



DN-DP

PROFIBUS-DP / DeviceNet-Gateway



Hardware Manual

to Product C.2930.02



NOTE

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This manual contains important information and instructions on safe and efficient handling of the module. Carefully read this manual before commencing any work and follow the instructions.

The manual is a product component, please retain it for future use.

Trademark Notices

PROFIBUS is a registered trademark of PROFIBUS Nutzerorganisation e.V..

DeviceNet™ is a trademark of the Open DeviceNet Vendor Association, Inc (ODVA).

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Changes in the chapters

The changes in the document listed below affect changes in the hardware and firmware as well as changes in the description of facts only.

Version	Chapter	Changes versus previous version
1.2	-	Safety instructions inserted
	1.	Maximum of 240 data byte per direction
	6.	Order information of engineering manual deleted
	-	EC Declaration of Conformity appended
1.3	-	Safety Instructions revised
	2.	New chapter: "Quick Start"
	5.1	Phoenix Contact part number of cable connector corrected
	5.4	Chapter "Conductor Connection/Conductor Cross Sections" inserted
	6.	New chapter "References"
	7.	New Declaration of Conformity inserted
1.4	8.	Order information revised
	-	Chapter 2."Quick Start" deleted
1.5	-	Safety Instructions revised , Classification inserted
	1.	Description of DN-DP revised

Technical details are subject to change without further notice.

Classification of Warning Messages and Safety Instructions

This manual contains noticeable descriptions, warning messages and safety instructions, which you must follow to avoid personal injuries or death and property damage.



This is the safety alert symbol.

It is used to alert you to potential personal injury hazards. Obey all safety messages and instructions that follow this symbol to avoid possible injury or death.

DANGER, WARNING, CAUTION

Depending on the hazard level the signal words DANGER, WARNING or CAUTION are used to highlight safety instructions and warning messages. These messages may also include a warning relating to property damage.



DANGER

Danger statements indicate a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Warning statements indicate a hazardous situation that, if not avoided, could result in death or serious injury.



CAUTION

Caution statements indicate a hazardous situation that, if not avoided, could result in minor or moderate injury.

INFORMATION



INFORMATION

Notes to point out something important or useful.



Safety Instructions

- When working with the DN-DP module follow the instructions below and read the manual carefully to protect yourself and the DN-DP module from damage.
- The permitted operating position is specified as shown (Fig. 2). Other operating positions are not allowed.
- Do not open the housing of the DN-DP module
- Never let liquids get inside the DN-DP module. Otherwise, electric shocks or short circuits may result.
- Protect the DN-DP module from dust, moisture and steam.
- Protect the DN-DP module from shocks and vibrations.
- In order to prevent overvoltage damage due to thunder storm, unplug the DN-DP from PROFIBUS-DP and the DeviceNet beforehand.
- The DN-DP module may become warm during normal use. Always allow adequate ventilation around the DN-DP module and use care when handling.
- Do not operate the DN-DP module adjacent to heat sources and do not expose it to unnecessary thermal radiation. Ensure an ambient temperature as specified in the technical data.
- Do not use damaged or defective cables to connect the DN-DP module .
- In case of damages to the device, which might affect safety, appropriate and immediate measures must be taken, that exclude an endangerment of persons and domestic animals and property.
- Current circuits which are connected to the device have to be sufficiently protected against hazardous voltage (SELV according to EN 60950-1).
- The DN-DP module may only be driven by power supply current circuits, that are contact protected. A power supply, that provides a safety extra-low voltage (SELV or PELV) according to EN 60950-1, complies with this conditions.

Conformity

The DN-DP is an industrial product and meets the demands of the EU regulations and EMC standards for industrial environments printed in the conformity declaration at the end of this manual.

Warning: In a residential, commercial or light industrial environment the DN-DP may cause radio interferences in which case the user may be required to take adequate measures.

