

Serial Link Gateway

RS-422/Current Loop Converter



User Manual Hardware specifications & installation

P DOC SLG 001E V11



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Introduction

The Serial Link Gateway is a RS-422/Current loop converter.

The Serial Link Gateway is fully compliant with the EN50155 standard for railway systems.

This user manual describes all the necessary information to getting started with the Serial Link Gateway hardware.

Prerequisites

It is necessary that the user has got technical knowledge in mechanical & electrical railway systems.

Safety instructions

Following symbols are used in this documentation in order to avoid user for potential risks:



Risk of personal injury or damage to the equipment.



Risk of an electrical hazard.

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Chapter 1

Introduction

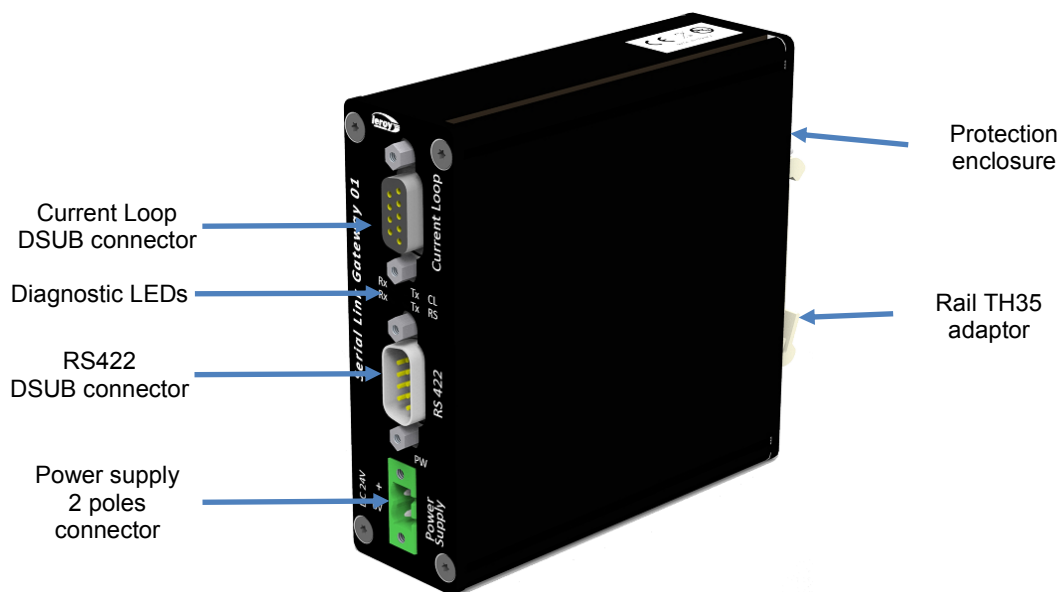
Contents

In this section, we will discuss the following topics:

- Hardware description,
- Product part numbers,
- Architecture

Hardware Description

The Serial Link Gateway is a hardware unit fully compliant with the EN50155 standard, and it is designed to be integrated in embedded railway systems and subsystems.

