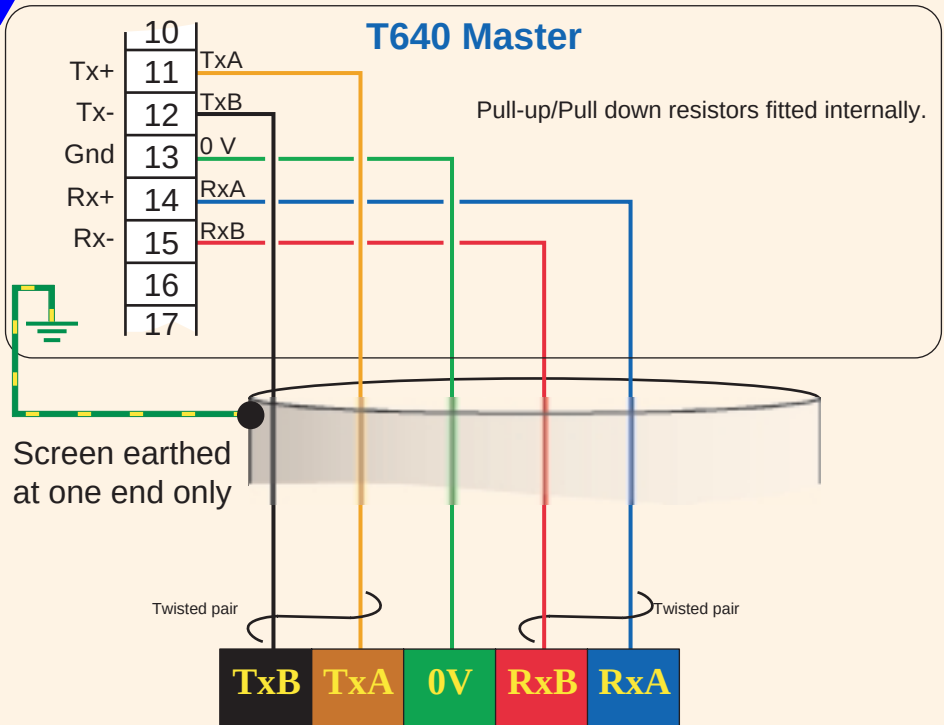
TxB TxA 0V RxB RxA

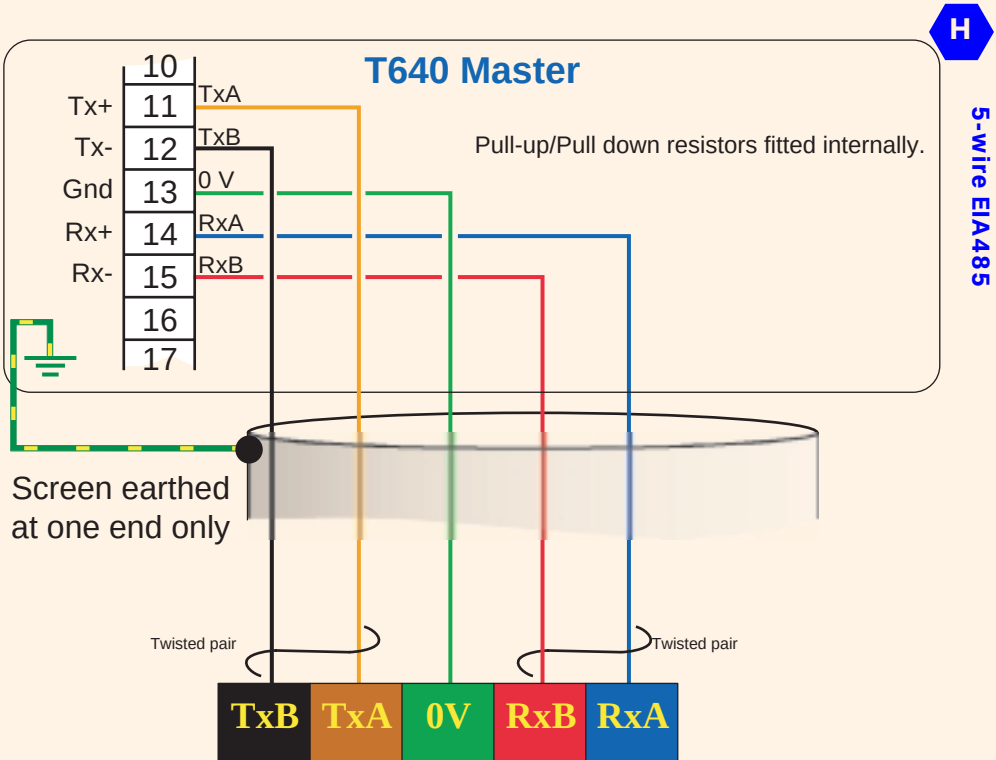
Common master wire colours

1	NC	Brown
2	NC	Orange
3	TxB	Red
4	TxA	Black
5	RxB	Green
6	RxA	Blue
7	0V	Grey
8	0V	White

H

5-wire EIA485



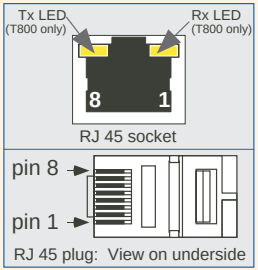


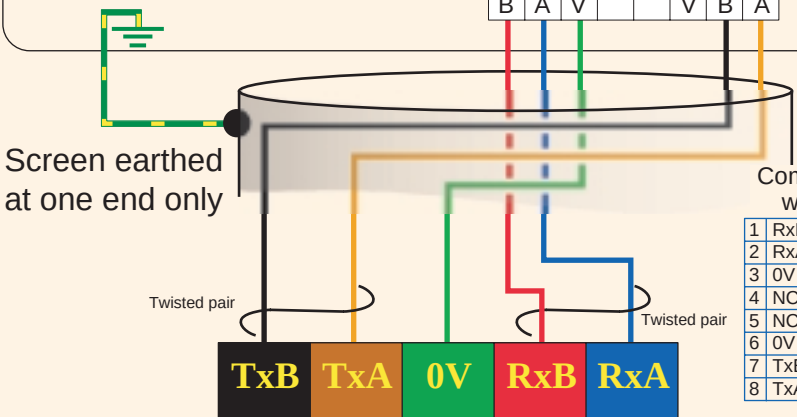
5-wire EIA485

J

5-wire EIA485

T800, T940 Master

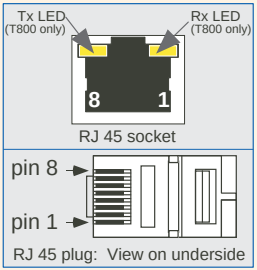


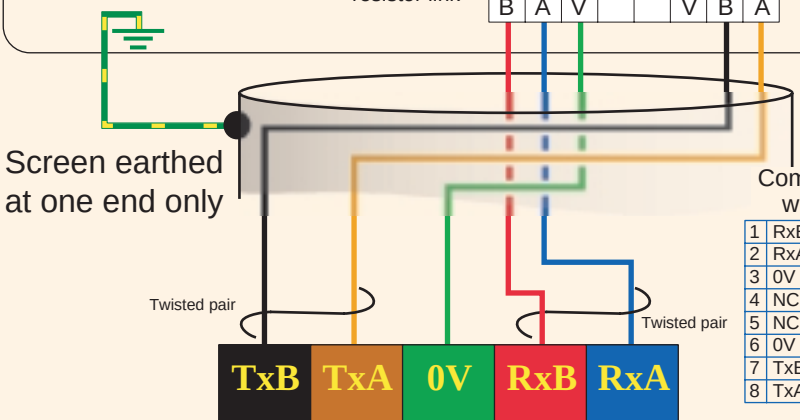


Common master wire colours

1	RxB	Orange/White
2	RxA	Orange
3	0V	Green/White
4	NC	Blue/White
5	NC	Blue
6	0V	Green
7	TxB	Brown/White
8	TxA	Brown

T800, T940 Master



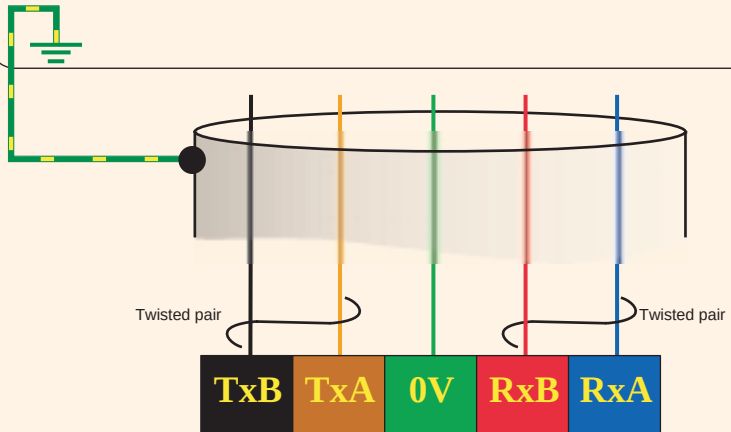


Common master wire colours

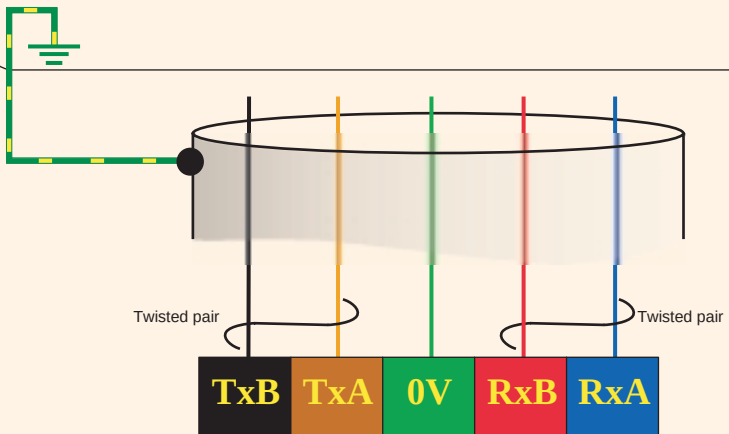
1	RxB	Orange/White
2	RxA	Orange
3	0V	Green/White
4	NC	Blue/White
5	NC	Blue
6	0V	Green
7	TxB	Brown/White
8	TxA	Brown

5-wire EIA485

Master

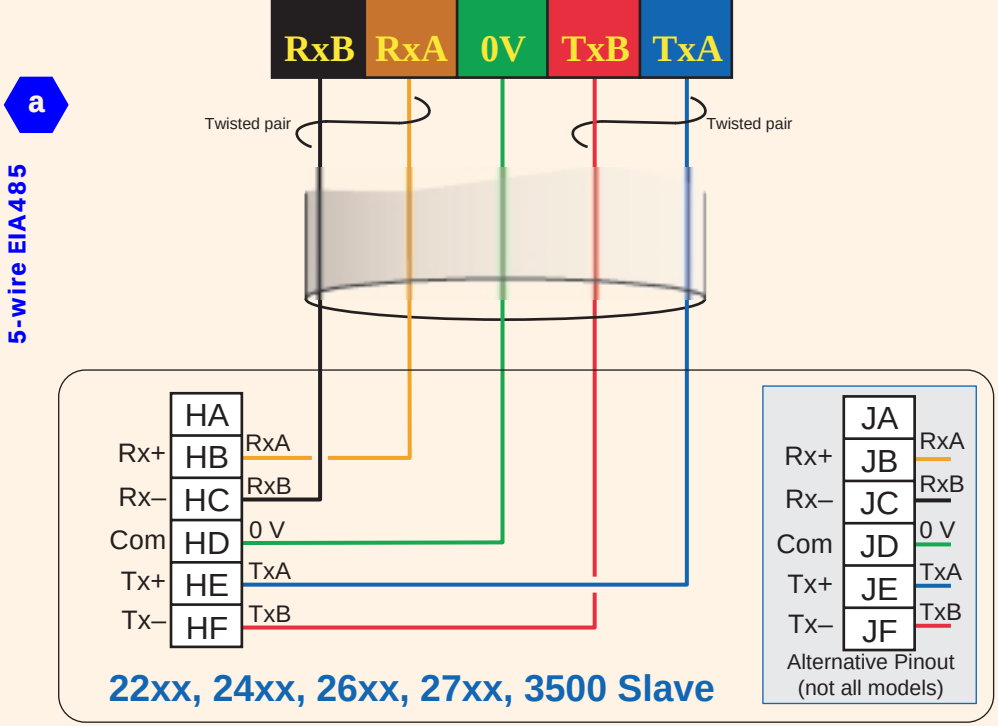


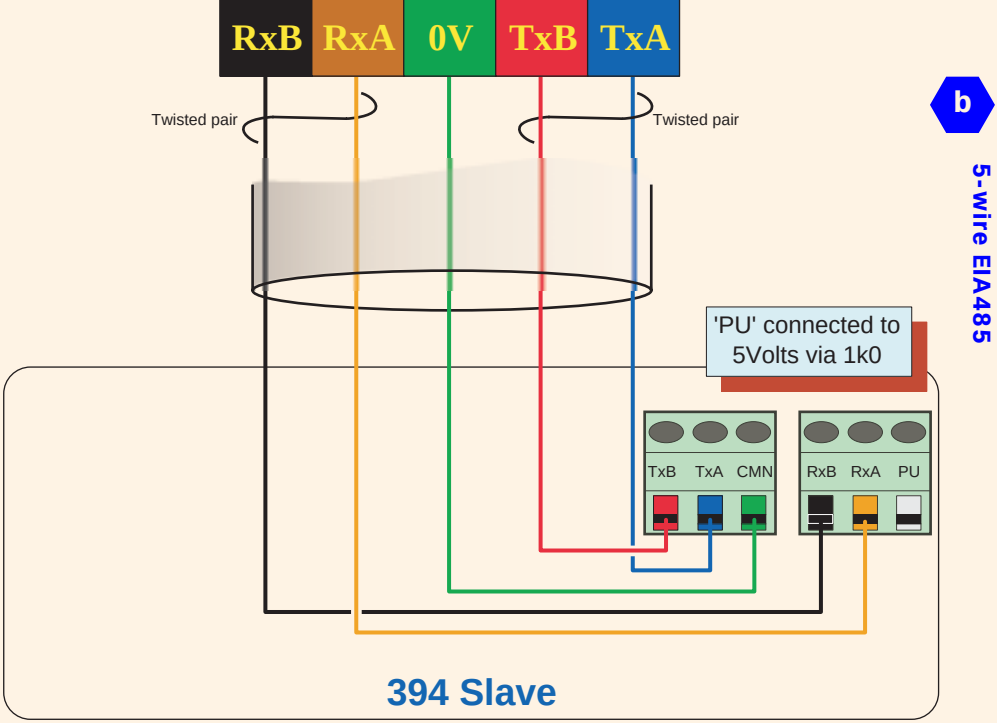
Master



Notes

EIA485 5-wire Slaves

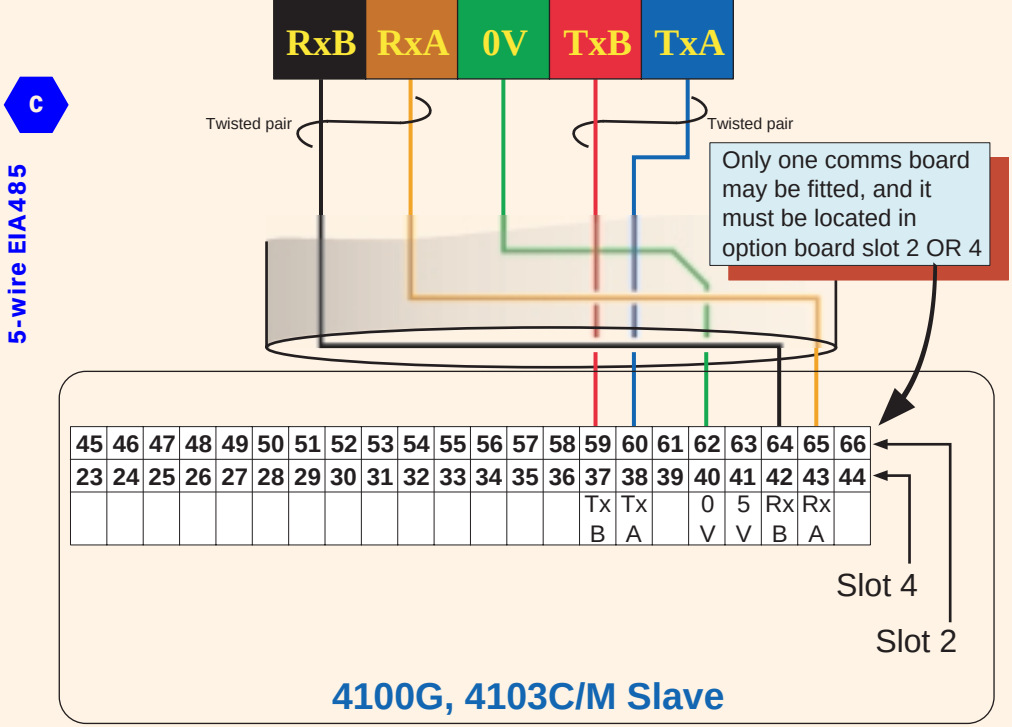

a
5-wire EIA485
RxB
RxA
0V
TxB
TxA
Twisted pair
Twisted pair
HA
HB
HC
HD
HE
HF
Rx+
Rx–
Com
Tx+
Tx–
RxA
RxB
0 V
TxA
TxB
22xx, 24xx, 26xx, 27xx, 3500 Slave
JA
JB
JC
JD
JE
JF
Alternative Pinout
(not all models)



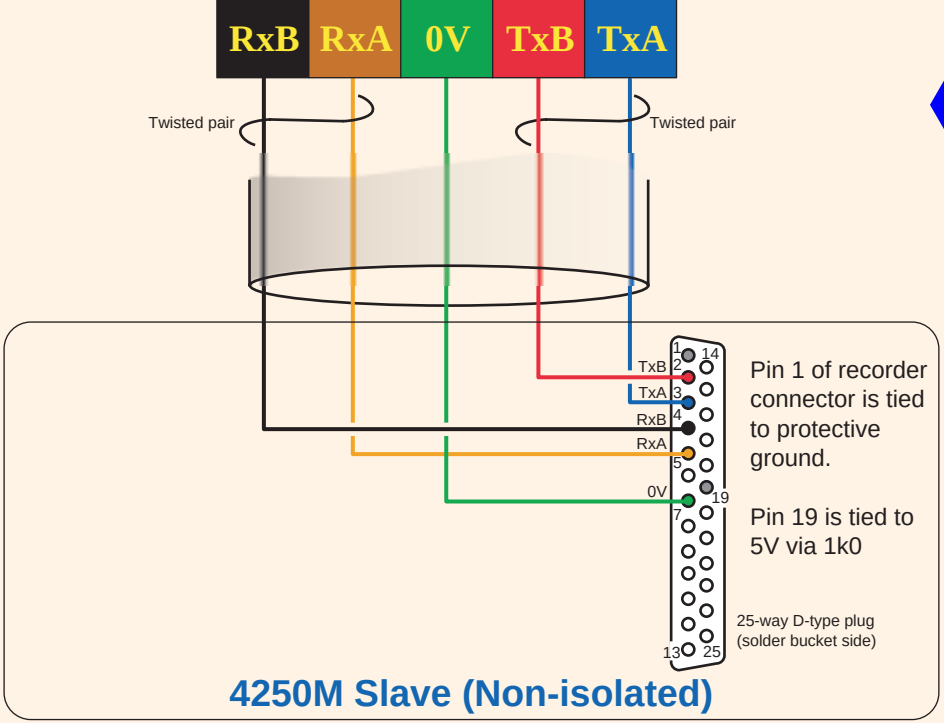
b

5-wire EIA485

HA028117


RxB
RxA
0V
TxB
TxA
Twisted pair
Twisted pair
Only one comms board may be fitted, and it must be located in option board slot 2 OR 4
5-wire EIA485
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
Tx B
Tx A
0 V
5 V
Rx B
Rx A
Slot 4
Slot 2
4100G, 4103C/M Slave

HA028117



4250M Slave (Non-isolated)

e

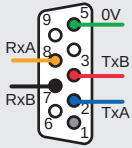
5-wire EIA485

Twisted pair

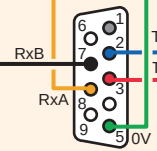
Twisted pair

The Comms module has a 9-way plug and a 9-way socket, wired in parallel for easy daisy chaining. For Graphics recorders and I/O Racks, only the fixed plug may be used.

Pin 1 internally connected to 5V via 1k0.



