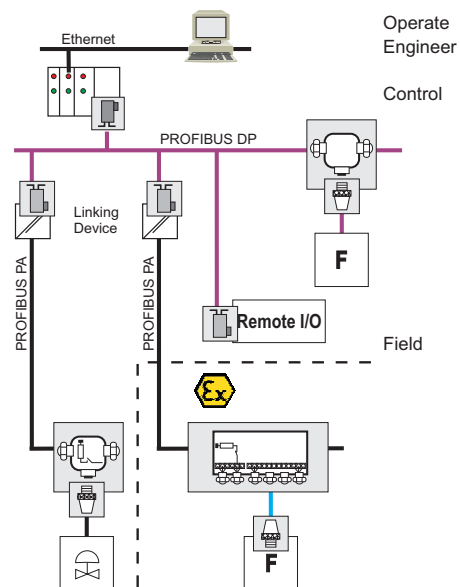


# Installation suggestion PROFIBUS



## PROFIBUS DP

- Passive T-junction and active bus termination in the Non-Ex area
- Remote I/Os and field devices in Ex (Haz.) and Non-Ex area
- Redundancy concept with RLM01

## PROFIBUS DP/PA

- Power Hub system

## PROFIBUS PA

- FieldBarrier in Ex (Haz.) area
- Passive T and 4-way junction in Non-Ex area

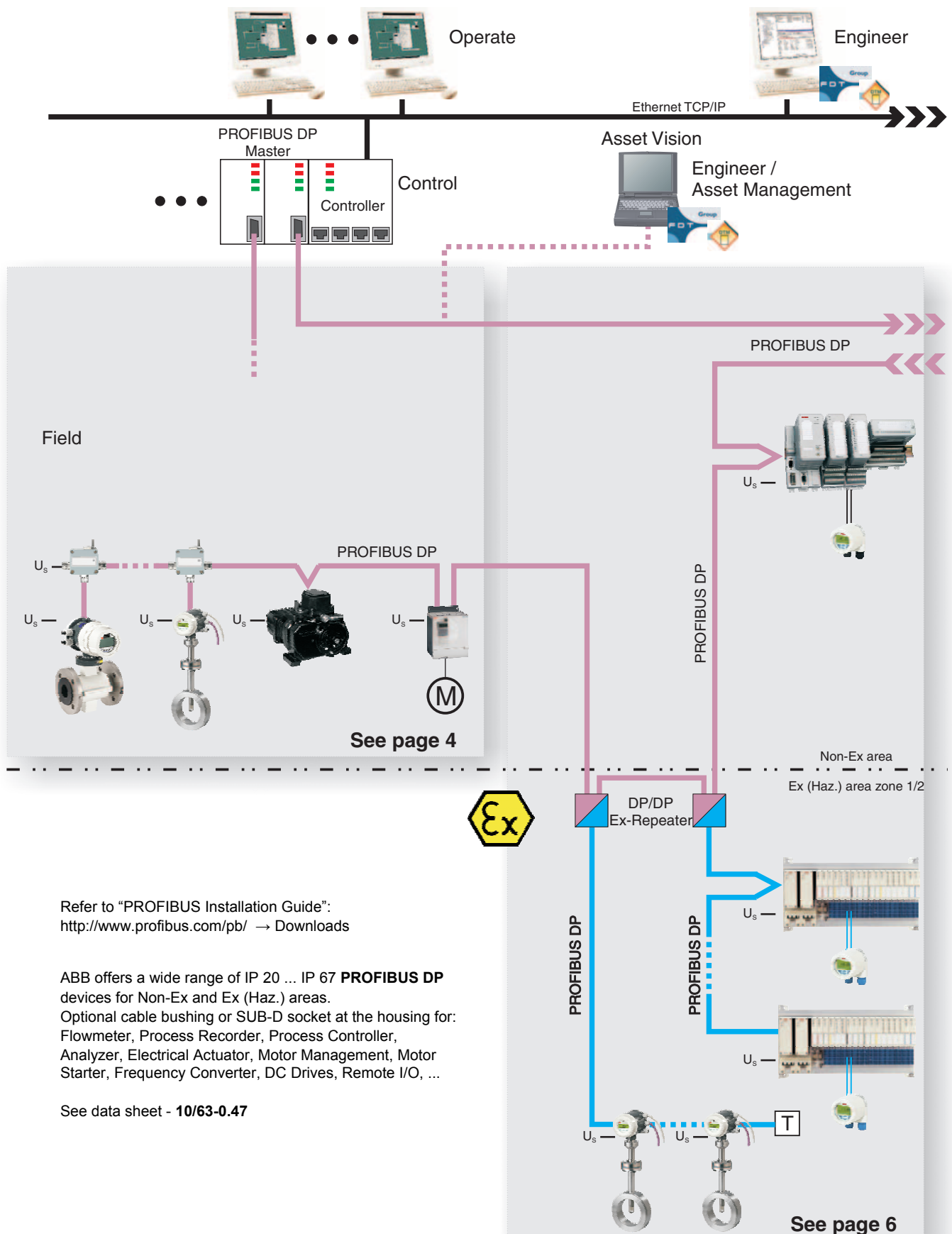
## Shielding and grounding

- PROFIBUS DP
- PROFIBUS PA

## PROFIBUS PA-layout example

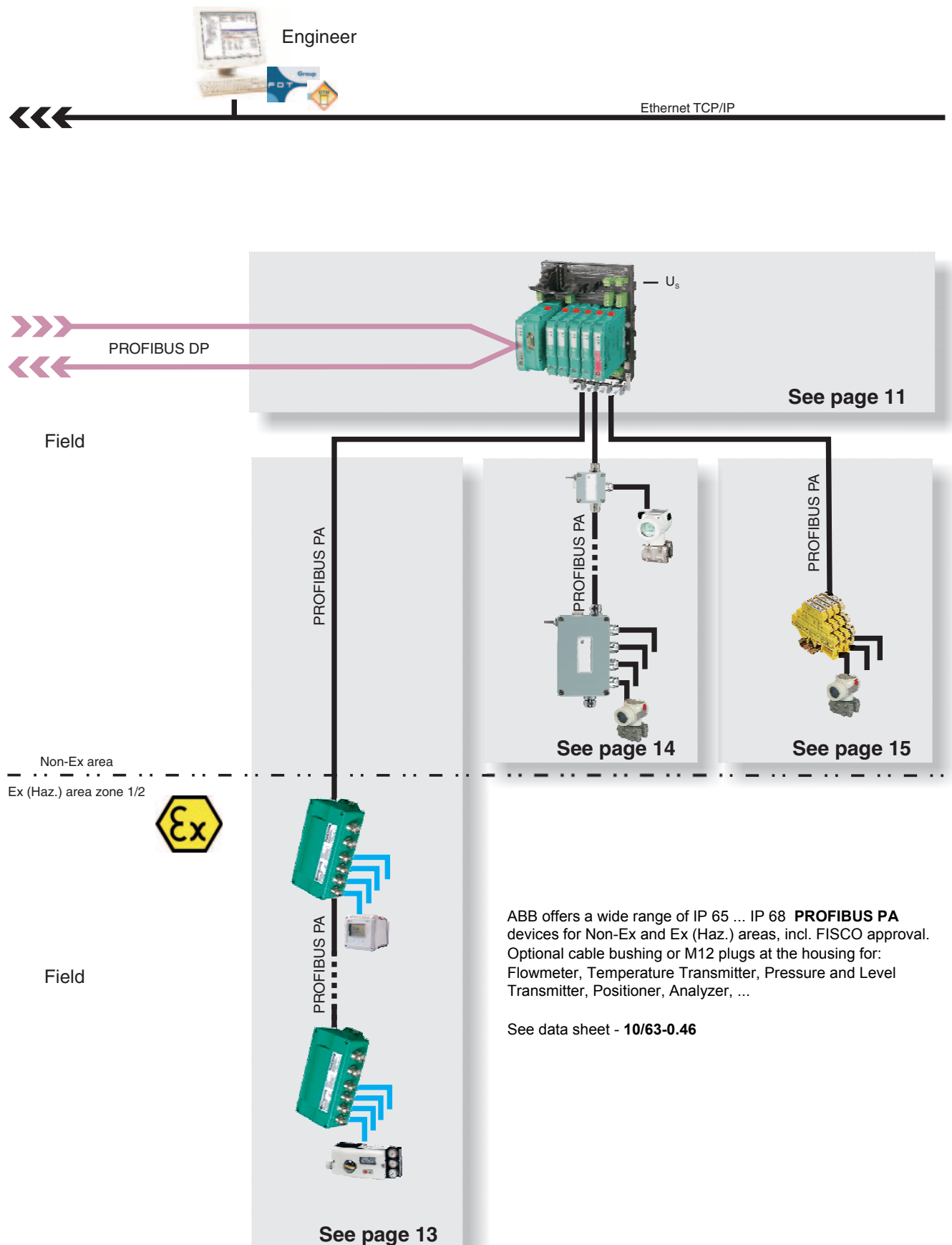
- FieldBarrier in Ex (Haz.) area
- Passive 4-way junction in Non-Ex area

### Overview



M00555\_EN

## Overview



M00556\_EN

## PROFIBUS DP - Passive T junction and active bus termination in the Non-Ex area

The diagram illustrates a PROFIBUS DP network topology. At the top, an Ethernet TCP/IP connection is shown. Below it, a PROFIBUS DP Master/Controller is connected to a passive T-junction. This junction branches out to several components: a Linking Device DP/PA, Remote I/Os and Field devices in an Ex area, a Repeater DP/DP for copper RS 485, FO, IR, etc., and Field devices. The main cable is labeled 'PROFIBUS DP' and is shown in violet. Various optional components are indicated with dashed lines and 'Option' labels. Grounding points are marked as  $L_T$  and  $L_S$ . A 24V DC power source is shown at the bottom left.

|   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Catalog No.     | Data sheet    |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------|
| 1 | <b>DTM Bundle &amp; DATxxx (option)</b><br>- Asset Vision - Device Management Tools for configuration and parameterization of PROFIBUS DP/PA and HART field devices incl. open FDT interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 63801-9 820 027 | DS/DTM/DAT200 |
| 2 | <b>NDA121-NO (option)</b><br>- PROFIBUS DP/PC Adapter for USB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 63631-9 890 002 | 10/63-6.31    |
| 3 | <b>NDE230-NO</b> - DP cable plug, 9-pos. SUB-D<br>- incl. switchable bus termination and programming connection SUB-D, $\leq 12$ MBit/s, IP 40<br>♦ PINs: <b>IN:</b> 1A = Rx/D/TxD-N, 1B = Rx/D/TxD-P<br><b>OUT:</b> 2A = Rx/D/TxD-N, 2B = Rx/D/TxD-P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 63641-9 890 119 | 10/63-6.40    |
| 4 | <b>NDE220-NO</b> - DP cable plug, 9-pos. SUB-D<br>- incl. switchable bus termination, $\leq 12$ MBit/s, IP 40<br>♦ PINs: <b>IN:</b> 1A = Rx/D/TxD-N, 1B = Rx/D/TxD-P<br><b>OUT:</b> 2A = Rx/D/TxD-N, 2B = Rx/D/TxD-P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 63641-9 890 118 | 10/63-6.40    |
| 5 | <b>PROFIBUS DP cable, violet</b><br><b>NDC110-NO</b> - 2 x 0.32 mm <sup>2</sup> (AWG22/1), 65/330/1000 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 63647-9 890 14x | 10/63-6.47    |
| 6 | <b>NDE210-NO</b> - DP cable plug, 9-pos. SUB-D<br>- without bus termination, $\leq 12$ MBit/s, IP 40<br>♦ PINs: <b>IN:</b> 1A = Rx/D/TxD-N, 1B = Rx/D/TxD-P<br><b>OUT:</b> 2A = Rx/D/TxD-N, 2B = Rx/D/TxD-P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 63641-9 890 117 | 10/63-6.40    |
| 7 | <b>NDJ120-NO</b> - DP T-junction, $\leq 1.5$ MBit/s<br>- 2x EMC cable bushing, without bus termination, aluminum housing, IP 66 (Shielding braid on ground via cable bushing)<br>♦ PINs: trunk cable ( $L_T$ ): <b>IN/OUT:</b> A = Rx/D/TxD-N, B = Rx/D/TxD-P<br>(Alternative, not shown)<br><b>NDJ130-NO</b> - DP T-junction, $\leq 1.5$ MBit/s<br>- 3x EMC cable bushing, without bus termination, aluminum housing, IP 66<br><b>NDJ120-NOS</b> - DP T-junction, $\leq 1.5$ MBit/s<br>- 2x cable bushing (plastic), without bus termination, stainless steel housing, IP 66<br>♦ PINs: trunk cable ( $L_T$ ): <b>IN/OUT:</b> A = Rx/D/TxD-N, B = Rx/D/TxD-P, S = shielding                                                                                                                                                                                                                                                                                    | 63640-9 890 109 | 10/63-6.40    |
| 8 | <b>NDE100-NE</b> - DP cable plug<br>- metal housing, M12, for Ex and Non-Ex areas, IP 67<br>♦ PINs: 2 = Rx/D/TxD-N, 4 = Rx/D/TxD-P, 5 = shielding<br>(Alternative, not shown)<br><b>NDJ122-NO</b> - DP T-junction, $\leq 1.5$ MBit/s<br>- 2x EMC cable bushing, incl. active bus termination, aluminum housing, IP 66 (Shielding braid on ground via cable bushing)<br>♦ PINs: trunk cable ( $L_T$ ): ( $L_T$ ): <b>IN:</b> A = Rx/D/TxD-N, B = Rx/D/TxD-P<br>♦ Power-PINs: 24V = (+), 0V = (-)<br>(Alternative, not shown)<br><b>NDJ132-NO</b> - DP T-junction, $\leq 1.5$ MBit/s<br>- 3x EMC cable bushing, incl. active bus termination, aluminum housing, IP 66<br><b>NDJ122-NOS</b> - DP T-junction, $\leq 1.5$ MBit/s<br>- 2x cable bushing (plastic), incl. active bus termination, stainless steel housing, IP 66<br>♦ PINs: PINs: trunk cable ( $L_T$ ): <b>IN:</b> A = Rx/D/TxD-N, B = Rx/D/TxD-P, S = shielding<br>♦ Power-PINs: 24V = (+), 0V = (-) | 63641-9 890 113 | 10/63-6.40    |
| 9 | <b>Color coding:</b><br><b>PROFIBUS DP:</b> Rx/D/TxD-P = red<br>Rx/D/TxD-N = green<br><b>PROFIBUS PA:</b> PA+ = red<br>PA- = green                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |               |

