TraxInterface^4

TraxBus INTERFACE CONVERTER

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.
TraxInterface^4 is an active interface converter from TraxBus™ to the following standard physical layers:

- EIA-RS232
- EIA-RS485

TraxInterface^4 can drive up to 250 remote peripherals operating in two different modes:

- Transparent
- Modbus® ASCII / RTU

An additional service port is available for monitoring and configuration.
A complete galvanic isolation is provided between local interfaces to fieldbus and power supply.

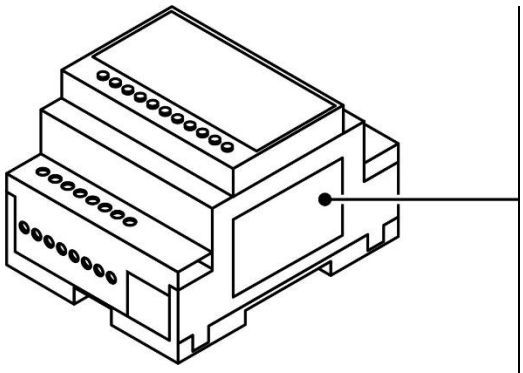
CE

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.

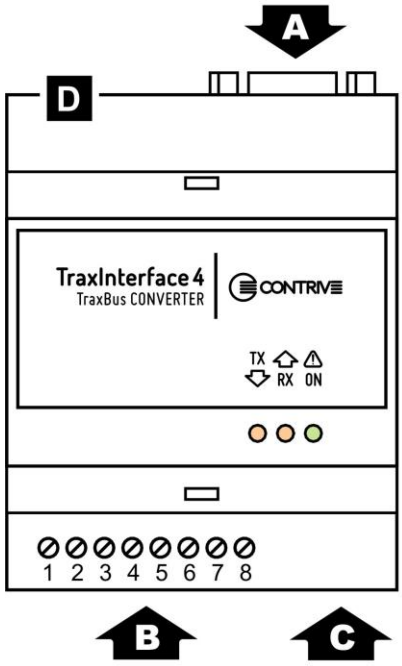
CONTRIVE guarantees for two years from the date of manufacture of its product to replace, or, at its option, to repair any product or part thereof (except fuses and with some limitations for tubes and photocells) which is found defective in material or workmanship or which otherwise fails to conform 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.

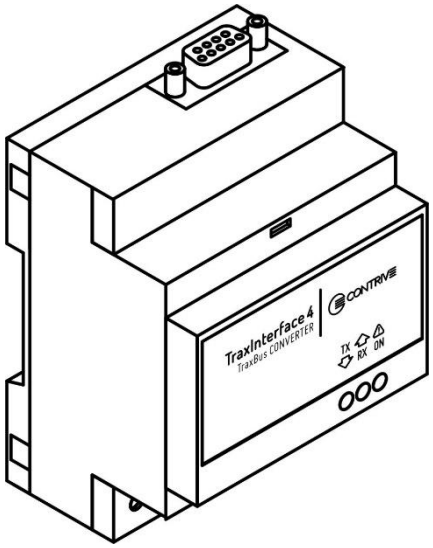


RECEIVING

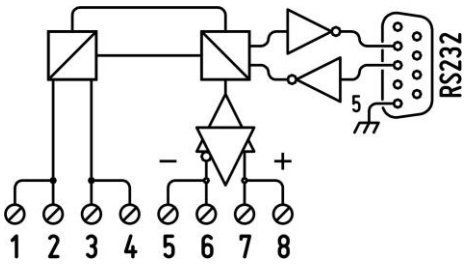
Please perform the following tasks after receiving the TraxInterface^4 :

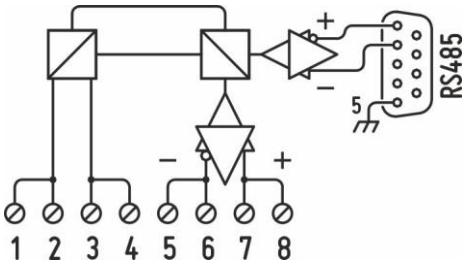
- Inspect the unit for damage. If the unit appears damaged upon receipt, contact the shipper immediately.
- Verify receipt of the correct unit by checking the label on the right side of the unit.
- If you have received the wrong model or the device does not function properly, contact your supplier.





MAIN PORT SubD9 FEMALE	**A**	TX	TraxBus™ TRANSMITTED DATA INDICATOR
POWER SUPPLY AND BUS TERMINALS	**B**	RX	TraxBus™ RECEIVED DATA INDICATOR
SERVICE PORT RJ45	**C**	ON	POWER ON BLINKING ON ModBus® ERROR
POWER SUPPLY FUSE REMOVE TOP COVER	**D**		





WIRING DIAGRAM

1	POWER SUPPLY	(AC/DC POLARITY INDEPENDENT)
2	POWER SUPPLY	(AC/DC POLARITY INDEPENDENT)
3	POWER SUPPLY	(AC/DC POLARITY INDEPENDENT)
4	POWER SUPPLY	(AC/DC POLARITY INDEPENDENT)
5	TRAXBUS – NEGATIVE	
6	TRAXBUS – NEGATIVE	
7	TRAXBUS – POSITIVE	
8	TRAXBUS – POSITIVE	

