

Quick Installation Guide

FOUNDATION™ Fieldbus Linking Device, LD 810HSE Ex

Version 1.0

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Section 1 Introduction

This Quick Installation Guide describes the electrical installation of FOUNDATION™ Fieldbus Linking Device LD 810HSE Ex in non-hazardous or hazardous areas.

The Linking Device LD 810HSE Ex is an electrical equipment with degree of protection Ex nA, approved for use in hazardous areas of Zone 2 or in the safe area. The 4 FF-H1 interfaces are designed according to the protection method Ex ic. Only certified circuits with an according protection method shall be connected to these FF-H1 interfaces.

Before setting the LD 810HSE Ex into operation, the corresponding marking field has to be signed (e.g. if the device is used in ic environment, the upper marking field on the type label has to be signed).

- Use an appropriate permanent pen for signing, e.g. an etching pen.
- More than one marking is not allowed. If you need a second marking, you must replace the existing equipment with a new one.
- An equipment, which has been operated under non-intrinsical safe conditions.

The following communication ports of the Linking Device are in open/filtered state and therefore need to be protected at all time:

- Port s0/UDP
- Port 1027/UDP
- Port 1028/UDP



The LD 810HSE Ex is only approved for intended and appropriate use. In case of noncompliance, the warranty and manufacturer's liability do no longer apply.

Intended use

For proper installation of LD 810HSE Ex, read this manual before installing LD 810HSE Ex.



For commissioning of LD 810HSE Ex, refer to the User Instructions (LD 810HSE Ex User Manual 2PAA114135-610), which is available in the MyABB portal (<https://myportal.abb.com/home>).

Before commissioning of LD 810HSE Ex make sure to use the latest and recommended Linking Device firmware released for your system environment.

Section 2 Installation

Installation in Hazardous Locations

The LD 810HSE Ex is suitable for use and installation in areas with potentially explosive atmosphere in accordance to the Division model (North America) and the Zone model (Europe and IEC countries) of hazardous locations.



Danger of explosion!

If energized conductors are plugged to or unplugged from the LD 810HSE Ex in potentially explosive atmosphere, this may result in an explosion. Thus, do not connect or disconnect energized conductors!



Danger of explosion!

Do not use the LD 810HSE in hazardous areas, only the LD 810HSE Ex is suitable to be used in areas with potentially explosive atmospheres. Check the device label for device type and marking for explosion protection.



This manual does not supersede the applicable national regulations, standards or directives. Thus, follow these regulations, standards or directives.

General Requirements



If the notes stated in this document are not observed or in case of inappropriate handling of the device, our liability is waived. In addition, the warranty on devices and spare parts does no longer apply.

The following general requirements must be observed when installing LD 810HSE Ex in hazardous locations:

- The details of this document must be observed along with the conditions for use and the applicable details stated on the marking and type labels of each LD 810HSE Ex.
- Any selection and operation of the device must be done as per the technical rules.
- Adequate precautions must be taken to prevent unintended actuation or impairment of I/O device.
- Connectors must not be connected or disconnected when the area is known to be hazardous. This can be life threatening in a potentially explosive atmosphere. Open or not securely closed sockets shall not be energized in the Ex atmosphere.
- Ensure that the installed equipment comply with the types of protection applicable to the corresponding zones.
- All connected electrical equipment must be suitable for the respective intended use.
- The operator must ensure protection against lightning in compliance with the locally applicable regulations.

- Electrostatic aspects must be considered when mounting the Linking Devices. Electrostatic charges have to be prevented.
- In explosion group IIC and Zone 2 no protected plastic surfaces > 20 cm² are allowed; in IIB or dust-Ex, 100 cm² may be reached.
- The hazard of any objects falling onto a Linking Device must be prevented.
- The Linking Device does not meet the requirements of impact protection and IP54 (according to IEC 60529). It must be installed in a protective enclosure which meets the requirements for resistance to impact and IP as stated in section 26.4 of IEC/EN 60079-0. This enclosure must be fully mounted and intact. If the enclosure is damaged, the operation is not permitted.
- The Linking Device is defined as instruments and apparatus of low energy according to clause 23 of IEC/EN 60079-15; thus the requirement stated in sub-clause C limiting the transient characteristic to 40 % above the rated voltage has to be adhered to when mounting the equipment.
- When removing the packaging ensure that no dirt can enter the enclosure or the plugs.
- If any vibration during the operation may cause parts of the plugs to loosen, the plugs have to be provided with a light firm varnish used for securing screws. An extraction force of 0.5 Nm has to be achieved at an equivalent thread.
- To circuits of Zone 2 only such equipment may be connected that is suitable for operation in this zone and has been certified accordingly.
- Components may only be replaced by original spare parts that are also approved for the use in Ex -atmospheres. Spare parts are ordered as