M00540\_EN

**Attention (valid for all pages): For the PIN coding the respective product data sheet is relevant!**

## Limits and rules!

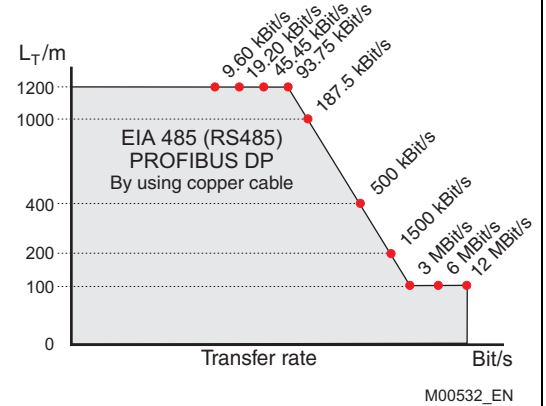
When using the ABB Fieldbus accessories:

**per PROFIBUS Line** (Line = Starting at the DP Master up to the last DP/PA Slave)

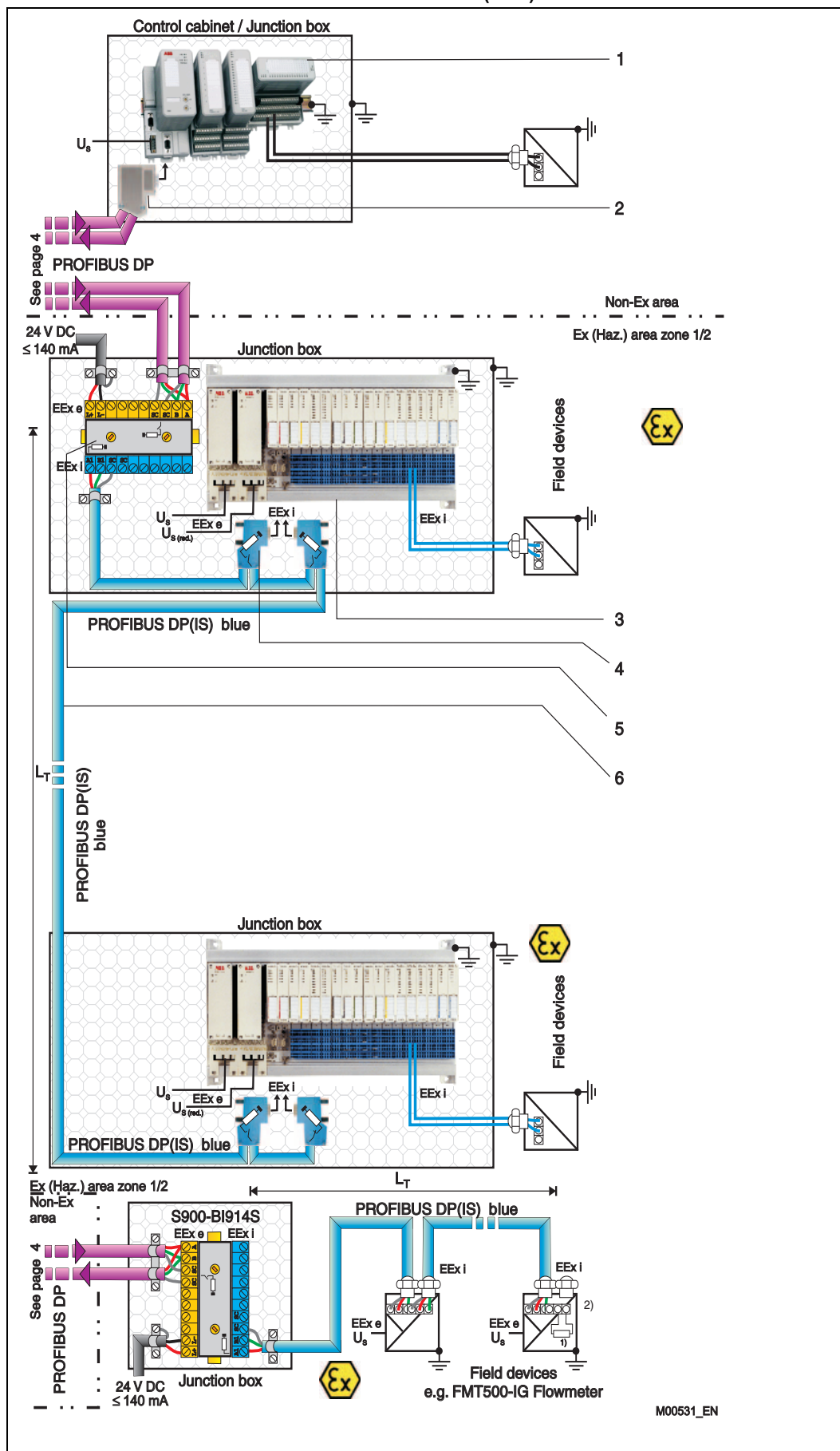
- approx. 4 up to 8 DP segments by Repeater (see data sheets of the Repeater)
- recommended DP transfer rate 500 ... 1500 kBit/s
- the slowest DP subscriber sets the transfer rate of the DP line
- number of PROFIBUS DP and PA subscribers  $\leq 126$  (Addresses 0 ... 125)

**per PROFIBUS DP segment:**

- number of DP subscriber  $\leq 32$  (subscriber = device with / without PROFIBUS address)
- bus termination each at the beginning and the end of every DP segment necessary!
- trunk cable length ( $L_T$ ) see diagram (length depending on transfer rate)
- spur cable length ( $L_S$ ), at  $\leq 1500$  kBit/s:  $L_S \leq 0.25$  m, at  $> 1500$  kBit/s:  $L_S = 0.00$  m!
  - at **1500 kBit/s** and ABB DP cable type A:
    - Total sum of all spur cable length ( $L_S$ )  $\leq 6.60$  m,
    - trunk cable length ( $L_T$ )  $> 6.60$  m,  $L_{total} = L_T + (\sum L_S) \leq 200$  m,
    - max. 22 DP subscribers (=  $6.60 \text{ m} / (0.25 \text{ m} + 0.05 \text{ m reserve})$ )



## PROFIBUS DP - Remote I/Os and field devices in Ex (Haz.) and Non-Ex area



**Color coding:**

PROFIBUS DP:

RxD/TxD-P = red

RxD/TxD-N = green

PROFIBUS PA:

PA+ = red

PA- = green

1) Alternative to increase the protocol stability:  
External active bus termination with S900-BI914S at the end of the DP segment.

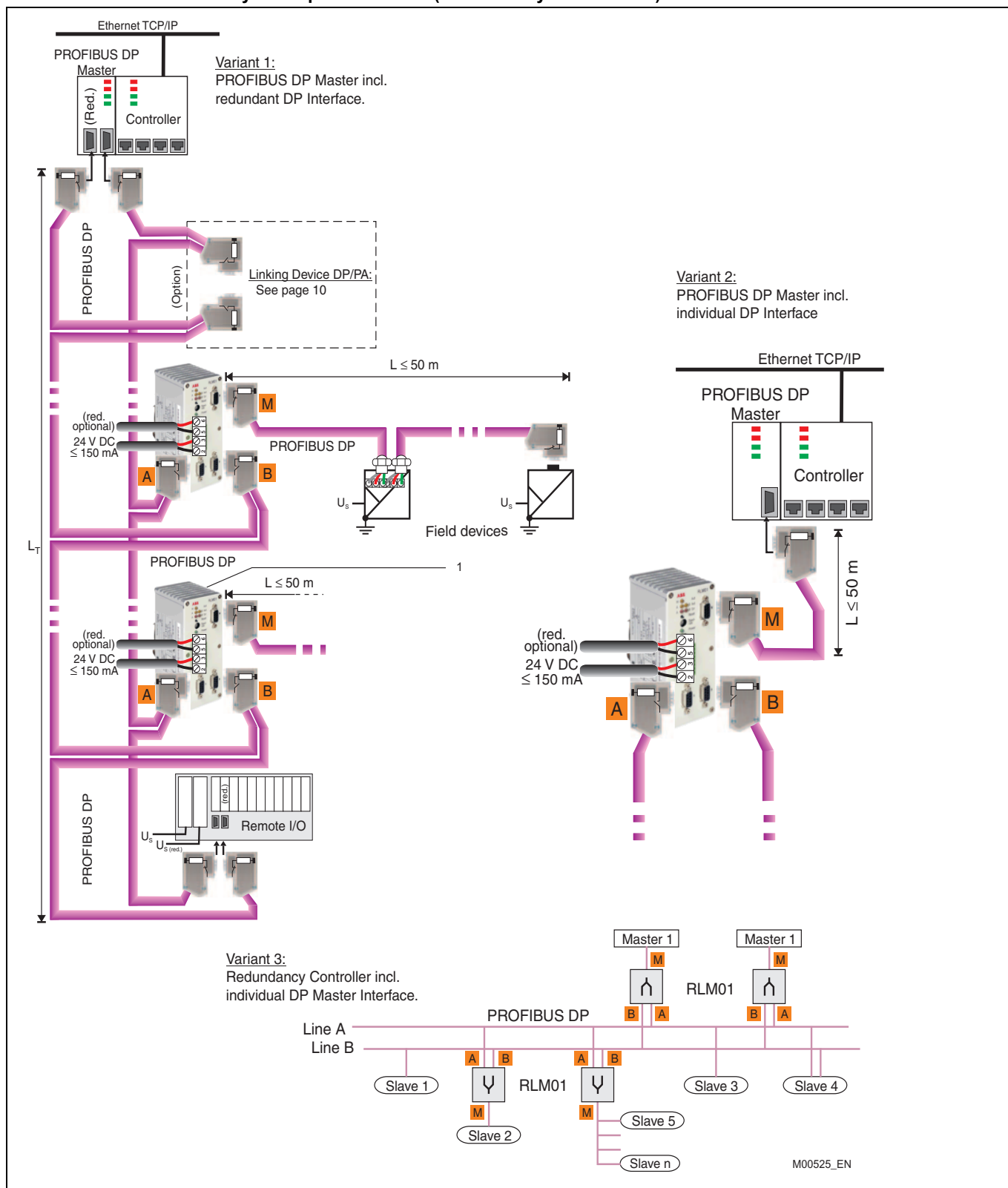
2) Number of field devices per DP EEx i segment are calculate explicitly and depend on the Repeater type, the DP cable, the Field devices and the bus termination.