Qualified Personal

This documentation is directed exclusively towards qualified personal in control and automation engineering. The installation and commissioning of the product may only be carried out by qualified personal, which is authorized to put devices, systems and electric circuits into operation according to the applicable national standards of safety engineering.

Intended Use

The intended use of the DN-DP is the operation as PROFIBUS-DP/DeviceNet-Gateway. The esd guarantee does not cover damages which result from improper use, usage not in accordance with regulations or disregard of safety instructions and warnings.

- The DN-DP is intended for indoor installation only.
- The operation of the DN-DP in hazardous areas, or areas exposed to potentially explosive materials is not permitted.
- The operation of the DN-DP for medical purposes is prohibited.

Service Note

The DN-DP does not contain any parts that require maintenance by the user. The DN-DP does not require any manual configuration of the hardware. Unauthorized intervention in the device voids warranty claims.

Remove all cables before cleaning. Clean the device with a lint-free cloth. Cleaning agents or solvents are not suitable.

Disposal

Devices which have become defective in the long run have to be disposed in an appropriate way or have to be returned to the manufacturer for proper disposal. Please, make a contribution to environmental protection.

Typographical Conventions

Throughout this manual the following typographical conventions are used to distinguish technical terms.

Convention	Example
File and path names	<code>/dev/null</code> or <code><stdio.h></code>
Function names	<i>open()</i>
Programming constants	<code>NULL</code>
Programming data types	<code>uint32_t</code>
Variable names	<i>Count</i>

Number Representation

All numbers in this document are base 10 unless designated otherwise. For hexadecimal numbers _h is appended. For example, 42 is represented as 2A_h in hexadecimal format.