complete units giving the material number stated on the device (marking, type label).

- Only such auxiliary components may be used in potentially explosive atmospheres that meet all requirements of European and national directives and legislation.
- The environmental conditions specified in the manuals have to be followed strictly.
- The Linking Device is not to be used in systems where cathodic systems for corrosion protection are in place. Although special precautions such as additional earthing bridges may allow the use in such systems, the manufacturer has to be consulted in each case.
- The operator has to provide measures for protection against lightning.
- According to the local conditions and in compliance with the environmental rules, the operator is responsible to visually inspect the system and to remove dust settlements every 6 months.
- The company installing the device has to ensure that the transient characteristic is limited to 40 % above the service voltage.
- Additional precautions have to be taken, if the presence of hydrosulphide, ethylene oxide and/or carbon monoxide is to be expected. Those substances are of a very low ignition energy.
- Icing is not permitted.



Make sure that the sum of power supply voltage and fieldbus supply voltage does not exceed 60 VDC.



Explosion hazard - Do not disconnect equipment unless the power has been removed or the area is known to be non-hazardous.



Observe relevant national regulations, standards and directives.

This manual does not supersede the relevant national regulations, standards and directives. These must be observed and have to be applied according to the national conditions.

Hazardous Location - North American Approval (cULus)

If indicated on the device label, the LD 810HSE Ex Linking Device is suitable for use in hazardous locations classified as Class 1, Division 2, Groups A, B, C, and D as well as non-hazardous locations.

The device must be installed in a protective enclosure that meets the requirements for resistance to impact and IP54 according to IEC 60529.

Marking for explosion protection: Class I, Div. 2, Groups A, B, C, D.



Explosion hazard - Do not disconnect equipment unless the power has been removed or the area is known to be non-hazardous.




Explosion hazard - Substitution of any components may impair suitability for Class I, Division 2.

Hazardous Location - European and International Approval (ATEX, IECEx)

The equipment was assessed as based on the following standards and editions:

1. IEC 60079-0:2011 Ed. 6, modified Cor. 2012 + Cor. 2013 / EN 60079-0:2012 + A11:2013
2. IEC 60079-11:2011 Ed. 6 + Corr. 2012 / EN 60079-11:2012
3. IEC 60079-15:2010 Ed. 4 / EN 60079-15:2010

If indicated on the device label or by technical documentation, the LD 810HSE Ex is suitable for use in gas-Ex atmospheres of Zone 2 in the explosion groups IIA, IIB and IIC in temperature class T4, if accommodated in a tested enclosure.

- IECEx marking for explosion protection: Ex nA [ic] IIC T4 Gc
- ATEX marking for explosion protection:  II 3G nA [ic] IIC T4 Gc

The Ex protection method [ic] corresponds only to the FF-H1 fieldbus interfaces.

The LD 810HSE Ex complies with the applicable standards and regulations and meets the requirements of Directive 2014/34/EU. The requirements for mounting the device as part of the system in potentially explosive atmospheres (e.g. IEC/EN 60079-14) must be strictly adhered to.



For general requirements, rules for installing, commissioning, maintaining, and the appropriate use of the LD 810HSE Ex in hazardous atmospheres, refer to Appendix C of the User Manual.

Mounting and Dismounting



Installation and inspection tasks are to be carried out by qualified personnel only, i. e. personnel qualified according to TRBS 1203 or similar! The definition of terms can be found in IEC 60079-17.