You can find more information  
on the following page.

## PROFIBUS – Installation suggestion

|   | Description (for page 6)                                                                                                                                                                                                                                                                                                                                                                                                                                               | Catalog No.     | Data sheets                        |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------------------------|
| 1 | <b>S800</b> - Remote I/O System<br>- DP / DPV1 bus up to 12 MBit/s, [EEx ia]<br>- more information see Product Guide                                                                                                                                                                                                                                                                                                                                                   | On request      | 3BSE015969R5001                    |
| 2 | <b>NDE210-NO</b> - DP cable plug, 9-pos. SUB-D<br>♦ PINs: <b>IN:</b> 1A = RxD/TxD-N, 1B = RxD/TxD-P<br><b>OUT:</b> 2A = RxD/TxD-N, 2B = RxD/TxD-P<br><b>NDE220-NO, NDE230-NO</b> (Alternative, not shown)<br>DP cable plug, 9-pos. SUB-D                                                                                                                                                                                                                               | 63641-9 890 117 | 10/63-6.40                         |
| 3 | <b>S900</b> - Remote I/O System<br>- for Ex (Haz.) (Zone 1/2) and Non-Ex area, DP / DPV1 bus up to 1.5 MBit/s<br>- More information how to build up the S900 System and limits see manual.<br>(e.g.: number of S900/CB220, Non-Ex or Ex (Haz.) zone 2, FO, redundancy, power supply filter, ...)                                                                                                                                                                       | On request      | 3BDD010420R0101<br>3BDD010421R0101 |
| 4 | <b>S900-BP910S</b> - DP cable plug<br>- 9-pos SUB-D, "blue", used for the EEx i DP cable, incl. switchable bus termination<br>♦ PINs: <b>IN/OUT:</b> A = RxD/TxD-N, B = RxD/TxD-P                                                                                                                                                                                                                                                                                      | 3KDE175831L9100 | 3BDD010420R0101                    |
| 5 | <b>S900-BI914S</b> - DP Repeater<br>- Build up in the Ex (Haz.) area, DIN rail mounted, RS485 Non-Ex and EEx i isolator,<br>1x DP/EEx i output, manual adjustment of the DP transfer rate up to 1.5 MBit/s, switchable DP bus termination (EEx e side).<br>♦ PINs (EEx e): <b>IN/OUT:</b> A = RxD/TxD-P, B = RxD/TxD-N, SC = DP shielding, <u>not</u> grounded!<br>♦ PINs (EEx i): <b>OUT:</b> A1 = RxD/TxD-P, B1 = RxD/TxD-N, SC = DP shielding, <u>not</u> grounded! | 3BDH000649R1    | On request                         |
| 6 | PROFIBUS DP cable, blue! (Intrinsic safety)<br><b>NDC110-EX</b> - 2 x 0.32 mm <sup>2</sup> (AWG22/1), 65/330/1000 m                                                                                                                                                                                                                                                                                                                                                    | 63647-9 890 14x | 10/63-6.47                         |

PROFIBUS DP - Redundancy concept with RLM01 (Redundancy Link Module)

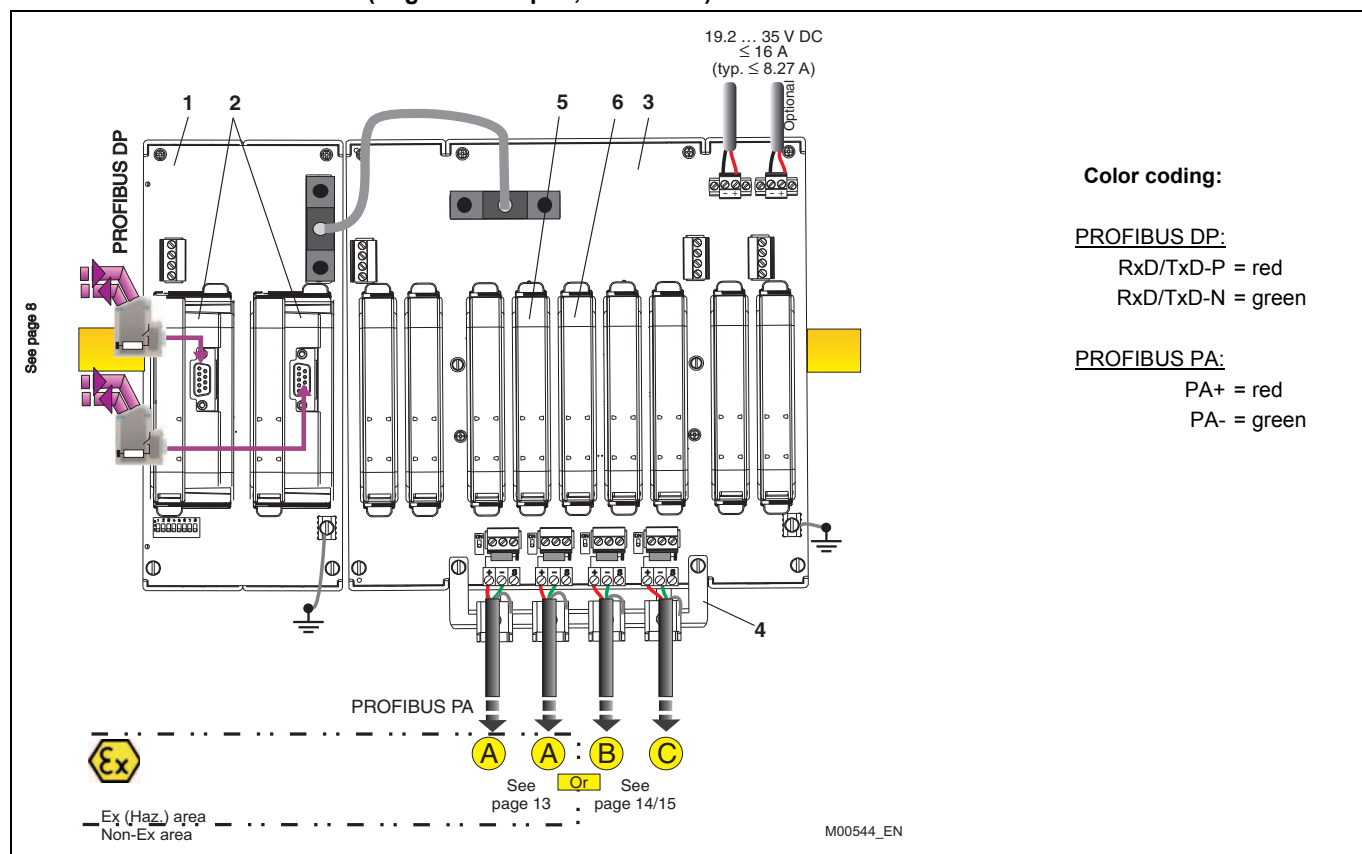


| Description                                                                                                                                                                                                                                                                                                                           | Catalog No.  | Data sheet      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|
| <b>1 RLM01 - DP Redundancy Link Module</b><br>- Converts a non-redundant DP line (M) to two redundant DP lines (A / B) and vice versa [redundant DP lines (A / B) to DP line (M)].<br>- Transfer rate 9.6 kBit/s ... 12 MBit/s, IP 20<br>♦ Power PINs: <b>individual:</b> 3 = (+), 2 = (-), 1 = PE <b>redundant:</b> 6 = (+), 5 = (-) | 3BDZ000398R1 | 3BDD011641R0301 |



# PROFIBUS – Installation suggestion

## PROFIBUS DP/PA - Power Hub (Segment Coupler, redundant)



### i

#### Important!

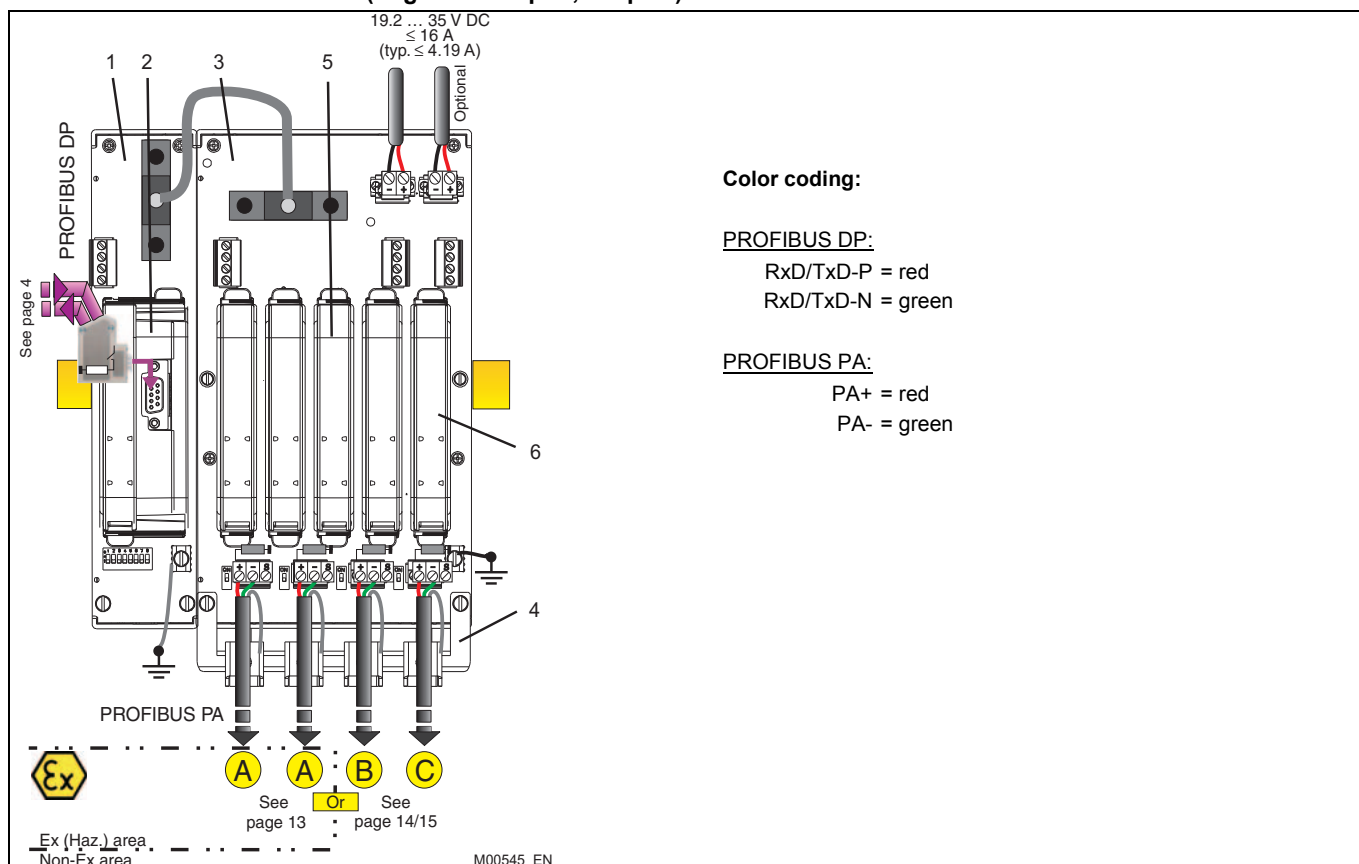
- With a redundant gateway configuration, an address must be set by means of a DIP switch.
- The addresses "1" & "2" must not be assigned for PA field devices.
- Max. 30 PA field devices per power supply module (red.).
- All modules can be combined with all other modules.
- Do not use NDE2x0-NO PROFIBUS DP cable connectors for applications in hazardous area Zone 2/Class I, Div. 2.
- First check that the diagnostic DTMs have been approved for your frame application

The four system combinations below are possible:

- Redundant connection & redundant supply
- Redundant connection & simple supply
- Simple connection & redundant supply
- Simple connection & simple supply