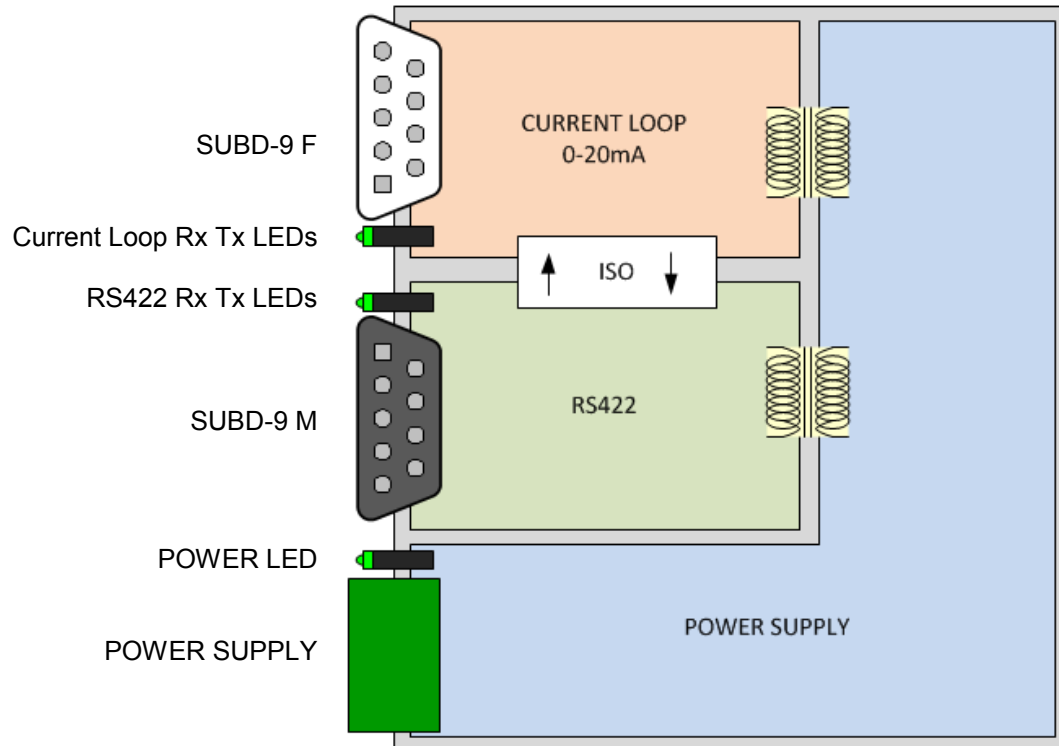


Product part numbers

Part number	P SLG 002
Range name	Serial Link Gateway
Power supply	24 VDC (16.8V to 30V)
RS422	Bidirectional port full duplex mode
Current Loop	0-20mA current loop

Architecture

Architecture example for a Serial Link Gateway reference P SLG 002:



Chapter

2

Specifications

Contents

In this section, we will discuss the following topics:

- General specifications
- Standards
- Electric specifications
- Mechanical specifications

General Specifications

Dimensions	34 x 105 x 117 (width x height x depth)
Weight	0,4kg
Covers	Aluminium alloys
Degree of protection	IP40
Startup time	<10ms
Operating temperature	Class T3 (-25 +70°C)
Storage temperature	-40°C /+70°C
Relative Humidity	+55°C 95% humidity 48 hours (NF EN 60068-2-30 - Criteria A)
Fire/Smoke	EN 45545-1 & 2 compliant (HL3)
MTBF	2 450 000 Hours

Interfaces

RS422	1 x D-Sub9 male connector type Class 1
Current Loop	1 x D-Sub9 female connector type Class 1
Power supply & IO	Base strip - MSTB 2,5/ 2-GF-5,08
Diagnosis LEDs	2 x LEDs for RS422 Tx/Rx status 2 x LEDs for CL Tx/Rx status 2 x LEDs for Power Supply status

Standards

Main standards		
Number	Date	Designation
NF EN 50155	2007-10	Railway applications - Electronic equipment used on rolling stock.
IRIS 02	2009	International Railway Industry Standard.
NF EN ISO9001	2008-11	Quality management systems.
NF EN 50121-3-2	2006-11	Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Apparatus.
NF EN 50121-5	2001-01	Railway applications - Electromagnetic compatibility - Emission and immunity of fixed power supply installations and apparatus.

Number	Date	Designation
EN 45545-1 EN 45545-2	2013	Railway application - Fire protection on railway vehicles Part 1 : General – Railway applications Part 2 : requirements for fire behavior of materials and components – Railway applications
NF ISO2859-1	2000-04	Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection.
IEC 62380	2004	Reliability data handbook - Universal model for reliability prediction of electronics components, PCBs and equipment.