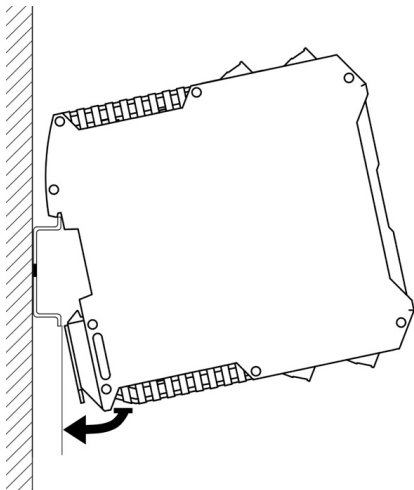
Make sure the LD 810HSE Ex is mounted in a manner that the power supply disconnecting device or interrupt facility can always be reached easily.



Depending on the installation position, the maximum ambient operating temperature may differ. Refer to "Section 4 Specifications" on page 30 for detailed information.

Mounting

4. For mounting the LD 810HSE Ex on a DIN rail (35 mm), attach the two upper notches to the rail.
5. Press the Linking Device down towards the rail until it locks into place.



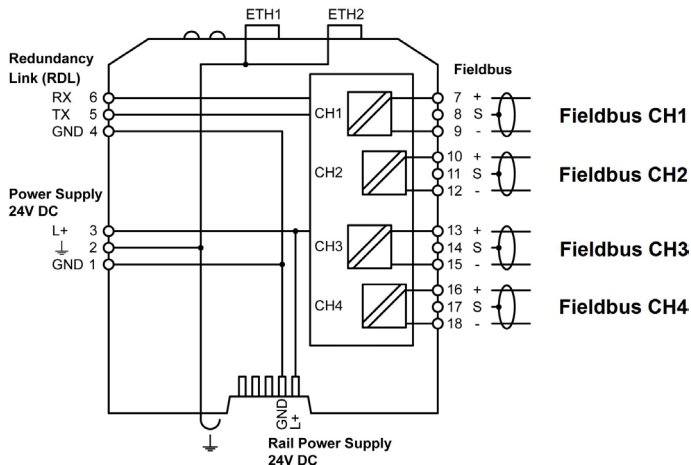
Do not put stress on the system by bending or torsion.

Dismounting

To dismount the LD 810HSE Ex Linking Device from the DIN rail, slide a screw driver horizontally underneath the housing into the locking bar, slide the bar downwards – without tilting the screw driver - and fold the device upwards.

Connection Diagram

The following connection diagram shows an overview on the different plugs and interfaces:

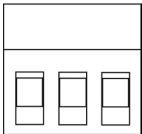





If ambient temperatures exceed 55 °C at the place of installation, it may occur that the temperatures of connecting cables strongly rise if those cables have been put in place in an unfavorable condition. In such cases, either perform measurements to confirm that the service temperature of the cables is not exceeded (i. e. 80 °C), or use such cable variants that withstand temperatures of minimum 90 °C.

Connecting the Power Supply

The supply voltage (18 V DC ... 32 V DC) is connected by a 3-pole terminal block. The power supply is connected to the plug connector via flexible wires with a cross section of 0.75 to 1.5 mm². The ground connection wire must have a cross section of 1.5 mm².

1	2	3	Pin	Signal	Description
			1	GND	Ground
			2		Functional Earth
			3	L+	Positive supply voltage



The Functional Earth (FE) connection of the device has to be connected at low inductance with the Protective Earth (PE) of the system.



As indicated in the connection diagram, the power can be applied alternatively by a special DIN rail connector (Rail Power Supply). For further information contact ABB.

Ethernet Ports

The Linking Device is equipped with two 10/100 Base-T Ethernet interface receptacles (RJ45). Ethernet port 1 (ETH 1) is intended to be connected to a FOUNDATION™ High Speed Ethernet system (HSE). Do not use Ethernet port 2 (ETH 2). It is reserved for future use. The Ethernet port corresponds to the IEEE 802.3 with the pin assignment shown in the following table.

