ETEL

TTL - RS422 converter

Hardware Manual

Version 1.1

THIS PAGE IS INTENTIONALLY LEFT BLANK

ETEL

Table of contents

Record of revisions

Version	Date	Main modifications
Ver 1.0	18.08.22	First version
Ver 1.1	25.01.23	Updated version: ■ Minor updates

Associated documentation

- Hardware Manual — Specifications & electrical interfaces

1 Introduction

This document concerns a TTL - RS422 converter also called 'converter' in this document. The purpose of this manual is to give details regarding the installation, interfacing and hardware items.

This converter is mainly used to interface the digital inputs/outputs (FDIN and FDOUT) of the AccurET and ACCURET+ controllers (also called 'controller' in this document) which are TTL signals to RS422 signals (TIA/EIA-422-B requirements) for the users. In fact, RS422 signals are more immune to electrical noise and this allows to have longer cables.

NOTICE

- Refer to the corresponding “Hardware Manuals” for more information about the controllers.

1.1 Safety

- The user must have read and understood this documentation before carrying out any operation on the converter. ETEL S.A. disclaims all responsibility for accidents and damages if it is not done. Please contact ETEL or authorized distributors in case of missing information or doubt regarding the installation procedures, safety or any other issue.

- Only qualified personnel are allowed to handle, install and operate the converter, respecting all regulations of the respective country concerning both safety and EMC aspects.
- Never use the converter for purposes other than those described in this manual.
- Troubleshooting and servicing are permitted only by ETEL's technicians and agreed distributors.
- If the converter is integrated into a machine, the manufacturer of this machine must establish that the machine fulfills the 2014/30/EU directive on EMC before operating the converter.

- Indicates electrostatic discharges (ESD), dangerous for the converter. The components must be handled in an ESD protected environment.

NOTICE

- The converter complies with the 2014/30/EU directive on EMC.

1.2 General operating conditions

- The converter is designed to operate in a non-aggressive and clean environment, within a humidity range of 10 % and 85 %, an altitude < 2000 m (6562 ft), and a temperature range between +10 °C (50 °F) and +40 °C (104 °F).
- The converter is intended for use in the second environment(1). The converter is not designed or intended for use in the on-line control of air traffic, aircraft navigation and communications as well as critical components in life support systems or in the design, construction, explosive atmosphere, operation and maintenance of any nuclear facility.
- All control voltages or all connections must fulfill requirements for Limited Voltage Circuits/ Isolated Secondary Circuits.

(1): Definition of Second Environment in product standard EN 61800-3 (2004): Environment that includes all establishments other than those directly connected to a low-voltage power supply network which

supplies buildings used for domestic purposes (industrial areas and technical areas of any building fed from a dedicated transformer are examples of second environment locations).

1.3 Transport and storage conditions

- During the transport and the storage, the converter must remain inside its original packaging which complies with the ESD standard.

- The transport conditions must respect the class 2K3 of the IEC 60721-3-2 standard (temperature between -25 °C (-13° F) and +70 °C (+158 °F), and humidity < 95 % without condensation).
- The storage conditions must respect the class 1K2 of the IEC 60721-3-1 standard (temperature between +5 °C (+41 °F) and +45 °C (+113 °F), and humidity between 5 and 85 % without condensation).

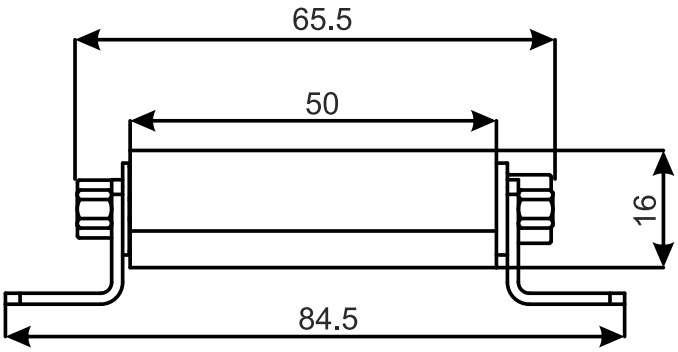
1.4 Maintenance operations

- For safety reasons, it is forbidden to open the converter housing. Opening the device invalidates the warranty.
- Repair and servicing the converter are permitted only by ETEL's technicians and agreed distributors.