Mechanical tests				
Number	Date	Designation	Level	Criteria
NF EN 61 373	2011	Railway applications - Rolling stock equipment - Shock and vibration tests.	Chocs: 50m/s ² XYZ - 30 ms	A
			Endurance: 7.9m/s ² XYZ - 150Hz - 5 hours	

Climatic tests				
Number	Date	Designation	Level	Criteria
NF EN 60068-2-1	2007	Cold storage	-40°C 16 hours	A
NF EN 60068-2-1	2007	Cold start	-40°C	A
NF EN 60068-2-2	2007	Hot test	+70°C	A
NF EN 60068-2-30	2007	Damp test	+55°C 95% humidity 48 hours	A
NF EN 50155	2007	Salt mist	96 hours	A

EMC tests				
Number	Date	Designation	Level	Criteria
NF EN 61000-4-2	2009	ESD	Enclosure contact : ±6 kV	B
			Enclosure air : ±8 kV	
NF EN 61000-4-3	2011	Immunity Radiated RFI	80 MHz ... 1 GHz : 20V/m 1.4 GHz ... 2.1 GHz : 10V/m 2.1 GHz ... 2.5 GHz : 5V/m	A
NF EN 61000-4-4	2010	Fast burst	±2 kV direct	A
NF EN 61000-4-5	2007	surge	±2 kV MC ±1 kV MD	A
NF EN 61000-4-6	2009	Immunity conducted RFI	10V RMS	A
NF EN 55011	2011	Measuring radiated emissions	150 kHz ... 500 kHz	99dBµV
			500 kHz ... 30 MHz	93dBµV
			30 MHz ... 230 MHz	47dBµV/m at 3m
			230 MHz ... 1 GHz	47dBµV/m at 3m

Electric specifications

Power supply

Input specifications

Nominal supply voltage range	24VDC
Extended supply voltage range	16.8VDC to 30VDC
Reverse polarity protection	Yes
Overvoltage protection	Yes
Inrush current limiting	<3xIn during 20ms
Low voltage protection	Startup only for U>16,8VDC
Resistance to voltage interferences	1.4x24V=33.6V : normal running 0.6x24V=14.4V : normal running during 100ms - gradual decline (from nominal to 0V) : support 1V/5min - Micro-switching at nominal voltage : 10ms
Fuse	No
Consumption	<10W
Displaying	2 LEDs (green)
Insulation	1500 VDC to ground 1500 VDC to CL 1500 VDC to RS422

RS422

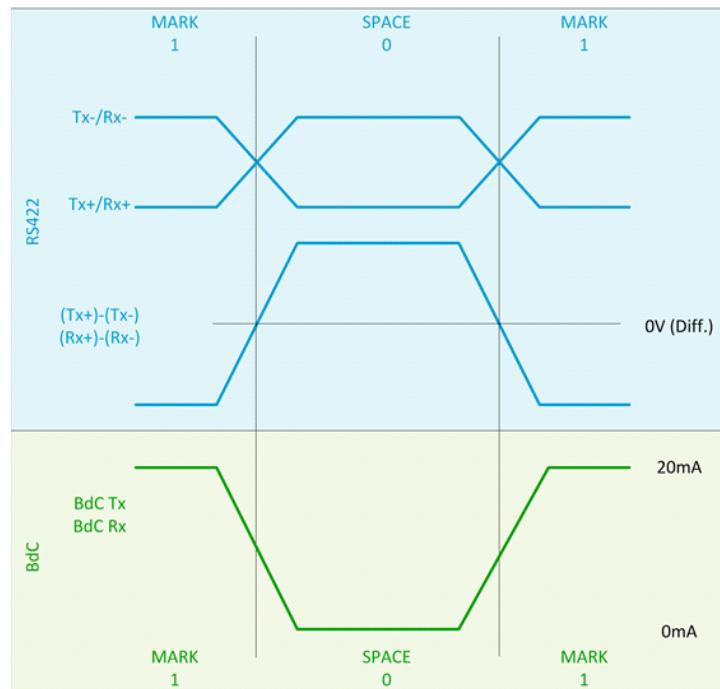
Supported modes	EIA/TIA-422 standards
Working mode	Full duplex
Terminating	TXA/TXB- RS485: no resistor RXA/RXB- RS485: resistor (120Ω)
Polarization	TXA and TXB- RS485: no resistor RXB/0V RS485: resistor (1000Ω) RXA/5V RS485: resistor (1000Ω)
Insulation	750 VDC to ground 1500 VDC to CL 1500 VDC to POWER SUPPLY
Displaying	2 LEDs (green) one for Tx and one for Rx

