FB-12SP ISO; FB-8SP-ISO

Isolated block device couplers for Zone 1 installation



Data sheet
3757_en_A

© PHOENIX CONTACT 2017-02-15

1 Description

The FB8SP-ISO and FB12SP-ISO device couplers are suitable for use in FOUNDATION Fieldbus™ and PROFIBUS PA applications. They provide an interface between the fieldbus trunk cable and intrinsically safe field devices. Limited width on the mounting rail reduces the required footprint and weight of the field enclosure.

The FB12(8)SP-ISO couplers connect to the trunk utilizing a trunk-in connector terminal block. Termination of the segment is done utilizing a bridge connector, ensuring termination is always available and error free. The single-sided plug configuration makes wiring in a field enclosure easy.

The device couplers can be installed in a Zone 1 hazardous location utilizing an approved enclosure.

The device couplers feature short circuit protection to the trunk. Multiple isolation zones provide data integrity and shielding options for all applications. A spur fault protection circuit is incorporated into the device coupler and turns off the spur when an overcurrent fault is detected, eliminating data interruption to the trunk.

Diagnostic LEDs include DC OK and individual spur fault indication on the segment.

Make sure you always use the latest documentation.
It can be downloaded at phoenixcontact.com.

This document is valid for all products listed in the “Ordering data” on page 2.

2 Ordering data

Products

Description	Type	Order No.	Pcs./Pkt.
Device coupler, 8-spur field barrier for Zone 1 installation	FB8SP-ISO	2316311	1
Device coupler, 12-spur field barrier for Zone 1 installation	FB12SP-ISO	2316312	1

Accessories

Description	Type	Order No.	Pcs./Pkt.
Power supply plug, 28 V DC, 500 mA	FB-PS-PLUG-24DC/28DC/0.5/EX	2316132	1
Power supply base, four-channel, redundant fieldbus with D-SUB 25 socket host connector	FB-PS-MB-25DSUB/EX	2316146	1
Power supply base, four-channel, redundant fieldbus with Yokogawa host connector	FB-PS-MB-Y/EX	2316148	1
Power supply base, four-channel, redundant fieldbus with Invesys host connector	FB-PS-MB-I/EX	2316149	1
Base, power supply	FB-PS-BASE/EXS	2316145	1
Surge protection, for Zone 1 trunk, M20	S-PT-EX-24DC	2800034	1
Surge protection, for Zone 1 trunk, 1/2-in.	S-PT-EX-24DC-1/2”	2800035	1
Axioline shield connection set, contains 2 busbars and 2 clamps	AXL SHIELD SET		1
Bus bar, 2000 mm	NLS-CU 3/10 SN 2000M	0402006	1
Clamp, shield connection	SK 5	3025338	50
Clamp, shield connection, black	AKG 4 BK-EX	0421058	1
Clamp, shield connection, blue	AKG 4 BU-EX	0421016	1
Clamp, shield connection, green/yellow	AKG 4 GNYE-EX	0421045	1

3 Technical data

General data	
Number of spurs	
FB8SP-ISO	8
FB12SP-ISO	12
Number of spurs per segment	16
Maximum number of couplers per segment	2
Ambient temperature, operating	-40 … 80°C
Ambient temperature, storage/transport	-40 … 85°C
Permissible relative humidity	≤95%, non-condensing
Degree of protection	IP20
	IP30 cover over trunk connections
Flammability rating, UL	V0
Mounting	NS35 (EN 60715)
Dimensions (H x W x D)	142 x 279 x 66 mm
Weight	
FB8SP-ISO	970 g
FB12SP-ISO	1050 g
Connection type	Screw-clamp terminals, individually removable for trunk and spur
Conductor cross section	0.2 … 2.5 mm² (24 … 12 AWG)

Electrical data

Maximum current draw of spur devices	35 mA
Maximum short-circuit current on spur	45 mA peak, 0 mA state in foldback
Supply voltage, minimum	16.0 V DC
Supply voltage, maximum	32.0 V DC
Rated current, trunk in to trunk out	≤2.0 A
Voltage drop, trunk in to trunk out	≤0.2 V
Termination	100 Ω, external removable bridge
Trunk voltage protection	Active, if voltage exceeds 37 V
Current consumption	See “Current consumption” on page 4
Power dissipation, maximum	
FB8SP-ISO	2.8 W
FB12SP-ISO	4.5 W
Rated voltage per spur	10 … 14 V DC
Galvanic isolation	
Trunk to spurs	1500 V AC
Spur to spur (between groups of four spurs)	500 V AC