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1. Overview

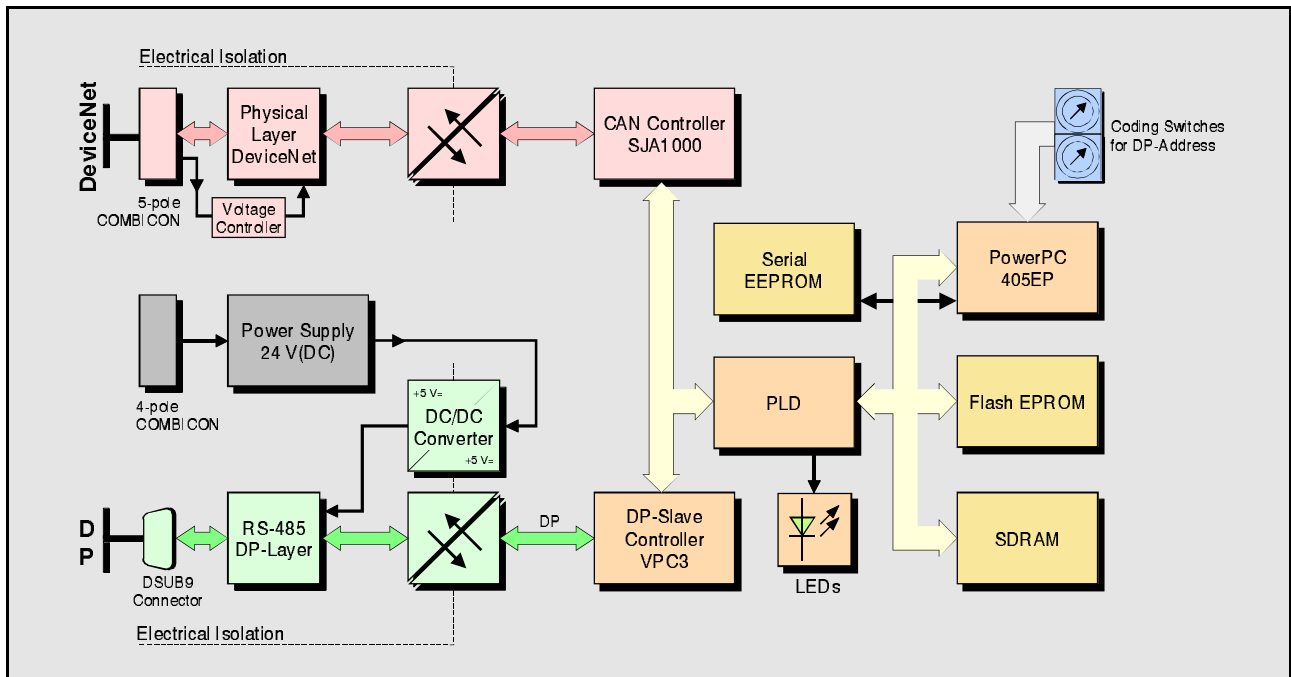


Fig. 1: Block circuit diagram

The DN-DP module can link any PROFIBUS[®] DP master to a DeviceNet[™] network. The DN-DP gateway operates as a PROFIBUS DP slave-I/O component.

At the DeviceNet network the DN-DP gateway can operate as a scanner to control several DeviceNet slave devices or as a single slave device to be connected to one DeviceNet scanner.

The DN-DP module is always configured via a PROFIBUS DP master.

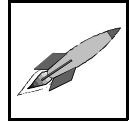
As a DeviceNet scanner, several DeviceNet slave devices can be addressed. The maximum number is between 20 and 40. This number depends on the configured PROFIBUS DP slave I/O type of each DeviceNet slave device. Up to a total of 312 user data bytes can be configured for each DeviceNet slave device. For each direction up to 240 user data bytes can be set up.

At the configuration of the DN-DP Gateway as DeviceNet Slave the DN-DP gateway can be configured as exactly one single DeviceNet slave. With this configuration, it can be connected to exactly one DeviceNet scanner.

With the DN-DP gateway you can couple DeviceNet modules to e.g. a SIMATIC-S7.

The DN-DP module is equipped with a PowerPC 405 EP, which buffers the CAN- and PROFIBUS data into a local SDRAM. The firmware is stored in the Flash. Internal, fixed parameters are stored in a serial EEPROM.

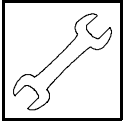
The DN-DP supports all DeviceNet compatible bit rates. The PROFIBUS DP Slave interface



automatically recognizes all usual bit rates up to 12 Mbit/s.

The PROFIBUS DP as well as the DeviceNet interface are electrically isolated.

The module can be configured via a PROFIBUS configuration tool, e.g. the PLC SIMATIC Manager or the TIA Portal.



2. Hardware Installation

2.1 Connecting Diagram

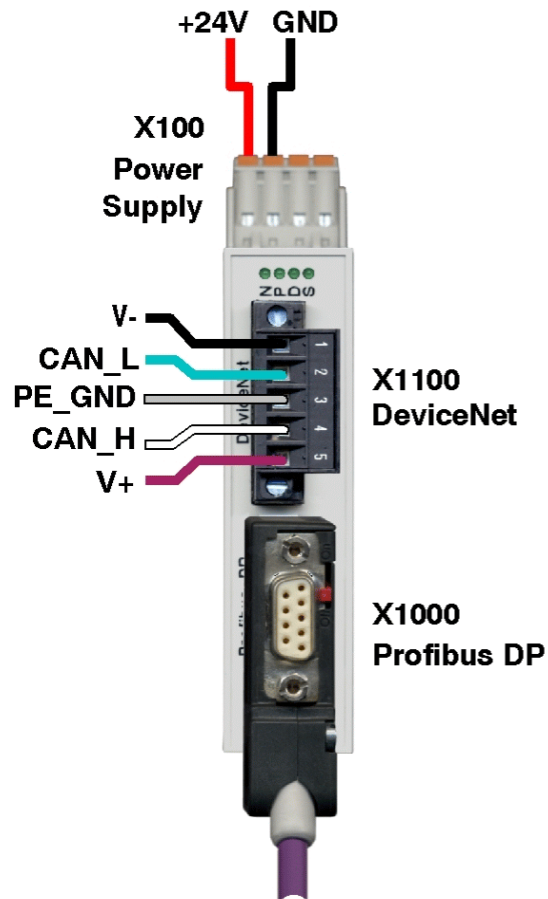
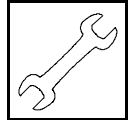


Fig. 2: Connections of the DN-DP module



INFORMATION

The connector pin assignment can be found on page 15 and following.
For conductor connection and conductor cross section see page 18.