Current Loop

Transmission	Active
Reception	Active
Maximum voltage in open loop	30 VDC
Working mode levels	Tx Logic level "0" [0 mA.to.0.5 mA] Tx Logic level "1" [18.1 mA.to.22.7 mA] Rx Logic level "0" [0mA.to.10.4mA] Rx Logic level "1" [10.9mA.to.24mA]
Insulation	750 VDC to ground 1500 VDC to RS422 1500 VDC to POWER SUPPLY
Displaying	2 LEDs (green) one for Tx and one for Rx

Coding

- logical FALSE: Current Loop Rx : 0mA = SPACE ; RS422 Rx+ - Rx- >0
- logical TRUE: Current Loop Rx : 20mA = MARK ; RS422 Rx+ - Rx- <0

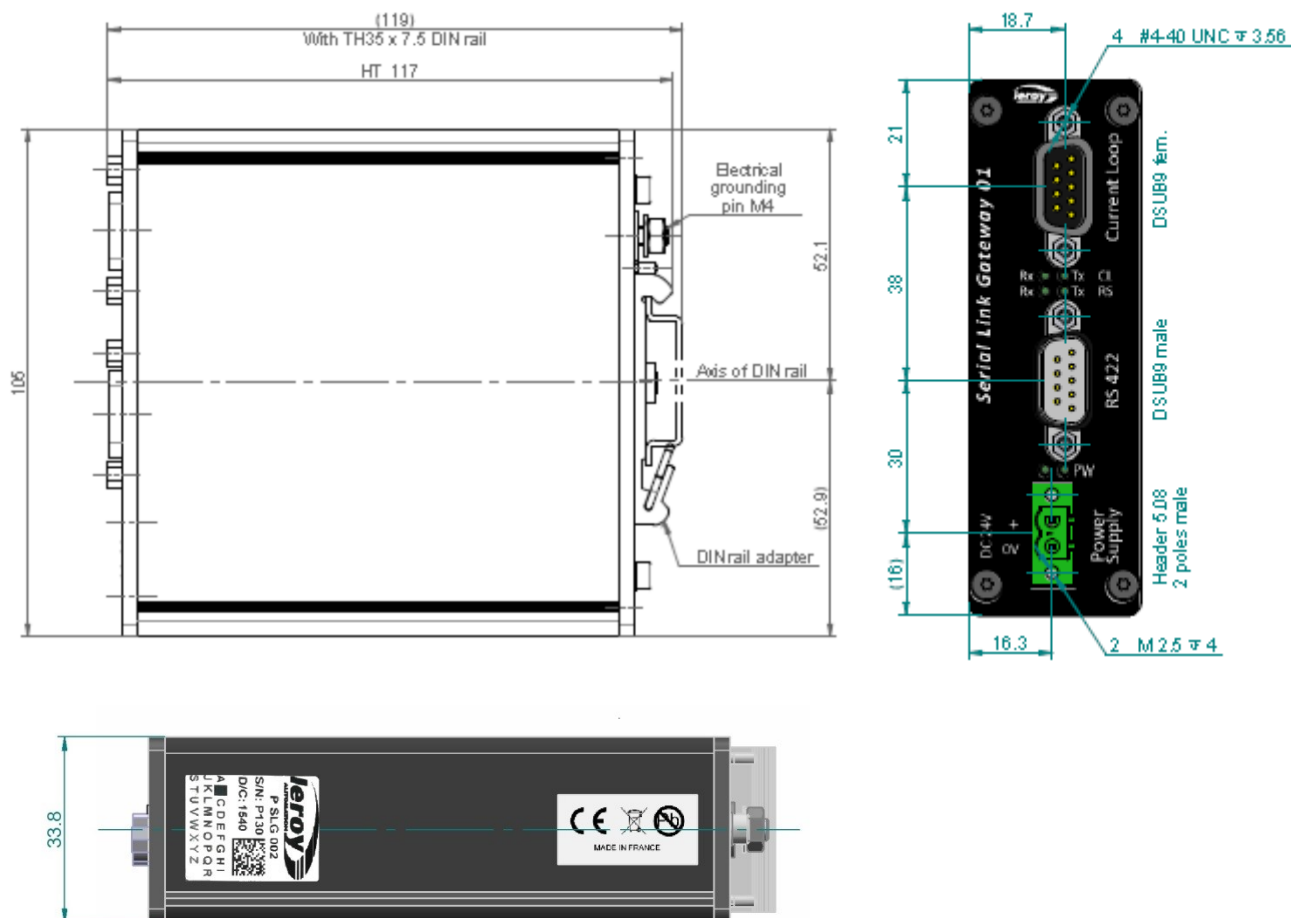


Baud rate

- Up to 38400 bits/s
- Lag : RX RS422 → TX CL : 15.6 μs
- Lag : RX CL → TX RS422 : 2.5 μs

Mechanical specifications

Dimensions (unit : mm)



External connectors

SUBD 9 pts with gilded crimp contacts Class 1 with cover locking with screws 4-40 UNC shall be used.

RS422 Connector

Preferential references are given below:

Description	Part Number HARTING	Part Number INOTEC
D-Sub crimp 9-pole female assembly	09 67 009 4701	DC09S-G
D SUB FE turned contact AWG 18-22_PL1	09 67 000 3476	NA
Crimp contacts female AWG 24-20	NA	DCC2S4
Crimp contacts female AWG 18	NA	DCC2S5
Full metal hood 9P T&S entry H UNC 4-40	61 03 001 2010	DG09MS-80
Full metal hood 9P S40° entry. H UNC 4-40	61 03 001 2013	DG09MS-1-80

Current Loop Connector

Preferential references are given below:

Description	Part Number HARTING	Part Number INOTEC
D-Sub crimp 9-pole male assembly	09 67 009 5601	DCE09P-G
D-Sub, MA AWG 18-22 crimp con	09 67 000 3576	NA
Crimp contacts male AWG 24-20-	NA	DCC2P4
Crimp contacts male AWG 18-	NA	DCC2P5
Full metal hood 9P T&S entry H UNC 4-40	61 03 001 2010	DG09MS-80
Full metal hood 9P S40° entry. H UNC 4-40	61 03 001 2013	DG09MS-1-80

Power supply Connector

Preferential references are given below:

Description	Type Phoenix Contact	Part Number Phoenix Contact
Printed-circuit board connector- Plug	MSTBC 2,5/ 2-STZF- 5,08	1809734
Module female contact for conductors from 0.5 to 1.0 mm ²	MSTBC-MT 0,5-1,0	3190564
Module female contact for conductors from 1.5 to 2.5 mm ²	MSTBC-MT 1,5-2,5	3190551