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Catalog No. | Data sheet |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------|
| <b>1 MB-FB-GTR</b><br>Motherboard, for 2x DP/PA gateway modules (redundant), DIN top-hat rail, IP 20, II 3G EEx nA IIC T4, Zone 2/Class I, Div. 2.<br>- Includes ACC-MB-HGC SUB-D cable, 25-pin, for connecting the motherboards<br>- Includes DIP switch for address assignment                                                                                                                                                                                                                                                                                             | On request  |            |
| <b>2 HD2-GTR-4PA</b><br>PROFIBUS DP/PA gateway, DP bus up to 12 Mbit/s, transparent, for 4x power supply modules, IP 20, II 3G EEx nA II T4, Zone 2/Class I, Div. 2.<br>- (Optional) DTM.FC for gateway parameterization, etc., can only be used if addresses assigned                                                                                                                                                                                                                                                                                                       | On request  |            |
| <b>3 MB-FB-4R.GEN</b><br>Motherboard, for 2x4 power supply modules (redundant) and for 1x diagnostic module, 4x switchable PA bus terminators, DIN top-hat rail, IP 20, II 3G EEx nA IIC T4, Zone 2/Class I, Div. 2.<br>♦ Power PINs: <b>PRI</b> : + = (+), - = GND, <b>SEC</b> (optional): + = (+), - = GND<br>♦ PA PINs: <b>OUT segment 1</b> : + = PA+, - = PA-, ACC-MB-HSK = shield <b>and!</b> motherboard grounding firmly<br><b>OUT segment 2/3/4</b> : + = PA+, - = PA-, ACC-MB-HSK = shield                                                                         | On request  |            |
| <b>4 ACC-MB-HSK</b> (optional)<br>Grounding connection set for large-surface connection of the trunk cable shields.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | On request  |            |
| <b>5 Power supply modules</b><br>PA bus fixed at 31.25 kbit/s, IP 20, II 3G EEx nA II T4, Zone 2/Class I, Div. 2.<br><b>HD2-FBPS-1.500</b> (for "A", "B", or "C")<br>- PA power feed: $U_s = 28...30$ V DC, $I_s \leq 500$ mA, elec. isolation.<br><b>HD2-FBCL-1.500</b> (for "A", "B", or "C")<br>- PA power feed: $U_s = 16.7...29.5$ V DC, $I_s \leq 500$ mA, no elec. isolation.                                                                                                                                                                                         | On request  |            |
| <b>6 Diagnostic modules</b> (optional)<br>For supply & PA bus, IP 20, Zone 2/Class I, Div. 2.<br><b>HD2-DM-B</b> (Basic), II 3G EEx nA IIC T4<br>- Check power sources, power supply modules, and PA for overload and short circuit, etc.<br>- Messages only transmitted by means of relay contact.<br><b>HD2-DM-A</b> (Advanced), II 3G EEx nA IIC T4<br>- Additional physical layer checks.<br>- DTM Diagnostic Manager (one of three is required)<br>- DTM Basic version<br>- DTM-FC.AD Professional, $\leq 100$ segments<br>- DTM-FC.AD.1 Professional, $> 100$ segments | On request  |            |

## PROFIBUS DP/PA –Power Hub (Segment Coupler, simplex)



## i

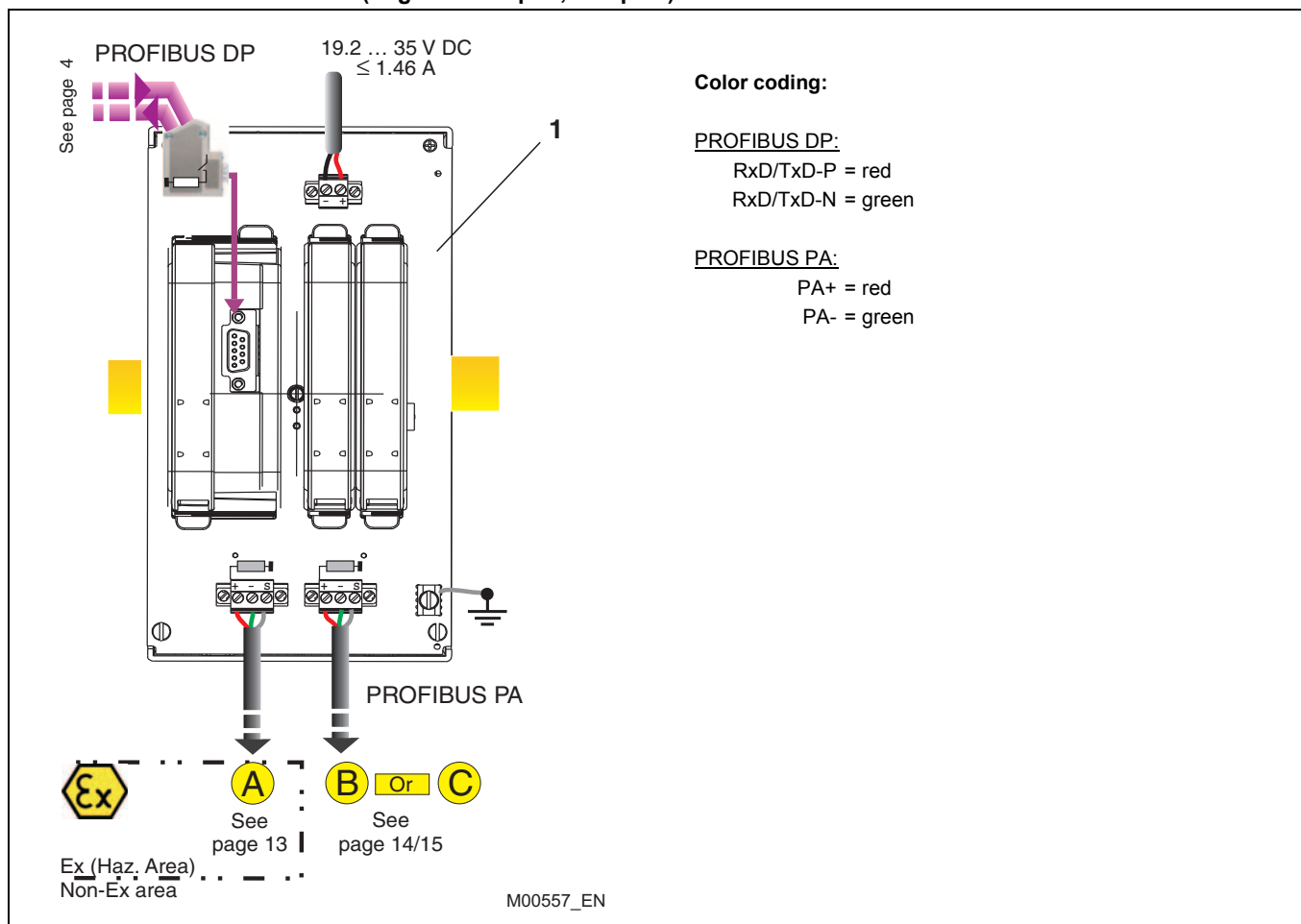
### Important!

- The address "1" must not be assigned for PA field devices
- Max. **31** PA field devices per power supply module.
- All modules can be combined with all other modules.
- Do not use NDE2x0-NO PROFIBUS DP cable connectors for applications in hazardous area Zone 2/Class I, Div. 2.
- First check that the diagnostic DTMs have been approved for your frame application.

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Catalog No. | Data sheet |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------|
| <b>1 MB-FB-GT</b><br>Motherboard, for 1x DP/PA gateway modules, DIN top-hat rail, IP 20, II 3G EEx nA IIC T4, Zone 2/Class I, Div. 2.<br>- Includes ACC-MB-HGC SUB-D cable, 25-pin, for connecting the motherboards<br>- Includes DIP switch for address assignment (optional for diagnostic transmission)                                                                                                                                                                                                                                                            | On request  |            |
| <b>2 HD2-GTR-4PA</b><br>PROFIBUS DP/PA gateway, DP bus up to 12 Mbit/s, transparent, for 4x power supply modules, IP 20, II 3G EEx nA II T4, Zone 2/Class I, Div. 2.<br>-(Optional) DTM.FC for gateway parameterization, etc., can only be used if addresses assigned                                                                                                                                                                                                                                                                                                 | On request  |            |
| <b>3 MB-FB-4.GEN</b><br>Motherboard, for 4 power supply modules and for 1x diagnostic module, 4x switchable PA bus terminators, DIN top-hat rail, IP 20, II 3G EEx nA IIC T4, Zone 2/Class I, Div. 2.<br>♦ Power PINs: <b>PRI</b> : + = (+), - = GND, <b>SEC</b> (optional): + = (+), - = GND<br>♦ PA PINs: <b>OUT segment 1</b> : + = PA+, - = PA-, ACC-MB-HSK = shield <b>and!</b> motherboard grounding firmly<br><b>OUT segment 2/3/4</b> : + = PA+, - = PA-, ACC-MB-HSK = shield                                                                                 | On request  |            |
| <b>4 ACC-MB-HSK (optional)</b><br>Grounding connection set for large-surface connection of the trunk cable shields.                                                                                                                                                                                                                                                                                                                                                                                                                                                   | On request  |            |
| <b>5 Power supply modules</b><br>PA bus fixed at 31.25 kbit/s, IP 20, II 3G EEx nA II T4, Zone 2/Class I, Div. 2.<br><b>HD2-FBPS-1.500</b> (for "A", "B", or "C")<br>- PA power feed: $U_S = 28 \dots 30 \text{ V DC}$ , $I_S \leq 500 \text{ mA}$ , elec. isolation.<br><b>HD2-FBCL-1.500</b> (for "A", "B", or "C")<br>- PA power feed: $U_S = 16.7 \dots 29.5 \text{ V DC}$ , $I_S \leq 500 \text{ mA}$ , no elec. isolation.                                                                                                                                      | On request  |            |
| <b>6 Diagnostic modules (optional)</b><br>For supply & PA bus, IP 20, Zone 2/Class I, Div. 2.<br><b>HD2-DM-B</b> (Basic), II 3G EEx nA IIC T4<br>- Check power sources, power supply modules, and PA for overload and short circuit, etc.<br>- Messages only transmitted by means of relay contact.<br><b>HD2-DM-A</b> (Advanced), II 3G EEx nA IIC T4<br>- Additional physical layer checks.<br>- DTM Diagnostic Manager (one of three is required)<br>- DTM Basic version<br>- DTM-FC.AD Professional, ≤ 100 segments<br>- DTM-FC.AD.1 Professional, > 100 segments | On request  |            |

# PROFIBUS – Installation suggestion

## PROFIBUS DP/PA - Power Hub (Segment Coupler, compact)



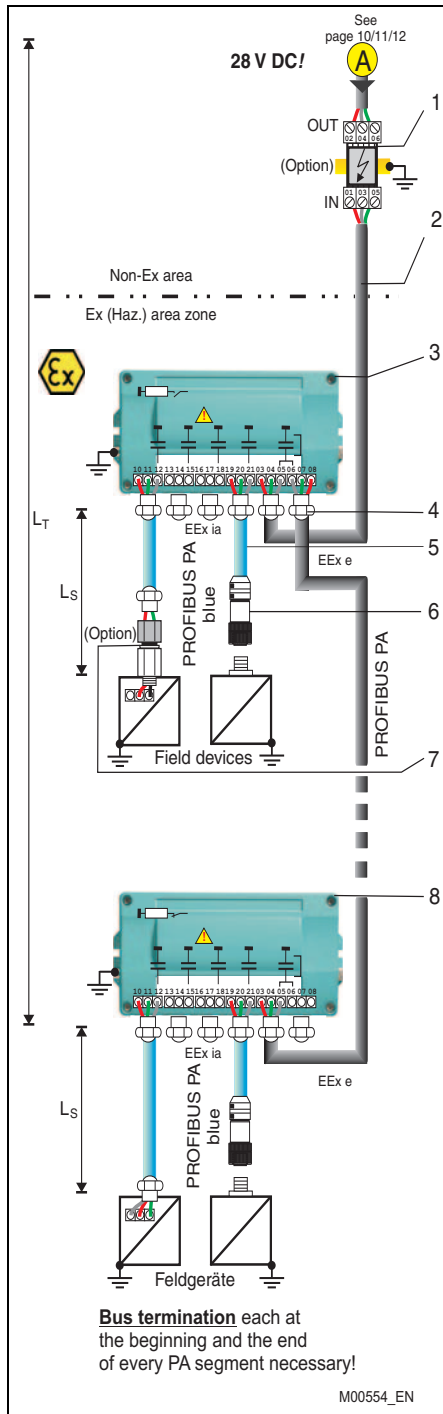
### i

#### Important!

- The address "1" must not be assigned for PA field devices.
- Max. 31 PA field devices per power supply module.
- Not permitted for Ex (Hazardous) areas.