Ethernet Port 1 (ETH 1)

Pin	Signal	Description
1	TX+	Transmit signal positive
2	TX–	Transmit signal negative
3	RX+	Receive signal positive
4	Not used	Drain wire
5	Not used	Drain wire
6	RX–	Receive signal negative
7	Not used	Drain wire
8	Not used	Drain wire

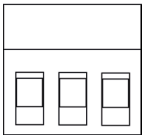
Redundancy Link Interface

When using two LD 810HSE Ex Linking Devices as a redundant set, the redundancy link interfaces (RDL) of both Linking Devices (primary and secondary) must be connected by a cable, thus forming a “redundancy link”. If the redundancy link is not installed during start-up (power-on), the LD 810HSE Ex will operate in non-redundant mode.



The interface is not galvanically isolated. Thus make sure that there is no potential difference between the two connected devices.

The maximum cable length is 0.5 m according to EMC requirements. The pin assignment is as follows:

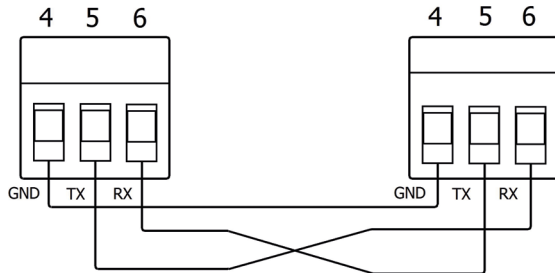
4	5	6	Pin	Signal	Description
			4	GND	Ground
			5	TX	Transmits data to redundant device.
			6	RX	Receives data from redundant device.



The receive (RX) and transmit (TX) signals must be crosslinked.

RDL of primary
Linking Device

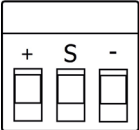
RDL of secondary
Linking Device



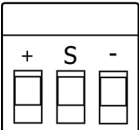
FF-H1 Interfaces

The LD 810HSE Ex provides 4 FOUNDATION™ Fieldbus H1 interfaces. These interfaces are named CH1 to CH4 and are used to connect an FF-H1 bus to the LD 810HSE Ex.

FF H1 Bus Line Channel 1

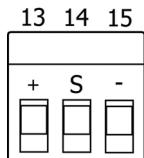
CH1	Pin	Signal	Description
7 8 9			
	7	+	Fieldbus +
	8	S	Fieldbus shield
	9	-	Fieldbus -

FF H1 Bus Line Channel 2

CH2	Pin	Signal	Description
10 11 12			
	10	+	Fieldbus +
	11	S	Fieldbus shield
	12	-	Fieldbus -

FF H1 Bus Line Channel 3

CH3

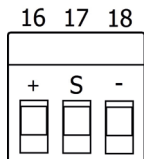


Pin	Signal	Description
-----	--------	-------------

13	+	Fieldbus +
14	S	Fieldbus shield
15	-	Fieldbus -

FF H1 Bus Line Channel 4

CH4



Pin	Signal	Description
-----	--------	-------------

16	+	Fieldbus +
17	S	Fieldbus shield
18	-	Fieldbus -



The fieldbus shield is not directly connected to functional earth. For EMC reasons, it is only connected via a capacitor. If a direct connection to functional earth or protective earth is required, you need to implement this separately.

Configuring LD 810HSE Ex

Although the Linking Device is delivered with a pre-configured IP address (192.168.0.10), it must be assigned an IP address from your LAN address range. Furthermore, subnet mask and gateway IP address must be set accordingly. This information is referred to as IP configuration.

The IP configuration can be changed via Ethernet by means of a web browser (HTTPS protocol, recommended). See the User Manual (2PAA114135-610) for the password of the web server interface. In addition, if a DHCP server is available, the LD 810HSE Ex can be configured to use a DHCP address.



Make sure that the LD 810HSE Ex and the PC are in the same network.

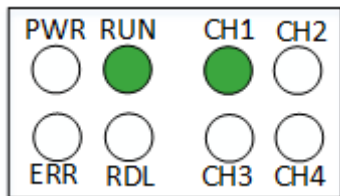









For commissioning of LD 810HSE Ex, refer to the LD 810HSE Ex User Manual (2PAA114135-610) available in the MyABB portal (<https://myportal.abb.com/home>).