9-way plug
(solder side)
(not 4000R, 4180G, 4181G, 4250G)

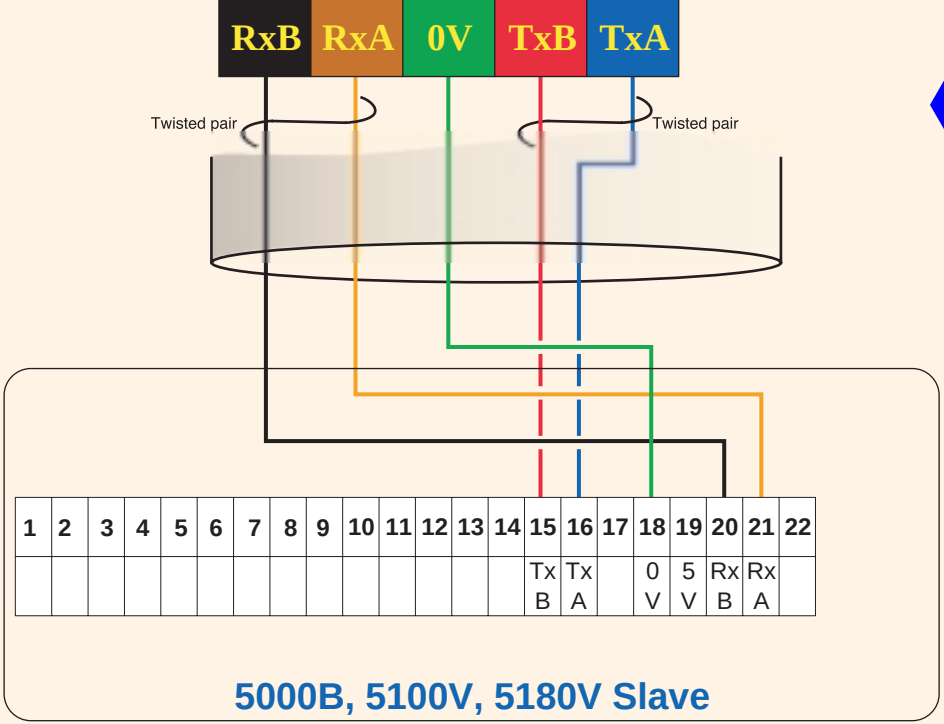


9-way socket
(solder side)

Pin 1 connected internally to 5V via 1k0.

4000R, 4180C/G/M, 4181M/G
4250C/G/M (Isolated)

Pin	Signal
1	5V via 1k0
2	TxA
3	TxB
4	NC
5	0V
6	NC
7	RxB
8	RxA
9	NC

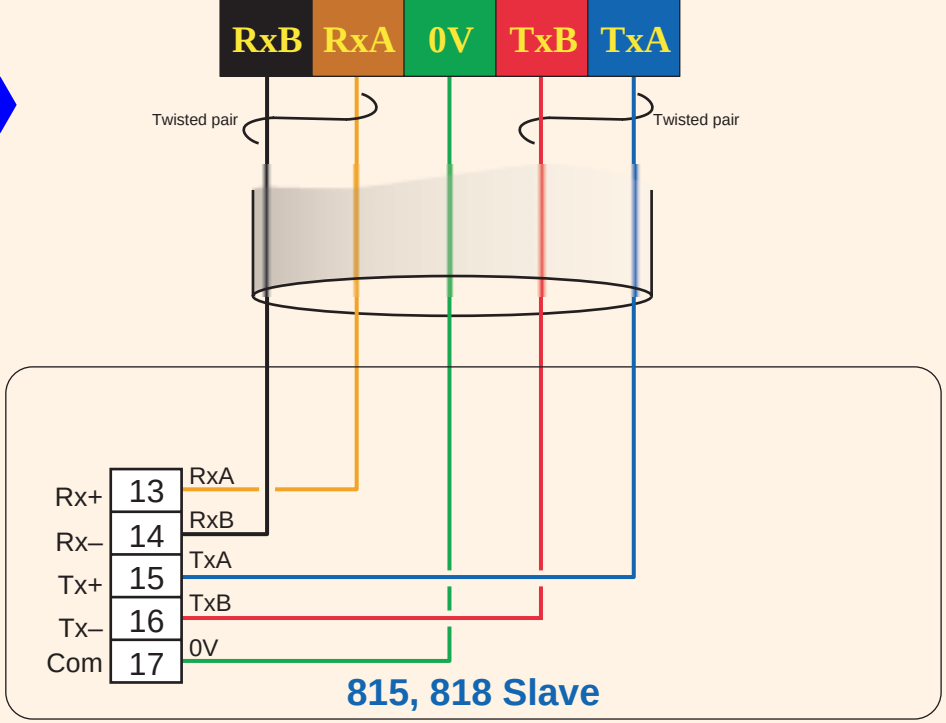


5-wire EIA485

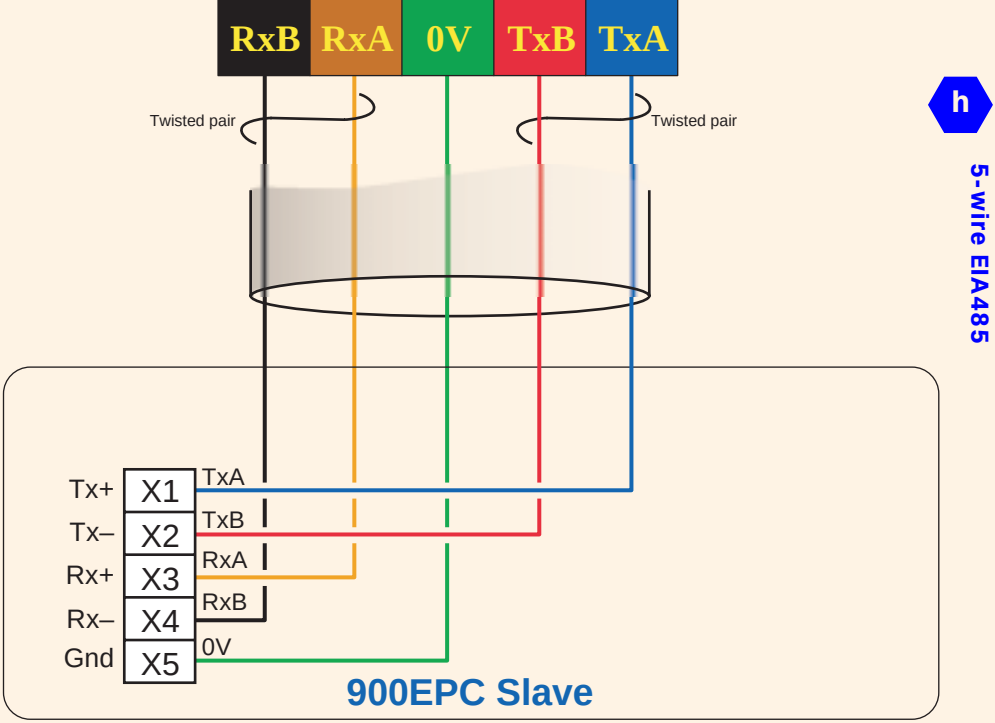
HA028117

g

5-wire EIA485



HA028117

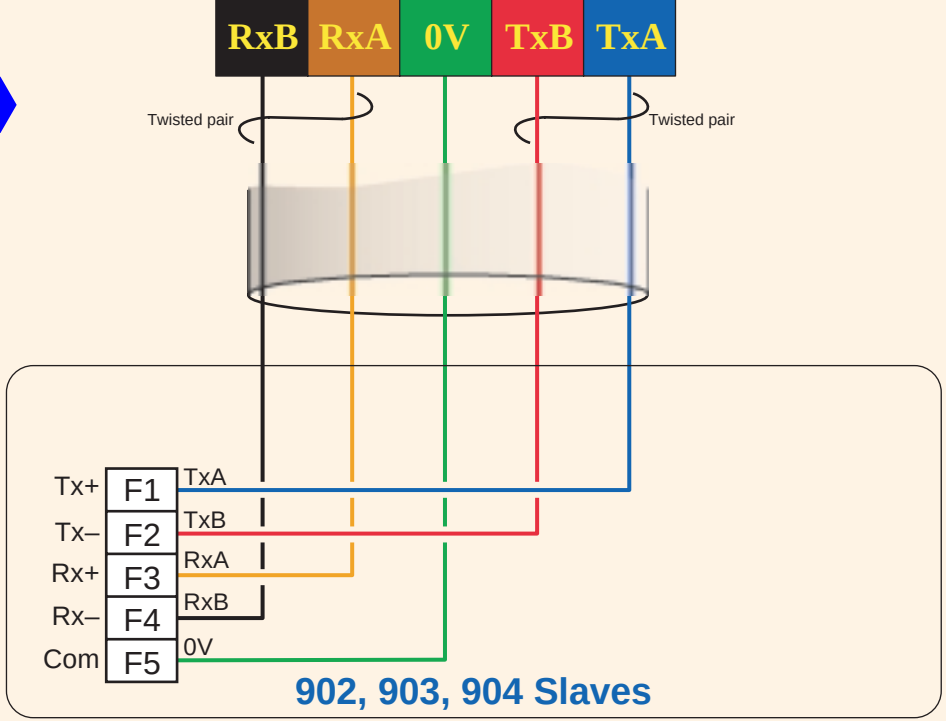


5-wire EIA485

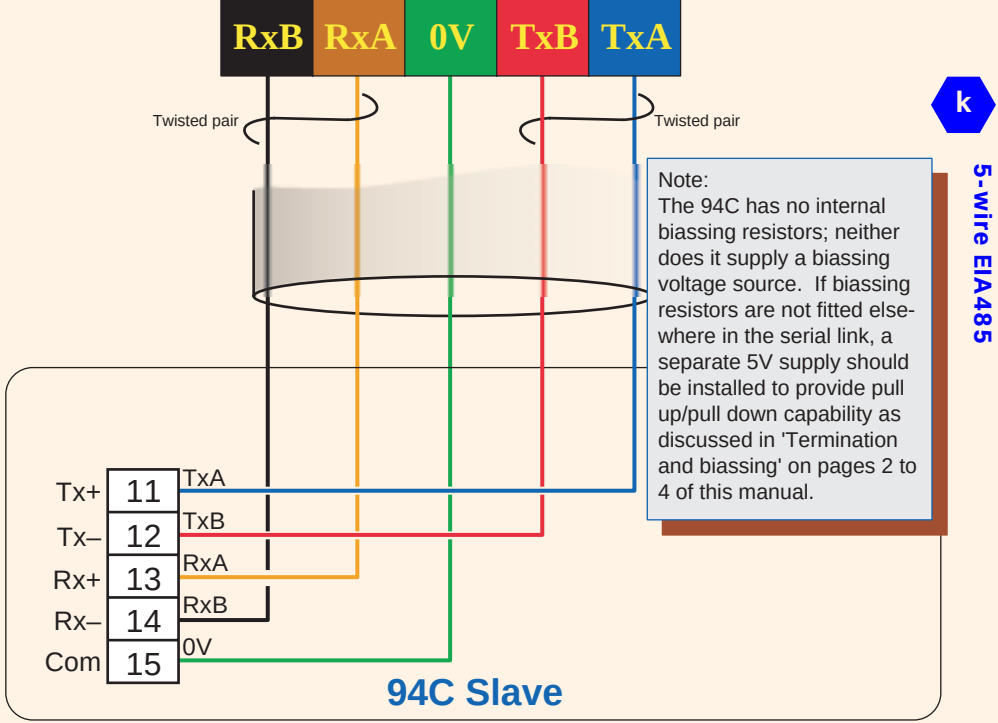
HA028117

j

5-wire EIA485

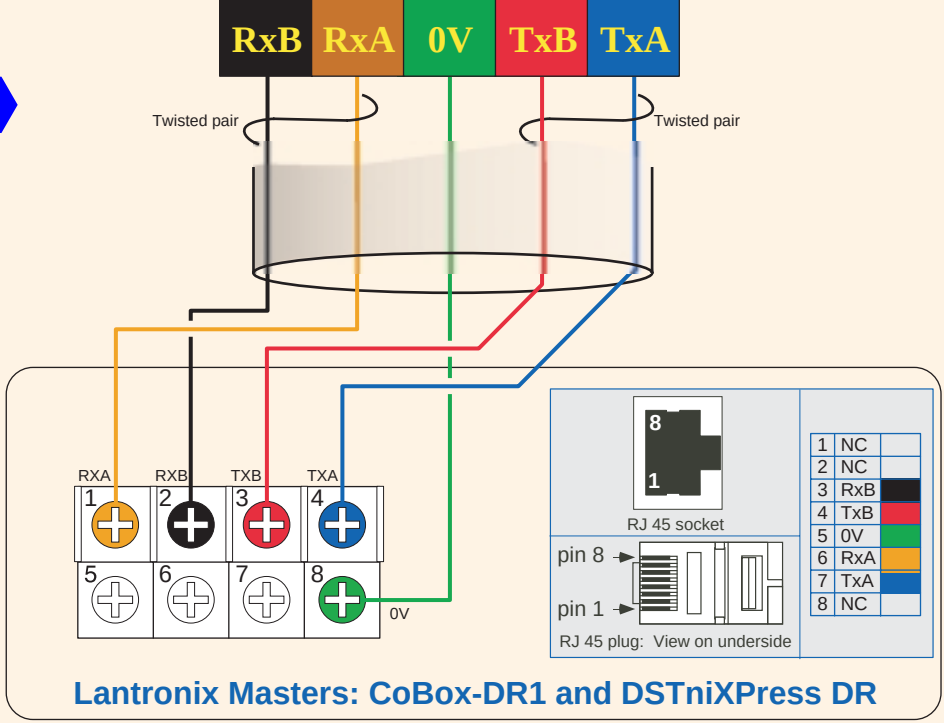


HA028117

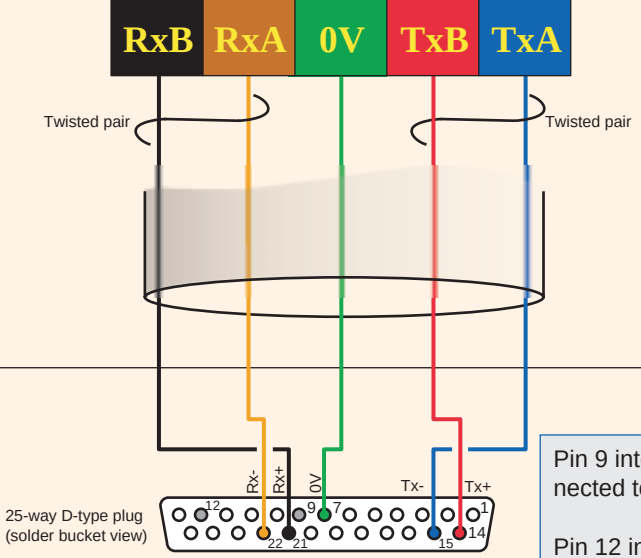

RxB
RxA
0V
TxB
TxA
Twisted pair
Twisted pair
Note:
The 94C has no internal biassing resistors; neither does it supply a biassing voltage source. If biassing resistors are not fitted elsewhere in the serial link, a separate 5V supply should be installed to provide pull up/pull down capability as discussed in 'Termination and biassing' on pages 2 to 4 of this manual.
Tx+ 11 TxA
Tx– 12 TxB
Rx+ 13 RxA
Rx– 14 RxB
Com 15 0V
94C Slave

I

5-wire EIA485



HA028117

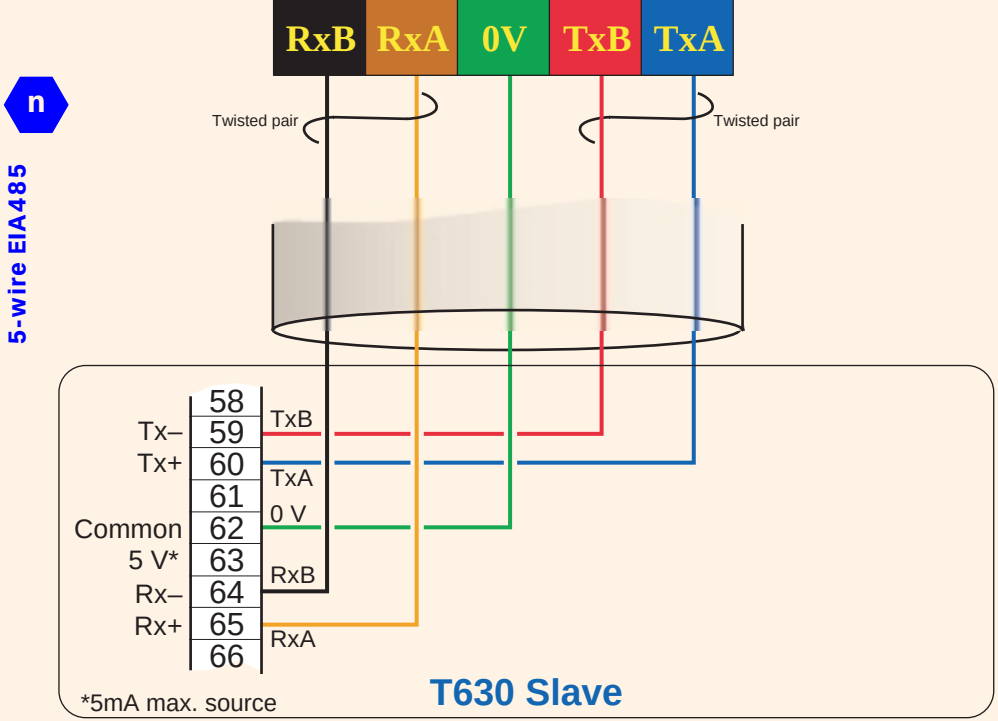


5-wire EIA485

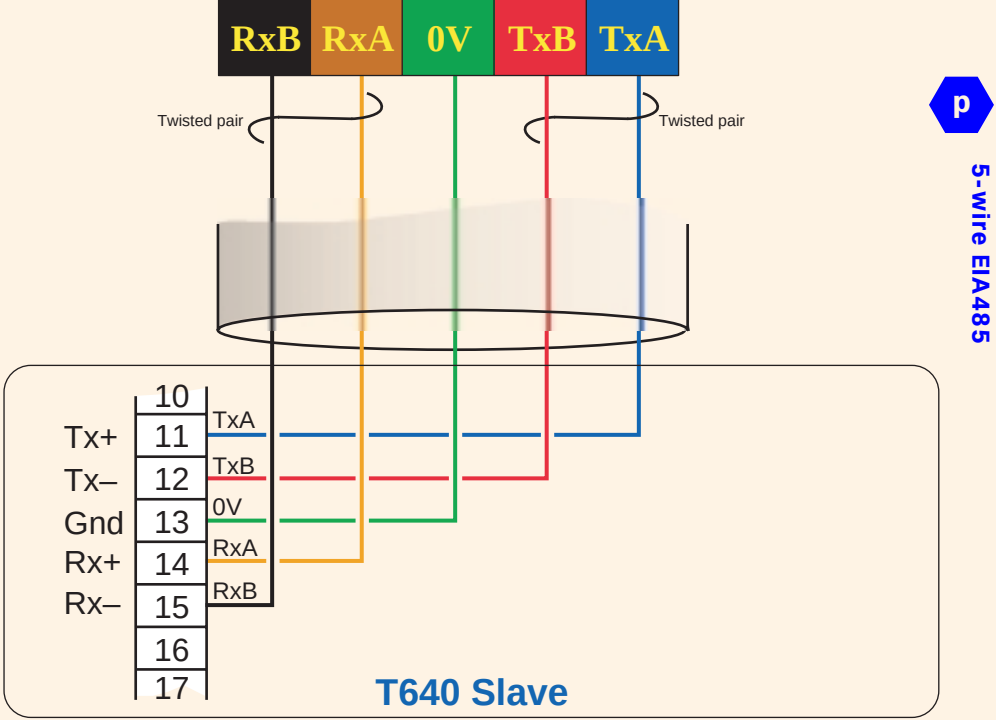
Pin 9 internally connected to regulated 5V

Pin 12 internally connected to unregulated 9 to 30 V

Lantronix Uds-10 Slave


RxB
RxA
0V
TxB
TxA
Twisted pair
Twisted pair
5-wire EIA485
58
Tx–
59
TxB
Tx+
60
TxA
61
0 V
Common
62
5 V*
63
RxB
Rx–
64
Rx+
65
RxA
66
*5mA max. source
T630 Slave