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Catalog No. | Data sheet |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------|
| <b>1 KT-MB-GTB-2PS</b><br>IP 20, comprises the following components:<br>1x MCB-FB-GT - Motherboard, DIN rail, system M36<br>1x HD2-GTB-2PA - PROFIBUS DP/PA gateway, DP bus up to 12 Mbit/s, transparent<br>2x HD2-FBPS-1.25.360 – Power supply modules, PA bus fixed at 31.25 kbit/s,<br>PA power feed: $U_S = 25 \dots 28 \text{ V DC}$ , $I_S \leq 360 \text{ mA}$ , incl. fixed bus termination<br>♦ Power PINs: + = (+), - = GND<br>♦ PA PINs: <b>OUT segment 1:</b> + = PA+, - = PA-, S = shield <b>and!</b> motherboard grounding firmly<br><b>OUT segment 2:</b> + = PA+, - = PA-, S = shield |             | On request |

## PROFIBUS PA – FieldBarrier in Ex (Haz.) area

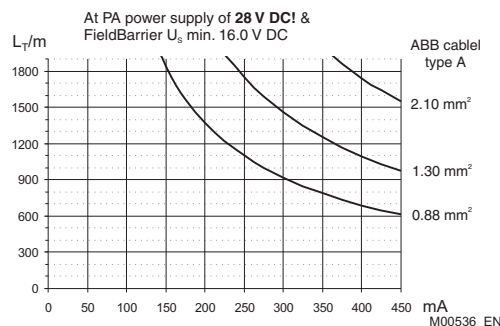


| Description                                                                                                                                                                                                                                                                                                                                                                                                             | Catalog No.                          | Data sheet                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------------|
| <b>1 PA overvoltage protection, 2-channel, IN ≤ 450 mA (option)</b>                                                                                                                                                                                                                                                                                                                                                     |                                      |                                              |
| <b>NGV211-NO</b> - Cartridge for NGV210-NO                                                                                                                                                                                                                                                                                                                                                                              | 63615-9 890 181                      | 10/63-6.15                                   |
| <b>NGV210-NO</b> - Basic element for top-hat rail                                                                                                                                                                                                                                                                                                                                                                       | 63615-9 890 180                      | 10/63-6.15                                   |
| ♦ PINs: 1. channel: <b>IN:</b> 01 = PA+, 05 = PA-, 03 = shielding <b>OUT:</b> 02 = PA+, 06 = PA-, 04 = shielding<br>2. channel: <b>IN:</b> 07 = PA+, 11 = PA-, 09 = shielding <b>OUT:</b> 08 = PA+, 12 = PA-, 10 = shielding                                                                                                                                                                                            |                                      |                                              |
| <b>2 PROFIBUS PA cable, black (No intrinsic safety)</b>                                                                                                                                                                                                                                                                                                                                                                 |                                      |                                              |
| <b>NPC080-NO</b> - 0.88 mm <sup>2</sup> , 43.6 Ω/km, 65/330/1000 m                                                                                                                                                                                                                                                                                                                                                      | 63648-9 890 13x                      | 10/63-6.47                                   |
| <b>NPC150-NO<sup>1)</sup></b> - 1.30 mm <sup>2</sup> , 27.4 Ω/km, 1000 m                                                                                                                                                                                                                                                                                                                                                | 63648-9 890 133                      | 10/63-6.47                                   |
| <b>NPC250-NO<sup>1)</sup></b> - 2.10 mm <sup>2</sup> , 17.2 Ω/km, 1000 m                                                                                                                                                                                                                                                                                                                                                | 63648-9 890 138                      | 10/63-6.47                                   |
| <b>3 F2D0-FB-Ex4.CG</b> - FieldBarrier                                                                                                                                                                                                                                                                                                                                                                                  |                                      |                                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      | On request                                   |
| - IP 67, aluminium housing, II 2 (1G/D) G EEx me [ia] IIC T4<br>- 6x cable bushing plastic (shielding capacitive!), switchable bus termination                                                                                                                                                                                                                                                                          |                                      |                                              |
| ♦ PINs: trunk cable (L <sub>T</sub> ): <b>IN:</b> 03 = PA+, 04 = PA-, 05 = S <b>OUT:</b> 08 = PA+, 07 = PA-, 06 = S<br>♦ PINs: spur cable (L <sub>S</sub> ): <b>4 x OUT:</b> 10 = PA+, 11 = PA-, 12 = S / 13 = PA+, 14 = PA-, 15 = S<br>16 = PA+, 17 = PA-, 18 = S / 19 = PA+, 20 = PA-, 21 = S                                                                                                                         |                                      |                                              |
| <b>RD0-FB-Ex4</b> - FieldBarrier, IP 20, rail mounting<br>(Alternative, not shown)                                                                                                                                                                                                                                                                                                                                      |                                      | On request                                   |
| <b>4 6x EMC cable bushing</b>                                                                                                                                                                                                                                                                                                                                                                                           |                                      |                                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      | Special order!                               |
| (Shielding braid on ground via cable bushing)                                                                                                                                                                                                                                                                                                                                                                           |                                      |                                              |
| <b>5 PROFIBUS PA cable, blue (Intrinsic safety)</b>                                                                                                                                                                                                                                                                                                                                                                     |                                      |                                              |
| <b>NPC080-EX</b> - 0.88 mm <sup>2</sup> , 43.6 Ω/km, 65/330/1000 m                                                                                                                                                                                                                                                                                                                                                      | 63648-9 890 13x                      | 10/63-6.47                                   |
| <b>6 NPE300-NE</b> - PA cable socket, IP 67                                                                                                                                                                                                                                                                                                                                                                             |                                      |                                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      | 63644-9 890 116                              |
| - metal case, M12, for Ex (Haz.) and Non-Ex area<br>♦ PINs: 1 = PA+, 3 = PA-, case (or 4) = shielding                                                                                                                                                                                                                                                                                                                   |                                      |                                              |
| <b>7 NGV220-EX<sup>2)</sup></b> - PA overvoltage protection (optional)                                                                                                                                                                                                                                                                                                                                                  |                                      |                                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      | 63615-7 964115                               |
| 10/63-6.15                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |                                              |
| - IP 67 metal case, for M20 x 1.5 cable gland mounting,<br>II(2)G EEx ia IIC T4/T5/T6<br>♦ PINs: <b>IN:</b> (+) = PA+, (-) = PA-, shielding on ground via EMC cable bushing<br>♦ PINs: <b>OUT:</b> red = PA+, black = PA-, shielding on ground via metal case<br>- Possible use at the FieldBarrier of the IN/OUT-PINs of the trunk cable (L <sub>T</sub> )<br>by using EMC cable bushing (shielding capacity bridged). |                                      |                                              |
| <b>8 FieldBarrier</b>                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |                                              |
| - Supply voltage per channel:<br>U <sub>S</sub> 12.25 V (at 10 mA) up to 9.78 V (at 43 mA)<br>- Supply current per channel:<br>I <sub>S</sub> ≤ 43 mA<br>- Basic current per Field<br>Barrier: I <sub>basic</sub> ≤ 49 mA                                                                                                                                                                                               |                                      |                                              |
| <p>FieldBarrier<br/>Output characteristic per channel</p> <p>Supply voltage U<sub>s</sub></p> <p>Field device current I<sub>s</sub></p> <p>Operation area</p> <p>M00538_EN</p>                                                                                                                                                                                                                                          |                                      |                                              |
| <b>Color coding:</b>                                                                                                                                                                                                                                                                                                                                                                                                    |                                      |                                              |
| <u>PROFIBUS DP:</u>                                                                                                                                                                                                                                                                                                                                                                                                     | RxD/TxD-P = red<br>RxD/TxD-N = green | <u>PROFIBUS PA:</u> PA+ = red<br>PA- = green |
| <sup>1)</sup> By using the 1.3 / 2.1 mm <sup>2</sup> cable it is not possible to use plugs / sockets!                                                                                                                                                                                                                                                                                                                   |                                      |                                              |
| <sup>2)</sup> By using the field device types FXE4000, FV4000, FS4000 it is not possible to use NGV220!                                                                                                                                                                                                                                                                                                                 |                                      |                                              |

### Limits and rules!

When using the Power Hub, FieldBarrier and ABB cable.  
 (by other Linking Devices / Barriers / cable the limits are calculated new)  
**per PROFIBUS PA segment:**

- number of PA subscribers ≤ 16
- number of FieldBarrier ≤ 4
- Σ current (I) ≤ 450 mA (max. current via NGV21x-NO)  
 Σ current (I) = Σ basic current of all Field devices and FieldBarriers  
 + error current of one device
- trunk cable length (L<sub>T</sub>) see diagram at U<sub>S</sub> min. 16.0V DC of FieldBarrier (length depending on Σ current and cable diameter)
- spur cable length (L<sub>S</sub>) (acc. to the FISCO/IEC 60079-27 model):  
 At 1 ... 12 spur cable: L<sub>S</sub> ≤ 20 m / at 13 ... 14 spur cable: L<sub>S</sub> ≤ 90 m  
 At 15 ... 16 spur cable: L<sub>S</sub> ≤ 60 m
- cable length L<sub>total</sub> = L<sub>T</sub> + (Σ L<sub>S</sub>) ≤ 1900 m



# PROFIBUS – Installation suggestion

## PROFIBUS PA – Passive T and 4-way junction (IP 66) in Non-Ex area

**Bus termination** each at the beginning and the end of every PA segment necessary!

M00546\_EN

|    | Description                                                                                                                                                                                                                                                                                                                                                                | Catalog No.                        | Data sheet               |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|--------------------------|
| 1  | PA overvoltage protection, 2-channel, $I_N \leq 450$ mA (Optional)<br><b>NGV211-NO</b> - Cartridge for NGV210-NO<br><b>NGV210-NO</b> - Basic element for top-hat rail<br>♦ PINs: 1. channel : IN: 01 = PA+, 05 = PA-, 03 = shielding OUT: 02 = PA+, 06 = PA-, 04 = shielding<br>2. channel: IN: 07 = PA+, 11 = PA-, 09 = shielding OUT: 08 = PA+, 12 = PA-, 10 = shielding | 63615-9 890 181<br>63615-9 890 180 | 10/63-6.15<br>10/63-6.15 |
| 2  | PROFIBUS PA cable, black (No intrinsic safety)<br><b>NPC080-NO</b> - 0.88 mm <sup>2</sup> , 43.6 Ω/km, 65/330/1000 m<br><b>NPC150-NO</b> <sup>1)</sup> - 1.30 mm <sup>2</sup> , 27.4 Ω/km, 1000 m                                                                                                                                                                          | 63648-9 890 13x<br>63648-9 890 133 | 10/63-6.47<br>10/63-6.47 |
| 3  | <b>NPJ120-NO</b> - PA T-junction, IP 66<br>- 2x EMC cable bushing, switchable bus termination (Shielding braid on ground via cable bushing)<br>♦ PINs: trunk cable ( $L_T$ ): IN/OUT: A = PA-, B = PA+                                                                                                                                                                     | 63643-9 890 101                    | 10/63-6.40               |
| 4  | <b>NPE100-NE</b> - PA cable plug, IP 67<br>- metal case, M12, for Ex (Haz.) and Non-Ex area<br>♦ PINs: 1 = PA+, 3 = PA-, case (or 4) = shielding                                                                                                                                                                                                                           | 63644-9 890 115                    | 10/63-6.40               |
| 5  | PROFIBUS PA cable, black<br><b>NPC080-NO</b> - 0.88 mm <sup>2</sup> , 43.6 Ω/km, 65/330/1000 m                                                                                                                                                                                                                                                                             | 63648-9 890 13x                    | 10/63-6.47               |
| 6  | <b>NGV220-NO</b> <sup>2)</sup> - PA overvoltage protection (Optional)<br>- IP 67 metal case, for M20 x 1.5 cable gland mounting<br>♦ PINs: IN: (+) = PA+, (-) = PA-, shielding on ground via EMC cable bushing<br>♦ PINs: OUT: red = PA+, black = PA-, shielding on ground via metal case                                                                                  | 63615-7 964 116                    | 10/63-6.15               |
| 7  | <b>NPJ130-NO</b> - PA T-junction, IP 66<br>- 3x EMC cable bushing, switchable bus termination (Shielding braid on ground via cable bushing)<br>♦ PINs: trunk cable ( $L_T$ ): IN/OUT: A = PA-, B = PA+<br>♦ PINs: spur cable ( $L_S$ ): OUT: A = PA-, B = PA+                                                                                                              | 63643-9 890 102                    | 10/63-6.40               |
| 8  | <b>NPE300-NE</b> - PA cable socket, IP 67<br>- metal case, M12, for Ex (Haz.) and Non-Ex area<br>♦ PINs: 1 = PA+, 3 = PA-, case (or 4) = shielding                                                                                                                                                                                                                         | 63644-9 890 116                    | 10/63-6.40               |
| 9  | <b>NPJ420-NO</b> - PA 4-way junction, IP 66<br>- 2x EMC cable bushing, switchable bus termination (Shielding braid on ground via cable bushing)<br>♦ PINs: trunk cable ( $L_T$ ) IN/OUT: A = PA-, B = PA+<br><b>NPJ460-NO</b> - PA 4-way junction, IP 66<br>- 6x EMC cable bushing, switchable bus termination (Alternative, not shown)                                    | 63643-9 890 103<br>63643-9 890 104 | 10/63-6.40<br>10/63-6.40 |
| 10 | <b>NDZ413-NE</b> - protection cap for sockets M12                                                                                                                                                                                                                                                                                                                          | 63642-9 890 122                    | 10/63-6.40               |