RS232
SubD9 FEMALE

2	Tx	DATA OUTPUT
3	Rx	DATA INPUT
5	SG	SIGNAL GROUND

RS485
SubD9 FEMALE

1	Tx/Rx	POSITIVE
2	Tx/Rx	NEGATIVE
5	SG	SIGNAL GROUND

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

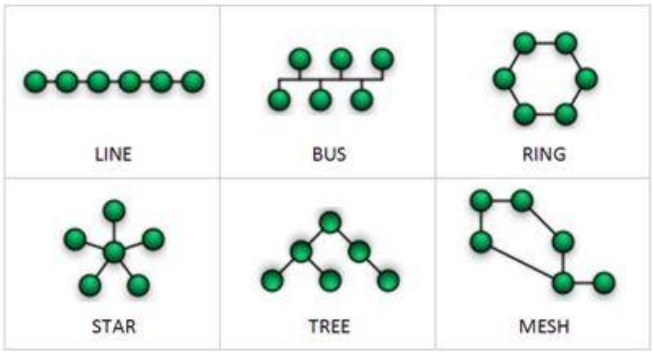
EIA-RS485

THE LINE MUST BE PROPERLY BIASED TO GUARANTEE THE MINIMUM DIFFERENTIAL VOLTAGE OF 200 mV ACROSS INPUTS. PROVIDE BIASING RESISTORS IF REQUIRED. NO TERMINATION RESISTOR IS PROVIDED.

TraxBus™ NETWORKS

TraxBus™ is an industrial network system for distributed control using a multi-drop wire pair: digital communication enables improved control capability, which can improve product yields. Near real-time operation is possible, despite the relatively low speed, thanks to an efficient protocol.
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.
Live connection and 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 TraxInterface[4], a limited time short-circuit while the unit is in idle mode (receiving) is tolerated.
Specific set of commands available for each device equipped with TraxBus™ interface (see detailed information on respective device technical literature).

TOPOLOGY



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.

Line capacitance and resistance are important factors.

OVERALL BUS CAPACITY	100 nF MAXIMUM
LOOP RESISTANCE	60 Ω MAXIMUM
CORE CROSS-SECTION	1 mm^2 MINIMUM

Excessive resistance will cancel data flow from MASTER to peripherals, while excessive capacitance will cancel data flow from peripherals to MASTER.