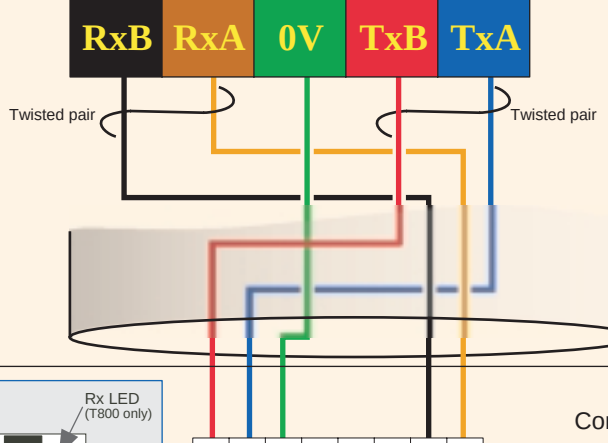
HA028117

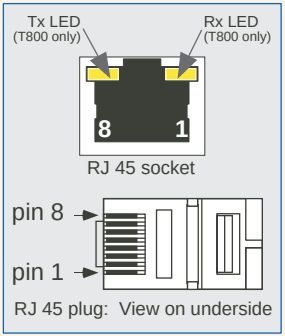


5-wire EIA485

HA028117

5-wire EIA485





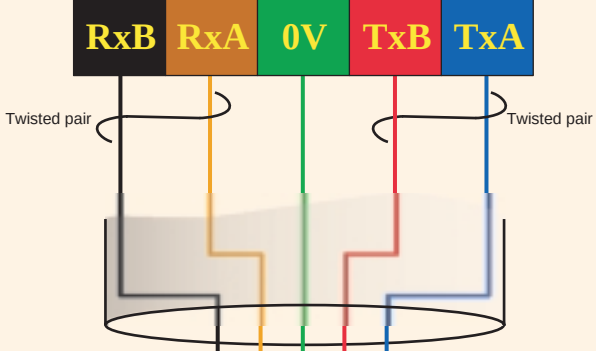
1	2	3	4	5	6	7	8
Tx B	Tx A	0 V			0 V	Rx B	Rx A

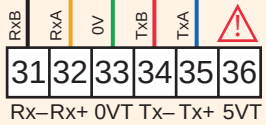
Mini 8
T800, T940
2500 Slave

Common slave wire colours

1	TxB	Orange/White
2	TxA	Orange
3	0V	Green/White
4	NC	Blue/White
5	NC	Blue
6	0V	Green
7	RxB	Brown/White
8	RxA	Brown

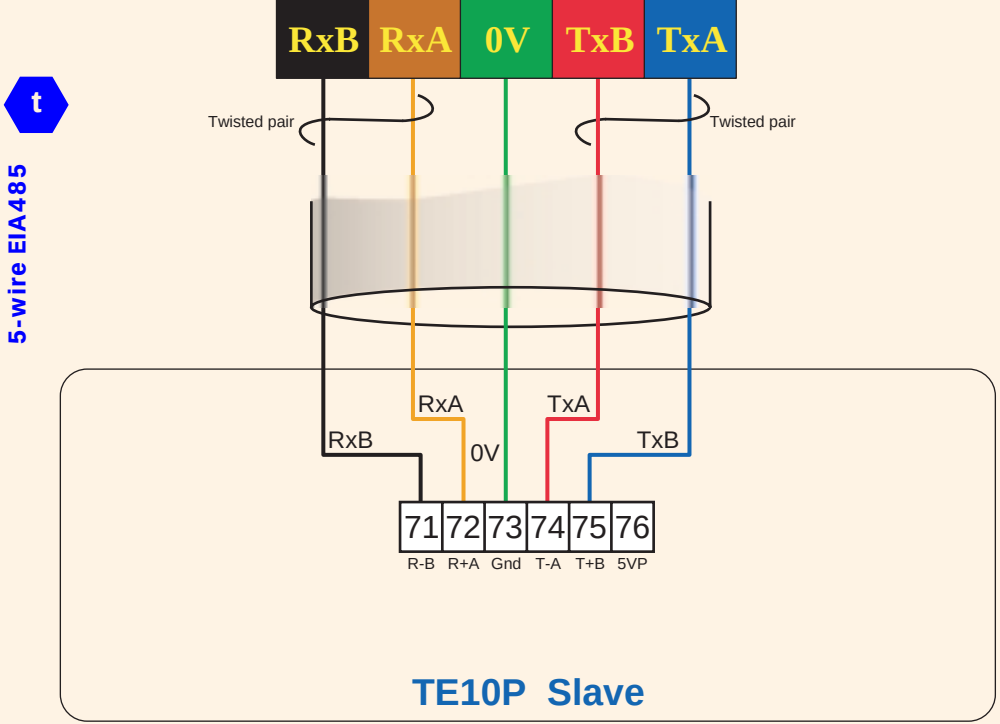
HA028117

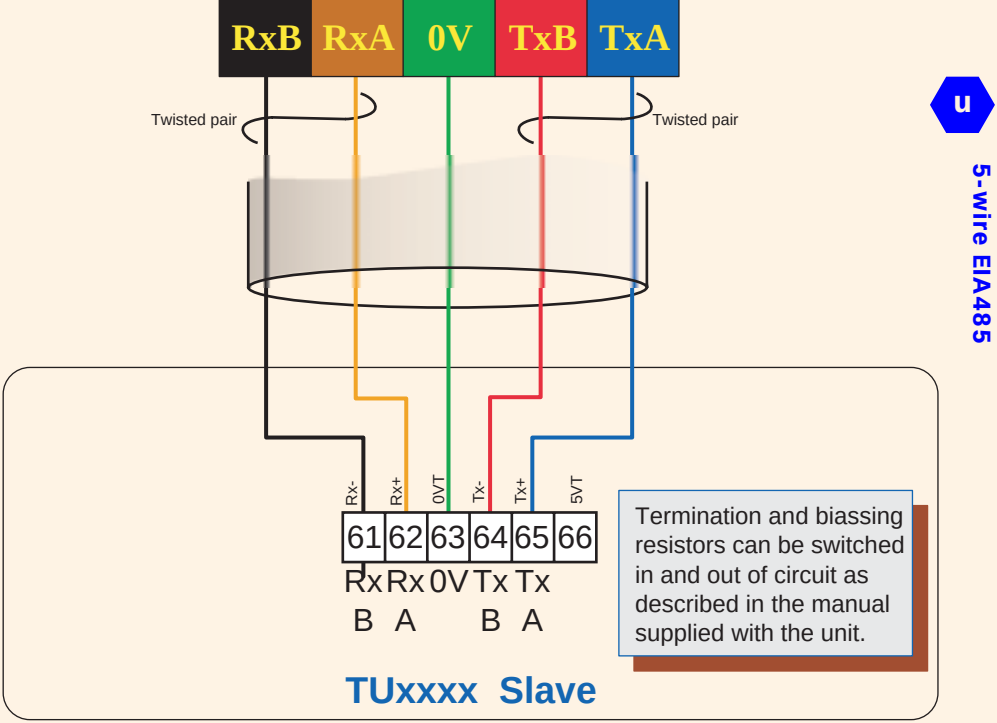


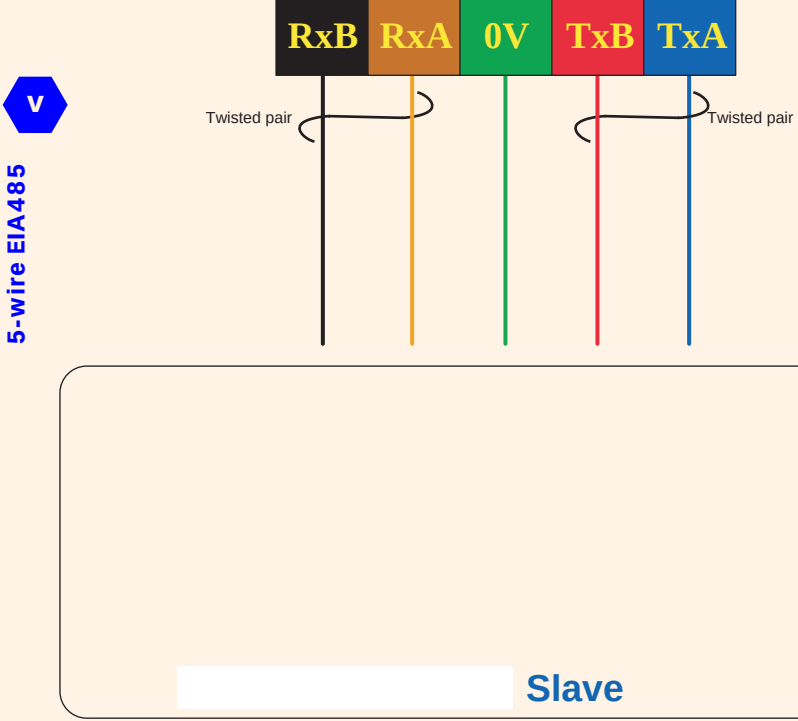


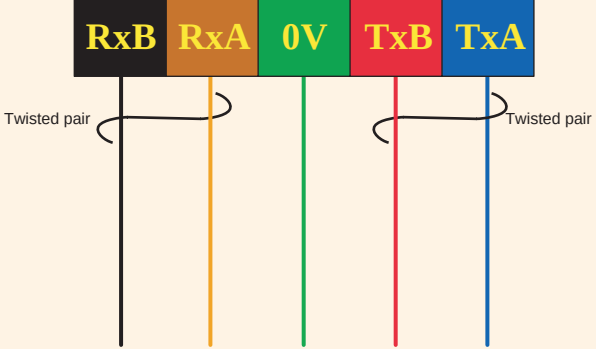
For current instruments, terminal 36 is 5V (isolated).
In the original design, terminals were numbered 1 to 6, where terminal 6 was 0V

TC3001/CE Slave


RxB
RxA
0V
TxB
TxA
Twisted pair
Twisted pair
5-wire EIA485
RxB
RxA
0V
TxA
TxB
71
72
73
74
75
76
R-B
R+A
Gnd
T-A
T+B
5VP
TE10P Slave


RxB
RxA
0V
TxB
TxA
Twisted pair
Twisted pair
Rx-
Rx+
0VT
Tx-
Tx+
5VT
61
62
63
64
65
66
Rx B
Rx A
0V
Tx B
Tx A
Termination and biassing resistors can be switched in and out of circuit as described in the manual supplied with the unit.
TUxxxx Slave


RxB
RxA
0V
TxB
TxA
Twisted pair
Twisted pair
5-wire EIA485
Slave

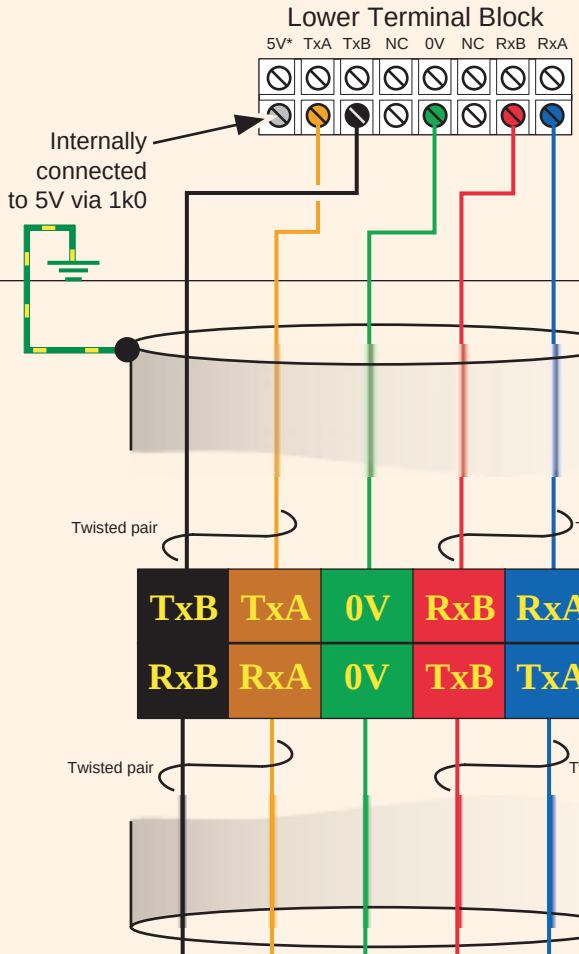


5-wire EIA485

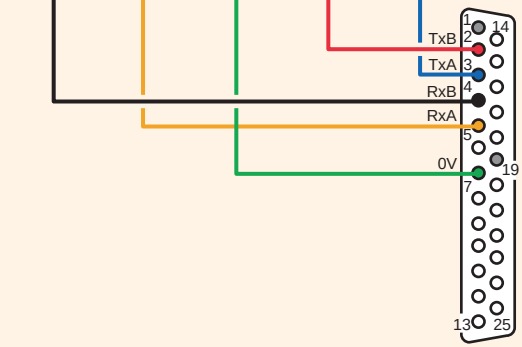
Slave

Notes

4250D (Remote display) Master



The 4250D can act as a master only to the models shown on pages L1/L2.



Pin 1 of recorder connector is tied to protective ground.

Pin 19 is tied to 5V via 1k0

25-way D-type plug (solder bucket side)

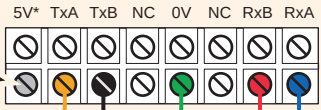
4200, 4250M Slave (Non-isolated)

5-wire EIA485

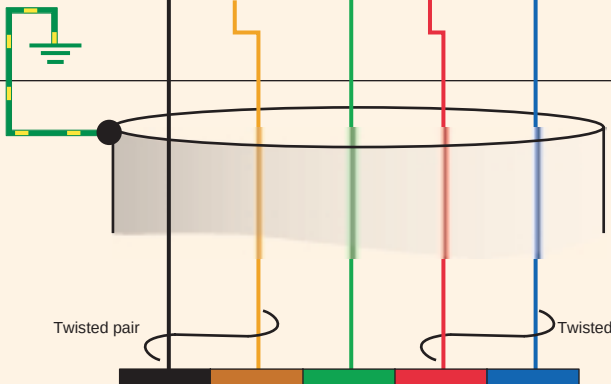
4250D (Remote display) Master

Lower Terminal Block

Internally connected to 5V via 1k0



The 4250D can act as a master only to the models shown on pages L1/L2.



Twisted pair

Twisted pair

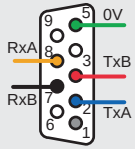
TxB	TxA	0V	RxB	RxA
RxB	RxA	0V	TxB	TxA

Twisted pair

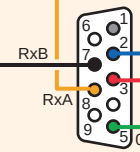
Twisted pair

The Comms module has a 9-way plug and a 9-way socket, wired in parallel for easy daisy chaining. For Graphics recorders and I/O Racks, only the fixed plug may be used.

Pin 1 internally connected to 5V via 1k0.



9-way plug (solder side) (not 4000R, 4180G, 4181G, 4250G)



Pin 1 connected internally to 5V via 1k0.

9-way socket (solder side)

4180C/G/M, 4181M/G 4000R, 4250C/G/M (Isolated)

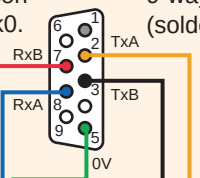
Pin	Signal
1	5V via 1k0
2	TxA
3	TxB
4	NC
5	0V
6	NC
7	RxB
8	RxA
9	NC

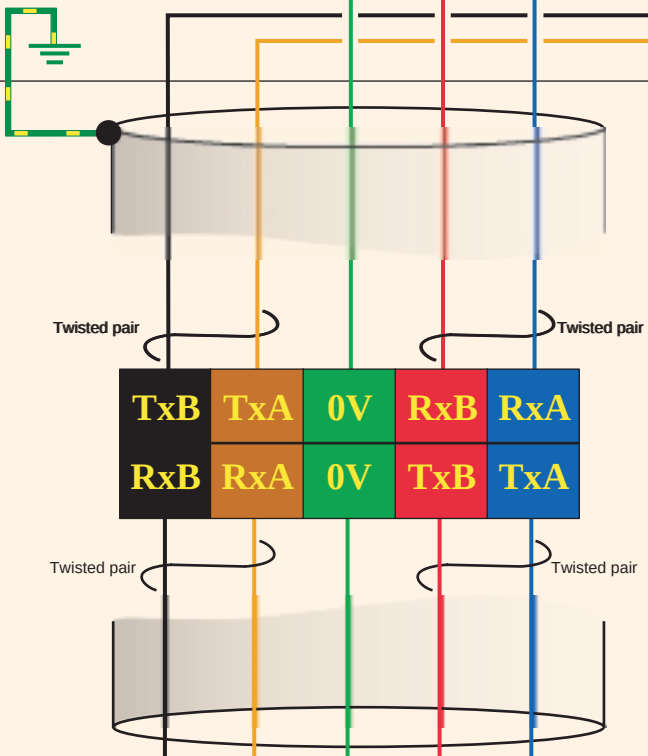
4180G, 4181G, 4250G Master

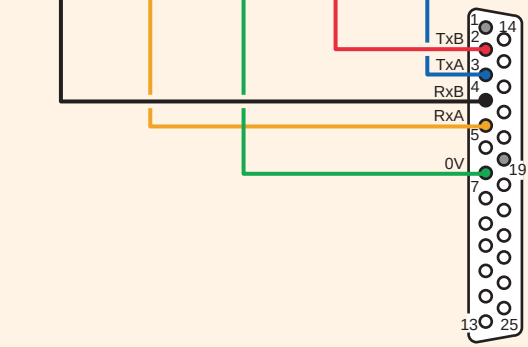
These units can act as a master only to the models shown on page M1/ M2.

Pin 1 of recorder connector to 5V via 1k0.

9-way socket (solder side)







Pin 1 of recorder connector is tied to protective ground.

Pin 19 is tied to 5V via 1k0

25-way D-type plug (solder bucket side)

4200, 4250M Slave (Non-isolated)

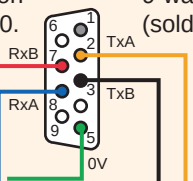
5-wire EIA485

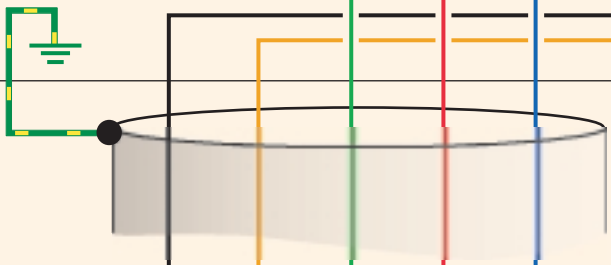
4180G, 4181G, 4250G Master

These units can act as a master only to the models shown on pages M1/M2

Pin 1 of recorder connector to 5V via 1k0.

9-way socket (solder side)





Twisted pair

Twisted pair

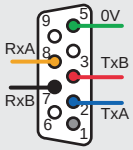
TxB	TxA	0V	RxB	RxA
RxB	RxA	0V	TxB	TxA

Twisted pair

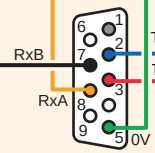
Twisted pair

The Comms module has a 9-way plug and a 9-way socket, wired in parallel for easy daisy chaining. For Graphics recorders and I/O Racks, only the fixed plug may be used.

Pin 1 internally connected to 5V via 1k0.



9-way plug (solder side) (not 4000R, 4180G, 4181G, 4250G)



9-way socket (solder side)

Pin 1 connected internally to 5V via 1k0.