**Color coding:**

PROFIBUS DP: Rx/D/TxD-P = red      PROFIBUS PA: PA+ = red  
Rx/D/TxD-N = green                      PA- = green

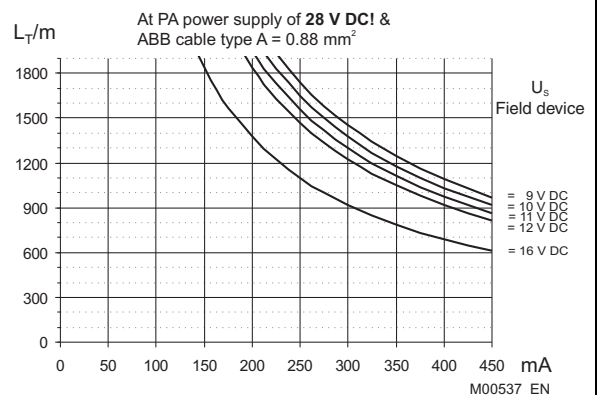
<sup>1)</sup> By using the 1.3 mm<sup>2</sup> cable it is not possible to use plugs / sockets!  
<sup>2)</sup> By using the field device types FXE4000, FV4000, FS4000 it is not possible to use NGV220!

### Limits and rules!

When using the Power Hubs and ABB junction & cable.  
(by other Linking Devices / junction / cable the limits are calculated new)

#### per PROFIBUS PA segment:

- number of PA subscribers  $\leq 31$
- $\Sigma$  current ( $I$ )  $\leq 450$  mA (max. current via NGV21x-NO)  
 $\Sigma$  current ( $I$ ) =  $\Sigma$  basic current of all field devices  
+ error current of one device
- trunk cable length ( $L_T$ ) of 0.88 mm<sup>2</sup> cable see diagram  
(length ( $L_T$ ) depending on  $\Sigma$  current,  $U_S$  field device and cable diameter)
- spur cable length ( $L_S$ ):  
at 1 ... 12 spur cable:  $L_S \leq 120$  m / at 13 ... 14 spur cable:  $L_S \leq 90$  m  
at 15 ... 18 spur cable:  $L_S \leq 60$  m / at 19 ... 24 spur cable:  $L_S \leq 30$  m  
at 25 ... 31 spur cable:  $L_S \leq 1$  m
- cable length  $L_{total} = L_T + (\Sigma L_S) \leq 1900$  m





## PROFIBUS PA – Passive T junction (IP 20) in Non-Ex area

See page 10/11/12

28 V DC!

OUT

(Option)

IN

PROFIBUS PA

Junction box

5 (n ... 1)

6

3

4

PROFIBUS PA

PROFIBUS PA

7

8 (Option)

Field devices

**Bus termination** each at the beginning and the end of every PA segment necessary!

M00547\_EN

| Description                                                                                                                                                                                                                                                                                                                                                             | Catalog No.                                           | Data sheet                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------|
| <b>1</b> PA overvoltage protection, 2-channel, $I_N \leq 450$ mA<br><b>NGV211-NO</b> - Cartridge for NGV210-NO<br><b>NGV210-NO</b> - Basic element for top-hat rail<br>♦ PINs: 1. channel: IN: 01 = PA+, 05 = PA-, 03 = shielding OUT: 02 = PA+, 06 = PA-, 04 = shielding<br>2. channel: IN: 07 = PA+, 11 = PA-, 09 = shielding OUT: 08 = PA+, 12 = PA-, 10 = shielding | 63615-9 890 181<br>63615-9 890 180                    | 10/63-6.15<br>10/63-6.15               |
| <b>2</b> PROFIBUS PA cable, black (No intrinsic safety)<br><b>NPC080-NO</b> - 0.88 mm <sup>2</sup> , 43.6 Ω/km, 65/330/1000 m<br><b>NPC150-NO</b> <sup>1)</sup> - 1.30 mm <sup>2</sup> , 27.4 Ω/km, 1000 m<br><b>NPC250-NO</b> <sup>1)</sup> - 2.10 mm <sup>2</sup> , 17.2 Ω/km, 1000 m                                                                                 | 63648-9 890 13x<br>63648-9 890 133<br>63648-9 890 138 | 10/63-6.47<br>10/63-6.47<br>10/63-6.47 |
| <b>3</b> PA shield module, for stabilizing the fieldbus shield<br>♦ PINs: Trunk cable (L <sub>T</sub> ): IN: S = shield (braided shield connected to ground via the module)                                                                                                                                                                                             | 3KXN623100L0050                                       | 10/63-6.40                             |
| <b>4</b> PA line-in module<br>For connecting the main line to the current-limiter modules,<br>max. voltage 30 V DC, rated current 380 mA<br>♦ PINs: Trunk cable (L <sub>T</sub> ): IN: A = PA+, B = PA-                                                                                                                                                                 | 3KXN623100L0010                                       | 10/63-6.40                             |
| <b>5</b> PA current-limiter module(s),<br>max. 20 modules per line-in module,<br>supply voltage U <sub>S</sub> = 17.5 V DC, supply current I <sub>S</sub> = 62 mA<br>♦ PINs: Spur cable (L <sub>S</sub> ): OUT: A = PA+, B = PA-                                                                                                                                        | 3KXN623100L0020                                       | 10/63-6.40                             |
| <b>6</b> PA bus termination module at end of every main line for NGJ100-NE                                                                                                                                                                                                                                                                                              | 3KXN623100L0040                                       | 10/63-6.40                             |
| Terminal for segment expansion                                                                                                                                                                                                                                                                                                                                          | On request!                                           |                                        |
| <b>NGJ100-NE</b><br>- Basic current per Line-In module: $I_{basic} \leq 5.0$ mA<br>- Basic current per Current-Limiter module: $I_{basic} \leq 5.0$ mA                                                                                                                                                                                                                  |                                                       |                                        |
| <b>7</b> <b>NPE300-NE</b> - PA cable socket, IP 67<br>- Metal case, M12, for Ex (Haz.) and Non-Ex area<br>♦ PINs: 1 = PA+, 3 = PA-, case (or 4) = shielding                                                                                                                                                                                                             | 63644-9 890 116                                       | 10/63-6.40                             |
| <b>8</b> <b>NGV220-NO</b> <sup>2)</sup> (optional) - PA overvoltage protection<br>- IP67 metal case, for M20 x 1.5 cable gland mounting<br>♦ PINs: IN: (+) = PA+, (-) = PA-, shielding on ground via EMC cable bushing<br>♦ PINs: OUT: red = PA+, black = PA-, shielding on ground via metal case                                                                       | 63615-7 964 116                                       | 10/63-6.15                             |

**Color coding:**

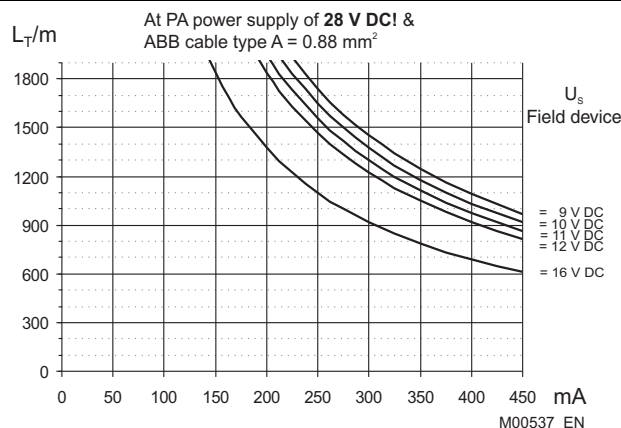
PROFIBUS DP: RxD/TxD-P = red  
RxD/TxD-N = green

PROFIBUS PA: PA+ = red  
PA - = green

<sup>1)</sup> By using the 1.3/2.1 mm<sup>2</sup> cable it is not possible to use plugs / sockets!  
By using the 2.1 mm<sup>2</sup> cable it is not possible to use NGV220-NO!  
<sup>2)</sup> By using the field device types FXE4000, FV4000, FS4000 it is not possible to use NGV220!

### Limits and rules!

- When using the Power Hubs and ABB junction & cable.  
(by other Linking Devices / junction / cable the limits are calculated new)  
**per PROFIBUS PA-Segment:**
- number of PA subscribers  $\leq 15$
  - $\Sigma$  current (I)  $\leq 450$  mA (max. current via NGV21x-NO)  
 $\Sigma$  current (I) =  $\Sigma$  basic current (all field devices, Line-In, Current-Limiter modules)  
+ error current of one device
  - trunk cable length (L<sub>T</sub>) of 0.88 mm<sup>2</sup> cable see diagram  
(length (L<sub>T</sub>) depending on  $\Sigma$  current, U<sub>S</sub> field device and cable diameter)
  - spur cable length (L<sub>S</sub>):  
at 1 ... 12 spur cable: L<sub>S</sub>  $\leq 120$  m  
at 13 ... 14 spur cable: L<sub>S</sub>  $\leq 90$  m  
at 15 spur cable: L<sub>S</sub>  $\leq 60$  m
  - cable length L<sub>total</sub> = L<sub>T</sub> + ( $\Sigma$  L<sub>S</sub>)  $\leq 1900$  m



# PROFIBUS – Installation suggestion

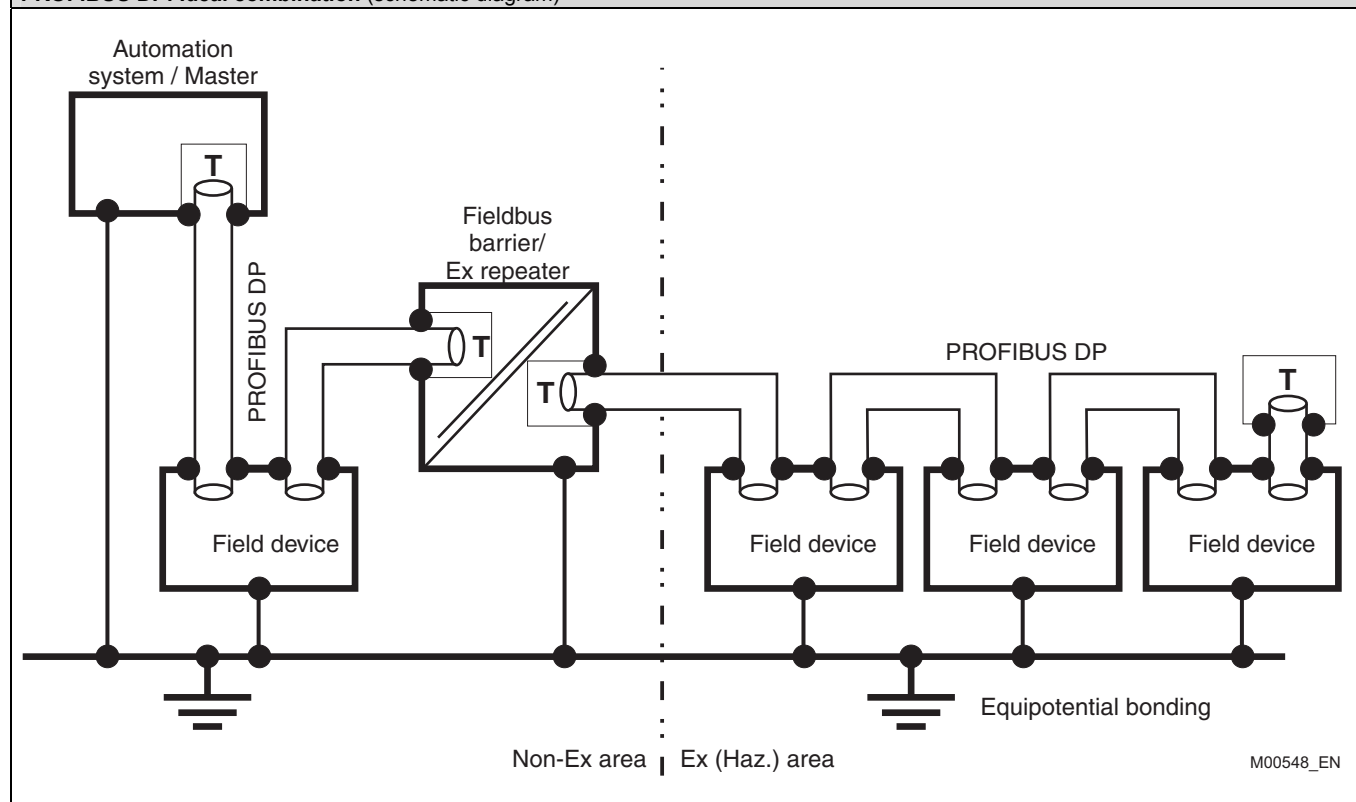
## PROFIBUS DP – Shielding and grounding