2.2 LEDs and Coding Switches

2.2.1 LED Assignment

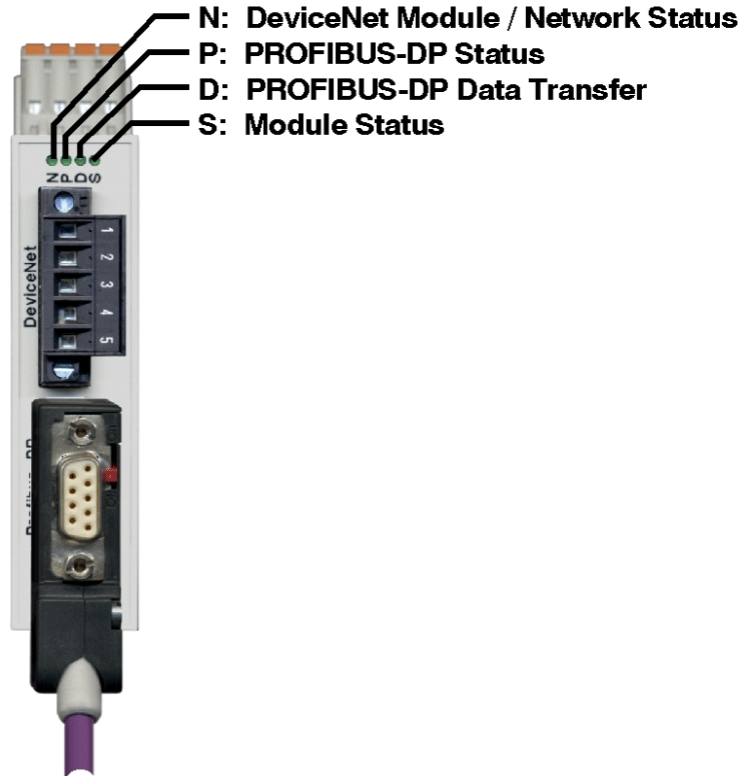


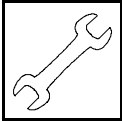
Fig. 3: Position of the LEDs in the front panel

LED	Colour	Label	Indication
N	red/green	DeviceNet Modul/Network Status	The complex indication function of these LEDs is controlled by the firmware. Please refer to the software manual for further information about the LEDs.
P	green	PROFIBUS-DP Status	
D	green	PROFIBUS-DP Data Transfer	
S	green	Module Status	



INFORMATION

The complex indication function of the LEDs is controlled by the firmware. After connecting the power supply voltage, initially all LEDs will be off until the firmware has booted.