Chapter

3

Wiring

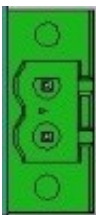
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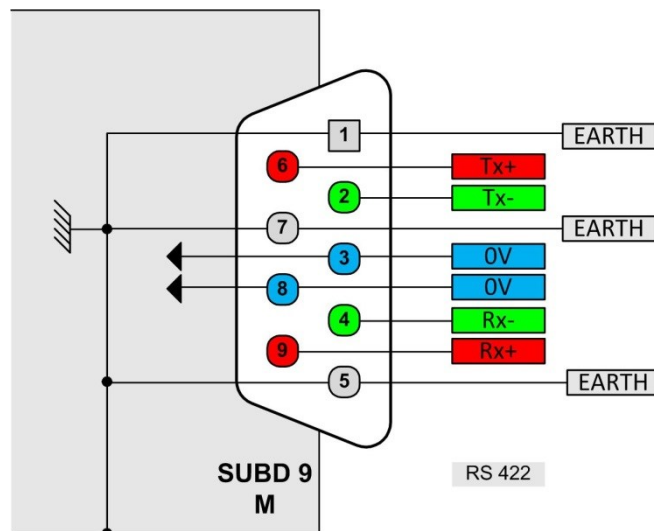
- Connectors Pinout