For information of shielding and grounding refer to the PROFIBUS Technical Guidelines

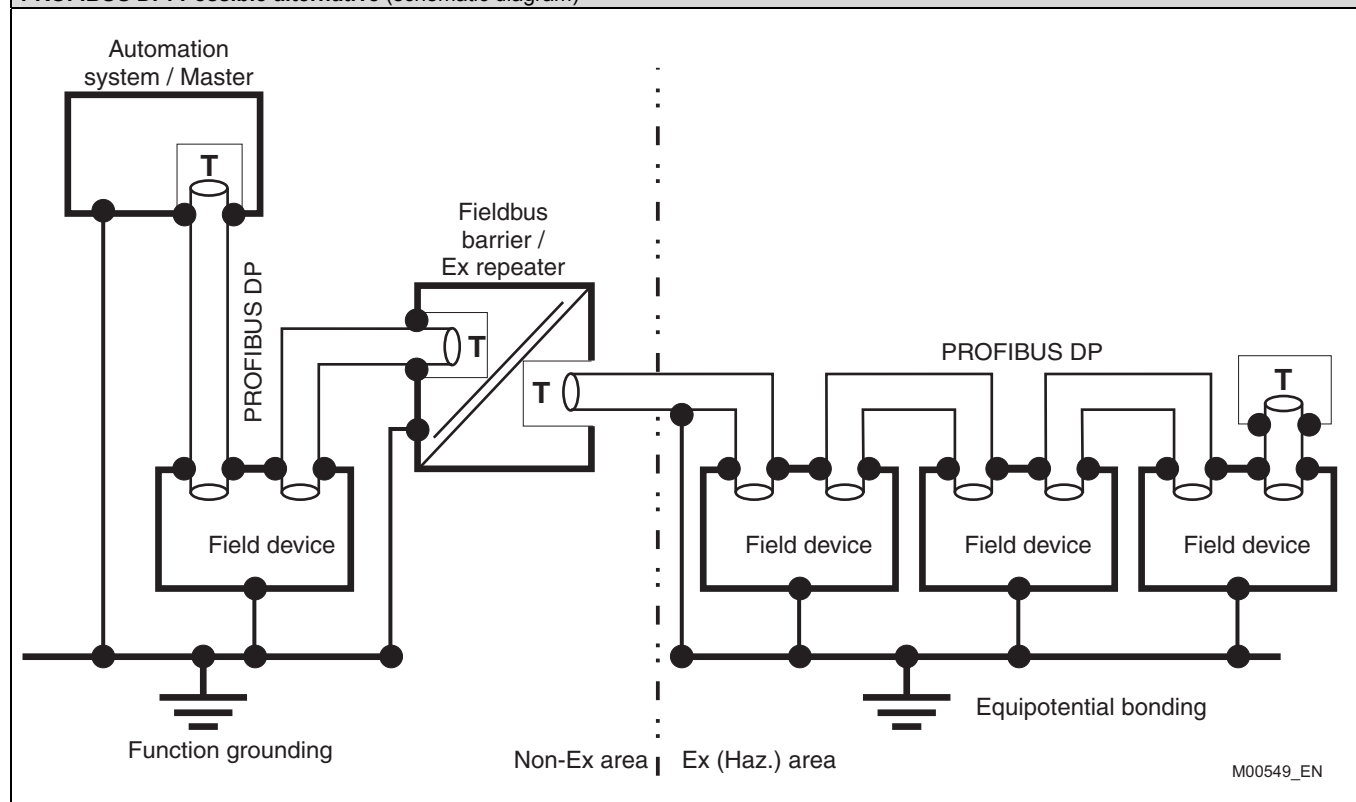
(<http://www.profibus.com/pb/> -> Technology -> Specifications & Documentation):

PNO - Order No. 2.262, PROFIBUS RS 485-IS - User and Installation Guidelines, chapter 3.5

### PROFIBUS DP: Ideal combination (schematic diagram)



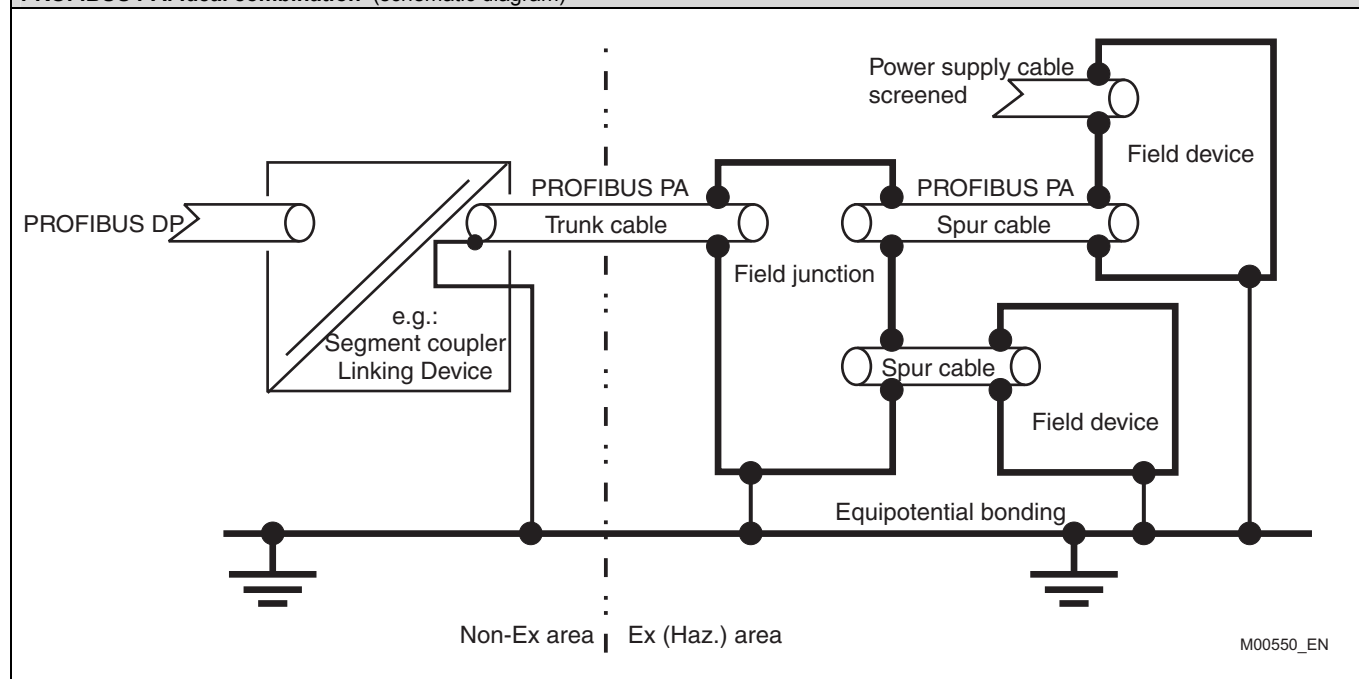
### PROFIBUS DP: Possible alternative (schematic diagram)



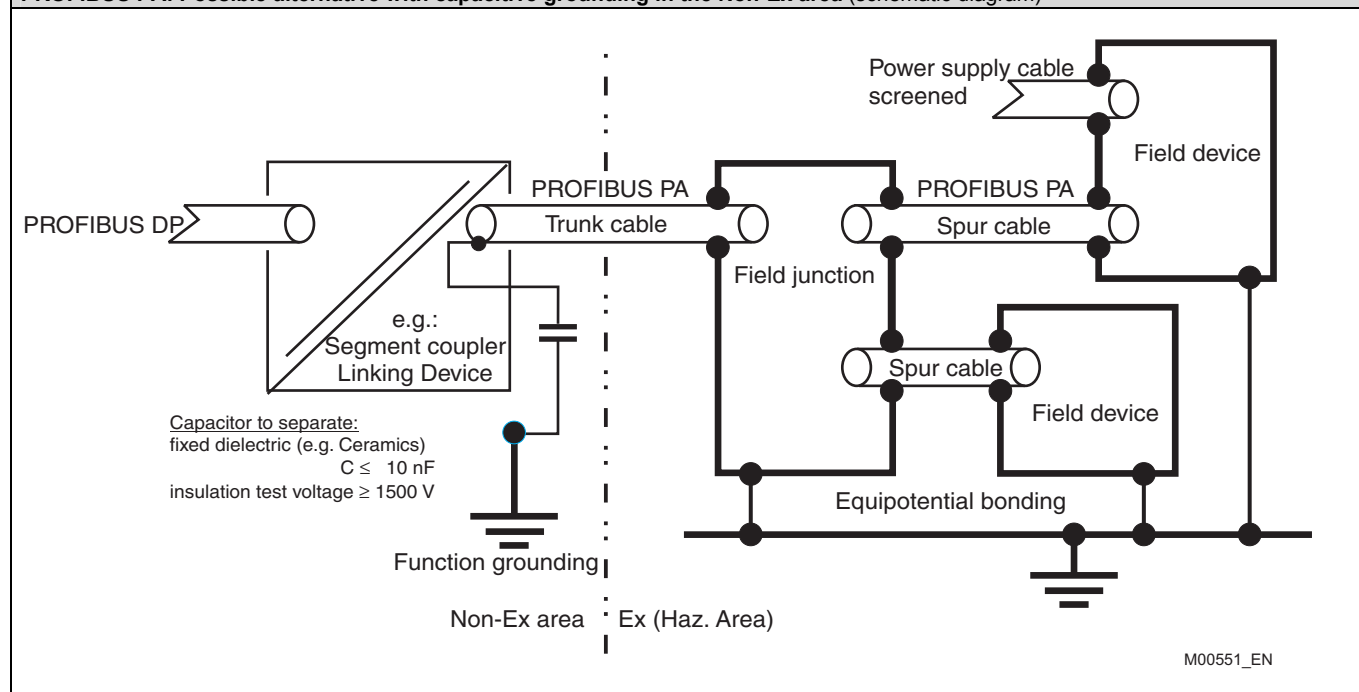
## PROFIBUS PA – Shielding and grounding

For information of shielding and grounding refer to the PROFIBUS Technical Guidelines  
(<http://www.profibus.com/pb/> -> Technology -> Specifications & Documentation):  
PNO - Order No. 2.092, PROFIBUS PA - User and Installation Guidelines, chapter 3.3.3

