

INTERFACE CONVERTER TraxBus TO EIA-RS232 / EIA-RS422 / EIA-RS485

TraxBus is a dedicated fieldbus specifically designed to operate in very harsh environments where electrical noise generated by ignition transformers makes very difficult to operate for any standard physical layer. By installing the TraxInterface³ it is possible to convert TraxBus to the following standard physical layers:

- EIA-RS232
- EIA-RS422
- EIA-RS485

The active version of TraxInterface³ can drive up to 300 remote peripherals.

The passive version can be used to interface standard peripherals (not equipped with TraxBus).

A complete galvanic isolation is provided between filedbus and local interface.



SAFETY INFORMATION

Read and understand this manual before installing, operating, or servicing this unit. This unit must be installed according to this manual and local regulations. The drawings may show units without covers or safety shields to illustrate details. Disconnect power supply and follow all usual safety precautions before carrying out any operation on the device. Be sure to reinstall covers or shields before operating any devices.

The device is not user serviceable, a faulty device must be put out of order and sent back for servicing.

CONTRIVE manufactures products used as components in a wide variety of industrial systems and equipment. The selection and application of products remain the responsibility of the equipment manufacturer or end user.

CONTRIVE accepts no responsibility for the way its products are incorporated into the final system design. All systems or equipment designed to incorporate a product manufactured by CONTRIVE must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation of that part. Any warnings provided by CONTRIVE must be promptly provided to the end user.

CONTRIVE guarantees for two years from the date of manufacture of its product to replace, or, at its option, to repair any product or part thereof (except fuses and with some limitations for tubes and photocells) which is found defective in material or workmanship or which otherwise fails to conform to the description of its sales order. CONTRIVE makes no warranty of merchantability or any other warranty express or implied. CONTRIVE assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products.

RECEIVING

Please perform the following tasks after receiving the TraxInterface³:

- Inspect the unit for damage. If the unit appears damaged upon receipt, contact the shipper immediately.
- Verify receipt of the correct unit by checking the label (bottom side).
- If you have received the wrong model or the device does not function properly,contact your supplier.





Α

В

С

D

Ε

F

- POWER SUPPLY TERMINALS
- POWER SUPPLY FUSE 2,5A QUICKBLOW
 - ACTIVE TraxBus TERMINALS
- 21 20 0 0 2 2500V ISOLATION Image: Book of the second s 𝔅 34 ② 33 Ð ⊕ 12 ⊖ 10 e Ø 30 13 11 02 01

WIRING DIAGRAM

EIA-RS422 / EIA-RS485 TERMINALS

PASSIVE TraxBus TERMINALS

EIA-RS232 SubD 9 pin FEMALE SOCKET

01	POWER SUPPLY	
02	POWER SUPPLY	
10	ACTIVE TRAXBUS – NEGATIVE	(ACTIVE VERSION ONLY)
11	ACTIVE TRAXBUS - NEGATIVE	(ACTIVE VERSION ONLY)
12	ACTIVE TRAXBUS - POSITIVE	(ACTIVE VERSION ONLY)
13	ACTIVE TRAXBUS - POSITIVE	(ACTIVE VERSION ONLY)
20	PASSIVE TRAXBUS – NEGATIVE	(PASSIVE VERSION ONLY)
21	PASSIVE TRAXBUS – POSITIVE	(PASSIVE VERSION ONLY)
30	EIA-RS422 A	
31	EIA-RS422 B	
32	GROUND	
33	EIA-RS422 Z OR EIA-RS485	B
34	EIA-RS422 Y OR EIA-RS485	A
-	EIA-RS232 FEMALE CONNECTOR	(232 VERSION ONLY)

USE POWER, SIGNAL AND CONTROL CABLE SUITABLE FOR THE TYPE OF OPERATION AND COMPLYING WITH ALL REGULATIONS DO NOT ROUTE FILEDBUS CABLE TOGETHER WITH FREQUENCY CONVERTER CABLES OR CABLES EMITTING STRONG FIELDS ALL ELECTRONIC SYSTEMS MUST BE SUPPLIED BY A DEDICATED TRANSFORMER IN A TN-S EARTHING SYSTEM

EIA-RS485 AND EIA-RS422

DATA LINE B (Z) IS POSITIVE WITH RESPECT TO DATA LINE A (Y) WHEN TRAXINTERFACE IS TRANSMITTING 1. INTERNAL 10KΩ RESISTORS ARE PROVIDED TO GUARANTEE THE BIASING. WHEN TERMINATION RESISTOR ARE USED, ADDITIONAL BIASING COULD BE REQUIRED TO GUARANTEE THE MINIMUM DIFFERENTIAL VOLTAGE OF 200 mV ACROSS INPUTS.