Hardware Installation

2.2.2 Setting PROFIBUS-DP Address via Coding Switches

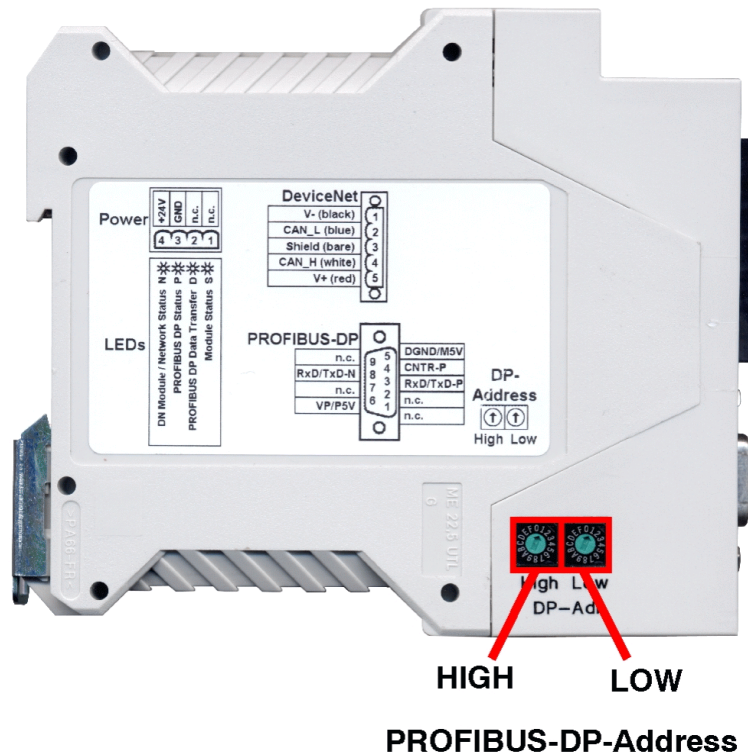


Fig. 4: Coding switches

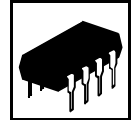
The PROFIBUS-DP address can be adjusted with the coding switches. When switching on the module, the coding switches are evaluated via the firmware. Changes of the settings have to be made before switching on the module because changes during operation have no effect.

The DN-DP is operated as slave station with a configurable *decimal* address range from 1 to 126 or *hexadecimal* from 01_{h} to $7E_{\text{h}}$. Configuring an address lower than 1, the address 1 is valid. Configuring an address higher than 126 ($7E_{\text{h}}$), the address 126 is valid.

The firmware switches in the firmware update mode, if the address 255 (FF_{h}) is set.

The coding switch HIGH configures the more significant bits, the coding switch LOW configures the low significant bits (refer to figure above).

The CAN identifier of the DN-DP can be configured via the PROFIBUS-DP configuration tool (e.g. SIMATIC Manager). Please, refer to the 'DN-DP Software Manual' for further information.



3. Technical Data

3.1 General Technical Data

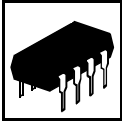
Power supply voltage	nominal current 24 V/DC $\pm 10\%$, current consumption (at 20 °C): typ.: 140 mA max.: 150 mA
Connectors	X1000 (DSUB9, female) - PROFIBUS-DP interface X1100 (5-pin COMBICON connector with screw connection) - DeviceNet interface X100 (4-pin COMBICON connector with spring-cage connection) - 24V-power supply voltage
Temperature range	0...50 °C ambient temperature
Humidity	max. 90%, non-condensing
Dimensions	width: 23 mm, height: 100 mm, depth: 120 mm (including hat rail mounting and connector projection)
Weight	135 g

Table 2: General data of the module

3.2 PowerPC Unit

PowerPC	PPC 405 EP, 133 MHz
Memory	SDRAM: 8M x 32 Bit (32 MB) Flash-EEPROM: 512 K x 16 Bit (1 MB) Serial EEPROM
Debug interface	for service and programming (for internal use only)

Table 3: PowerPC Unit



3.3 DeviceNet-Interface

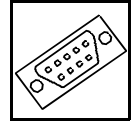
Number	1 x DeviceNet
Connector	5-pin COMBICON with screw connection
Controller	SJA1000, ISO11898-1
Electrical isolation	via dual channel digital isolator and DC/DC-converter
Physical CAN Layer	according to DeviceNet Specification release 2.0, differential, electrically isolated, all DeviceNet bit rates supported

Table 4: DeviceNet interface

3.4 PROFIBUS-DP Interface

Number of PROFIBUS-DP-interfaces	1x PROFIBUS-DP
DP-Controller	PROFIBUS Controller VPC3, DP-Slave
Physical Layer	RS-485, transmission rate max. 12 Mbit/s
Connector	9 pin DSUB (female contacts)
Electrical isolation	via NVE IL485 and DC/DC-converter

Table 5: PROFIBUS-DP interface



4. Connector Pin Assignment

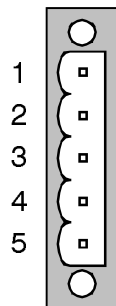
4.1 DeviceNet (X1100, 5-pol. COMBICON-Style)

The DeviceNet interface is designed according to ODVA Specification for DeviceNet Physical Layer.