Ex area ratings

Temperature T_a	-40 … 80°C
Voltage U_m	253 V
Voltage U_o	16.7 V DC
Current I_o	250 mA
Capacitance C_i	0 F
Inductance L_i	0 mH
Capacitance C_o, IIB/IIC	2.33 µF/0.39 µF
Inductance L_o, IIB/IIC	2.27 mH/0.56 mH

Conformance

FOUNDATION Fieldbus registered	FF-846
NAMUR	NE 21
EN	EN 61326
Shock resistance	15g 11 ms
Vibration resistance	2g, 10-150 Hz
Corrosive resistance	ANSI/ISA 71.04-1985 - Severity level G3

Approvals

ATEX	DEMKO 16ATEX 1689X II 2(1) G Ex eb ib mb [ia Ga] IIC T4 Gb II (1D) [Ex ia Da] IIIC FISCO power supply (spur)
IECEx	IECEx UL 16.0114X Ex eb ib mb [ia Ga] IIC T4 Gb [Ex ia Da] IIIC FISCO power supply (spur)
UL, USA/Canada	Install in Class I, Div. 2, Groups A, B, C, D Entity/FISCO spur to: Class I, Groups A, B, C, D; Class II, Groups E, F, G; Class III; Group IIIC Class I, Zone 1 AEx eb ib mb [ia Ga] IIC T4 Gb [AEx ia Da] IIIC FISCO power supply (spur) Ex eb ib mb [ia Ga] IIC T4 Gb [Ex ia Da] IIIC FISCO power supply (spur)

3.1 Current consumption

		Spur load				
	Trunk voltage	**No load**	**One spur @ 20 mA**	**All spurs @ 20 mA**	**All spurs @ 20 mA with one spur short circuit**	**All spurs @ 35 mA**
FB8SP-ISO	16 V	35 mA	55 mA	210 mA	235 mA	350 mA
	32 V	25 mA	35 mA	110 mA	125 mA	175 mA
FB12SP-ISO	16 V	50 mA	70 mA	315 mA	335 mA	550 mA
	32 V	35 mA	45 mA	165 mA	180 mA	265 mA