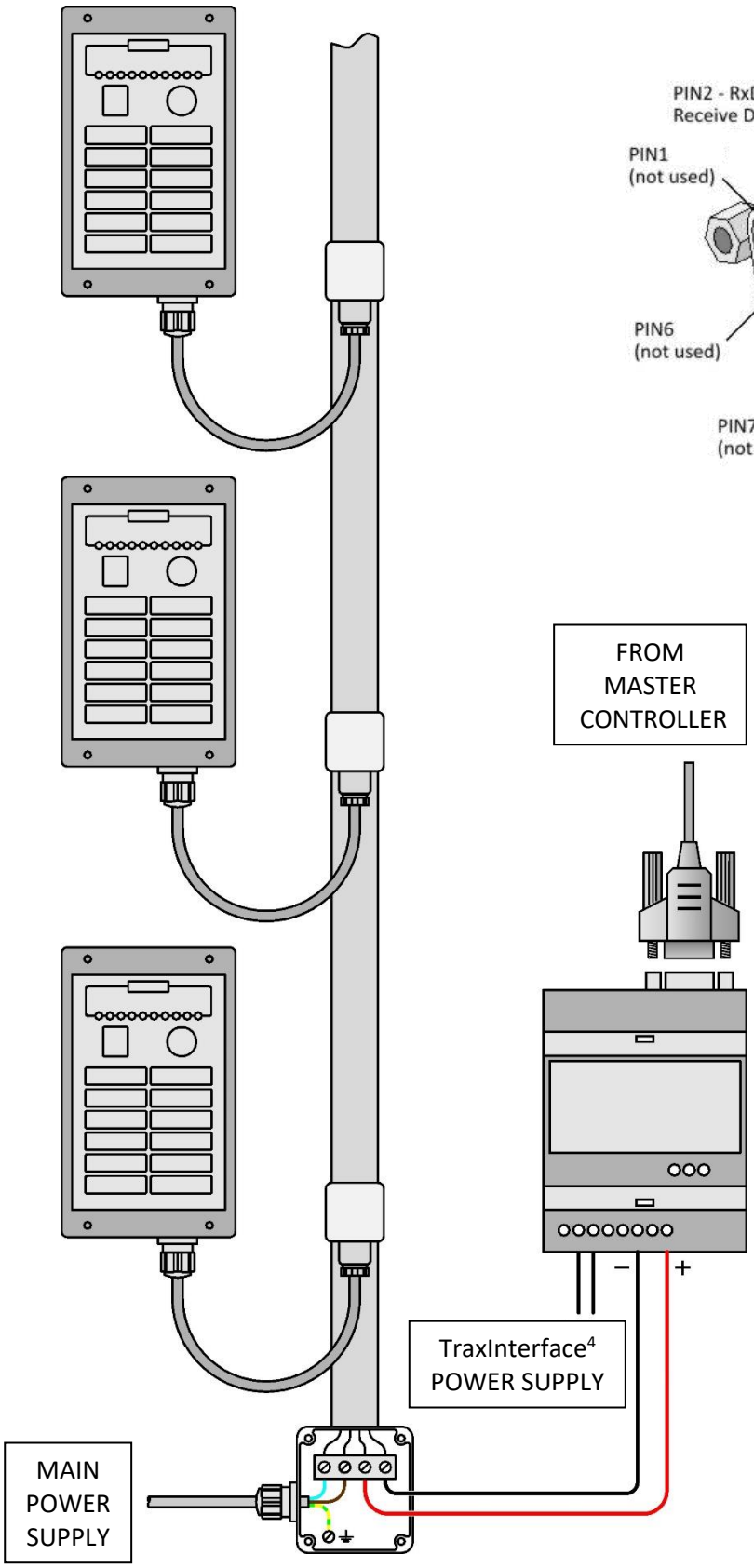
USEFUL INFORMATION

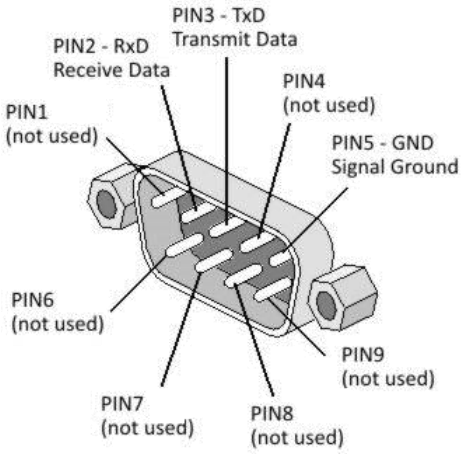
- Each TraxInterface[4] can drive up to 250 physical units. Network topology, cables characteristic and other environmental conditions could reduce the number of driven units.
- TraxBus™ is a master/slave system, only 1 master is allowed. The master can drive one or more TraxInterface[4] (using EIA-RS485 multidrop version).
- Additional overvoltage protections on both power supply and data lines must be provided when TraxBus™ is exposed to severe EMC condition.
- The power supply current depends on the number of remote units, as a general rule consider 300 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 300 + (10*200) = 2300 mA @ 24Vac).
- Ensure that specified environmental conditions in “Technical data” are complied and make sure there is adequate ventilation around the unit.
- This product is not subject to WEEE Directive 2002/96/EC or relevant national laws. The product must be disposed of at a specialist recycling facility. Do not use municipal garbage collection points. According to the WEEE Directive 2002/96/EC, only products used in private applications may be disposed of at municipal garbage facilities. If it is not possible to dispose of device properly, CONTRIVE can accept and dispose of returns for a fee.

MAIN PORT RS232

EIA-RS232 interface is a point-to-point connection of two communication devices.
EIA-RS232 is the easiest way to implement TraxBus™ when the number of remote peripherals and the system architecture does not require more than 1 TraxBus™ line.

In the figure below, a single TraxInterface[4] 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 is very important to keep those cables as short as possible.





A single master controller is connected to SubD 9 female socket.
The cable coming from the master DTE (Data Terminal Equipment) must be terminated with a SubD male socket.
TraxInterface[4] is Data Communication Equipment (DCE).
Only shielded cables have to be used, required signals are RxD, TxD and GND.
No termination resistors are required.

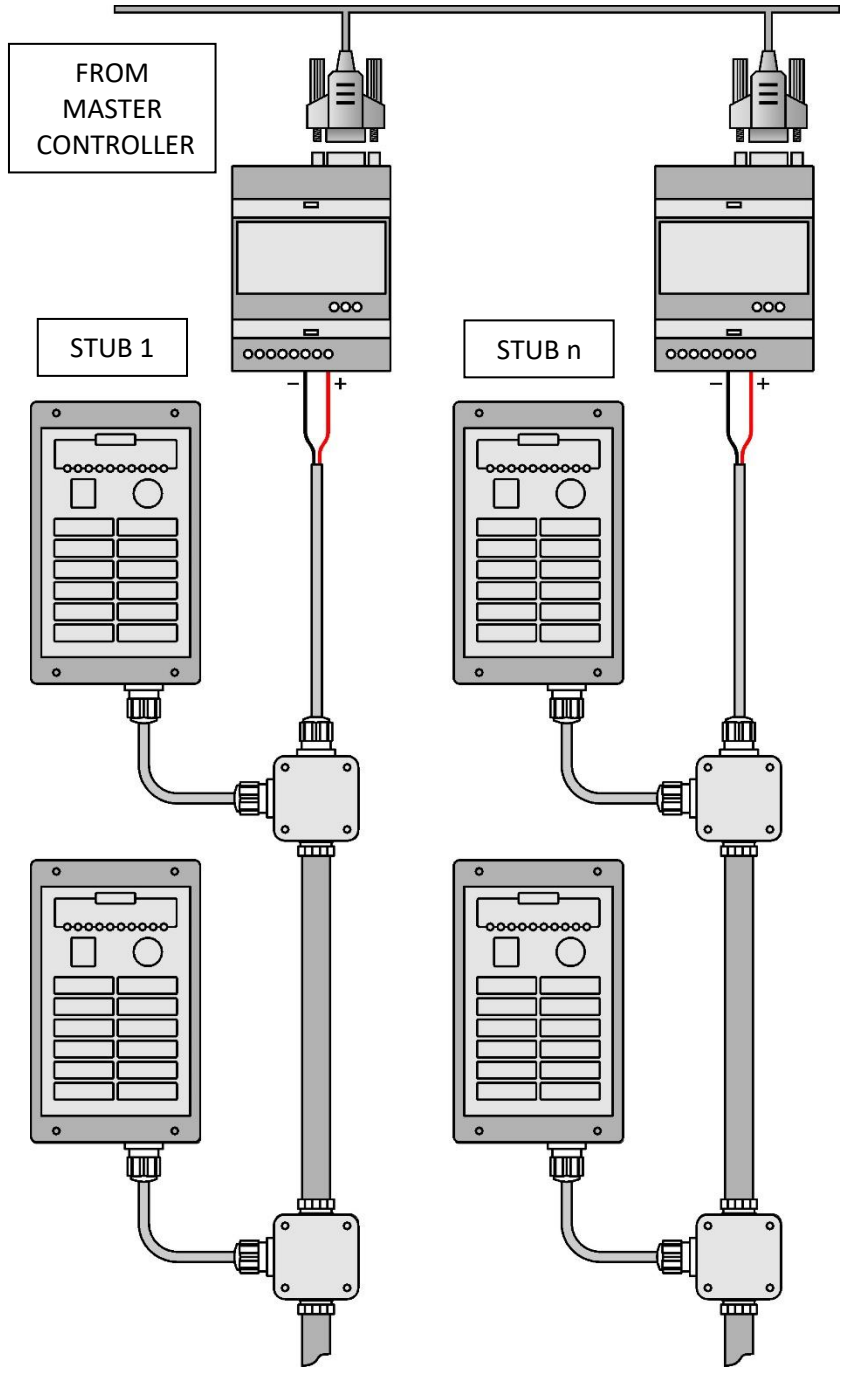
A maximum cable capacitance of 2500 pF is allowed for a RS232 connection (EIA-232). For cables of such capacitance the following maximum lengths are allowed (depending on the baud rate).