TraxBus NETWORKS

Following "ISO Basic Reference Model for Open System Interconnection" (ISO/OSI) TraxBus is the physical part of the connection (Physical Layer).

TraxBus features high electromagnetic noise immunity and great wiring simplicity, also using busbar trunkets. Possible application are in hostile industrial environments where other standard networks doesn't work.

Devices with embedded TraxBus uses a set of ASCII command (protocol).

Detailed information on command set are available on respective device technical literature.

Live connection and/or disconnection while the communication is running are allowed, though a short break in the data flow may result from this operation.

A short-circuit on the TraxBus while the unit is transmitting can damage the TraxInterface³, a limited time short-circuit while the unit is in idle mode (receiving) is tolerated.



TraxBus lines can be wired in any form: star, ring, line or mixed but signal line must be wired separately from power lines. Do not use shielded cables.

Do not use multicore cables or limit the usage to short stubs.

Use conventional single wires or busbar trunkets to interconnect all peripherals. If some shielding is absolutely necessary it is always possible to put twisted pairs in a conduit or grounded metal tube, without packing too many conductors together.

It's very important to understand that the only precaution for good wiring are line capacitance and resistance. Excessive resistance will cancel data flow from MASTER to peripherals. Excessive capacitance will cancel data flow from peripherals to MASTER.

Overall bus capacity	100 nF maximum
Loop resistance	60 Ω maximum
Core cross-section	1 mm ² minimum

Some useful information...

- Up to 300 physical units can be connected to each TraxInterface³. Network topology, cables characteristic and other environmental conditions could reduce the number of driven units.
- TraxBus is a master/slave system, thus only 1 master is allowed.
 The master can drive one or more TraxInterface³ (using EIA-RS422 or EIA-RS485 multidrop version).
- When TraxBus is exposed to severe EMC condition, it could be necessary to provide overvoltage protections on both power supply and data lines.
- The power supply current is depending from the number of remote units, as a general rule consider 200 mA + 10 mA per each connected peripheral (e.g.: having 200 units connected on a single bus the external power supply must be capable to deliver 200 + (10*200) = 2200 mA @ 24Vac).
- Make sure there is adequate ventilation around the heatsink located on the top of the unit.

TraxInterface3.232.A

EIA-RS-232 interface is the easiest way to implement TraxBus when the number of remote peripherals and the system architecture doesn't require more than 1 TraxBus line.

In the figure below, a single TraxInterface³ is driving several units deployed on a busbar trunket used for both the main power supply and the communication bus. This solution can simplify the installation and maintenance. Since the stubs from the units to the busbar socket are made using multi-core cable (usually phase, neutral, ground, communication positive and negative) it's very important to keep those cables as short as possible.



TraxInterface3.485.A

EIA-RS485 interface can be used to drive one or more TraxBus lines. Communication line coming from the master must be wired at terminals 33 and 34, signal ground and shield to terminal 32, leaving terminals 30 and 31 unconnected.

At higher baud rates and long distance could be necessary to install termination resistors (typically 120 Ω) at both ends. Since TraxInterface³ is provided with high value fail safe resistors (10 k Ω), additional biasing could be required.



TraxInterface3.422.A

EIA-RS422 is a Full Duplex interface, TraxBus handles Half Duplex only, thus there is no practical reason to adopt such interface that requires additional wires. TraxInterface³ can handle multiple receivers/transmitters in a multidrop configuration, following the same rules as EIA-RS485.



The recommended arrangement of the wires is as a connected series of point-to-point (multidrop) nodes, line or bus topology only. Ideally, the two ends of the net will have a termination resistor [RT] connected across the two wires.

How can I tell if I'll need termination on my RS485/RS422 connections?

Line terminations are not needed if the duration of a single bit transmitted is greater than at least 10 times the time that the signal takes to travel down the line.

Assuming 1200 m network length and 9600 bit/s:

$$BitTx = \frac{1}{baud \ rate} = \frac{1}{9600} = 105 \ \mu s \ approx$$

$$tt = \frac{1}{0.66 c} \cdot l = \frac{1}{0.66 \cdot 299\,792\,458} \cdot 1200 = 6\mu s \ approx$$

BitTx= duration of a single bit transmittedtt= time that the signal takes to travel down the line terminationl= network lengthc= speed of light

Propagation speed in an electrical cable is about 66% the speed of light

No termination required, since it's verified that: $BitTx > 10 \cdot tt$

Termination adds to the complexity of the installation and can potentially load down drivers, we recommend only using termination if it's required.

No more than 2 termination resistors should be used, one at each end of the transmission line.

TraxInterface3.xxx.P

Thirds party products can be connected to TraxBus by means of PASSIVE TraxInterface³.