3.2 Dimensions

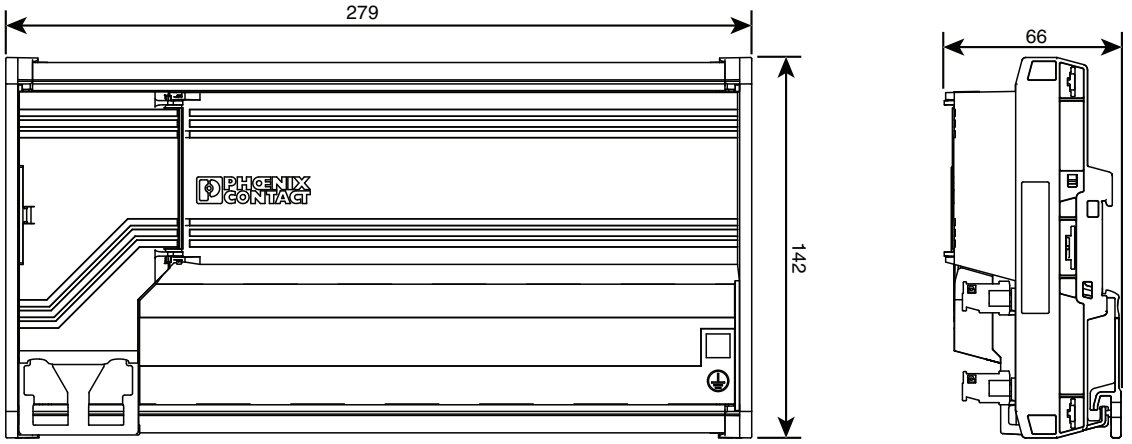


Figure 1 Dimensions

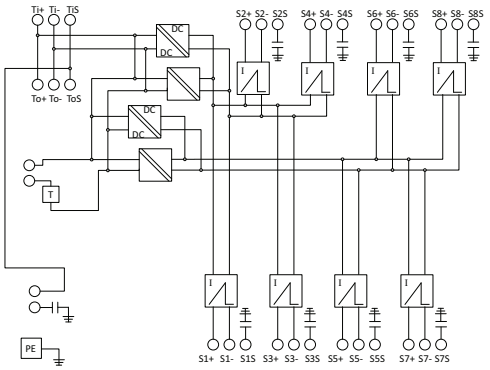


Figure 2 FB8SP-ISO block diagram

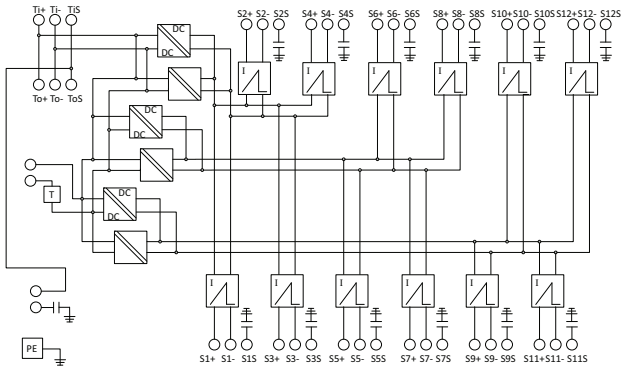
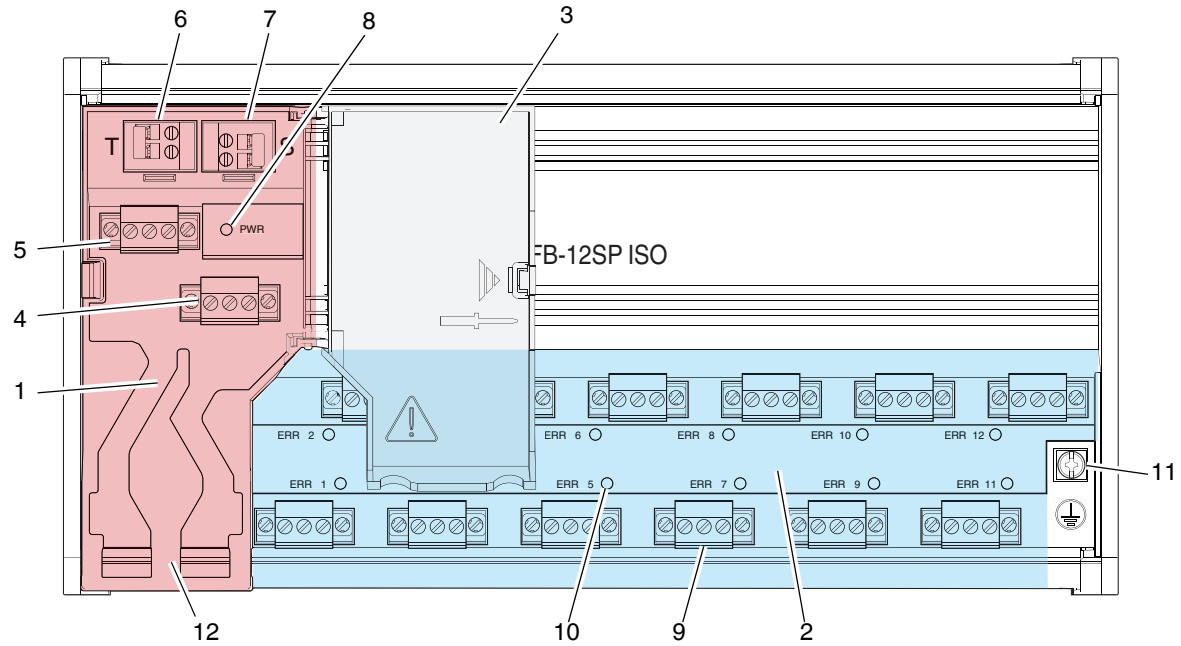


Figure 3 FB12SP-ISO block diagram

4 Structure



1 Ex e area (red shading)
2 Ex i area (blue shading)
3 Cover (shown open)
4 Trunk out connector
5 Trunk in connector
6 Terminator selection jumper
7 Shield section jumper
8 PWR LED
9 Spur connectors
10 Spur LEDs
11 Protective earth (PE) connection
12 Trunk cable tie

Figure 4 Structure (FB12SP-ISO shown)

5 Installation

The FB12(8)SP-ISO mounts on DIN rail.