MAX BAUD RATE	MAX LENGTH
19200	15 m
57600	5 m
115200	2 m

Use ultra low capacitance cable if higher lengths are required.

MAIN PORT RS485

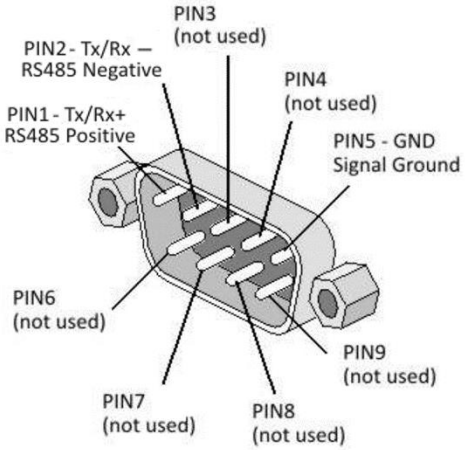
EIA-RS485 operates in push-pull action over two lines, allowing the connection of up to 32 transceivers, thus can be used to drive one or more TraxBus™ lines.
The bus cable must be a shielded twisted pair cable where the shield should be connected at both ends with large contact areas to the potential equalization system. At higher baud rates the bus requires a termination resistor on each end of approximately the amount of the characteristic wave impedance of the cable, which usually amounts to a value between 120 Ω and 220 Ω.
Optional pull-up and pull-down (biasing) resistors should have a value of 390 Ω up to 650 Ω.
Some master controller already includes biasing resistors.



Cabling is an important factor of the reliable operation. It is mandatory to use shielded twisted-pair cables.

PARAMETER	VALUE
IMPEDANCE	150 Ω ± 15 Ω
CAPACITANCE	< 30 pF/m
RESISTANCE	110 Ω/km
WIRE GAUGE	0.64 mm

Total line must not exceed 1200 m and length of each branch derived from main line should be less than 1.5 m.



Do I really need termination resistor?

Terminations increase complexity and can potentially load down drivers, we recommend only using termination if it is required. No more than 2 termination resistors should be used, one at each end of transmission line.
Line termination are not needed if the duration of a single bit transmitted is greater at least 10 times the time that the signal takes to travel down the line.
Assuming 1200 m length and 9600 bit/s:

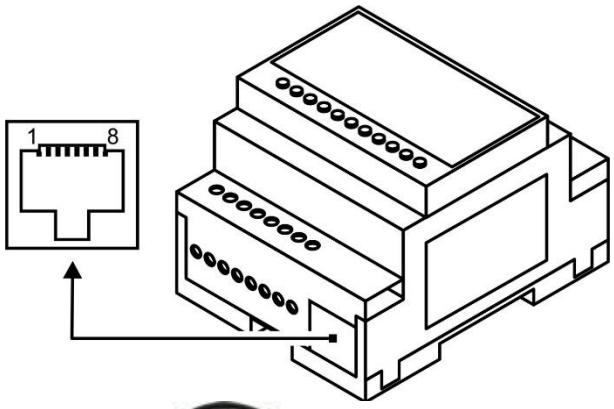
$$BitTx = \frac{1}{baud\ rate} = \frac{1}{9600} = 105\,\mu s \quad approx \qquad tt = \frac{1}{0.66\,c} \cdot l = \frac{1}{0.66 \cdot 299\,792\,458} \cdot 1200 = 6\mu s \quad approx$$

BitTx = duration of a single bit transmitted
tt = time that the signal takes to travel down the line termination
l = network length
c = speed of light (Propagation speed in an electrical cable is about 66% the speed of light)

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

SERVICE PORT RS232 / EXPANSION

Custom RJ45 modular jack includes RxD, TxD and GND signals of Service Port, useful for configuration, commissioning and troubleshooting.
The same connector provides the link signal to expansion devices like TCU6, a preconfigured remote control and supervisor for 6 burner or zones of burners.



