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Manual
IMPACT20 DeviceNet

- System Description
- Configuration
- Mounting and Installation
- LED Diagnostics
- DeviceNet Bus System
- Technical Data

Publisher's Note

DeviceNet	IMPACT20 DN DI16	Article Number: 56 908
	IMPACT20 DN DI8 DO8	Article Number: 56 909
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Service and Support

Website:

www.murrelektronik.com

In addition, our Customer Service Center (CSC) will be glad to assist you:

Our Customer Service Center can support you throughout your project: planning and the conception of customer applications, configuration, installation, and startup. We also offer competent consulting or – in more complex cases – we even provide direct onsite support.

The Customer Service Center provides support tools. They perform measurements for fieldbus systems, such as Profibus DP, DeviceNet, CanOpen, and AS interface, as well as energy, heat, and EMC measurements.

Our coworkers at the Customer Service Center provide their competence, know-how, and years of experience. They are knowledgeable about hardware and software, and compatibility with products made by various manufacturers.

You can contact the Customer Service Center at

telephone number +49 (0) 71 91 47-424

or by email at csc@murrelektronik.de.

About the User Manual and its Structure

Bus Manual:
General explanations and functions for each bus.

On this subject, please click on the links to the next page.

System/Product Manuals:
Describe the system and product-specific features.

Art. No.	Designation
56931	IMPACT20 Profibus
56932	IMPACT20 CanOpen
56933	IMPACT20 DeviceNet
56934	IMPACT20 EtherCat
56935	IMPACT20 EtherNet/IP
56936	IMPACT20 ProfiNet

www.murrelektronik.com

The following links will provide you with more information on bus systems, as well as the standards and specifications on which they are based:

>>> DeviceNet (www.odva.org)

Table of Contents

Important Information

Minimum Basic Knowledge Requirements

This manual contains general information on the system and the product. For more details, refer to the bus manuals (see Manual Overview Seite III).

To understand this manual, you need to have knowledge about automation systems.

Symbols and Icons

This manual contains information and instructions you must comply with in order to maintain safety and avoid personal injury or damage to property. They are identified as follows:

Notes indicate important information.

Warnings contain information that, if you ignore this information, may cause damage to equipment or other assets or, if you fail to comply with safety precautions, may constitute a danger to the user's health and life.

➔ ***Refer to our catalog or visit our inline shop at www.murrelektronik.com***.

Intended Purpose

Before starting the devices, read this manual carefully. Keep it in a location that is accessible to all users at all times.

The products that are described in this manual were developed, manufactured, tested, and documented in compliance with the relevant safety standards. In normal cases, these products do not constitute any danger to persons or objects, provided the handling specifications and safety instructions described in this manual are observed. They meet the specifications of the European EMC Directive (2004/108/EC).

WARNING

Devices from the IMPACT20 series are not safety devices conforming to the relevant standards.

Do not use the OFF state of the outputs to implement safety-related requirements of the system/machine.

The products are designed for industrial use. An industrial environment is defined as one in which loads are not connected directly to the public low-voltage power grid. Additional measures must be taken if the products are used in private, business, or trade environments.

The safe, troublefree functioning of the products requires proper transportation, storage, mounting, and careful operation. Operation of the devices for their intended purposes is only guaranteed when the devices are fully mounted.

Current safety and accident prevention laws valid for a specific application must be observed for the configuration, installation, setup, maintenance, and testing of the devices. The power supply must comply with SELV or PELV. Power sources in accordance with EN 61558-2-6 (transformer) or EN 60950-1 (switched-mode power supply) meet these requirements.

Only use cables that meet the requirements and regulations for safety, electromagnetic compatibility, and, if necessary, telecommunications terminal equipment specifications.

Information on cables and accessories made by Murrelektronik GmbH for this product is contained in Chapter Accessories.

Qualified Personnel

Only qualified, trained electricians knowledgeable in the safety standards of automation systems may configure, install, set up, maintain, and test the devices. The requirements concerning qualified personnel are dependent on the requirements profiles described in ZVEI and VDMA. For this reason, electricians must know the contents of the manual "Weiterbildung in der Automatisierung" (Further Training in Automation Systems) published by ZVEI and VDMA published by Maschinenbau-Verlag, Post Box 710864, 60498 Frankfurt, Germany) before installing and maintaining the devices. They are therefore electricians who are capable of assessing the work executed and any possible dangers arising from this due to their professional training, knowledge, experience, and their knowledge of the pertinent standards; or who have a level of knowledge equivalent to professional training due to their many years of activity in a comparable field.