5.1 Mounting

1. Secure the mounting rail to an appropriate surface.
2. Hook the FB12(8)SP-ISO over the top edge of the rail.
3. Rotate the device down until it latches onto the bottom edge of the rail.

5.2 Removal

1. Place a screwdriver in the latch release mechanism.
2. Gently pry the release until the latch releases.
3. Rotate the device up and lift it off the rail.

5.3 Trunk cover

DANGER:
Always remove power from the device coupler before opening the trunk cover, if installed in a hazardous area.

When installed in a Zone 1 hazardous area, the cover (IP30) conceals connections that are not energy limited. Spur connections are energy limited and do not need to be covered.

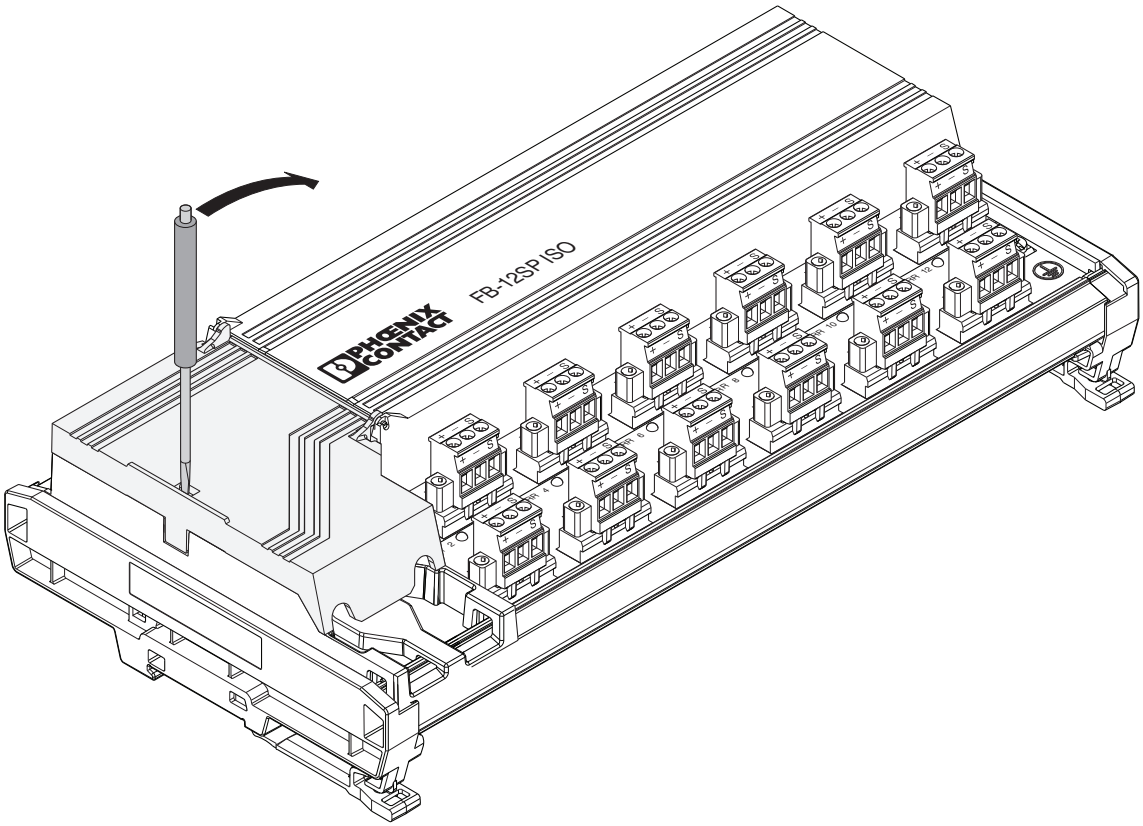


Figure 5 Trunk cover removal

1. Insert a slotted screwdriver into the access hole in the cover.
2. Use the screwdriver to release the latch.
3. Rotate the cover (it is hinged) back to reveal the trunk connections.