4180C/G/M, 4181M/G 4000R, 4250C/G/M (Isolated)

Pin	Signal
1	5V via 1k0
2	TxA
3	TxB
4	NC
5	0V
6	NC
7	RxB
8	RxA
9	NC

EIA 485 Modbus Wiring

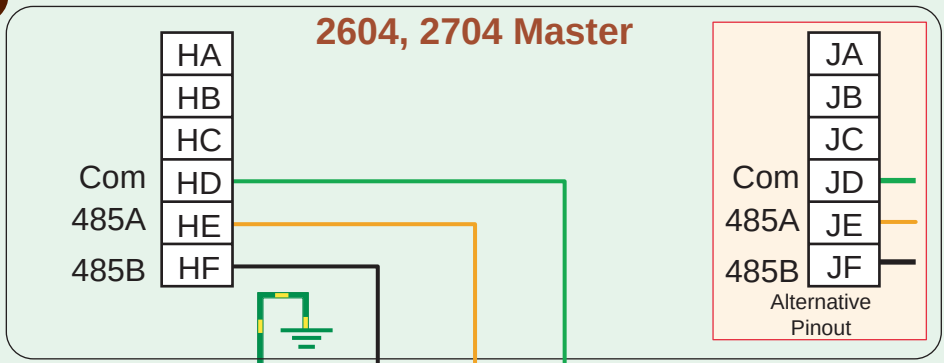
(3-Wire)

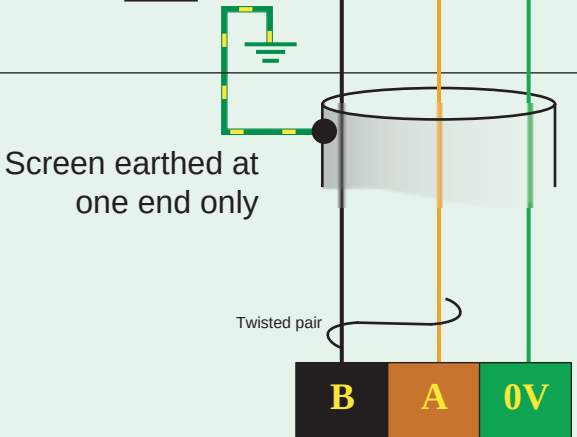
3-Wire EIA485

EIA485 3-Wire Masters

A

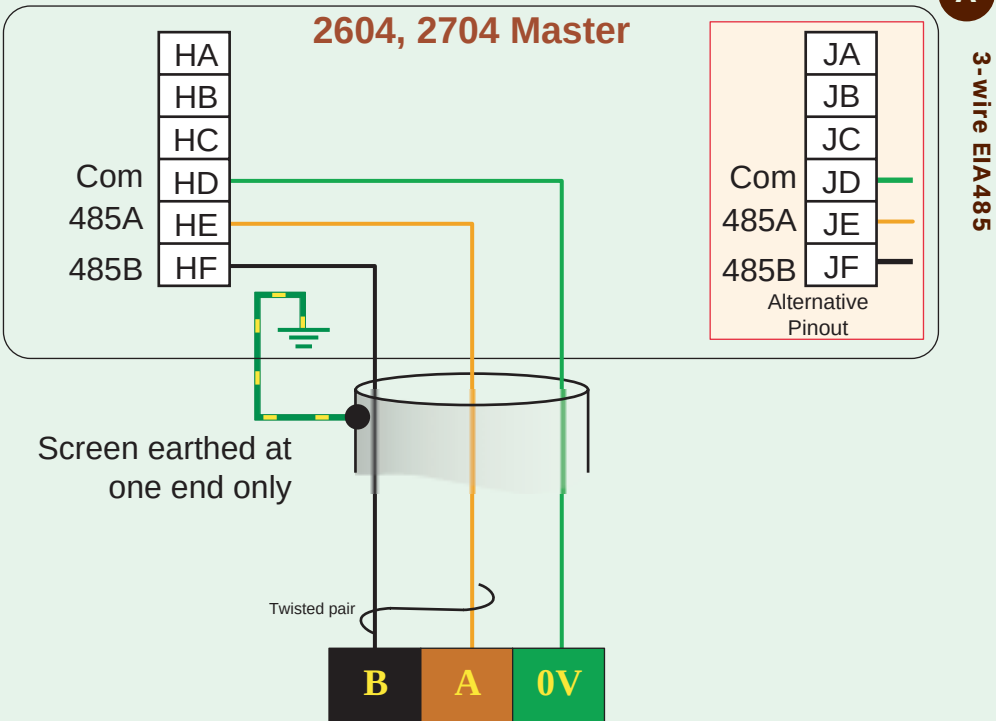
3-wire EIA485





A

3-wire EIA485

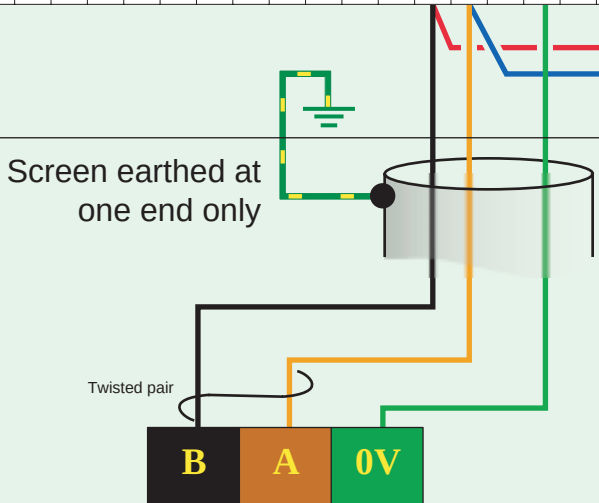


B

3-wire EIA485

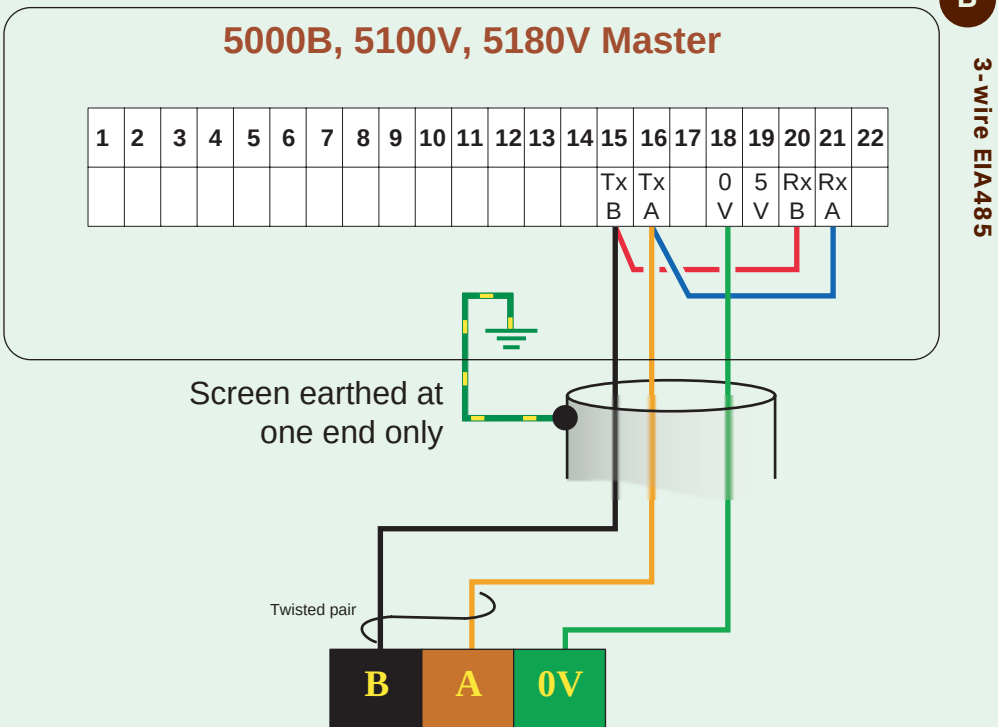
5000B, 5100V, 5180V Master

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
														Tx B	Tx A		0 V	5 V	Rx B	Rx A	



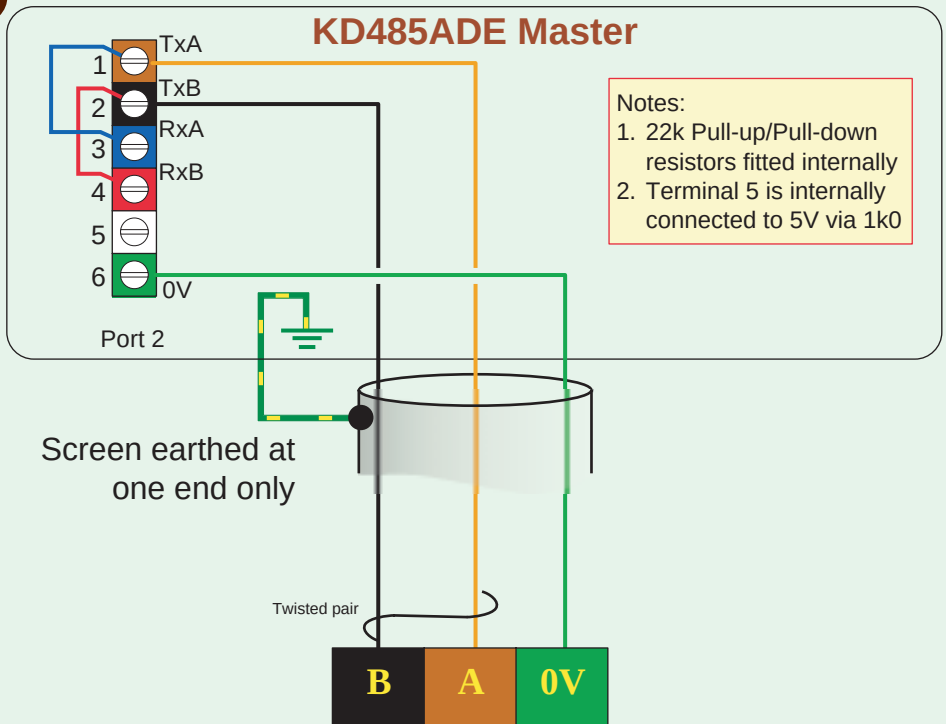
5000B, 5100V, 5180V Master

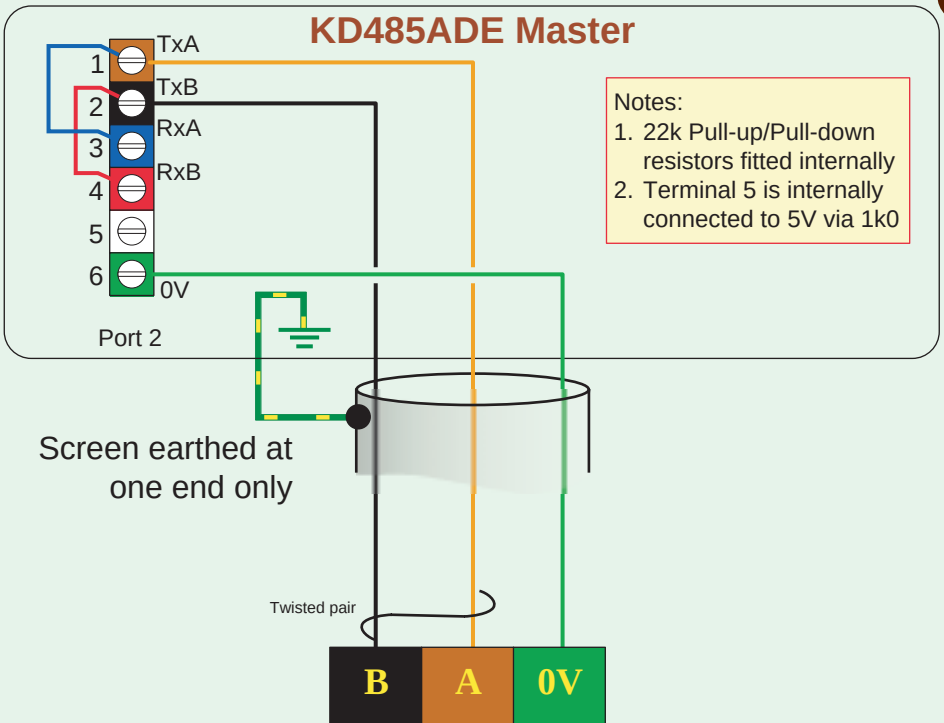
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
														Tx B	Tx A		0 V	5 V	Rx B	Rx A	



C

3-wire EIA485

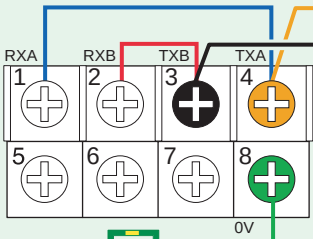


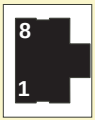

KD485ADE Master
TxA
TxB
RxA
RxB
0V
1
2
3
4
5
6
Port 2
Notes:
1. 22k Pull-up/Pull-down resistors fitted internally
2. Terminal 5 is internally connected to 5V via 1k0
Screen earthed at one end only
Twisted pair
B
A
0V

D

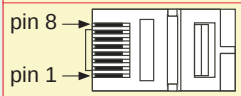
3-wire EIA485

Lantronix Masters: CoBox-DR1 and DSTniXPress DR





RJ 45 socket



RJ 45 plug: View on underside

1	NC	
2	NC	
3	RxB	
4	TxB	
5	0V	
6	RxA	
7	TxA	
8	NC	

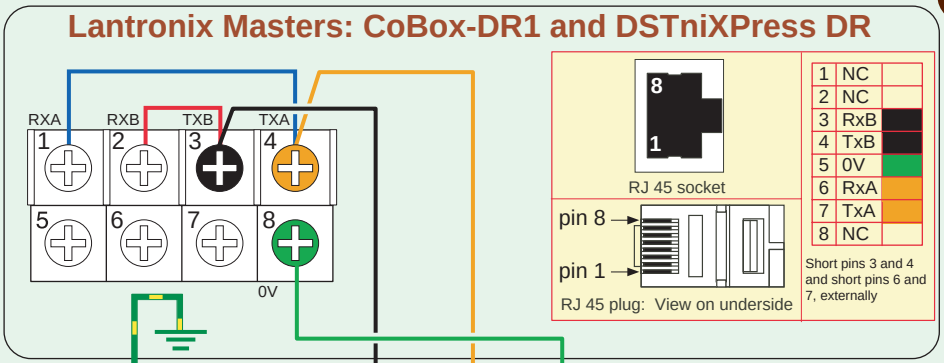
Short pins 3 and 4 and short pins 6 and 7, externally

Screen earthed at one end only

Twisted pair

B A 0V

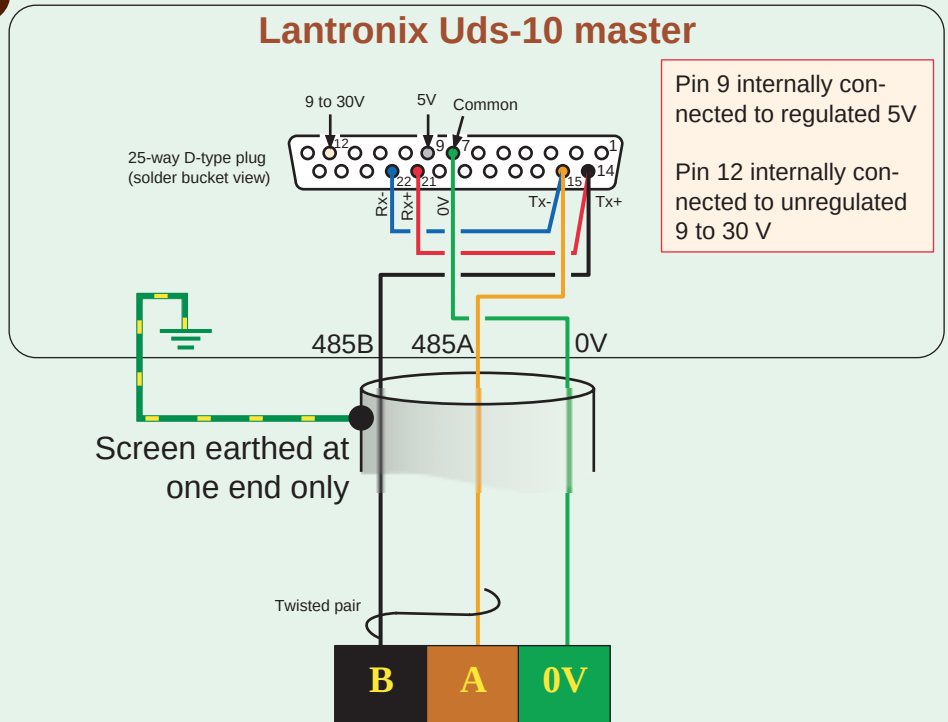
Lantronix Masters: CoBox-DR1 and DSTniXPress DR



E

3-wire EIA485

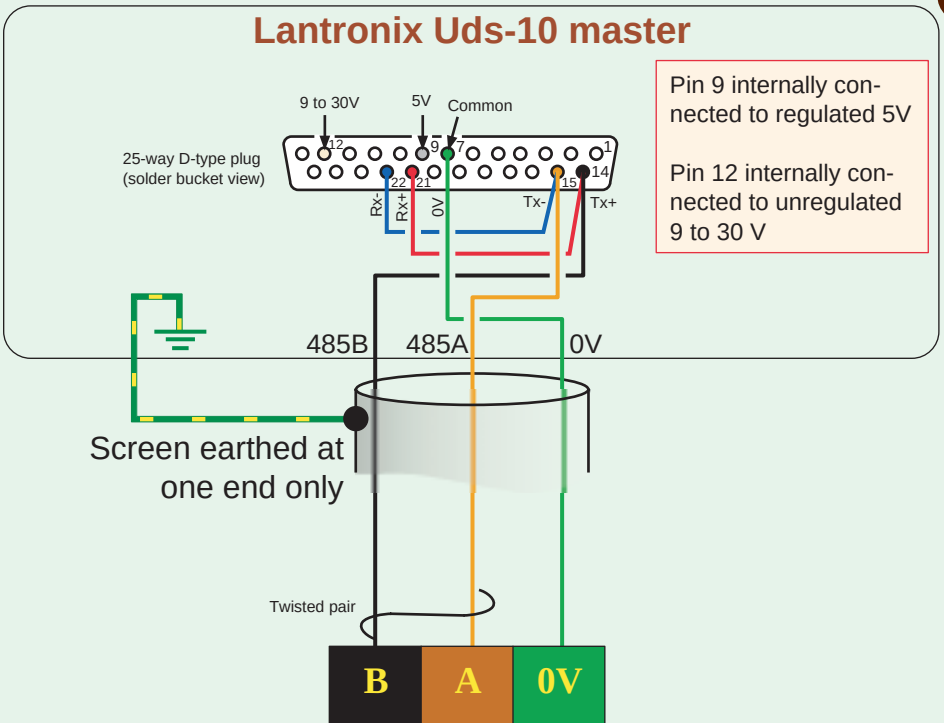
Lantronix Uds-10 master



Pin 9 internally connected to regulated 5V

Pin 12 internally connected to unregulated 9 to 30 V

Lantronix Uds-10 master



Pin 9 internally connected to regulated 5V

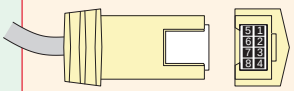
Pin 12 internally connected to unregulated 9 to 30 V

F

3-wire EIA485

PC3000 Master (LCM, LCM+, ICM)

Connector details
Ports A to D



Pull-up/Pull down resistors fitted internally.
Internal 100 Ohm terminating resistor can be inserted into circuit by fitting a link, as described in the manual HA022231.

485A	5	1	NC
485B	6	2	NC
0V	7	3	485A
0V	8	4	485B

Pin 3 is internally connected to pin 5
Pin 4 is internally connected to pin 6
Pin 7 is internally connected to pin 8

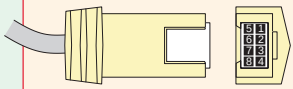
Screen earthed at one end only

Twisted pair

B A 0V

PC3000 Master (LCM, LCM+, ICM)

Connector details
Ports A to D



Pull-up/Pull down resistors fitted internally.
Internal 100 Ohm terminating resistor can be inserted into circuit by fitting a link, as described in the manual HA022231.