Connectors Pinout

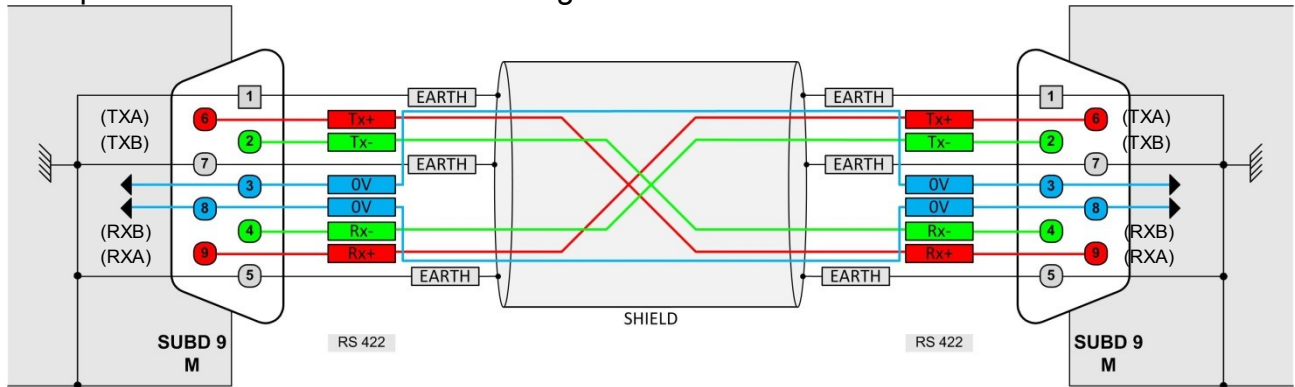
Power supply connector Pinout

Designation	Pins	Front view
+ 24V	1	
0V	2	

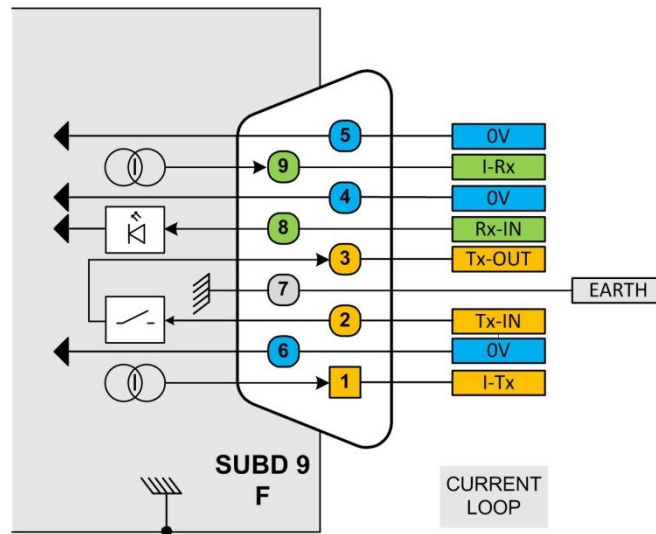
Terminal block RS422 connector pin-out



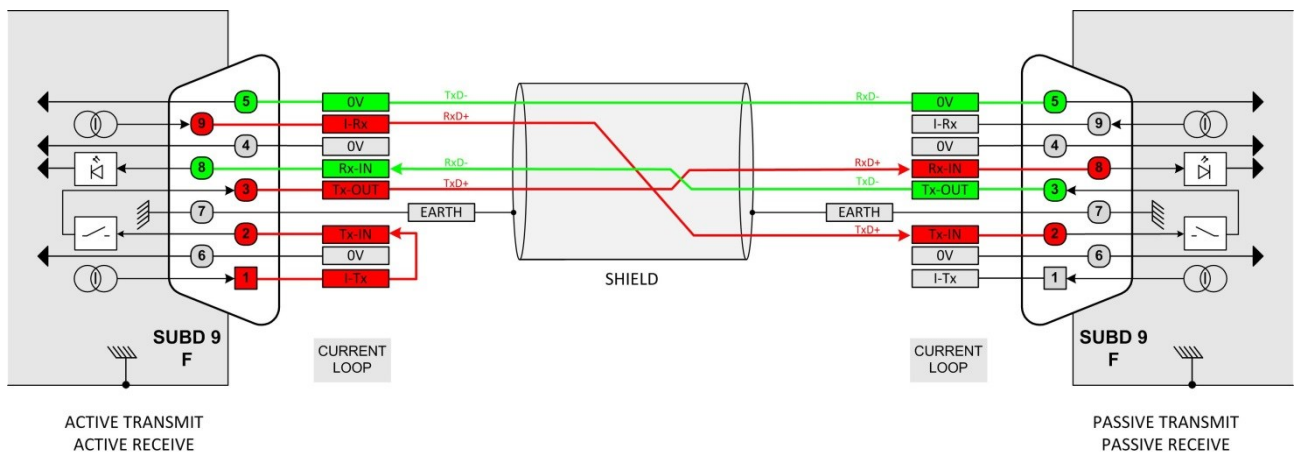
Example of Terminal block RS422 wiring:



Terminal block Current Loop connector pin-out



Example of Terminal block Current Loop wiring:



Mounting, installation & environmental compatibility

Contents

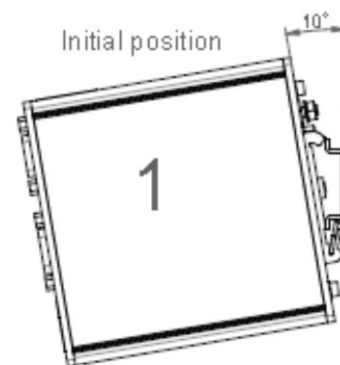
In this section, we will discuss the following topics:

- Mounting
- Installation
- Environmental compatibility and disposal

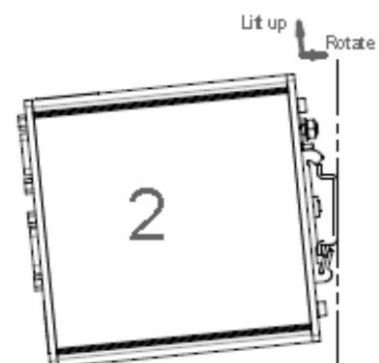
Mounting

Mounting procedure

With the Serial Link Gateway unit inclined at 10 °, put the spring of the rail DIN adaptor below the edge of the rail.



Lift up the Serial Link Gateway unit by compressing the spring then rotate him for as the adaptor clip will lock on the top edge of the DIN rail.



Then the Serial Link Gateway unit is ready to work.



Required tools

No tool is necessary in order to mount or dismount the Serial Link Gateway on its rail.
A screwdriver is necessary to mount or dismount D-sub connectors on Serial Link Gateway.