Specific cables are available to convert RJ45 socket to standard connectors and interfaces:

2505.00.03 Mobi.Link USB

2505.00.01 Mobi.Link RS232

Service port operates in 3 different modes, type the command to select:

TRON	>Trace ON	Enter TRACE Mode
TRSP	>Local transparent mode	Enter LOCAL Mode
CNFG	>Local configuration mode	Enter CONFIGURATION Mode

TRACE MODE

All data traffic from master to remotes and vice-versa echoed to service port, allowing inspection of bus activity.
Commands accepted while in Trace Mode:

TROFF	>Trace OFF	Exit Trace mode

LOCAL MODE

Overtakes MAIN PORT, data traffic is redirected to service port ignoring data coming from main port, useful for commissioning and troubleshooting.
Commands accepted while in Local Mode:

EXIT	>OK	Exit Local mode

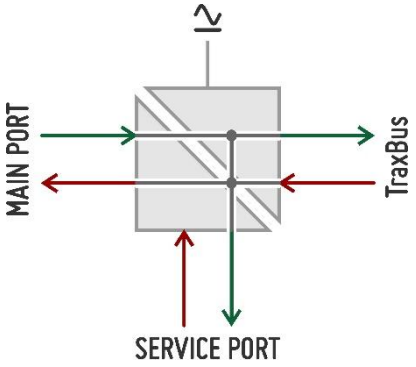
CONFIGURATION MODE

Normal activity is suspended. TraxInterface[4] can be configured from Service Port by means of specific commands:

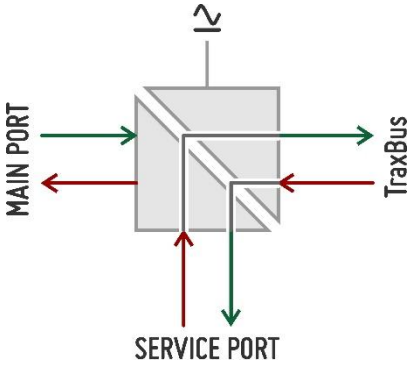
EXIT	>OK	Exit Configuration mode
help		List of available commands
MODE=T	>Transparent	Data transferred from Main Port to remotes and vice-versa
MODE=A	>Modbus ASCII	Main port operates Modbus® ASCII protocol
MODE=R	>Modbus RTU	Main port operates Modbus® RTU protocol
MODE=?	>MODE=…	Returns current Main port operating mode
PRM={x}	>BPM={z}	Set Framing for Main port {z} = N (8N2) E (8E1) O (8O1)
BRM={x}	>BRM={x}	Set Baud rate for Main port
BRM=?	>BRM={x}	Returns current baud rate of Main port {x} = 4800 9600 19200 38400 57600 115200
BRS={y}	>BRM={y}	Set Baud rate for Slave port (TraxBus™)
BRS=?	>BRM={y}	Returns current baud rate of Slave port (TraxBus™) {y} = 4800 9600 19200 38400

Use free software utility Q|tool for easy configuration and management of TraxInterface[4]

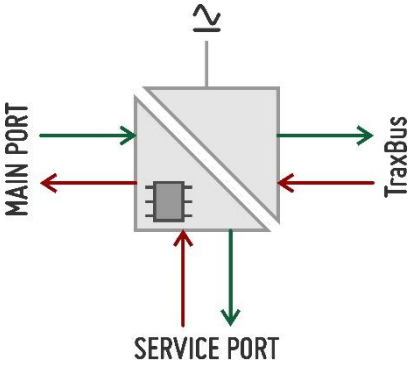
TRACE MODE §
MAIN RX → TRAXBUS TX
MAIN TX ← TRAXBUS RX
SERVICE RX – DISABLED
SERVICE TX ← TRAXBUS TX & RX



LOCAL MODE
MAIN RX – DISABLED
MAIN TX – DISABLED
SERVICE RX → TRAXBUS TX
SERVICE TX ← TRAXBUS RX



CONFIGURATION MODE
MAIN & TRAXBUS RX – DISABLED
MAIN & TRAXBUS TX – DISABLED
SERVICE RX → INTERFACE SETUP
SERVICE TX ← INTERFACE SETUP