485A	5	1	NC
485B	6	2	NC
0V	7	3	485A
0V	8	4	485B

Pin 3 is internally connected to pin 5
Pin 4 is internally connected to pin 6
Pin 7 is internally connected to pin 8

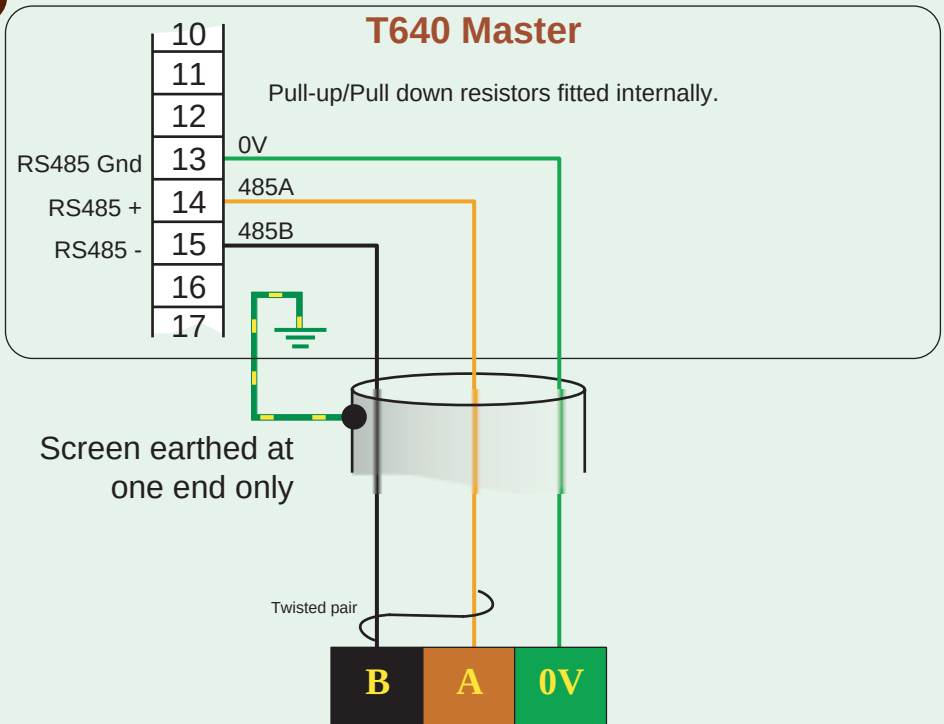
Screen earthed at one end only

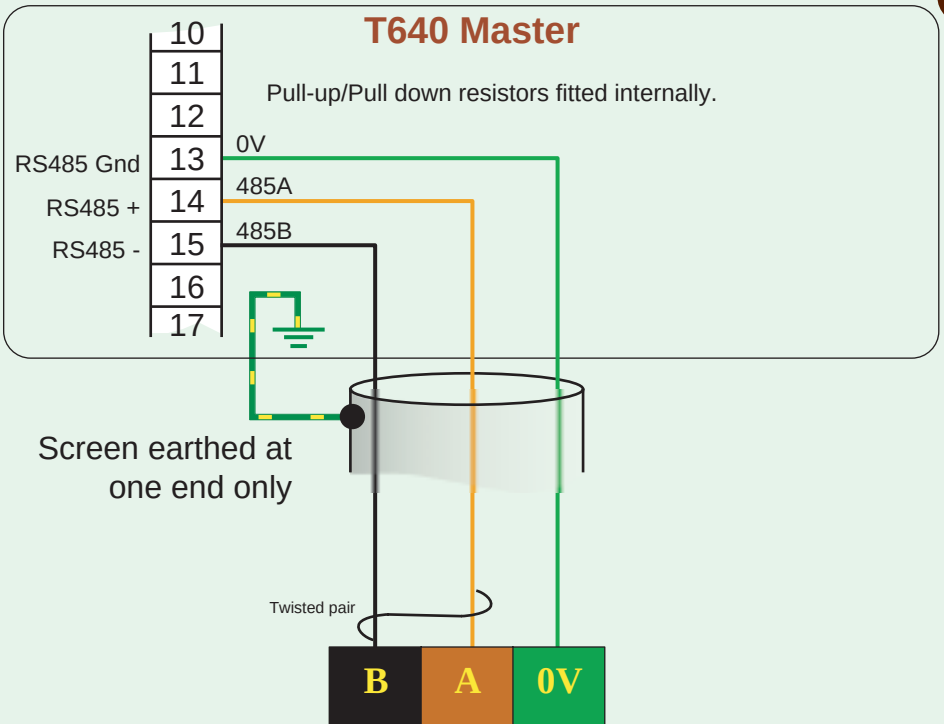
Twisted pair

B A 0V

G

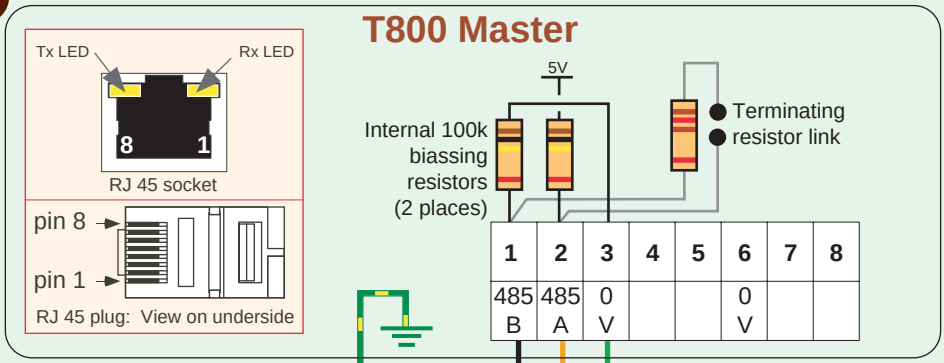
3-wire EIA485




T640 Master
Pull-up/Pull down resistors fitted internally.
10
11
12
13
14
15
16
17
RS485 Gnd
RS485 +
RS485 -
0V
485A
485B
Screen earthed at one end only
Twisted pair
B
A
0V

H

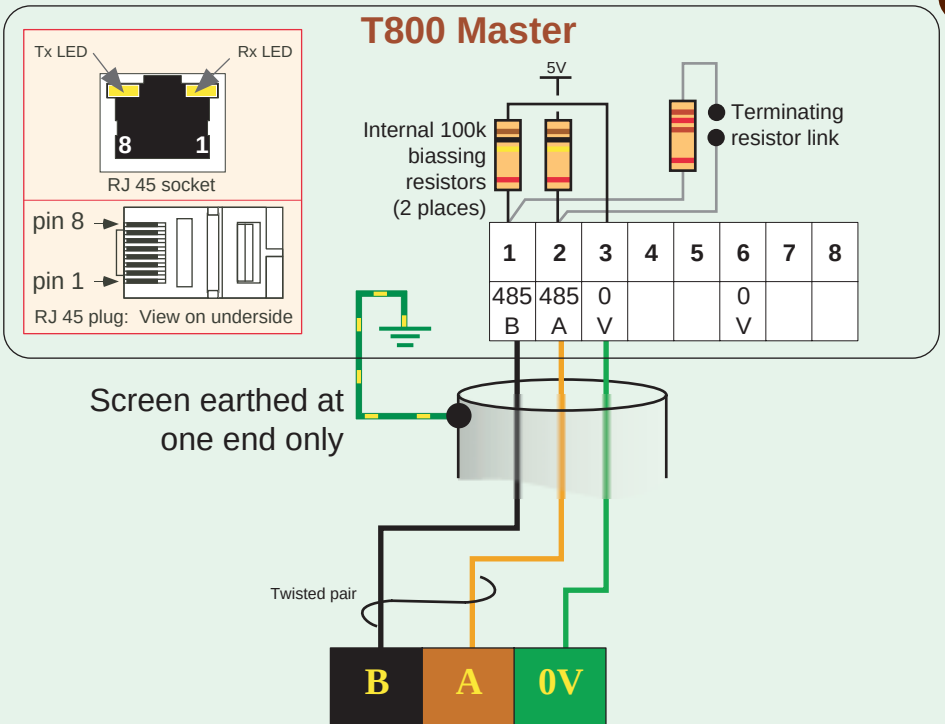
3-wire EIA485



Screen earthed at one end only

Twisted pair

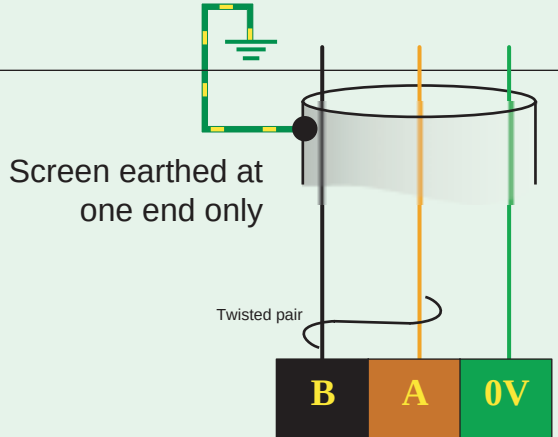
B A 0V


T800 Master
Tx LED
Rx LED
8
1
RJ 45 socket
pin 8
pin 1
RJ 45 plug: View on underside
5V
Internal 100k biassing resistors (2 places)
Terminating resistor link
1 2 3 4 5 6 7 8
485 B
485 A
0 V
0 V
Screen earthed at one end only
Twisted pair
B
A
0V

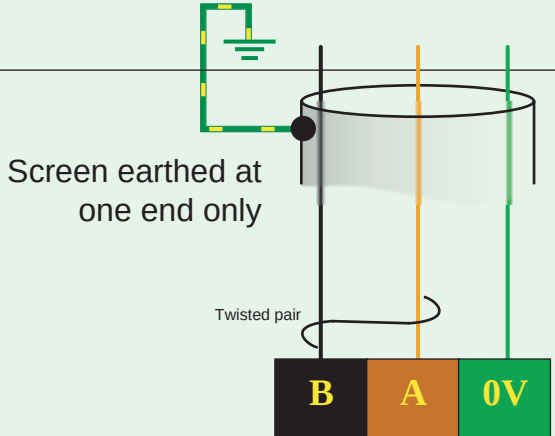
J

3-wire EIA485

Master

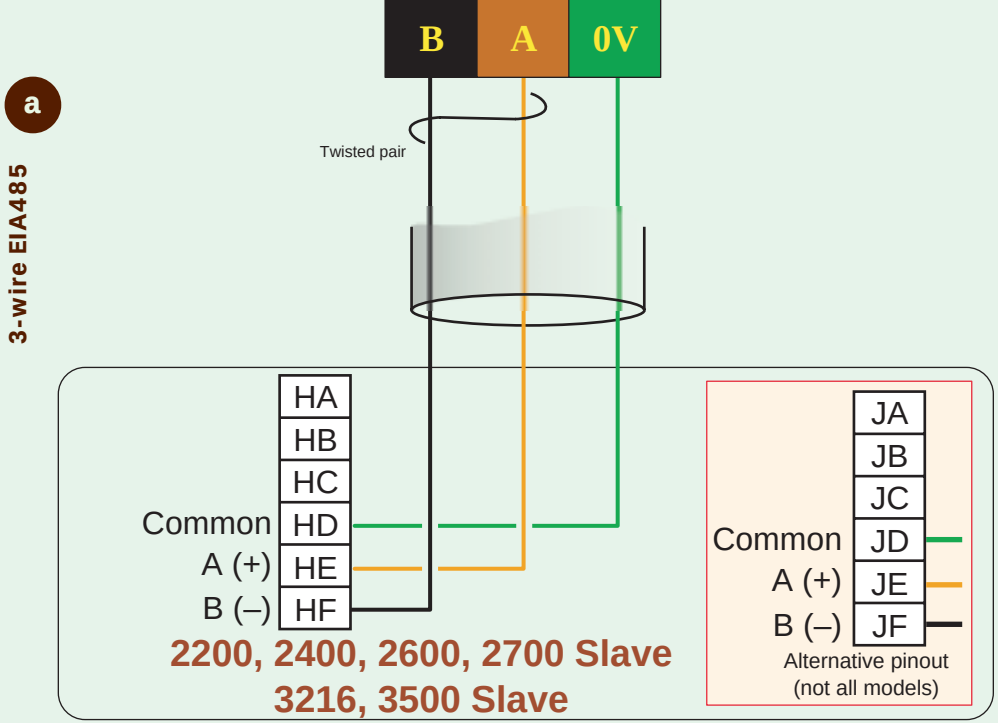


Master



Notes

EIA485 3-Wire Slaves


a
3-wire EIA485
B
A
0V
Twisted pair
HA
HB
HC
Common
HD
A (+)
HE
B (–)
HF
2200, 2400, 2600, 2700 Slave
3216, 3500 Slave
JA
JB
JC
Common
JD
A (+)
JE
B (–)
JF
Alternative pinout
(not all models)

HA028117

b

3-wire EIA485

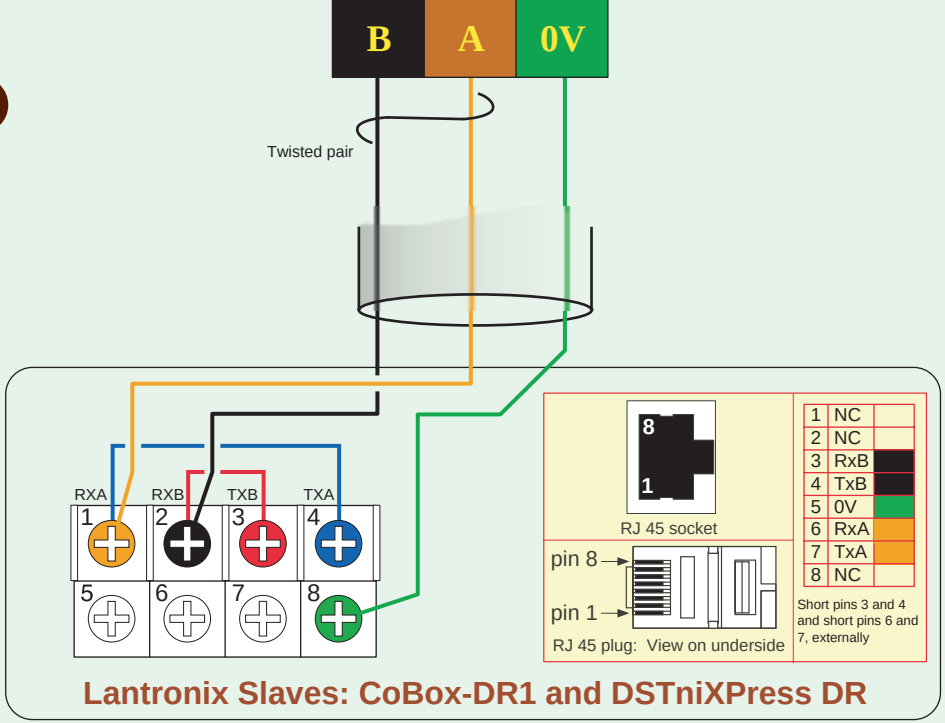
Twisted pair

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
														Tx B	Tx A		0 V	5 V	Rx B	Rx A	

5000B, 5100V, 5180V Slave

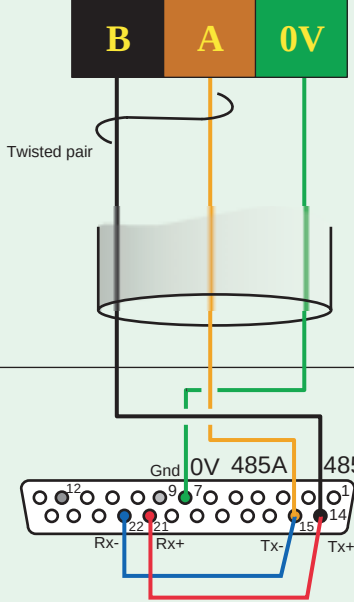
c

3-wire EIA485



Lantronix Slaves: CoBox-DR1 and DSTniXPress DR

HA028117



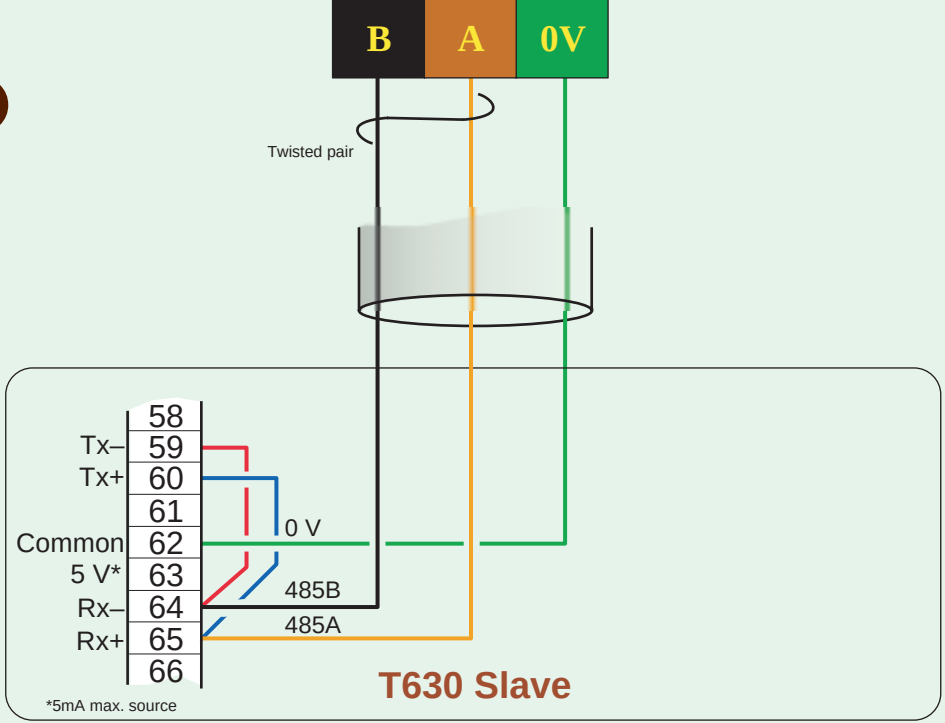
Pin 9 internally connected to regulated 5V

Pin 12 internally connected to unregulated 9 to 30 V

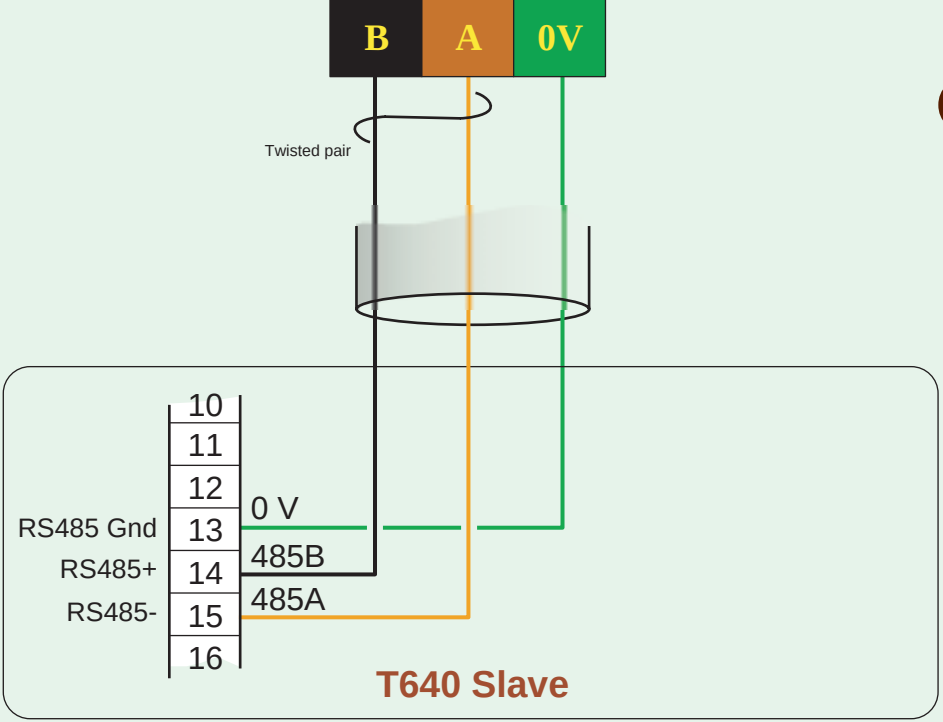
Lantronix Uds-10 Slave

e

3-wire EIA485



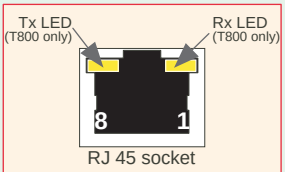
HA028117


B
A
0V
Twisted pair
10
11
12
13
14
15
16
RS485 Gnd
RS485+
RS485-
0 V
485B
485A
T640 Slave

g

3-wire EIA485

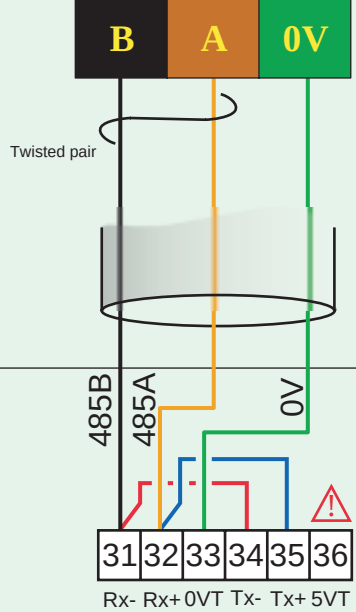
Twisted pair



1	2	3	4	5	6	7	8
485 B	485 A	0 V			0 V		

Mini8, T800, T940, 2500 Slave

HA028117

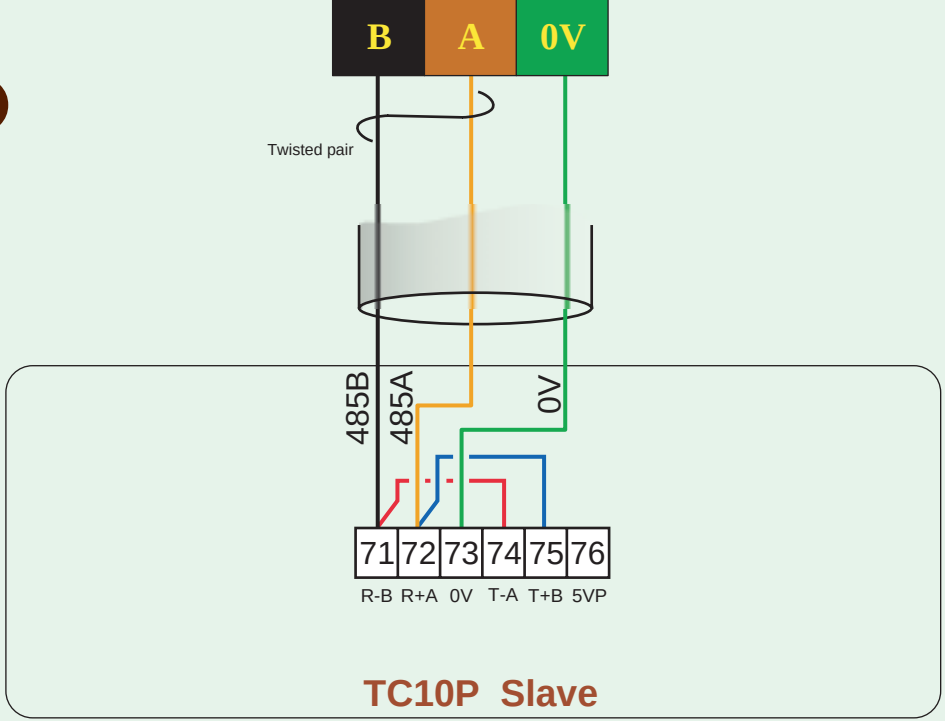


For current instruments, terminal 36 is 5V (isolated).
In the original design, terminals were numbered 1 to 6, where terminal 6 was 0V