Before commissioning of LD 810HSE Ex, make sure to use the latest and recommended Linking Device firmware released for your system environment.

Section 3 Status Indicators - LEDs













The Linking Device is equipped with eight LEDs on its front side:



Symbol	Meaning	Symbol	Meaning
	Off		Permanently green
			Flashing green
	Permanently red		Flashing green slowly (0.5 Hz)
	Flashing red		Flashing green quickly (5 Hz)









LED Indicators in Stand-Alone Mode (RUN and ERR)

The following table shows possible LED indications in stand-alone mode:

LEDs		Meaning
PWR	RUN	Start-up phase (approx. 7 seconds) During this phase, the redundancy role is determined.
		
		
ERR	RDL	
PWR	RUN	Non-redundant device, ready. The device is operational; it is not part of a redundant set.
		
		
ERR	RDL	
PWR	RUN	Permanent hardware fault detection during startup. A fatal error has been detected.
		
		
ERR	RDL	

LED Indicators in Redundant Mode (RUN, ERR, and RDL)

The redundancy link LED is used to indicate if traffic via the serial line is performed. It will flash green if a valid message is received. It will switch to red if serial communication is lost and it will be off if no serial response has been received after startup.

LEDs		Meaning
PWR	RUN	Start-up phase (approx. 7 seconds)
		During this phase, the redundancy role is determined.
		
ERR	RDL	
PWR	RUN	Non redundant device, ready
		The device is operational; it is not part of a redundant set. The primary device is set to redundant mode.
		The device is operational, acting as primary device in a redundant set. The secondary device is ready.
ERR	RDL	

PWR



RUN



Permanent hardware fault detection during startup

A fatal error has been detected. Possible failure could be a missing Ethernet connection.



ERR



RDL

PWR



RUN



Primary device or non-redundant device, hardware failure

The device is acting as non-redundant device, but a minor hardware failure has been detected during start-up. In the case of a primary device in a redundant set, the secondary device is not ready.



ERR



RDL

PWR



RUN



Either: Primary device or non-redundant device, failure

The device is acting as non-redundant device, but a failure has been detected.



ERR



RDL

Or: Secondary device, not ready

The device is acting as secondary device in a redundant set, but it is not ready to take over the primary role due to e. g. not synchronized configuration information or a non-operational redundancy link.

Or: Primary device or non-redundant device, failure

The device is acting as primary device in a redundant set or as non-redundant device, but a failure has been detected. In the case of a primary device in a redundant set or as a non-redundant set, the secondary device is not ready.

PWR



ERR

RUN



RDL

Secondary device, operational

The device is operational as secondary device in a redundant set. The configuration information has been successfully transferred from the primary device and the redundancy link is operational.

PWR



ERR

RUN



RDL

Secondary device, hardware failure

The device is acting as secondary device in a redundant set, but a hardware failure has been detected. Details are available on the Diagnostics page of the web server of the Linking Device.

PWR



ERR

RUN



RDL

Primary with H1 error state

PWR RUN Primary, not ready



ERR

RDL

PWR RUN Secondary with H1 error



ERR

RDL

PWR RUN Primary, configuration error









ERR

RDL

Status Indications of the 4 H1 Channels

The following table shows the meanings of the 4 channel H1 channel LEDs (CH1 ... CH4):

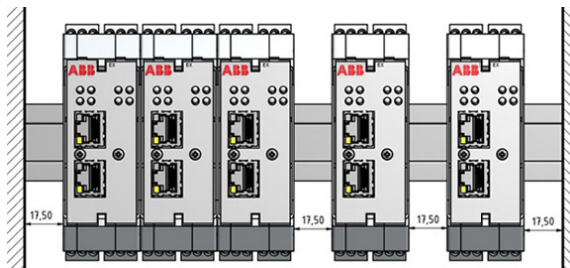
Symbol	Color/Lighting	Meaning
	Green	Visitor address
	Flashing Slowly (0.5 Hz)	Not in LAS role
	Flashing Quickly (5 Hz)	LAS role
	Red	No carrier or H1 link is disconnected
	Flashing Red	No token received
	Off	H1 link unused