Tightening torque

Element	Recommended tightening torque
D-sub connector device screws	0.4 to 0.5 Nm
Power connector device screws	0.4 to 0.5 Nm

Installation

	NOTICE
	Grounding of the Serial Link Gateway! Danger of electrical discharge as a result of a missing ground connection. • shall be connected to ground pin to the rear of the housing.
	NOTICE
	Serial Link Gateway mounting or dismounting must be done unpowered.

Cables

The connectors required for assembly of the cables are available as accessories.

Cable with D-sub connector

- Only use cables AWG20/AWG24 to assemble the cables with D-sub connectors.

Screened data transmission cable mit PE core insulation, 7-wire strands and twisted pairs (100 Ohms-120 Ohms) Flexing: - 5°C up to +70°C Fixed installation: - 40°C up to +80°C Flame retardant acc. to IEC 60332-1-2	Example: UNITRONIC® Li2YCY (TP) ref: 0031321 (6xAWG24) 0031326 (6xAWG22) 0031331 (6xAWG20)
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- Mount a female D-sub connector at each end of the cable for RS422 liaison.
- Mount a male D-sub connector at each end of the cable for Current Loop liaison.

Note: For correct EMC protection it is recommended that the shield of the transmission cable must be directly connected to the metal hood of each D'SUB connector.



The following applies to cables with D-sub connectors:

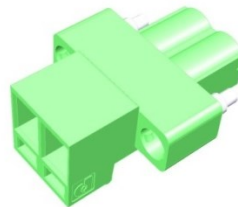
Maximum permissible cable length of an individual cable: 100 m.

Pin assignments refer to **Chapter 3**.

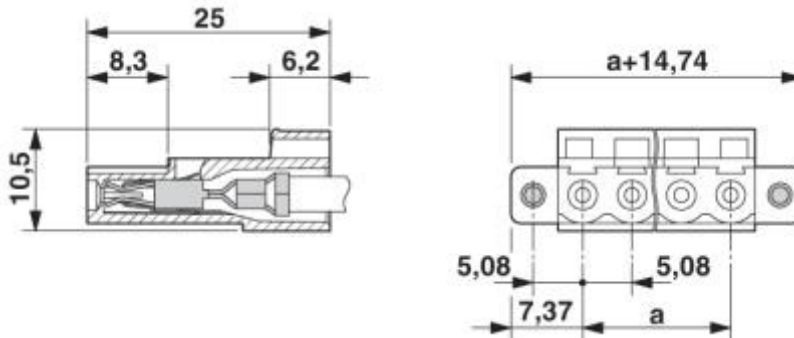
Cable for power supply

The power supply cable shall be connected to the Serial Link Gateway through a 2 female pole 5.08 plug connector type.

- Only use cables AWG16/AWG20 to assemble the cables with MSTBC plug type.



MSTBC 2,5/ 2-STZF-5,08 plug



MSTBC 2,5/ 2-STZF-5,08 dimensions

Pin assignments refer to **Chapter 3**.

Grounding connection

The Serial Link Gateway shall be connected to electrical ground by its ground pin to the rear panel of the housing.

Preconized Earth Bonding Straps:



Earth Bonding Strap example

Features:

- Circular tinned copper braid leads.
- Both ends fitted with integral lug terminations.
- Conductor sectional area $\geq 5 \text{ mm}^2$ (AWG 10 or less)
- Maximum length 250 mm.

Mounting parameters:

- Stud Size M4 with HEXAGONAL NUT ISO 4032 - M4 (Hex socket 7 - Torque 1.5 to 2 Nm)

Environmental compatibility and disposal



This device is manufactured using materials and procedures which comply with current environmental protection standards as best as possible. More specifically, the following measures have been undertaken:

- Use of reusable materials
- Use of halogen-free plastics
- Electronic parts and synthetic materials can be separated



Electronic parts and batteries must not be disposed of with domestic waste.

- Take electronic parts and batteries to local collection points or recycling centers.
- Contact local authorities for more information.
- Observe national requirements for disposing of electronic parts and batteries.