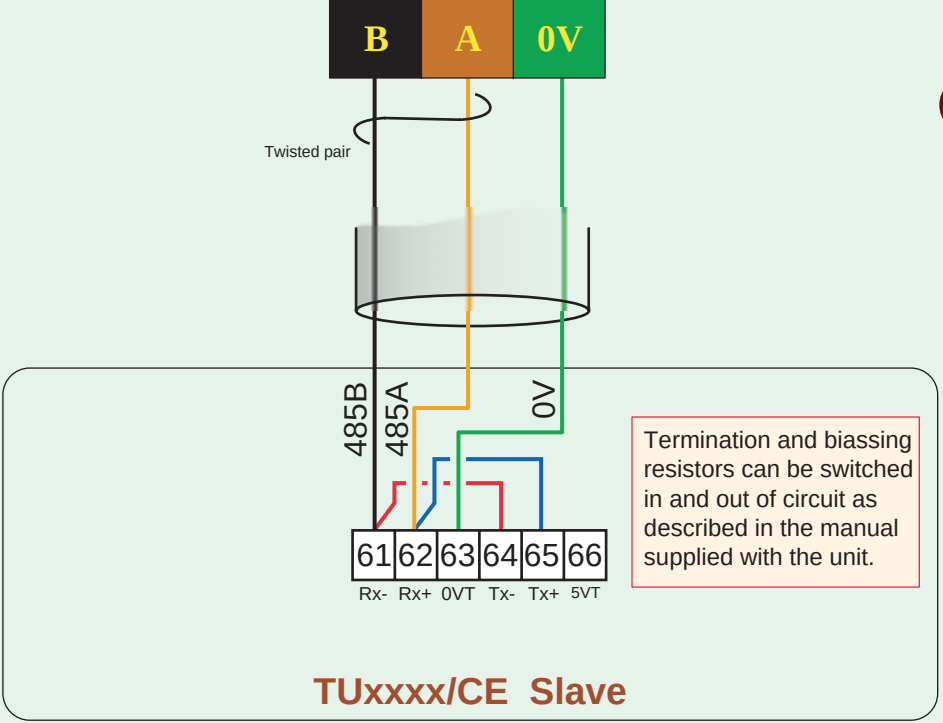
TC3001/CE Slave

j

3-wire EIA485



HA028117

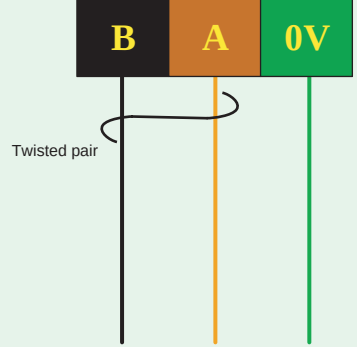


Termination and biassing resistors can be switched in and out of circuit as described in the manual supplied with the unit.

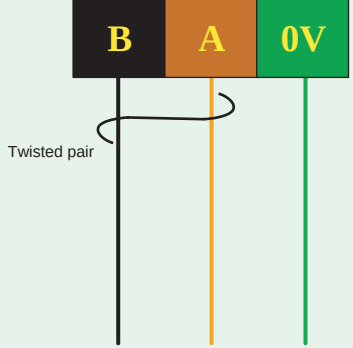
TUxxxx/CE Slave

l

3-wire EIA485



Slave



Slave

3-wire EIA485

HA028117

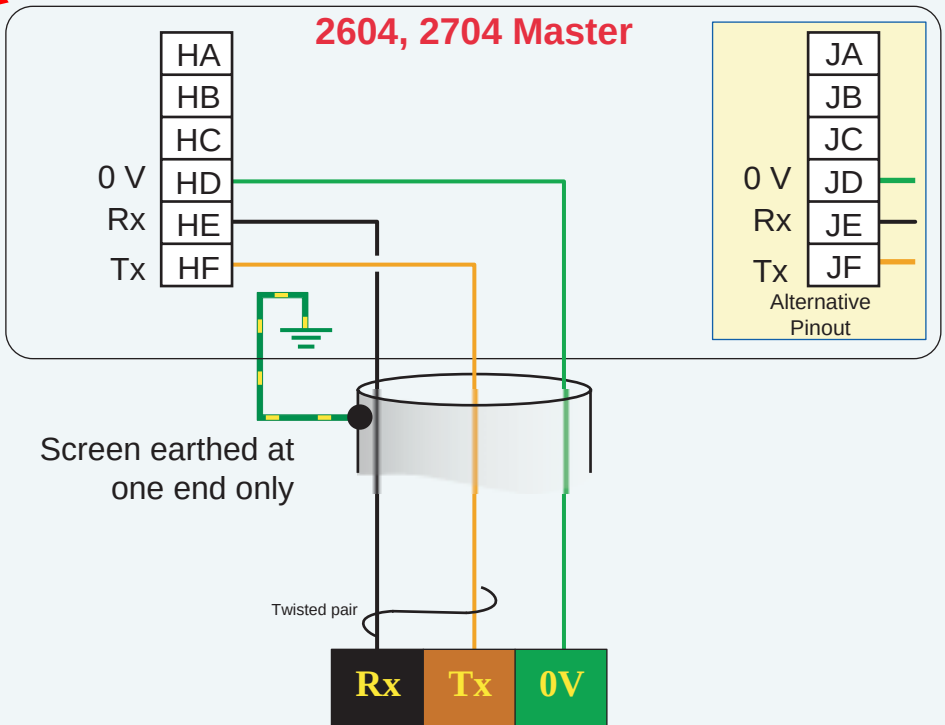
Notes

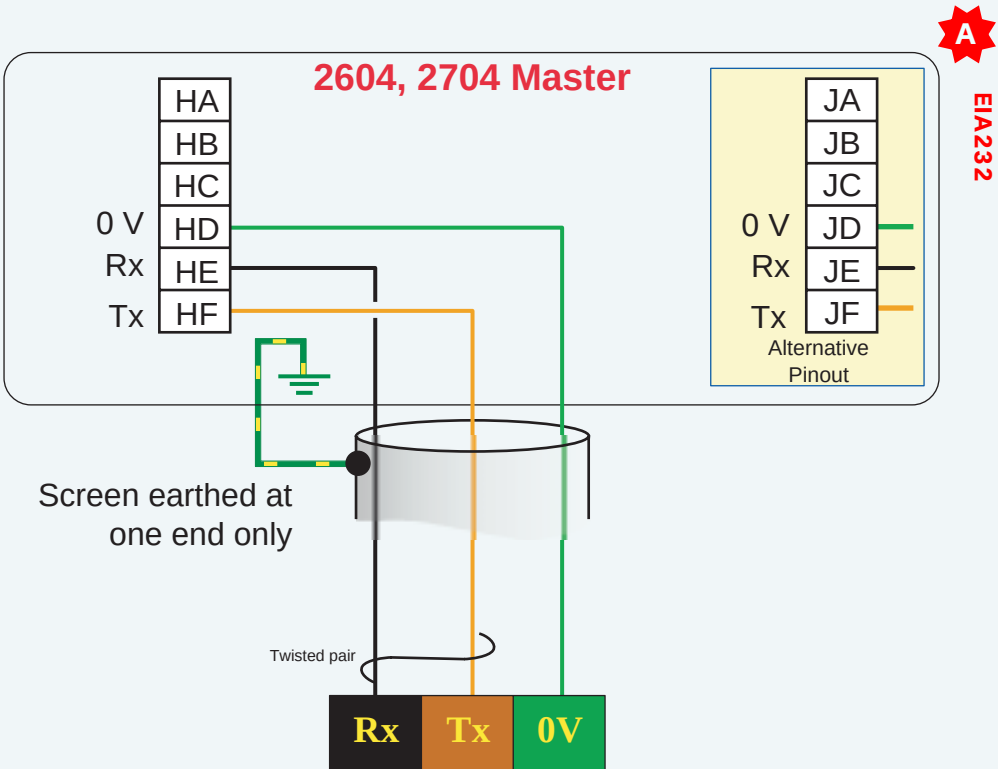
EIA 232 Modbus Wiring

EIA 232 MASTERS

A

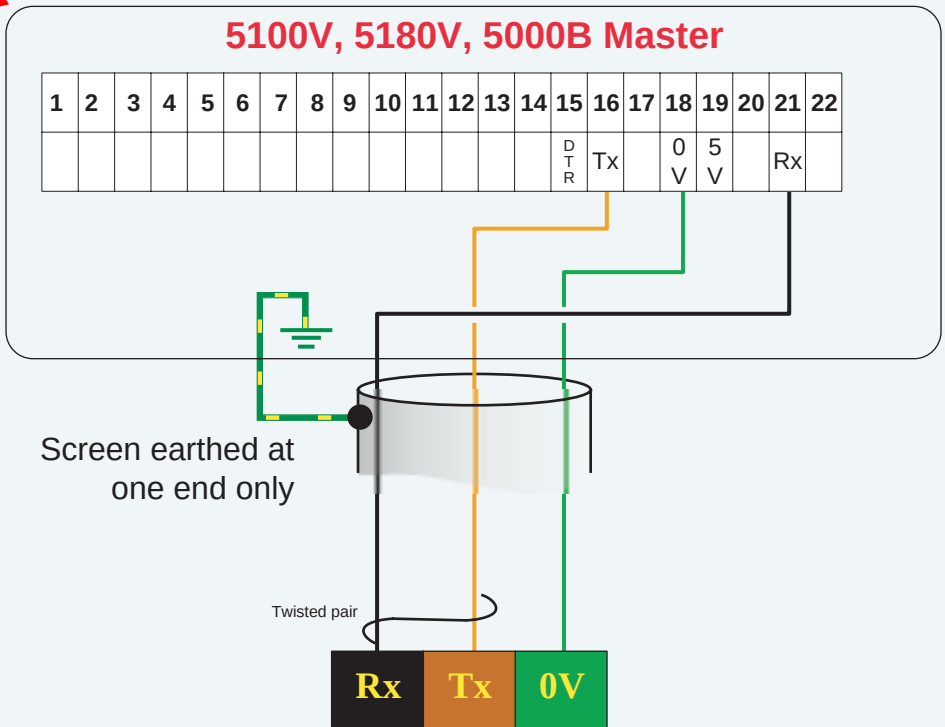
EIA232


2604, 2704 Master
HA
HB
HC
0 V
HD
Rx
HE
Tx
HF
JA
JB
JC
0 V
JD
Rx
JE
Tx
JF
Alternative Pinout
Screen earthed at one end only
Twisted pair
Rx
Tx
0V


A
EIA232
2604, 2704 Master
HA
HB
HC
0 V
HD
Rx
HE
Tx
HF
JA
JB
JC
0 V
JD
Rx
JE
Tx
JF
Alternative
Pinout
Screen earthed at
one end only
Twisted pair
Rx
Tx
0V

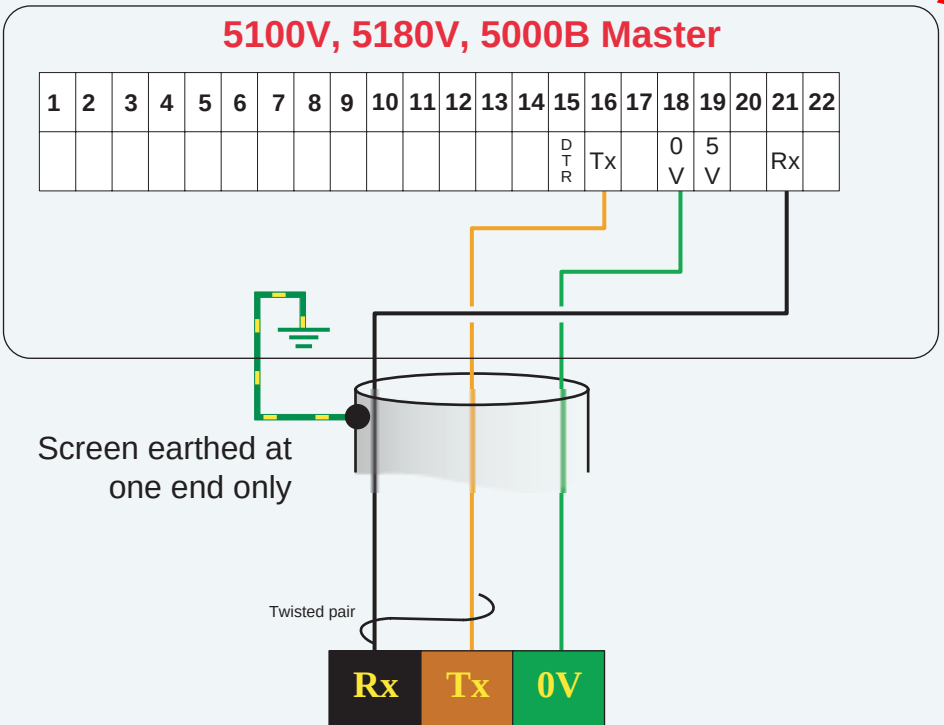
B

EIA232

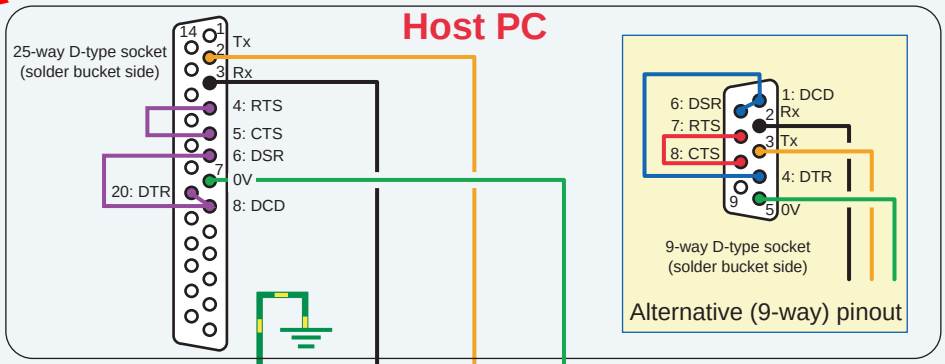

5100V, 5180V, 5000B Master
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
DTR
Tx
0 V
5 V
Rx
Screen earthed at one end only
Twisted pair
Rx
Tx
0V

B

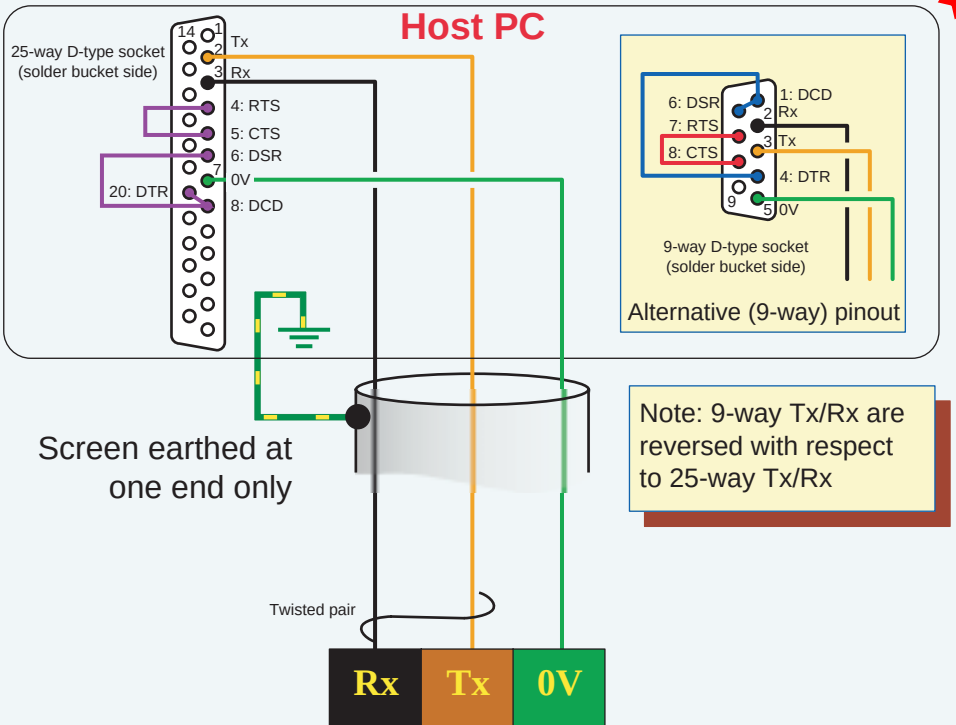
EIA232


5100V, 5180V, 5000B Master
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
DTR
Tx
0 V
5 V
Rx
Screen earthed at one end only
Twisted pair
Rx
Tx
0V

EIA232

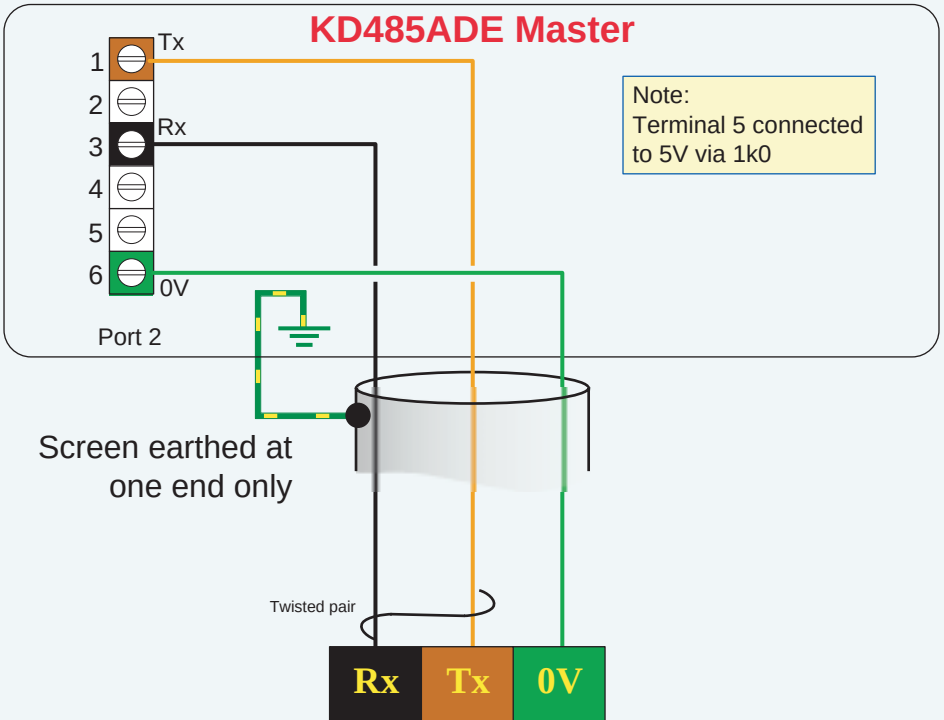


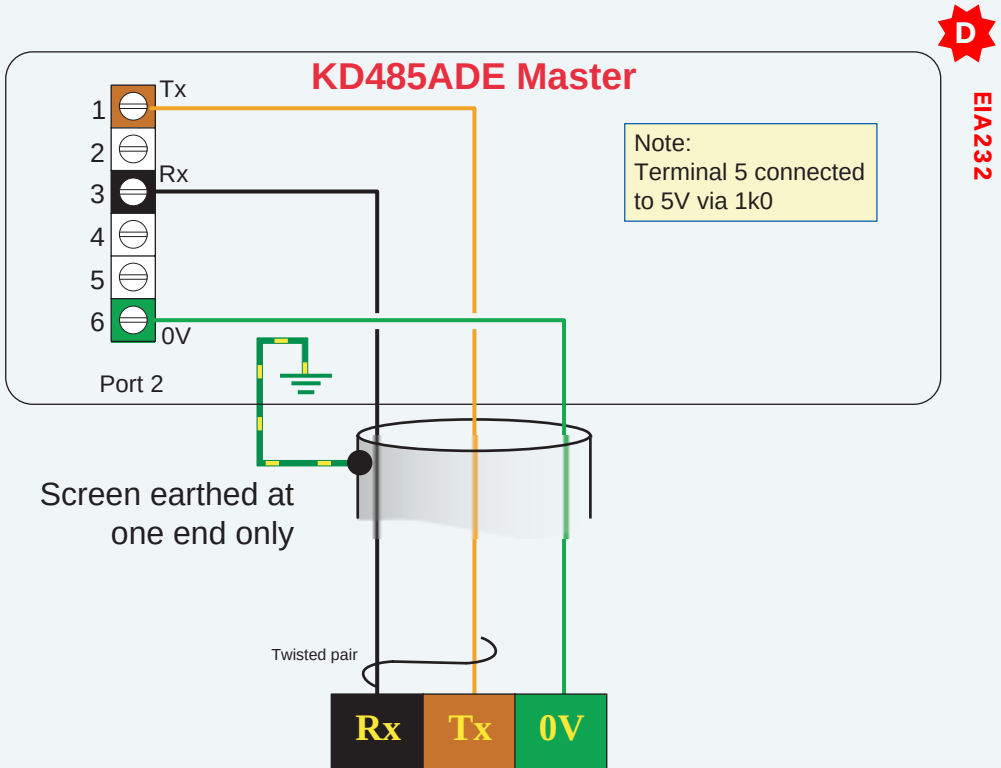
Note: 9-way Tx/Rx are reversed with respect to 25-way Tx/Rx