To install the cover, rotate the cover back into place and ensure that it snaps into the latch.

5.4 Connections

FOUNDATION Fieldbus and PROFIBUS PA network configurations are bus-type networks. Each device coupler includes removable trunk and spur connectors.

Connection	Label	Function
Trunk	TiS	Trunk in shield
	Ti-	Trunk in –
	Ti+	Trunk in +
	ToS	Trunk out shield
	To-	Trunk out –
	To+	Trunk out +
Spur	S*n*S	Spur *n* shield
	S*n*-	Spur *n* –
	S*n*+	Spur *n* +

where *n* indicates the spur number.

Couplers may have multiple spur connections.

Recommended stripping lengths are:

Trunk in	95 mm
Trunk out	70 mm
Spurs 2, 4, 6, 8, 10, 12	95 mm
Spurs 1, 3, 5, 7, 9, 11	60 mm

Molded into the housing are features that enable the use of cable ties to anchor the trunk cables for strain relief. The maximum cable tie width is 3.6 mm.

Protective ground terminal

The protective earth (PE) connection is a screw terminal. The #6-32 screw accepts 0.3 to 2.0 mm^2 (22 to 14 AWG) wire and appropriately sized ring-and-spade terminals.

5.5 Termination

A termination jumper is provided with each FB12(8)SP-ISO device. The jumper can be placed in one of two positions (see Figure 6):

– If the FB12(8)SP-ISO is at the end of the trunk, the termination jumper must be installed (default position).
– If the FB12(8)SP-ISO is not at the end of the trunk, the termination jumper must not be installed.

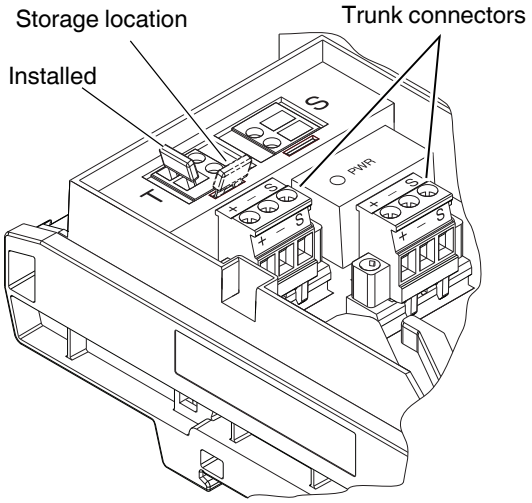


Figure 6 Termination jumper

The termination jumper can be stored on the device in case it is needed at a later time.

Connect the trunk out to the next trunk device.

The termination jumper should never be installed when the trunk out connector is utilized.

5.6 Cable shields and grounding

5.6.1 Spur shield

Each spur shield can be connected directly to local ground by using a grounded bus bar. Each spur cable shield can be coupled to local each via a 4.7 ηF capacitor by using the “S” terminal of the spur connector.

5.6.2 Trunk shield

The trunk cable shield can be connected to local ground by using a grounded bus bar.

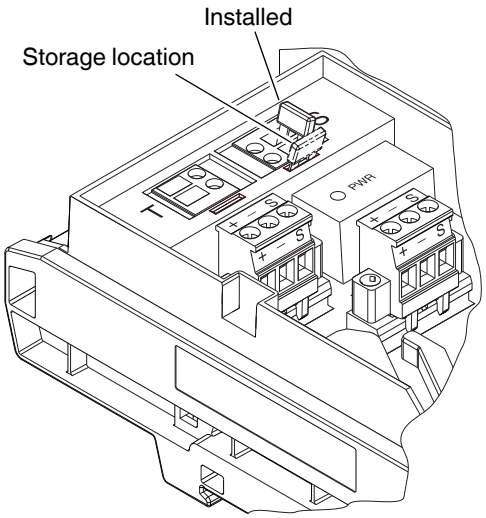


Figure 7 Trunk cable shield jumper

The trunk cable shield can be floated with respect to local ground by using the “S” terminal of the trunk connector and removing the shield jumper. The shield jumper can be stored on the device (default position) for use at a later time.

The trunk cable shield can be coupled to local ground via a 1.0 ηF capacitor by using the “S” terminal of the trunk connector and installing the shield jumper.