Depending on selected interface, the local peripheral can use EIA-RS232, EIA-RS422 or EIA-RS485.

From local interface it will be possible to read all the network data traffic. Specific peripheral must be programmed to handle the communication and transmit on the network only when is required.



Ordering Guide

Both EIA-RS422 an EIA-RS485 are available on the same interface option [485]. SubD 9 pin is available on all types but operative on [232] version only.

Passive version requires a power supply current of 200 mA approx @ 24Vac.



TECHNICAL DATA

POWER SUPPLY

VOLTAGE	24 VAC / 30VDC ±10%
FREQUENCY	0 1000 Hz
LINE FUSE	2,5 A QUICKBLOW - 5x20mm
POWER CONSUMPTIO	N 5 90 VA 1 300 PERIPHERALS
POWER DISSIPATION	3 30 VA 1 300 PERIPHERALS
TERMINALS	2 x 2,5 mm ² (AWG22-12) REMOVABLE

ENVIRONMENT

OPERATING TEMPERATURE	0 60 °C
STORAGE TEMPERATURE	-20 80 °C
PROTECTION CLASS (EN 69529)	IP20
RELATIVE HUMIDITY	30 90% NON CONDENSING
MOUNTING POSITION	ANY

PASSIVE TraxBus INTERFACE

BUS VOLTAGE	30 Vdc max
BAUD RATE	38400 max

ACTIVE TraxBus INTERFACE

TYPE	ASYNCHRONOUS MULTI	DROP HALF DUPLEX
ALLOWABLE PER	RIPHERALS	300 max
BAUD RATE		38400 max
BUS VOLTAGE		24 VDC MAX
BUS CURRENT		2,5 А мах
ALLOWABLE VO	LTAGE DROPOUT	3 V max
ALLOWABLE LIN	E CAPACITANCE	100 nF мах
TERMINALS	4 x 2,5 mm ² (AWG	22-12) REMOVABLE

EIA-TIA RS232

DATA FORMAT	SERIAL ASYNCHRONOUS UART/NRZ
DEVICE TYPE	DCE
SIGNAL	5=GND, 3=TxD, 2=RxD SEEN FROM DTE
ISOLATION TEST VOLTAGE	2500 V @ 50 Hz, 1 minute
INSULATION VOLTAGE	300 V rms max

EIA-TIA RS422/485

MULTIDROP UNITS	32 MAX
LINE LENGTH	1000 m мах
TERMINALS	5 x 2,5 mm ² (AWG22-12) REMOVABLE
ISOLATION TEST VOLTA	GE 2500 V @ 50 Hz, 1 minute
INSULATION VOLTAGE	300 V RMS MAX

EIA/TIA-232 Interface Between Data Terminal Equipment and Data Circuit Terminating Equipment Employing Serial Binary Data Interchange

V.28 Electrical characteristics for unbalanced doublecurrent interchange circuits

EIA/TIA-485 Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems

- TIA/EIA-422
 Electrical
 Characteristics
 of
 Balanced
 Voltage

 Digital
 Interface
 Circuits
 Voltage
 Voltage
- V.11 Electrical characteristics for balanced doublecurrent interchange circuits operating at data signalling rates up to 10 Mbit/s
- EIAElectronic Industries AllianceTIATelecommunications Industry Association



CONTRIVE S.r.l. I-24040 SUISIO (Bergamo) via Enrico Fermi 18

ANY ILLUSTRATIONS, PHOTOGRAPHS, OR EXAMPLES USED IN THIS MANUAL ARE PROVIDED AS EXAMPLES ONLY AND MAY NOT APPLY TO ALL PRODUCTS TO WHICH THIS MANUAL IS APPLICABLE. THE PRODUCTS AND SPECIFICATIONS DESCRIBED IN THIS MANUAL OR THE CONTENT AND PRESENTATION OF THE MANUAL MAY BE CHANGED WITHOUT NOTICE TO IMPROVE THE PRODUCT AND/OR THE MANUAL.

PRODUCT NAMES, CORPORATE NAMES, OR TITLES USED WITHIN THIS DOCUMENT MAY BE TRADEMARKS OR REGISTERED TRADEMARKS OF OTHER COMPANIES, AND ARE MENTIONED ONLY IN AN EXPLANATORY MANNER TO THE READERS' BENEFIT, AND WITHOUT INTENTION TO INFRINGE.

WHILE EVERY EFFORT HAS BEEN MADE TO MAKE SURE THE INFORMATION IN THIS DOCUMENT IS CORRECT, CONTRIVE CAN NOT BE LIABLE FOR ANY DAMAGES WHATSOEVER FOR LOSS RELATING TO THIS DOCUMENT.

© COPYRIGHT 2010 CONTRIVE SRL ITALY. ALL RIGHT RESERVED.