Host PC
25-way D-type socket
(solder bucket side)
14
1
2
3
Tx
Rx
4: RTS
5: CTS
6: DSR
7
0V
20: DTR
8: DCD
6: DSR
7: RTS
8: CTS
1: DCD
2
Rx
3
Tx
4: DTR
9
5
0V
9-way D-type socket
(solder bucket side)
Alternative (9-way) pinout
Screen earthed at
one end only
Note: 9-way Tx/Rx are
reversed with respect
to 25-way Tx/Rx
Twisted pair
Rx
Tx
0V

D

EIA232

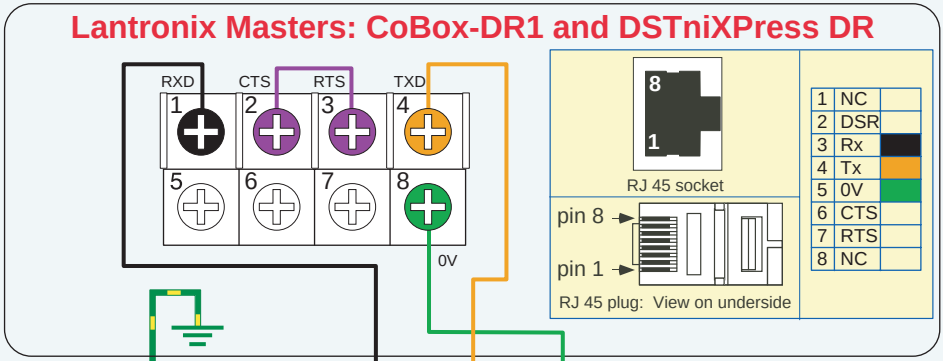

KD485ADE Master
Tx
Rx
0V
1
2
3
4
5
6
Port 2
Note:
Terminal 5 connected
to 5V via 1k0
Screen earthed at
one end only
Twisted pair
Rx
Tx
0V


KD485ADE Master
Tx
Rx
0V
1
2
3
4
5
6
Port 2
Note:
Terminal 5 connected
to 5V via 1k0
EIA232
Screen earthed at
one end only
Twisted pair
Rx
Tx
0V

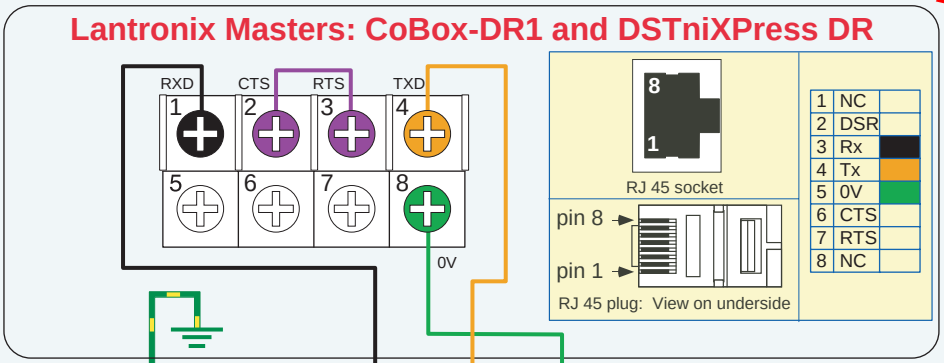
E

EIA232

Lantronix Masters: CoBox-DR1 and DSTniXPress DR



Lantronix Masters: CoBox-DR1 and DSTniXPress DR

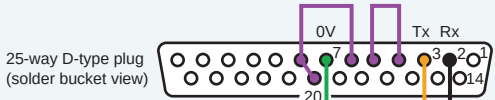


EIA232

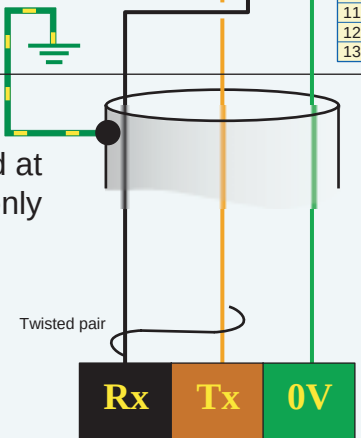
F

EIA232

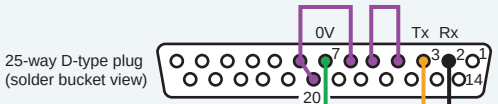
Lantronix Uds-10 master



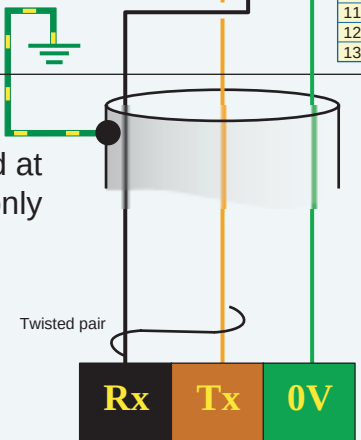
Pin	Signal	Pin	Signal
1	NC	14	Reserved
2	Rx	15	Reserved
3	Tx	16	NC
4	RTS	17	NC
5	CTS	18	NC
6	DSR	19	NC
7	0V	20	DTR
8	DCD	21	Reserved
9	5V (reg)	22	Reserved
10	NC	23	NC
11	NC	24	NC
12	9 to 30V (unreg)	25	NC
13	NC		



Lantronix Uds-10 master

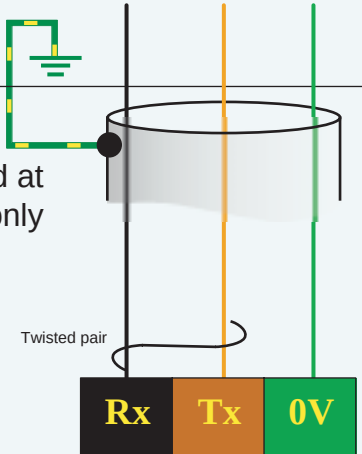


Pin	Signal	Pin	Signal
1	NC	14	Reserved
2	Rx	15	Reserved
3	Tx	16	NC
4	RTS	17	NC
5	CTS	18	NC
6	DSR	19	NC
7	0V	20	DTR
8	DCD	21	Reserved
9	5V (reg)	22	Reserved
10	NC	23	NC
11	NC	24	NC
12	9 to 30V (unreg)	25	NC
13	NC		



EIA232

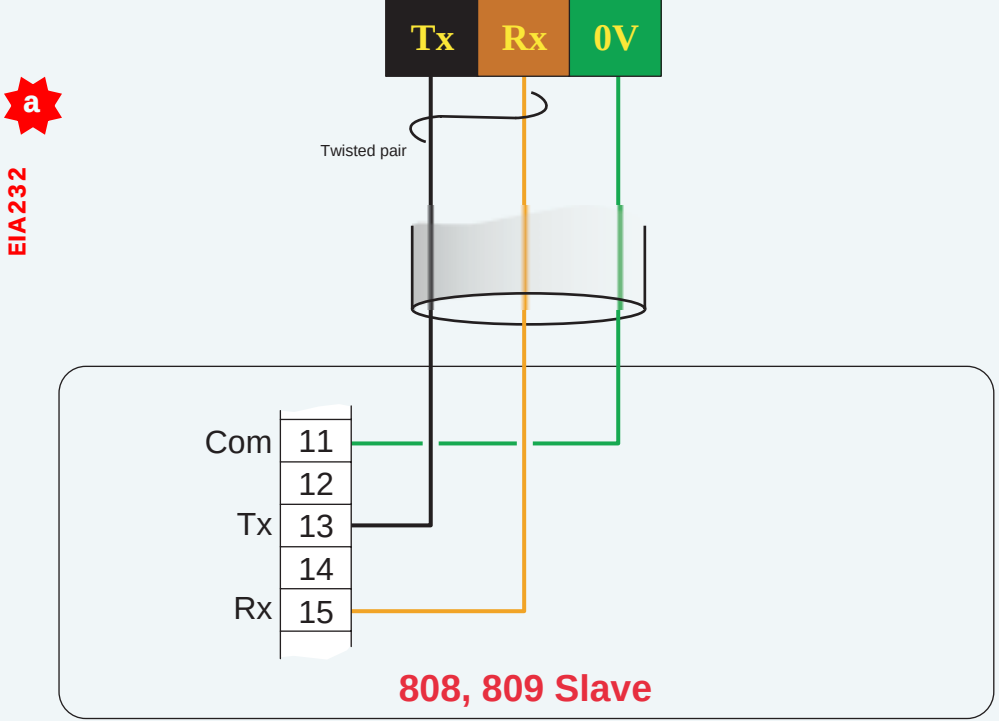
Master



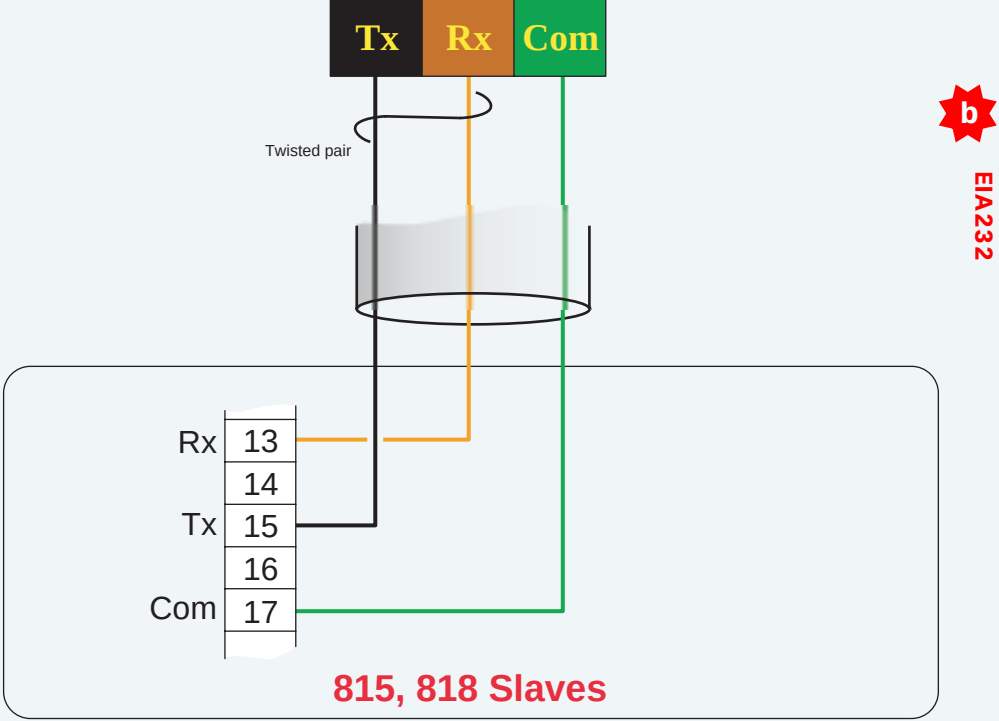
Screen earthed at one end only

Twisted pair

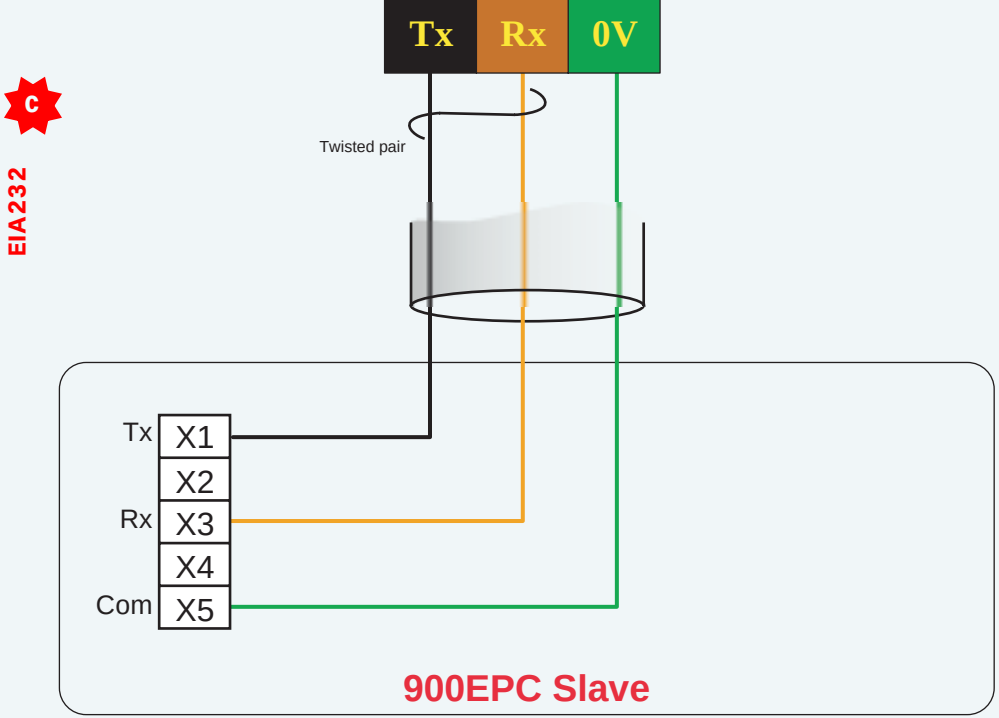
EIA 232 Slaves


a
EIA232
Tx
Rx
0V
Twisted pair
Com
11
12
Tx
13
14
Rx
15
808, 809 Slave

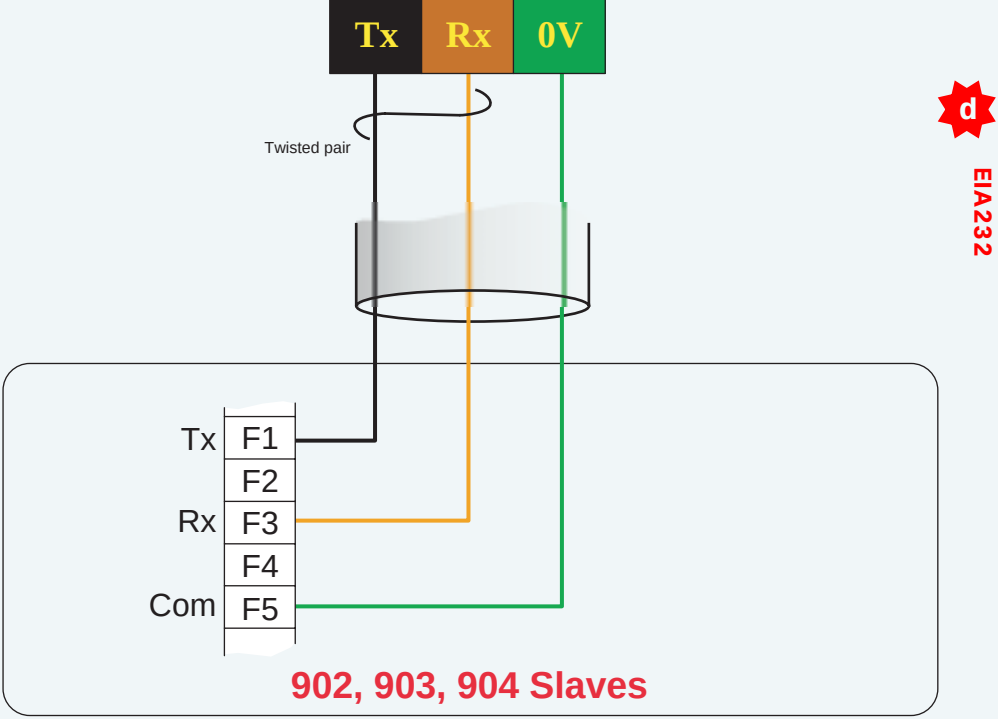
HA028117


Tx
Rx
Com
Twisted pair
b
EIA232
Rx
13
14
Tx
15
16
Com
17
815, 818 Slaves

HA028117


Tx
Rx
0V
Twisted pair
EIA232
Tx
X1
X2
Rx
X3
X4
Com
X5
900EPC Slave

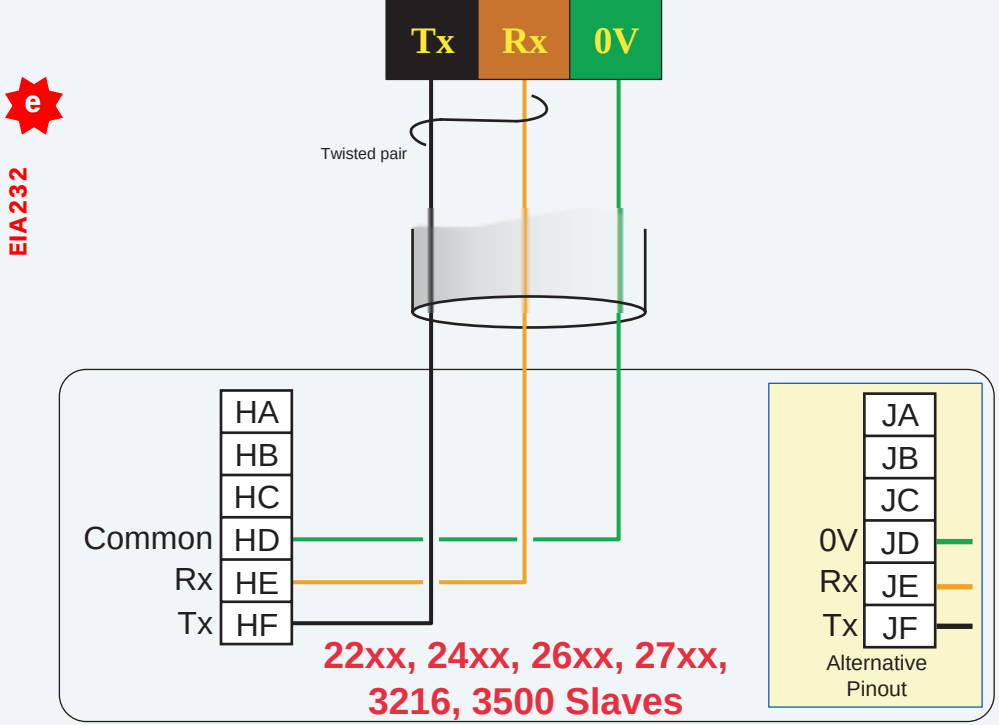
HA028117



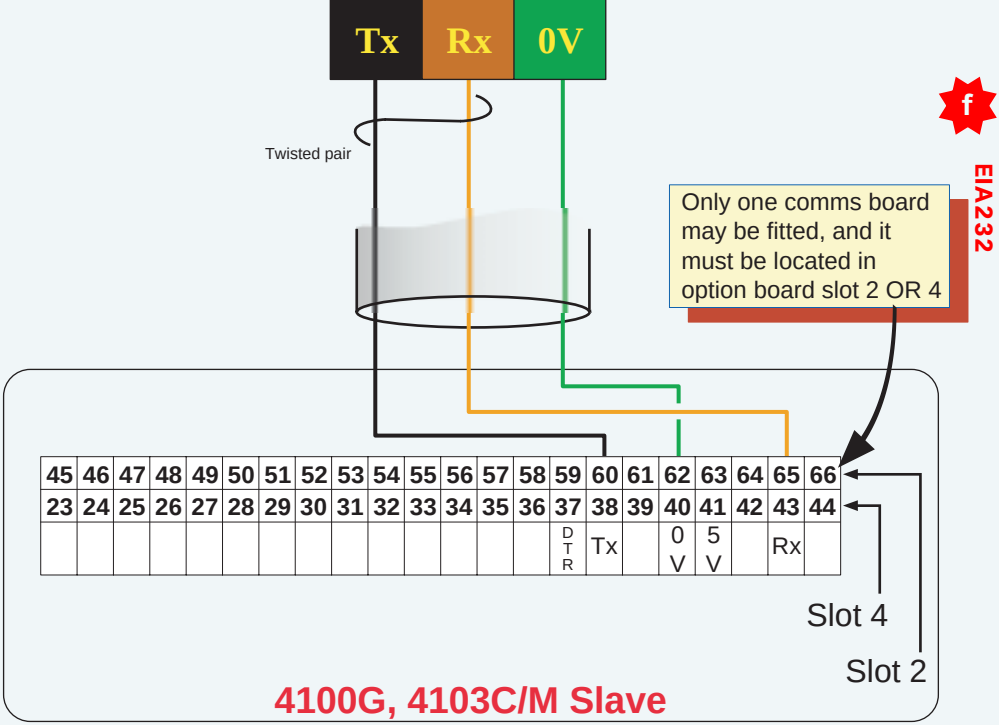
d

EIA232

HA028117


Tx
Rx
0V
Twisted pair
EIA232
HA
HB
HC
Common
HD
Rx
HE
Tx
HF
22xx, 24xx, 26xx, 27xx,
3216, 3500 Slaves
JA
JB
JC
0V
JD
Rx
JE
Tx
JF
Alternative
Pinout

HA028117

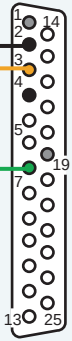

Tx
Rx
0V
Twisted pair
Only one comms board may be fitted, and it must be located in option board slot 2 OR 4
EIA232
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
DTR
Tx
0V
5V
Rx
Slot 4
Slot 2
4100G, 4103C/M Slave

HA028117

EIA232

Twisted pair

Pin	Signal (wrt recorder)
1	Protective ground
2	Tx
3	Rx
4	RTS
5	CTS
6	DSR
7	0V
8 to 18	Not used
19	5 Volts via 1k0
20	DTR



Pin 1 of recorder connector is tied to protective ground.