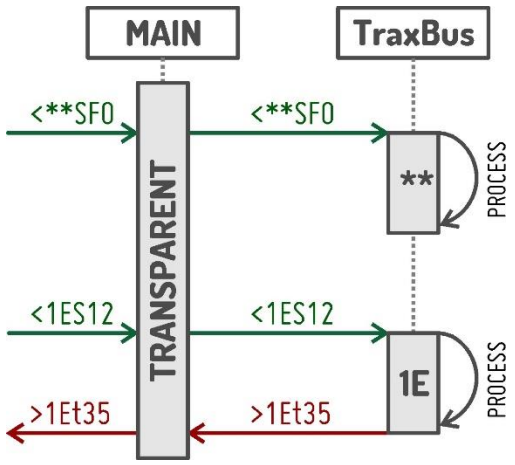


§ A LITTLE DELAY IS INTRODUCED TO CYCLIC COMMUNICATION WHILE IN TRACE MODE

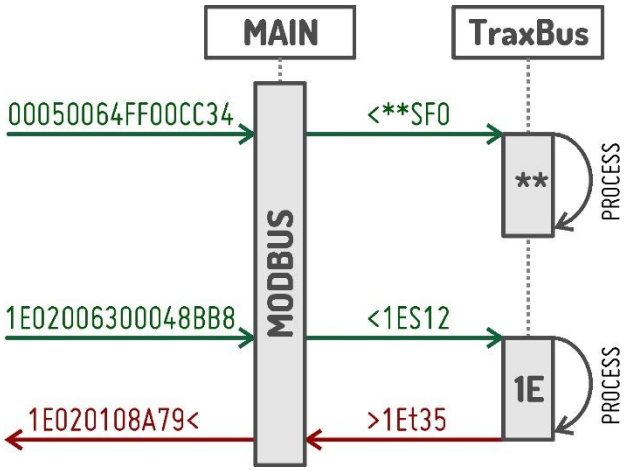
CYCLIC COMMUNICATION

TraxInterface[4] receives data from Main Port at specified baud rate and send data to TraxBus™ at specified baud rate and protocol, without buffering. This means that the overall response time for each communication is affected by the lowest baud rate among Main Port and TraxBus™, adding the process time of the addressed peripheral.

TRANSPARENT MODE
MAIN RX {TRAX} → TRAXBUS TX {TRAX}
MAIN TX {TRAX} ← TRAXBUS RX {TRAX}



MODBUS® MODE
MAIN RX {MODBUS} → TRAXBUS TX {TRAX}
MAIN TX {MODBUS} ← TRAXBUS RX {TRAX}



Master supervisor sends commands to TraxInterface[4] using the TRAX protocol made by simple ASCII commands and described in each device literature or using the Modbus® protocol as described later in this document.
In the schema above, the first command is broadcast, it is received and processed by all networked units but there is no answer (to prevent collision due to concurrent response).
The second command, addressed to specific peripheral 1E, issued transparently (left) or converted from Modbus® protocol (right) is processed by addressed unit that will return an answer.

TRANSPARENT MODE

Data received from the Main Port is transferred to TraxBus™ port and vice-versa. Baud rate could be different for Main port and TraxBus™ port, TraxInterface[4] converts the data speed between the two ports.
This is the default operating mode.

MODBUS® MODE

PERIPHERAL ADDRESS WITHIN A NETWORK

The address field of the message frame contains two characters (in ASCII mode), or 8 binary bits (in RTU Mode).
Valid addresses are from 1-247 (01-F7 HEX), corresponding to the address set for each remote peripheral.
When the slave responds, it places its own address in this field of its response to let the master know which slave is responding. Address 0 (00 HEX) is reserved for the broadcast address, which all slave devices on a network recognize.
Some functions does not support broadcast. A slave device does not issue a response to a broadcast message.

DATA ADDRESS WITHIN A PERIPHERAL

All data addresses in Modbus® messages are referenced to 0, with the first occurrence of a data item addressed as item number zero.
Further, a function code field already specifies which register group it operates on (i.e. 0x, 1x, 3x, or 4x reference addresses). For example, holding register 40001 is addressed as register 0000 in the data address field of the message. The function code that operates on this register specifies a "holding register" operation and the "4xxxx" reference group is implied.
Thus, holding register 40108 is actually addressed as register 006B HEX (107 decimal).

MODBUS® FUNCTIONS

The table highlights the subset of standard functions used by TraxBus™. When a remote device responds to the master, it uses the function code field to indicate either a normal (error-free) response, or that some kind of error has occurred (exception response).
The number of registers returned in a single answer is limited to 1, the number of coils returned in a single answer is limited to 16.
A valid answer is given if at least one of read coil is valid, in such case the value returned for invalid ones will be 0 (zero).
An error is given when the whole addresses are not valid.

CODE	FUNCTION	REFERENCE
02	READ INPUT STATUS	1xxxx
05	FORCE SINGLE COIL	0xxxx
04	READ INPUT REGISTER	3xxxx
06	PRESET SINGLE REGISTER	4xxxx
43	READ DEVICE IDENTIFICATION	

Read input status

This command will read the ON/OFF status of discrete or logical inputs in remote units.
Broadcast transmission is not supported.
Note that the leading character 1x reference address is implied by the function code and omitted from the address specified.
This query specifies the starting address and quantity of points to be read. Following the Modbus® specification, the example reads 4 points from the starting address 99 (63 HEX) corresponding to coil 100.

The response message is packed as one input per bit of each data field, the status indicated as 1 for ON (closed, active) and 0 for OFF (open, inactive). The LSB of the first data byte corresponds to the status of the input addressed in the query, the other inputs follow sequentially, moving toward the high end of the byte.
Unused bits of the data bit will be set to 0 (zero).