**PROFIBUS PA: Ideal combination** (schematic diagram)



**PROFIBUS PA: Possible alternative with capacitive grounding in the Non-Ex area** (schematic diagram)

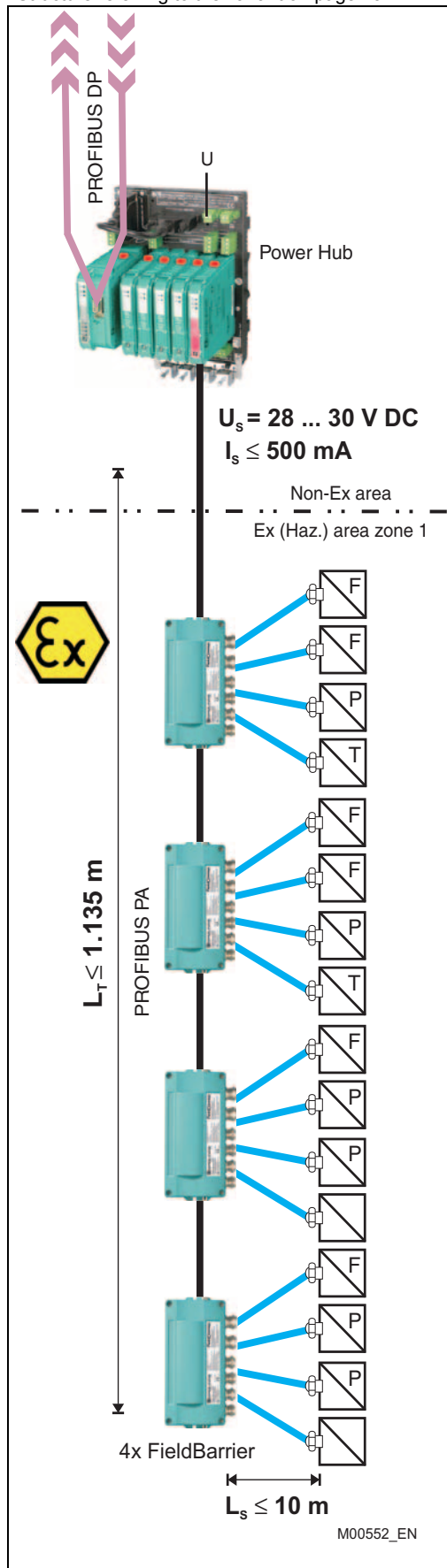




## PROFIBUS PA-layout example – FieldBarrier in Ex (Haz.) area

**Calculation example for one PROFIBUS PA segment:** Number of PA subscriber and cable length

Structure referring to the variant on page 13



**Guideline:**

- A PA segment with 16 field devices in the **Ex (Haz.) area** for an application (e.g. Tank with a mixer)
- ABB field device types
 

|                 |                                  |
|-----------------|----------------------------------|
| For Flow        | 3x FV4000, 3x FXE4000            |
| For Pressure    | 3x 2600T(264xx), 3x 2600T(265xx) |
| For Temperature | 2x TF212-EX                      |
| For Positioning | 2x TZIDC-110                     |
- Power supply by the Power Hub module HD2-FBPS-1.500  
( $U_S = 28 \dots 30 \text{ V DC}$ ,  $I_S \leq 500 \text{ mA}$ )
- **FieldBarrier F2D0-FB-Ex4.CG**
- Spur length per field device max. 10 m and  $L_T$  min. 750 m

**Question:**

1. **Is the structure possible?**  
Referring to the current and voltage supply.
2. If yes, **which max. PA segment cable length can be laid?**  
Referring to PA cable of  $1.30 \text{ mm}^2$  ,  
from the Power Hub module up to the last PA field device

**Calculation:**

Create a table with the FieldBarrier and the six field device types and fill in the  $U_{s \text{ Min.}}$ ,  $I_{\text{basic current}}$  and  $I_{\text{error current}}$ .

These values are shown in the data sheet

“ABB Device overview for PROFIBUS PA” (10/63-0.46).

| PA devices      | U <sub>s</sub> Min | I <sub>basic</sub> current | I <sub>error</sub> current |
|-----------------|--------------------|----------------------------|----------------------------|
| 4x FieldBarrier | 16.0 V             | 49.0 mA                    | ---                        |
| 3x FV4000       | 9.0 V              | 10.0 mA                    | 3.0 mA                     |
| 3x FXE4000      | 9.0 V              | 13.0 mA                    | 4.0 mA                     |
| 3x 2600T(264xx) | 9.0 V              | 10.5 mA                    | 9.5 mA                     |
| 3x 2600T(265xx) | 10.2 V             | 11.7 mA                    | 5.6 mA                     |
| 2x TF212-EX     | 9.0 V              | 11.8 mA                    | 3.2 mA                     |
| 2x TZIDC-110    | 9.0 V              | 10.5 mA                    | 4.5 mA                     |
|                 |                    | Σ 376.2 mA                 |                            |

1. Appraise and calculate (U, I):
  - for the voltage supply:  
Highest  $U_{s \text{ Min.}}$  (16.0 V)  
**is less than**  $U_s = 28 \dots 30 \text{ V DC}$  of the Power Hub module.
  - for the current supply:  
Sum  $I_{\text{basic current}}$  (376.2 mA) plus 1x highest  $I_{\text{error current}}$  (9.5 mA)  
**is less than**  $I_s \leq 500 \text{ mA}$  of the Power Hub module.
2. Calculation of the PA segment length ( $L_T$ ):
  - Max.  $L_T$  is approx. 1.135 m  
Shown in the diagram page 13  
by means of the characteristic curve for the ABB PA cable  $1.30 \text{ mm}^2$  and  
of the sum current (0.3857 A)
  - Max. total length of the PA segment cable is equal to  
 $L_{\text{max}} = 1.135 \text{ m} + L_s (16 \times 10 \text{ m}) = 1.295 \text{ m}$   
**is less than** the max. allowed 1.900 m.

**Result:**

1. The structure is possible in principle!
2.  $L_{\max} = 1.295 \text{ m}$ .

**Cycle time on the PA segment at 31.25 kBit/s:**

min. 206 ms up to max. 243 ms

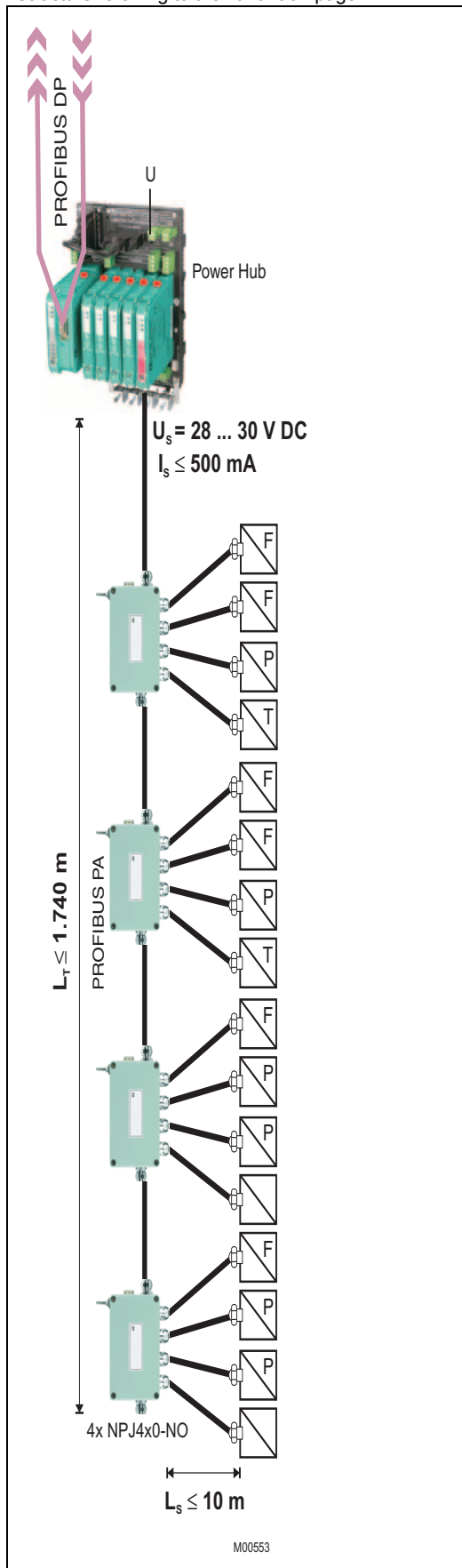
(Depending on the number of cyclic variables)

For the calculation of complex PROFIBUS topologies, bus cycle times and much more we recommend the ABB Layout Tool **DTD100** (Catalog No.: 63341-9790051)

## PROFIBUS PA layout example - Passive 4-way junction in Non-Ex area

Calculation example for one PROFIBUS PA segment: Number of PA subscriber and cable length

Structure referring to the variant on page 14



### Guideline:

- A PA segment with 16 field devices in the **Non-Ex area** for an application (e.g. Tank with a mixer)
- ABB field device types:
  - For Flow - 3x FV4000, 3x FXE4000
  - For Pressure - 3x 2600T(264xx), 3x 2600T(265xx)
  - For Temperature - 2x TF212
  - For Positioning - 2x TZIDC-110
- Power supply by the Power Hub module HD2-FBPS-1.500 ( $U_s = 28 \dots 30 \text{ V DC}$ ,  $I_s \leq 500 \text{ mA}$ )
- **Passive 4-way junction** NPJ460-NO
- Spur length per field device max. 10 m and  $L_T$  min. 750 m

### Question:

1. **Is the structure possible?**  
Referring to the current and voltage supply.
2. If yes, **which max. PA segment cable length can be laid?**  
Referring to PA cable of  $0.88 \text{ mm}^2$ , from the Power Hub module up to the last PA field device.

### Calculation:

Create a table with the six field device types and

fill in the  $U_{s \text{ Min.}}$ ,  $I_{\text{basic current}}$  und  $I_{\text{error current}}$ .

These values are shown in the data sheet

"ABB Device overview for PROFIBUS PA" (10/63-0.46).

| PA devices                                  | $U_{s \text{ Min.}}$ | $I_{\text{basic current}}$ | $I_{\text{error current}}$ |
|---------------------------------------------|----------------------|----------------------------|----------------------------|
| 4x NPJ460-NO                                | ---                  | ---                        | ---                        |
| 3x FV4000                                   | 9.0 V                | 10.0 mA                    | 3.0 mA                     |
| 3x FXE4000                                  | 9.0 V                | 13.0 mA                    | 4.0 mA                     |
| 3x 2600T(264xx)                             | 9.0 V                | 10.5 mA                    | 9.5 mA                     |
| 3x 2600T(265xx)                             | 10.2 V               | 11.7 mA                    | 5.6 mA                     |
| 2x TF212                                    | 9.0 V                | 11.8 mA                    | 3.2 mA                     |
| 2x TZIDC-110                                | 9.0 V                | 10.5 mA                    | 4.5 mA                     |
| <b><math>\Sigma 180.2 \text{ mA}</math></b> |                      |                            |                            |

1. Appraise and calculate ( $U$ ,  $I$ ):
  - for the voltage supply:  
Highest  $U_{s \text{ Min.}}$  (10.2 V)  
**is less than  $U_s = 28 \dots 30 \text{ V DC}$  of the Power Hub module.**
  - for the current supply:  
Sum  $I_{\text{basic current}}$  (180.2 mA) plus 1x highest  $I_{\text{error current}}$  (9.5 mA)  
**is less than  $I_s \leq 500 \text{ mA}$  of the Power Hub module.**
2. Calculation of the PA segment length ( $L_T$ ):
  - Max.  $L_T$  is  $> 1.900 \text{ m}$ !  
Shown in the diagram page 13  
by means of the characteristic curve for the ABB PA cable  $0.88 \text{ mm}^2$ , the sum current (0.1897 A) and highest  $U_{s \text{ Min.}}$  (10.2 V).
  - Max. total length of the PA segment cable is equal to  
 $L_{\text{max}} = 1.900 \text{ m} + L_S (16 \times 10 \text{ m}) > 1.900 \text{ m}$ !  
**Attention:** Not exceed the max. allowed 1.900 m!  
Max.  $L_T = 1.900 \text{ m} - L_S (16 \times 10 \text{ m}) = 1.740 \text{ m}$ !

### Result:

1. **The structure is possible in principle!**
2.  **$L_{\text{max}} = 1.900 \text{ m}$ .**

Cycle time on the PA segment at 31.25 kBit/s:

**min. 206 ms up to max. 243 ms**

(Depending on the number of cyclic variables.)

For the calculation of complex PROFIBUS topologies, bus cycle times and much more we recommend the ABB Layout Tool **DTD100** (Catalog No.: 63341-9790051).



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### Note

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