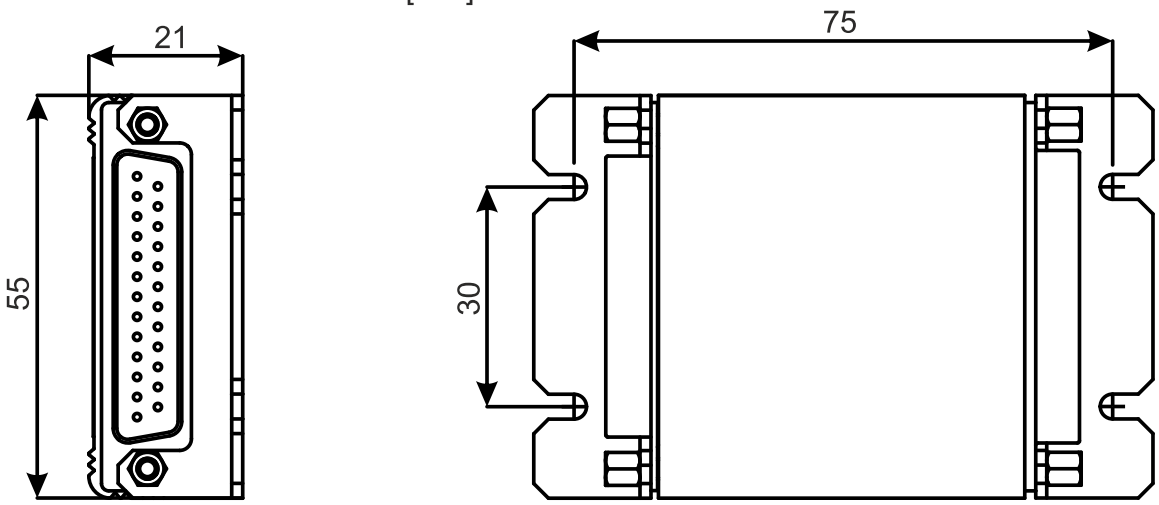
NOTICE

- No field maintenance operation is required.

2 Outline and dmensions



Unit: [mm]



NOTICE

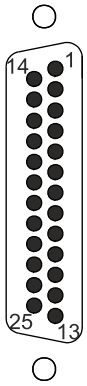
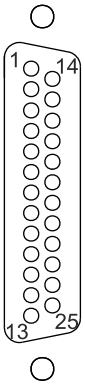
- The size of the four screws used to fix it is M3.
- The weight of the converter is around 0.1 kg.

3 Electrical interface

- The inputs/outputs connectors must be handled in an ESD protected environment.

NOTICE

- In the following paragraphs, connectors with male pins are indicated with the '•'symbol (full), and female pins are represented with the 'o' symbol (empty).
- This product is designed to be used with I/O of ETEL's controllers. Refer to the documentation corresponding the controller before cabling and use.

Controller side				User side		
D-SUB, 25 pins, male	Pin #	Signal		Signal	Pin #	D-SUB, 25 pins, female
	1	TTL OUT1		RS422+ IN1	1	
	2	TTL OUT1		RS422+ IN2	2	
	3	NC		RS422+ IN3	3	
	4	TTL IN1		RS422+ IN4	4	
	5	TTL IN3		GND	5	
	6	NC		RS422+ OUT1	6	
	7	GND		RS422+ OUT2	7	
	8	GND		RS422+ OUT3	8	
	9	NC		RS422+ OUT4	9	
	10	NC		NC	10	
	11	USER1		USER1	11	
	12	USER2		USER2	12	
	13	USER3	Converter	USER3	13	
	14	TTL OUT2		RS422- IN1	14	
	15	TTL OUT4		RS422- IN2	15	
	16	NC		RS422- IN3	16	
	17	TTL IN2		RS422- IN4	17	
	18	TTL IN4		GND	18	
	19	NC		RS422- OUT1	19	
	20	+5 V (±10%) / 0.25 A		RS422- OUT2	20	
	21	NC		RS422- OUT3	21	
	22	NC		RS422- OUT4	22	
	23	USER4		USER4	23	
	24	USER5		USER5	24	
	25	USER6		USER6	25	

Here is the contacts description:

Pin #	Signal		Signal	Pin #
1	TTL OUT1	1 quad receiver (TTL ← RS422)	RS422+ IN1	1
			RS422- IN1	14
14	TTL OUT2		RS422+ IN2	2
			RS422- IN2	15
2	TTL OUT3		RS422+ IN3	3
			RS422- IN3	16
15	TTL OUT4		RS422+ IN4	4
			RS422- IN4	17

Pin #	Signal		Signal	Pin #
4	TTL IN1	1 quad transmitter (TTL→ RS422)	RS422+ OUT1	6
			RS422- OUT1	19
17	TTL IN2		RS422+ OUT2	7
			RS422- OUT2	20
5	TTL IN3		RS422+ OUT3	8
			RS422- OUT3	21
18	TTL IN4		RS422+ OUT4	9
			RS422- OUT4	22

Pin #	Signal		Signal	Pin #
11	USER1	1:1	USER1	11
12	USER2		USER2	12
13	USER3		USER3	13
23	USER4		USER4	23
24	USER5		USER5	24
25	USER6		USER6	25
7	GND		GND	5
8	GND		GND	18