BYNARY	0	0	0	0	1	0	0	0
HEX	0				8			
INPUTS	-	-	-	-	ON	OFF	OFF	OFF

EXAMPLE 1E 02 0063 0004 8BB8

QUERY FIELD	VALUE	HEX
SLAVE ADDRESS	30	1E
FUNCTION CODE	2	02
STARTING ADDRESS (HIGH)	99	00
STARTING ADDRESS (LOW)		63
NUMBER OF POINTS (HIGH)	4	00
NUMBER OF POINTS (LOW)		04
CRC/LRC		8BB8

This example asks for LOCKOUT, MANUAL SHUTDOWN, REMOTE HALT, THERMOSTAT HALT of QBK whose address is 1E (reading coil 100 to 103).

RESPONSE FIELD	VALUE	HEX
SLAVE ADDRESS	30	1E
FUNCTION CODE	2	02
BYTE COUNT	1	01
DATA COILS	8	08
CRC/LRC		A79A

Read input register

This command will read the binary content of input or logical registers in remote units.
Broadcast transmission is not supported.
Note that the leading character 3x reference address is implied by the function code and omitted from the address specified.

This query specifies the starting address and quantity of points to be read that is limited to 1 register per query. Following the Modbus® specification, the example reads 1 register from starting address 100 (64 HEX) corresponding to register 101 (QBK flame signal = 18 µA).

The response message is the current value of register.
An error is returned reading more than 1 register at a time.

EXAMPLE 1E 04 0064 0001 727A

QUERY FIELD	VALUE	HEX
SLAVE ADDRESS	30	1E
FUNCTION CODE	4	04
STARTING ADDRESS (HIGH)	100	00
STARTING ADDRESS (LOW)		64
NUMBER OF POINTS (HIGH)	1	00
NUMBER OF POINTS (LOW)		01
CRC/LRC		727A

This example asks for FLAME SIGNAL of QBK whose address is 1E (reading register 101).

RESPONSE FIELD	VALUE	HEX
SLAVE ADDRESS	30	1E
FUNCTION CODE	4	04
BYTE COUNT	1	01
DATA (HIGH)	18	00
DATA (LOW)		12
CRC/LRC		5CFF

Force single coil

Forces a single coil to either ON or OFF. With broadcast transmission it forces the same coil in all networked units.
This query specifies the coil reference address to be forced and the state to force it to.
The ON/OFF state is indicated via a constant in the query field. A value of FF00HEX forces the coil to be turned ON and 0000HEX forces the coil to be turned OFF, all other values are invalid and will not affect the coil.
Note that the leading character 0x reference address is implied by the function code and omitted from the address specified. The starting coil address 101 (65 HEX).
The response message is simply an echo (copy) of the query.
No response is returned to broadcast queries.

EXAMPLE 1E 05 0064 FF00 CF8A

QUERY FIELD	VALUE	HEX
SLAVE ADDRESS	30	1E
FUNCTION CODE	5	05
STARTING ADDRESS (HIGH)	100	00
STARTING ADDRESS (LOW)		64
FORCE DATA (HIGH)	255	FF
FORCE DATA (LOW)	0	00
CRC/LRC		CF8A

This example send a RUN command to QBK whose address is 1E (turning on coil 101).

Preset single register

This command presets a single holding register (4x reference addresses) to a specific value.
When broadcast, the function presets the same register reference in all networked units.
This query specifies the register reference address to be preset and the preset value.
The response message is simply an echo (copy) of the query.
No response is returned to broadcast queries.

EXAMPLE 01 06 00C8 03E8 088A

QUERY FIELD	VALUE	HEX
SLAVE ADDRESS	1	01
FUNCTION CODE	6	06
STARTING ADDRESS (HIGH)	200	00
STARTING ADDRESS (LOW)		C8
PRESET DATA (HIGH)	1000	03
PRESET DATA (LOW)		E8
CRC/LRC		088A

This example preset to 1000 the SETPOINT TEMPERAURE of Q|TC whose address is A0 (writing register 201).

CONVERSION FROM MODBUS® TO TraxBus™

TraxInterface[4] converts Modbus® commands to equivalent TraxBus™ commands and TraxBus™ answers to equivalent Modbus® answers. This activity is based on a predefined conversion table supporting some specific remote units.
Only commands received from the Main port that have a match are converted and sent to peripherals.
There is no memory map within TraxInterface[4].

QBK – Burner Control Unit

Read input status returns coils representing specific status of burner controller:

COIL	STATUS
1 0100	Returns 1 when QBK is in LOCKOUT or FAILURE (equivalent to status S).
1 0101	Returns 1 when QBK is in MANUAL SHUTDOWN (equivalent to status 0).
1 0102	Returns 1 when QBK is in REMOTE HALT (equivalent to status H).
1 0103	Returns 1 when QBK is waiting for local THERMOSTAT (equivalent to status t).
1 0104	Returns 1 when QBK is waiting for AIR PRESSURE (equivalent to status A).
1 0105	Returns 1 during PREPURGE (equivalent to status P).
1 0106	Returns 1 during IGNITION (equivalent to status 1).
1 0107	Returns 1 when PILOT burner is ON (equivalent to status 2).
1 0108	Returns 1 when both PILOT and MAIN burner are ON (equivalent to status 3).
1 0109	Returns 1 when MAIN burner is ON (equivalent to status 4).
1 0110	Returns 1 during POSTCOMBUSTION (equivalent to status Y).
1 0111	Returns 1 during POSTPURGE (equivalent to status W).
1 0112	Returns 1 when BURNER is ON (equivalent to status P 1 2 3 4).
1 0113	Returns 1 when BURNER is OFF (equivalent to status 0 H t).