Device connector: COMBICON MSTB 2,5/5-GF-5,08 BKAU (male contacts)
 Cable connector: COMBICON MSTB 2,5/ 5-STF-5,08BKAUBD:1-5 with screw connections
 PHOENIX-CONTACT order No.: 1768033, (contained in the scope of delivery).
 For conductor connection and conductor cross section see page 18.

Pin position:

(Device connector view)

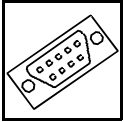


Pin assignment:

Pin	Signal
1	V-
2	CAN_L
3	PE_GND
4	CAN_H
5	V+

Signal description:

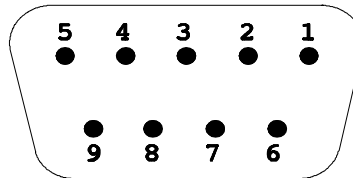
V+... power supply voltage ($U_{VCC} = 24\text{ V}$)
 V-... reference potential to V+ , CAN_L and CAN_H
 CAN_L, CAN_H ... CAN signal lines
 PE_GND ... shield



Connector Pin Assignment

4.2 PROFIBUS-DP Interface (X1000, 9-pin DSUB, female)

Pin position



Pin assignment:

Signal	Pin		Signal
-	1	6	P5V (output)
-	2		
RxD/TxD-P (input/output)	3	7	-
CNTR-P (output)	4	8	RxD/TxD-N (input/output)
DGND	5	9	-

9 pin DSUB

Signal description:

RxD/TxD-P ... receive/transmit data- Plus, B-Line

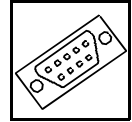
RxD/TxD-N... receive/transmit data- N, A-Line

CNTR-P ... control signal for repeater ('Request To Send')

P5V ... supply voltage for external bus termination networks
(+5 V, max. 50 mA)

DGND ... reference potential

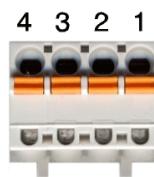
- ... not connected



4.3 Power Supply Voltage (X100)

Device connector: COMBICON MSTBO 2,5/4-G1R-KMGY (male contacts)
 Cable connector: COMBICON FKCT 2,5/4-ST, 5.0 mm grid, spring-cage connection, PHOENIX-CONTACT order No.: 19 21 90 0 (contained in the scope of delivery)
 For conductor connection and conductor cross section see page 18.

Pin position:

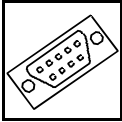


Pin Assignment:

Pin	4	3	2	1
Signal	+24 V	GND	-	-

Signal description:

- +24 V... power supply voltage
- GND ... reference potential
- ... not connected



Connector Pin Assignment

4.4 Conductor Connection/Conductor Cross Sections

The following table contains an extract of the technical data of the cable connectors.