5.7 Shield configuration examples

Several different configurations for shielding/grounding can be used, depending upon the application.

The example illustrations are adapted from the FOUNDATION Fieldbus System Engineering Guide AG-181. Additional examples and information can be found in this document. See www.fieldcommgroup.org.

The term “ground”, as used by the FOUNDATION Fieldbus guide, is used interchangeably with the term “earth”.

Multi-point grounding (Figure 8)

If the application provides a high degree of equipotential bonding, the cable shield can be connected directly to ground at all points.

- Directly ground the trunk cable shield at the fieldbus power supply.
- Directly ground the trunk cable shield at the device coupler using the grounded bus bar.
- Directly ground the spur cable shields at the device coupler using the grounded bus bar.
- Directly ground the spur cable shields at the field devices.

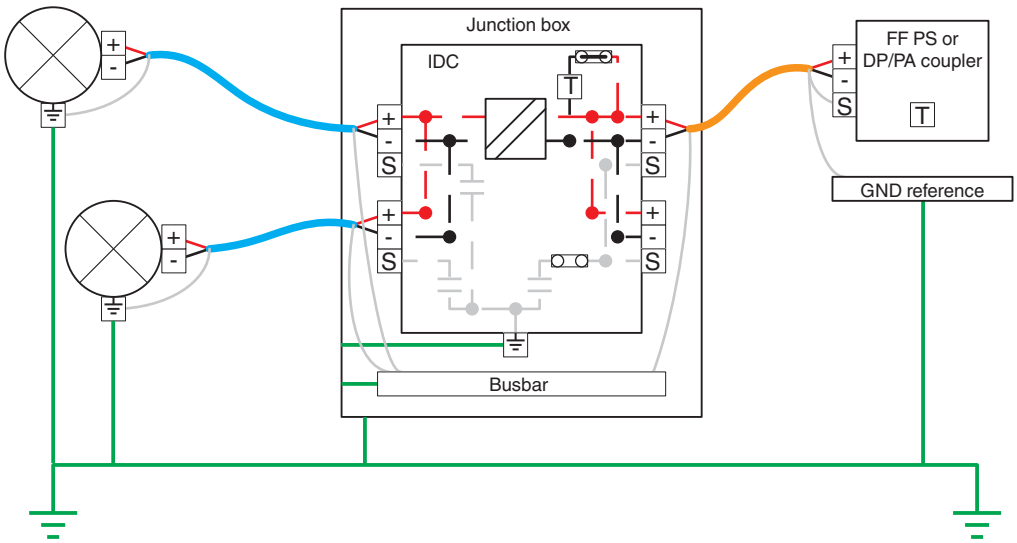


Figure 8 Multi-point shielding example

Dual-point grounding (Figure 9)

If equipotential bonding does not exist, the ground reference can be established in the field.

There is no continuity between the trunk cable shield and the spur cable shields.

- Directly ground the trunk cable shield at the fieldbus power supply.
- Float the trunk cable shield at the device coupler by using the “Trunk in” connector and removing the shield jumper.
- Directly ground the spur cable shields at the device coupler using the grounded bus bar.
- Float the spur cable shields at the field devices.