Pin 19 is tied to 5V via 1k0

25-way D-type plug (solder bucket side)

4200, 4250M Slave (Non-isolated)

HA028117

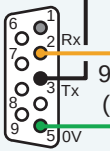
Twisted pair

The Comms module has a 9-way plug and a 9-way socket, wired in parallel for easy daisy chaining.
For Graphics recorders and I/O racks, only the fixed plug may be used.

EIA232

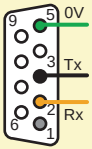
Pin 1 is tied to 5V via 1k0

Pin	Signal (wrt recorder)
1	5V via 1k0
2	Rx
3	Tx
4	DTR
5	0V
6	DSR
7	RTS
8	CTS
9	Not connected



9-way socket (solder side)

Pin 1 of recorder connector to 5V via 1k0.

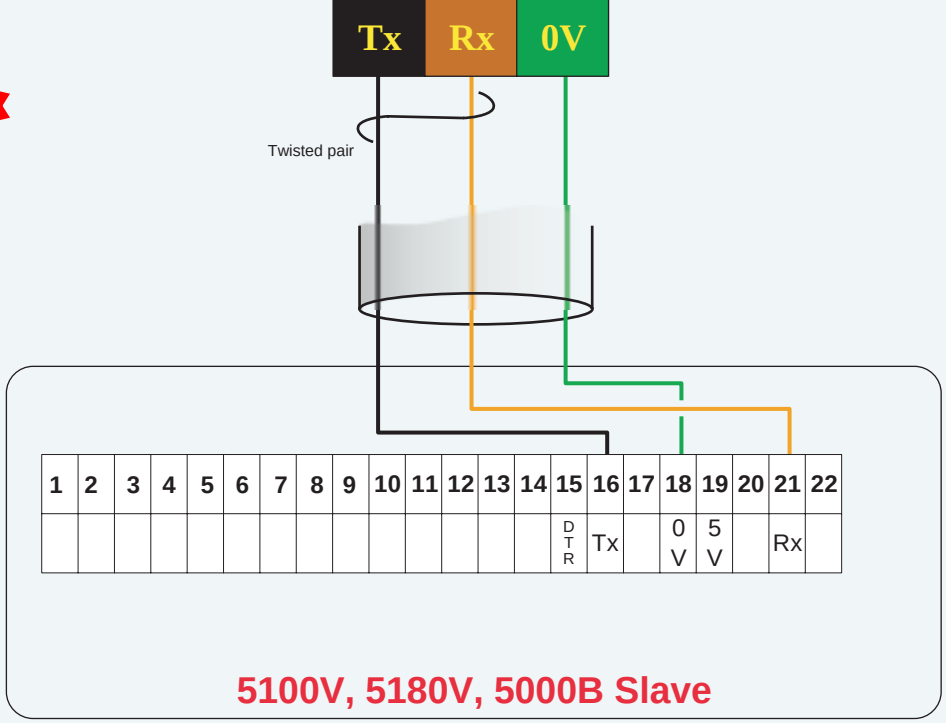


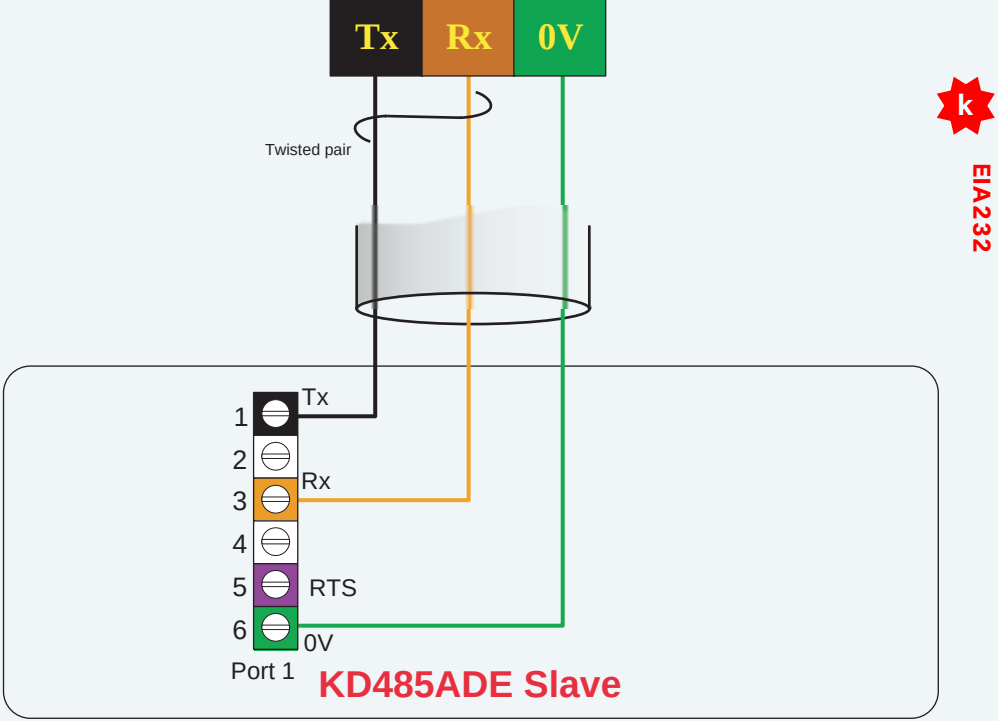
9-way plug (solder side) (not 4180G, 4181G, 4250G)

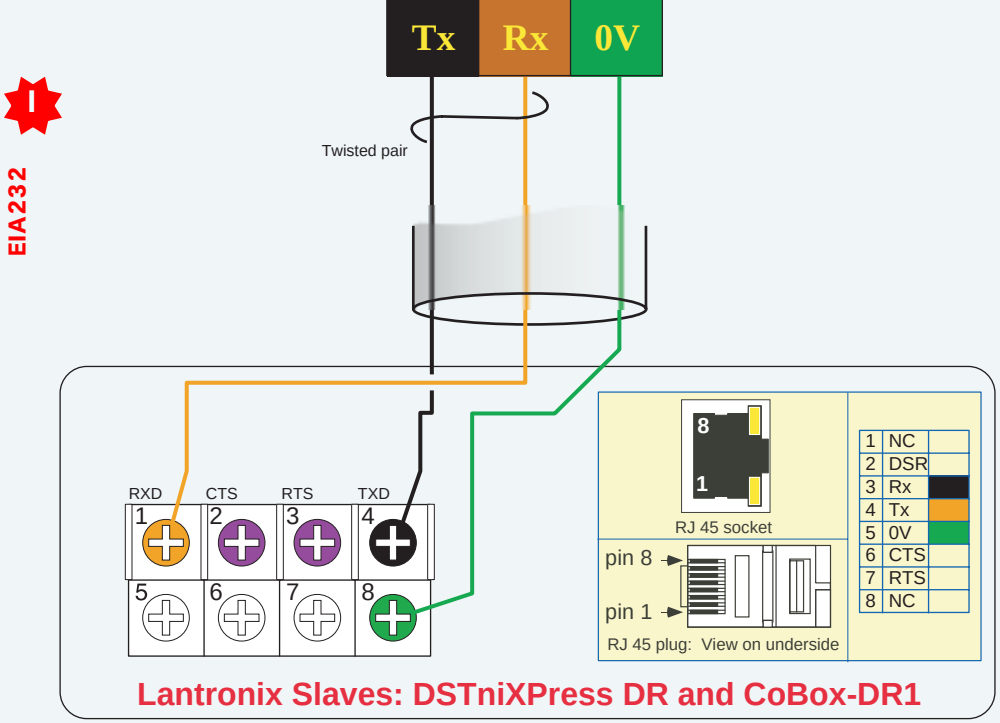
4000R, 4180C/G/M, 4181G/M Slave, 4250C/G/M Slave (Isolated)

HA028117

EIA232

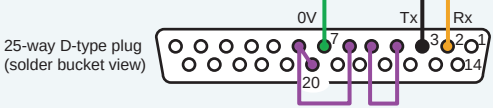

Tx
Rx
0V
Twisted pair
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
DTR
Tx
0 V
5 V
Rx
5100V, 5180V, 5000B Slave


Tx
Rx
0V
Twisted pair
1
2
3
4
5
6
Tx
Rx
RTS
0V
Port 1
KD485ADE Slave
EIA232
HA028117


Tx
Rx
0V
Twisted pair
EIA232
RXD
CTS
RTS
TXD
1
2
3
4
5
6
7
8
8
1
RJ 45 socket
pin 8
pin 1
RJ 45 plug: View on underside
1 NC
2 DSR
3 Rx
4 Tx
5 0V
6 CTS
7 RTS
8 NC
Lantronix Slaves: DSTniXPress DR and CoBox-DR1

HA028117

Twisted pair



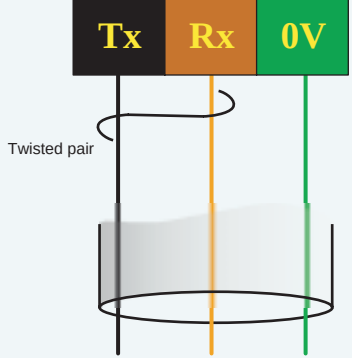
25-way D-type plug
(solder bucket view)

Pin	Signal	Pin	Signal
1	NC	14	Reserved
2	Rx	15	Reserved
3	Tx	16	NC
4	RTS	17	NC
5	CTS	18	NC
6	DSR	19	NC
7	0V	20	DTR
8	DCD	21	Reserved
9	5V (reg)	22	Reserved
10	NC	23	NC
11	NC	24	NC
12	9 to 30V (unreg)	25	NC
13	NC		

Lantronix Uds-10 Slave

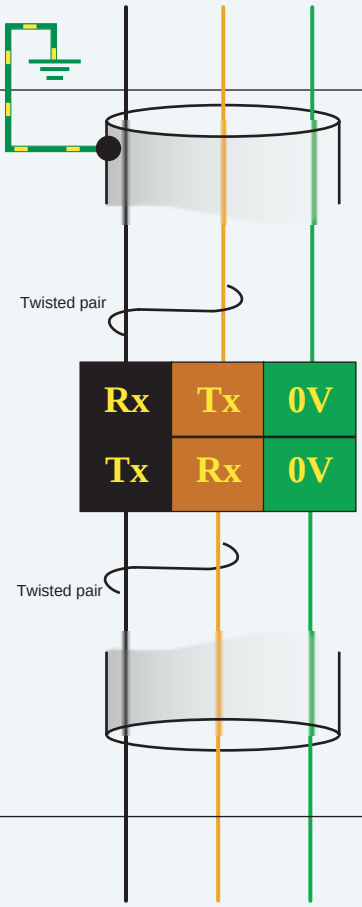
EIA232

EIA232



Slave

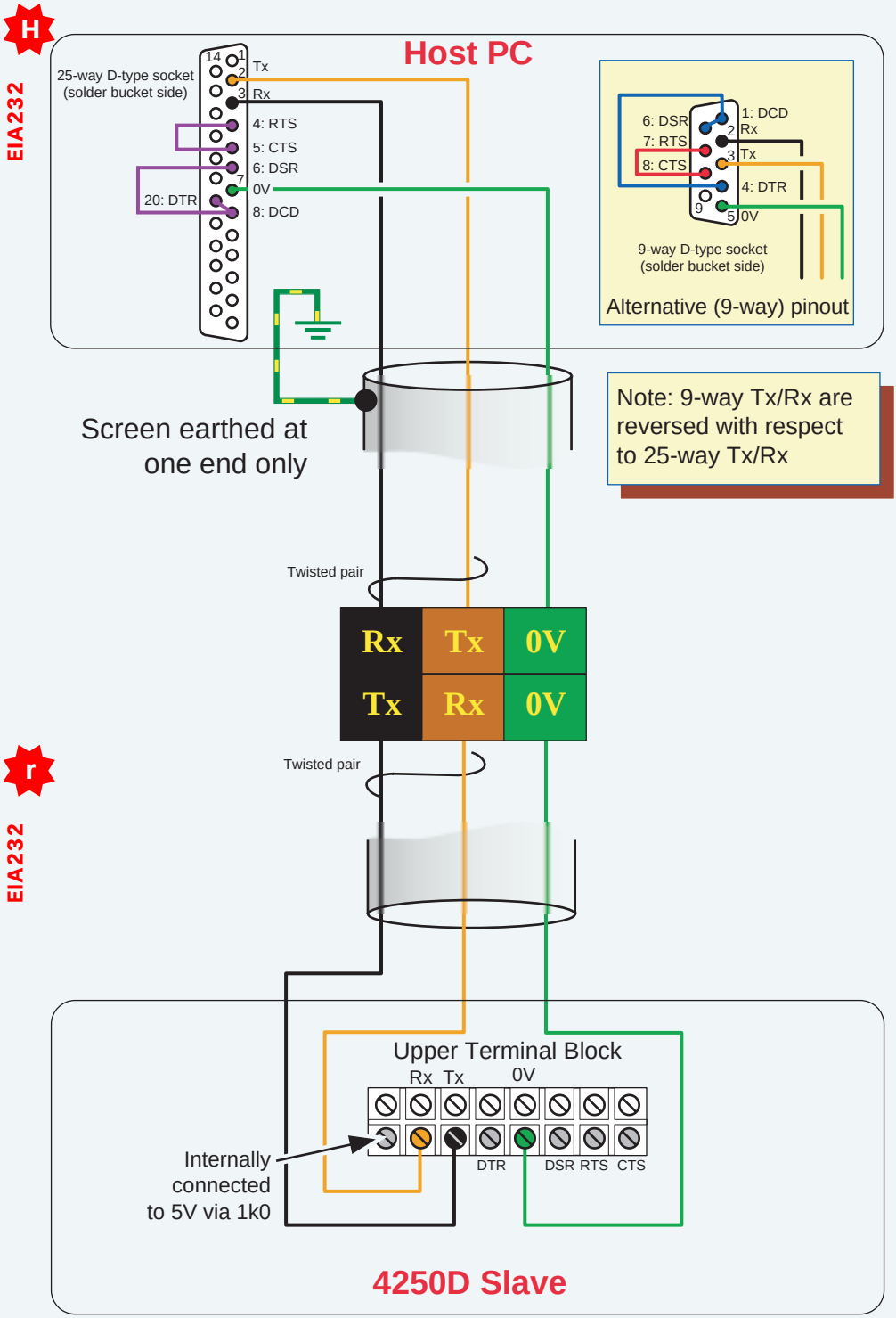
Master



Slave

EIA232

EIA232


H
EIA232
Host PC
25-way D-type socket
(solder bucket side)
14
1
Tx
2
3
Rx
4: RTS
5: CTS
6: DSR
7
0V
20: DTR
8: DCD
6: DSR
7: RTS
8: CTS
1: DCD
2
Rx
3
Tx
4: DTR
9
5
0V
9-way D-type socket
(solder bucket side)
Alternative (9-way) pinout
Screen earthed at
one end only
Note: 9-way Tx/Rx are
reversed with respect
to 25-way Tx/Rx
Twisted pair
Rx
Tx
0V
Tx
Rx
0V
Twisted pair
r
EIA232
Upper Terminal Block
Rx
Tx
0V
DTR
DSR
RTS
CTS
Internally
connected
to 5V via 1k0
4250D Slave

HA028117

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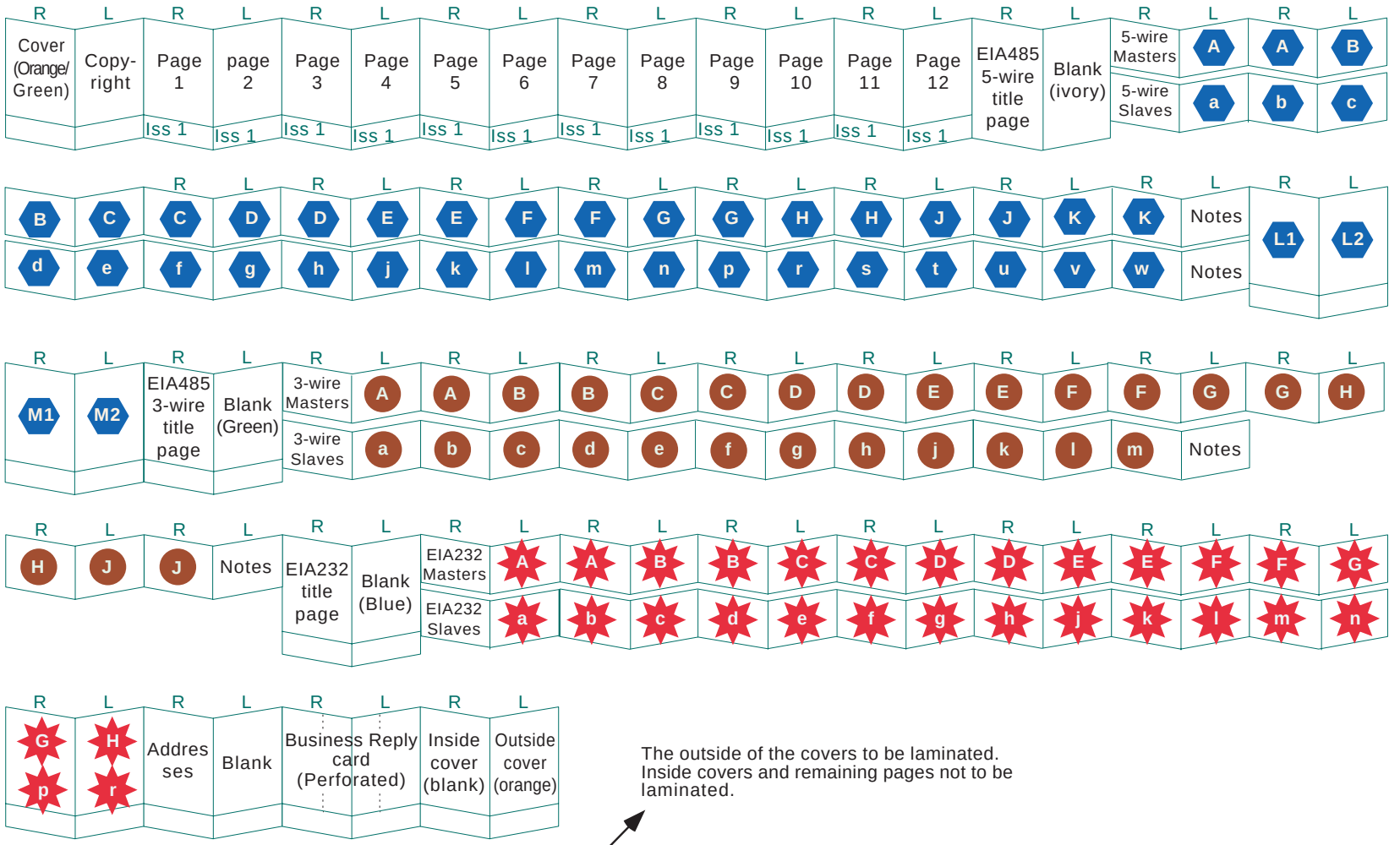

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