Interface	Power Supply Voltage 24 V ^[1]	DeviceNet ^[2]
Connector type plug component (Range of articles)	FKCT 2,5/..-ST KMGY	MSTB 2,5/ 5-STF- 5,08BKAUBD:1-5
Connection method	spring-cage connection	screw connection
Stripping length	10 mm	
Conductor cross section solid min.	0.2 mm ²	0.2 mm ²
Conductor cross section solid max.	2.5 mm ²	2.5 mm ²
Conductor cross section stranded min.	0.2 mm ²	0.2 mm ²
Conductor cross section stranded max.	2.5 mm ²	2.5 mm ²
Conductor cross section stranded, with ferrule without plastic sleeve min.	0.25 mm ²	0.25 mm ²
Conductor cross section stranded, with ferrule without plastic sleeve max.	2.5 mm ²	2.5 mm ²
Conductor cross section stranded, with ferrule with plastic sleeve min.	0.25 mm ²	0.25 mm ²
Conductor cross section stranded, with ferrule with plastic sleeve max.	2.5 mm ²	2.5 mm ²
Conductor cross section AWG/kcmil min.	24	24
Conductor cross section AWG/kcmil max	12	12
2 conductors with same cross section, solid min.	n.a.	0.2 mm ²
2 conductors with same cross section, solid max.	n.a.	1 mm ²
2 conductors with same cross section, stranded min.	n.a.	0.2 mm ²
2 conductors with same cross section, stranded max.	n.a.	1.5 mm ²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.	n.a.	0.25 mm ²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, max.	n.a.	1 mm ²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0.5 mm ²	0.5 mm ²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	1 mm ²	1.5 mm ²
Minimum AWG according to UL/CUL	26	30
Maximum AWG according to UL/CUL	12	12

n.a. ... not allowed

5. References

- [1] Phoenix Contact GmbH & Co. KG, Blomberg.
Technical data is taken from the Phoenix Contact website:
<https://www.phoenixcontact.com/online/portal/de>;
PCB plug connector - FKCT-2,5/4-ST KMGY - 1921900, downloaded 2015-09-02

- [2] Phoenix Contact GmbH & Co. KG, Blomberg.,
Technical data is taken from the Phoenix Contact website:
<https://www.phoenixcontact.com/online/portal/de>;
Cable connector - MSTB 2,5/ 5-STF-5,08BKAUBD:1-5 - 1768033, downloaded 2015-09-02

6. Declaration of Conformity

EU-KONFORMITÄTSERKLÄRUNG EU DECLARATION OF CONFORMITY



Adresse **esd electronic system design gmbh**
Address **Vahrenwalder Str. 207**
30165 Hannover
Germany

esd erklärt, dass das Produkt
esd declares, that the product

DN-DP

Typ, Modell, Artikel-Nr.
Type, Model, Article No.

C.2930.02

die Anforderungen der Normen
fulfills the requirements of the standards

EN 61000-6-2:2005,
EN 61000-6-4:2007+A1:2011

gemäß folgendem Prüfbericht erfüllt.
according to test certificate.

H-K00-0310-08,
H-Z01-0310-13

Das Produkt entspricht damit der EU-Richtlinie „EMV“
Therefore the product conforms to the EU Directive 'EMC'

2014/30/EU

Das Produkt entspricht der EU-Richtlinie „RoHS“
The product conforms to the EU Directive 'RoHS'

2011/65/EU

Diese Erklärung verliert ihre Gültigkeit, wenn das Produkt nicht den Herstellerunterlagen entsprechend eingesetzt und betrieben wird, oder das Produkt abweichend modifiziert wird.
This declaration loses its validity if the product is not used or run according to the manufacturer's documentation or if non-compliant modifications are made.

Name / Name T. Ramm
Funktion / Title CE-Koordinator / CE Coordinator
Datum / Date Hannover, 2015-07-20

Rechtsgültige Unterschrift / authorized signature

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7. Order Information

Type	Features	Order No.
DN-DP	Gateway DeviceNet/PROFIBUS-DP-Slave, CPU PPC405, GSD-file	C.2930.02

Table 6: Order information

PDF Manuals

Manuals are available in English and usually in German as well. For availability of English manuals see the following table.

Please download the manuals as PDF documents from our esd website www.esd.eu for free.

Manuals	Order No.
DN-DP-ME	DN-DP Hardware Manual in English DN-CBM-DP / DN_DP Software Manual in English
	C.2930.21

Table 7: Available manuals

Printed Manuals

If you need a printout of the manual additionally, please contact our sales team: sales@esd.eu for a quotation. Printed manuals may be ordered for a fee.