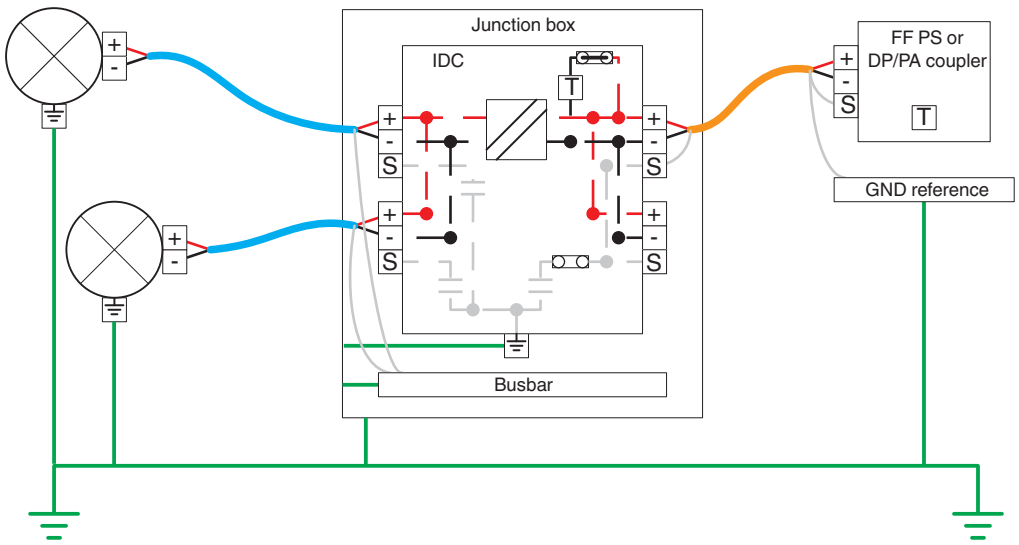


Figure 9 Dual-point shielding example

Capacitive/single-point grounding (Figure 10)

To maintain a single direct connection to ground, the cable shields can be capacitively coupled to local ground at the device coupler.

– Directly ground the trunk cable shield at the fieldbus power supply.
– Capacitively couple the trunk shield to ground at the device coupler using the “Trunk in” connector and install the “Shield” jumper.
– Capacitively couple the spur cable shields to ground at the device coupler by using the spur connectors.
– Float the spur cable shields at the field devices.

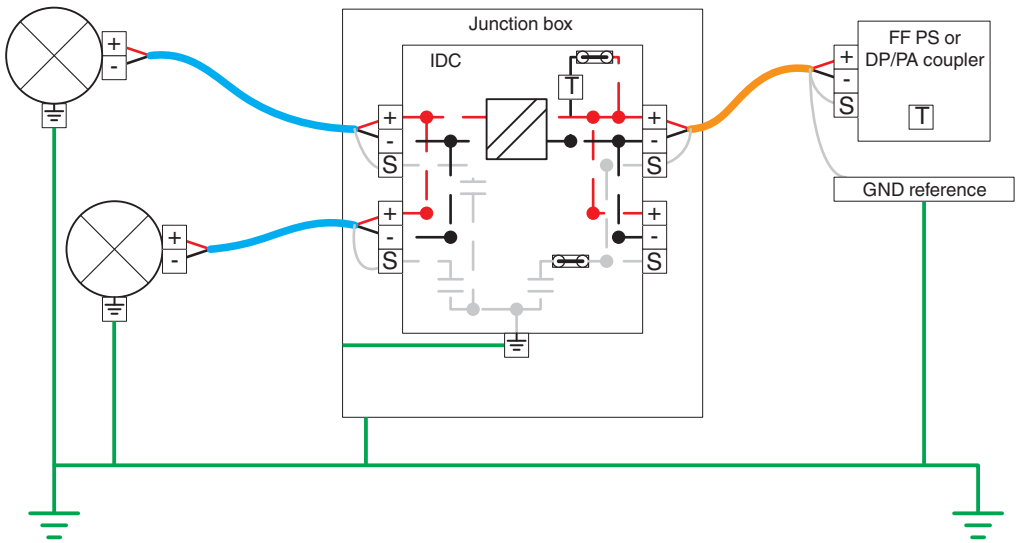


Figure 10 Capacitive/Single-point shielding example

6 Maintenance

Status LEDs

Label	Color	Function
PWR	Green	On indicates power present
ERR*n*	Red	On indicates a short on spur *n*[1]

[1] Each ERR LED will illuminate during power up. It will turn off when the spur is available.

7 Power management

7.1 Startup

The device coupler employs staggered spur startup to limit the stress placed on the fieldbus power supply during commissioning. Upon power up, the spurs will become active in groups of four. While the spurs are inactive, the red ERR LEDs are illuminated.

7.2 Spur fault

When an overcurrent fault is detected on a spur, that spur is deactivated, providing no power to the field device. After a period of time (around 10 seconds), the spur attempts to reactivate. If a fault is still present, the spur remains off. The spur will continue to try to reactivate until the fault condition is cleared.

The current consumption with a short circuit (see “Current consumption” on page 4) is the peak current that can appear during a fault; the steady-state value is lower.

By shutting off the spur, the device coupler minimizes the impact to the trunk due to intermittent spur faults. It also reduces the power loss in the device coupler, especially in the instance of multiple spur faults.