Force single coil to control specific function of remote burner controller:

COIL	ACTION
0 0100	Behavior similar to a remote push button, set 1 for a while to RESET from lockout.
0 0101	Behavior similar to thermostat, set 1 to RUN the burner and set 0 to HALT the burner.
0 0102	Behavior similar to main burner thermostat, set 1 to RUN 2nd stage and set 0 to HALT 2nd stage.
0 0103	Behavior similar to a switch, set 1 to switch on AIR output and set 0 to switch off AIR output.

Read input register is converted to the corresponding command for QBK:

REGISTER	STATUS		
3 0100	Cumulative status:	BIT 0	Same as coil 10100 – Lockout
		BIT 1	Same as coil 10101 – Manual Shutdown
		BIT 2	Same as coil 10102 – Remote Halt
		BIT 3	Same as coil 10103 – Thermostat Halt
		BIT 4	Same as coil 10104 – Air pressure waiting
		BIT 5	Same as coil 10105 – Prepurge
		BIT 6	Same as coil 10106 – Ignition
		BIT 7	Same as coil 10107 – Pilot on
		BIT 8	Same as coil 10108 – Pilot & Main on
		BIT 9	Same as coil 10109 – Main on
		BIT 10	Same as coil 10110 – Postcombustion
		BIT 11	Same as coil 10111 – Postpurge
		BIT 12	Same as coil 10112 – Buner on
		BIT 13	Same as coil 10113 – Burner off
		…	All other bits not used
3 0101	Current flame signal, analog value in the range 0 to 26 µA.		
3 0110	Current air damper position from 0 to 99% of working range (between MIN / MAX limit switches). §		
3 0111	Current air damper overdrive from 0 to 99 seconds below the MIN limit switch. §		

MODBUS® EXCEPTIONS

In a normal response the most significant bit (MSB) of the returned function code equals to 0 (zero).
In an exception response the most significant bit (MSB) of the returned function code equals to 1, exactly 80 HEX higher than normal value. The exception code is specified in the data field. This is used by the master's application to recognize an exception response and to direct an examination of the data field for the applicable exception code:

CODE	EXCEPTION	DESCRIPTION
01	ILLEGAL FUNCTION	The function code received in the query is not allowed or invalid
02	ILLEGAL DATA ADDRESS	The data address received in the query is not allowable or is invalid
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable or is invalid
04	SLAVE DEVICE FAILURE	An unrecoverable error occurred while attempting to perform the request
07	NEGATIVE ACKNOWLEDGE	The slave cannot perform the program function received in the query

The master's application program must handle the exception response.
It may choose to post subsequent retries of the original message, it may try sending a diagnostic query, or it may simply notify the operator of the exception error.

TECHNICAL DATA

POWER SUPPLY

VOLTAGE	24 VAC / 30VDC ±10%
FREQUENCY	0 … 200 Hz
LINE FUSE	3 A QUICKBLOW - 5x20mm
POWER CONSUMPTION	8 … 70 VA 1 … 250 PERIPHERALS
POWER DISSIPATION	3 … 20 W 1 … 250 PERIPHERALS
ISOLATION	4000 V DC / 1 sec
TERMINALS	2 x 2,5 mm^2 (AWG14)

ENVIRONMENT

OPERATING TEMPERATURE	-20 … 60 °C
STORAGE TEMPERATURE	-40 … 85 °C
ENCLOSURE	POLYCARBONATE UL94-V0
PROTECTION CLASS	IP20
RELATIVE HUMIDITY	30 … 90% NON CONDENSING
DIMENSIONS (W x H x D)	71 x 90 x 58 mm
MOUNTING POSITION	ANY

TRAXBUS™ INTERFACE

TYPE	ASYNCHRONOUS MULTIDROP HALF DUPLEX
PERIPHERALS	300 MAX
BAUD RATE	38400 MAX
BUS VOLTAGE	24 VDC MAX
BUS CURRENT	2,5 A MAX
ALLOWABLE VOLTAGE DROPOUT	3 V MAX
ALLOWABLE LINE CAPACITANCE	100 nF MAX
ISOLATION	3750 V RMS
TERMINALS	4 x 2,5 mm^2 (AWG14)

EIA RS-232

DATA FORMAT	SERIAL ASYNCHRONOUS UART/NRZ
DEVICE TYPE	DCE
PROTOCOLS	TRANSPARENT, MODBUS ASCII, MODBUS RTU
BAUD RATE	4800, 9600, 19200, 38400, 57600, 115200
DATA FRAMING	8N1 | 8N2 TRANSPARENT 8N2 | 8E1 | 8O1 MODBUS (ASCII OR RTU)

EIA RS-485

MULTIDROP UNITS	32 MAX
LINE LENGTH	1200 m MAX
PROTOCOLS	TRANSPARENT, MODBUS ASCII, MODBUS RTU
BAUD RATE	4800, 9600, 19200, 38400, 57600, 115200
DATA FRAMING	8N1 | 8N2 TRANSPARENT 8N2 | 8E1 | 8O2 MODBUS (ASCII OR RTU)

SERVICE PORT (RS232)

DATA FORMAT	SERIAL ASYNCHRONOUS UART/NRZ
BAUD RATE	19200
DATA FRAMING	8N1

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

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

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