Here are the propagation times:

	RS422 IN to TTL out	TTL IN to RS422 OUT
Rising edge [ns]	30	15
Falling edge [ns]	30	15

The minimum and maximum values for high and low voltage detection are:

TTL IN	Min. high-level input voltage [V]	2.0
	Max. low-level input voltage [V]	0.8
TTL OUT	Min. high-level output voltage [V]	2.4
	Max. low-level output voltage [V]	0.5

NOTICE

- The above-mentioned times takes only the hardware into account .
- There is no insulation between TTL and RS422 signals.
- +5 V (±10 %): input supply voltage. It is intended that the user uses the +5 V of the controller I/O connector to supply the converter.
- TTL OUT: it is intended that the user connects these signals to the FDIN of the controller I/O connectors.
- TTL IN: it is intended that the user connects these signals to FDOUT of the controller I/O connectors.
- USER1 to USER6 are signals that go through the converter without any modification. This is useful if the user wants to use 24 V digital I/O from the controller I/O connector in addition to the RS422 signal. The maximum values on these signals are 26.5 V and 0.5 A.
- In case of failure, check the cabling as well as the voltages and if everything is correct, please contact your ETEL S.A. representative.

3.1 Cable manufacturing

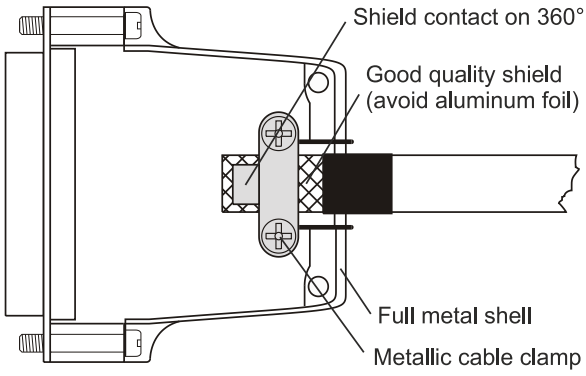
If the cables delivered by ETEL are not used, follow the shielding recommendations below. Simple shielded cable must be linked to the connector shells on both cable ends. Only full metallic conductive connector shells must be used. Use only copper braid (85 % covering shield). The shield must entirely cover all wires. 'Pig tail' connections are forbidden! The shield contact on 360° and a metallic cable clamp is necessary.

NOTICE

- Ensure the quality of the shielding to guarantee correct signal behavior and EMC requirements.

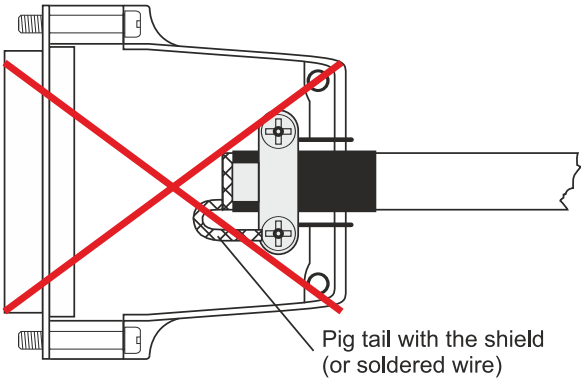
Here is an example of good shielding connection:

Good shielding connection

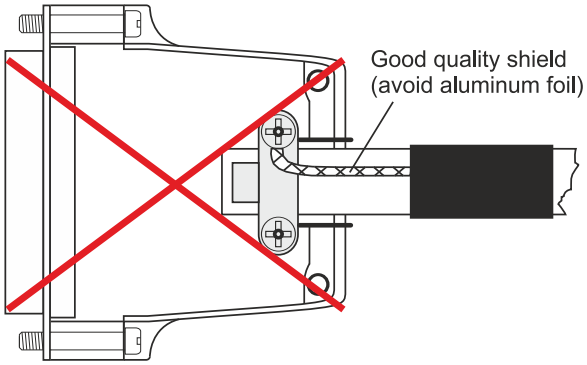


Here are examples of bad shielding connection:

Bad shielding connection



Bad shielding connection



4 Service and support

For any inquiry regarding technical, commercial and service information relating to ETEL S.A. products, please contact your ETEL S.A. representative listed on www.etel.ch.

The technical hotline, based in ETEL S.A.'s headquarters, can be reached by:

- Phone: +41 (0)32 862 01 12.
- Fax: +41 (0)32 862 01 01.
- E-mail: support@etel.ch.

Please refer to your corresponding ETEL S.A. representative for more information about the technical documentation. ETEL S.A. organizes training courses for customers on request, including theoretical presentations of our products and practical demonstrations at our facilities.