Section 4 Specifications

Power supply	18VDC ... 32VDC; SELV/PELV supply mandatory The 4 FF H1 channels' output current is 10 mA each. Typical input current is 200 mA; maximum is 1 A (considering the rush-in current at switch-on).
FF-H1	4 FF-H1 channels, compliant with type 114 of the FF physical layer profile. Fieldbus voltage range is 9VDC ... 32VDC. Preferred voltage is 24VDC.
Ethernet	IEEE 802.3 100BASE-TX/10BASE-T
Minimum ambient operating temperature	−40 °C
Storage temperature	−40 °C ... +85 °C
Relative humidity	10 % ... 95 % (non-condensing)
Altitude	Must not exceed 2,000 m
Location	Indoor use only and no direct sunlight.
Coating	Conformal Coating based on ANSI/ISA-S71.04 G3.
Safety standard	IEC/EN/UL 61010-1, "Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements" and IEC/EN/UL 61010-2-201, "Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-201: Particular requirements for control equipment" (both with CB scheme)
Ingress protection	IP20

Depending on the installation position, different ambient operating temperatures are allowed:

Horizontal Installation Position



Ambient operating temperature (T_A) and installation distance and position

Maximum number of fieldbus channels used **Maximum fieldbus voltage** **Minimum distance** **Maximum permissible ambient temperature T_A**

4 32 V DC 0 mm 55 °C

2 24 V DC 0 mm 60 °C

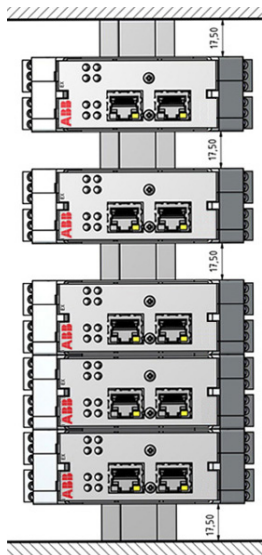
4 32 V DC 17.5 mm 65 °C

2 24 V DC 17.5 mm 70 °C



The maximum permissible ambient temperature values are also valid for a 180° rotated installation position.

Vertical Installation Position	Maximum number of fieldbus channels used	Maximum fieldbus voltage	Minimum distance	Maximum permissible ambient temperature T_A
--------------------------------	--	--------------------------	------------------	---



4	32 V DC	0 mm	40 °C
---	---------	------	-------

2	24 V DC	0 mm	50 °C
---	---------	------	-------

4	32 V DC	17.5 mm	55 °C
---	---------	---------	-------

2	24 V DC	17.5 mm	60 °C
---	---------	---------	-------



The maximum permissible ambient temperature values are also valid for a 180° rotated installation position.

Section 5 Manufacturer's Declaration

This device complies with the requirements of the EC directive 2014/30/EU, "Electromagnetic Compatibility" (EMC directive). It meets the following harmonized standards:

- EN 55011 - Industrial, scientific and medical (ISM) devices - radio disturbance - limits and methods of measurement
- EN 55032 - Electromagnetic compatibility of multimedia equipment (MME) and interference emission
- EN 61000-6-4 - Electromagnetic compatibility (EMC); part 6-4: generic standard – Emission standard for industrial environments
- EN 61000-6-2 - Electromagnetic compatibility (EMC); part 6-2: generic standard - Immunity for industrial environments



To fulfill the EMC requirements, the other components of your installation (DC adapter, Industrial Ethernet devices, etc.) also have to meet the EMC requirements. A shielded cable must be used. In addition, the cable shield must be grounded properly.

RoHS

RoHS

2011/165/EU

The LD 810HSE Ex device is RoHS compliant.

WEEE



Electrical and electronic equipment must be disposed of separately from normal waste at the end of its operational lifetime. Packaging material and worn components shall be disposed of according to the regulations applicable in the country of installation.

FCC



This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures!

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

VCCI



This Class A product conforms to the regulations of Voluntary Control Council for Interference (VCCI) by Information Technology Equipment.

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