Only Murrelektronik technical personnel are allowed to execute work on the hardware and software of our devices, if they are devices not described in this manual.

Unqualified tampering with the hardware or software, or failure to observe the warnings cited in this manual may result in severe personal injury or damage to property.

1 System Description

1.1 Description of IMPACT20 Systems

Impact20 is a compact Murrelektronik fieldbus I/O station. It combines 16 inputs or outputs in a very constrained space. Due to its small dimensions, the Impact20 is ideal for use in switch cabinets, terminal boxes, and control panels. An Impact20 device comprises a bus interface and a fixed number of I/O slots. The I/O functions are module-dependent and are not changeable. All connections are implemented using spring-loaded clamping terminals. They are clearly arranged so that functional relationships are logically recognizable.

Fieldbus Protocols

Impact20 is supplied for the following fieldbus protocols:

- PROFIBUS
- CANopen
- DeviceNet
- EtherCAT
- Ethernet/IP
- ProfiNet

Module variants

- Module with 16 inputs
- Module with 8 inputs and 8 outputs
- Module with 16 outputs

Functions

- Easy to recognize, directly assigned status and diagnostic LEDs
- Clear, unmistakable slot designation
- Signal identification on the module
- Terminal-specific disconnection in the event of an error
- Group diagnostic and single-channel short-circuit diagnostic over the bus

1.2 System Components

1.2.1 Product Designation Code

The designation format of IMPACT20 system components explains their function.

Examples:

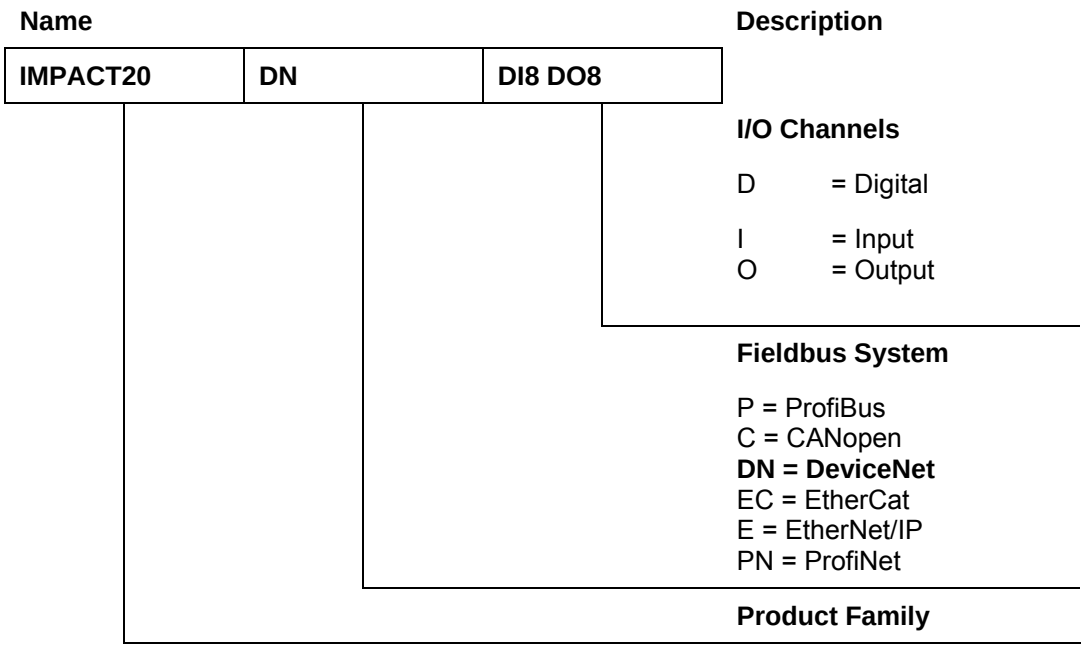


Fig. 1: Example of product designation

1.2.2 Bus Slaves

The function of the IMPACT20 System is to group I/O level signals decentrally and supply this information over a fieldbus network (e.g. DeviceNet).

Article Number	Description
56 908	IMPACT20 DN DI16
56 909	IMPACT20 DN DI8 DO8
56 910	IMPACT20 DN DO16

Table 1: DeviceNet Fieldbus Module

1.3 The IMPACT20 System in the Bus Network

The IMPACT20 System is an I/O system for use in switch cabinets (IP20) for the decentralized capture and control of digital process units. It comprises fieldbus-specific slaves with I/O functions.

1.3.1 System Design Principle

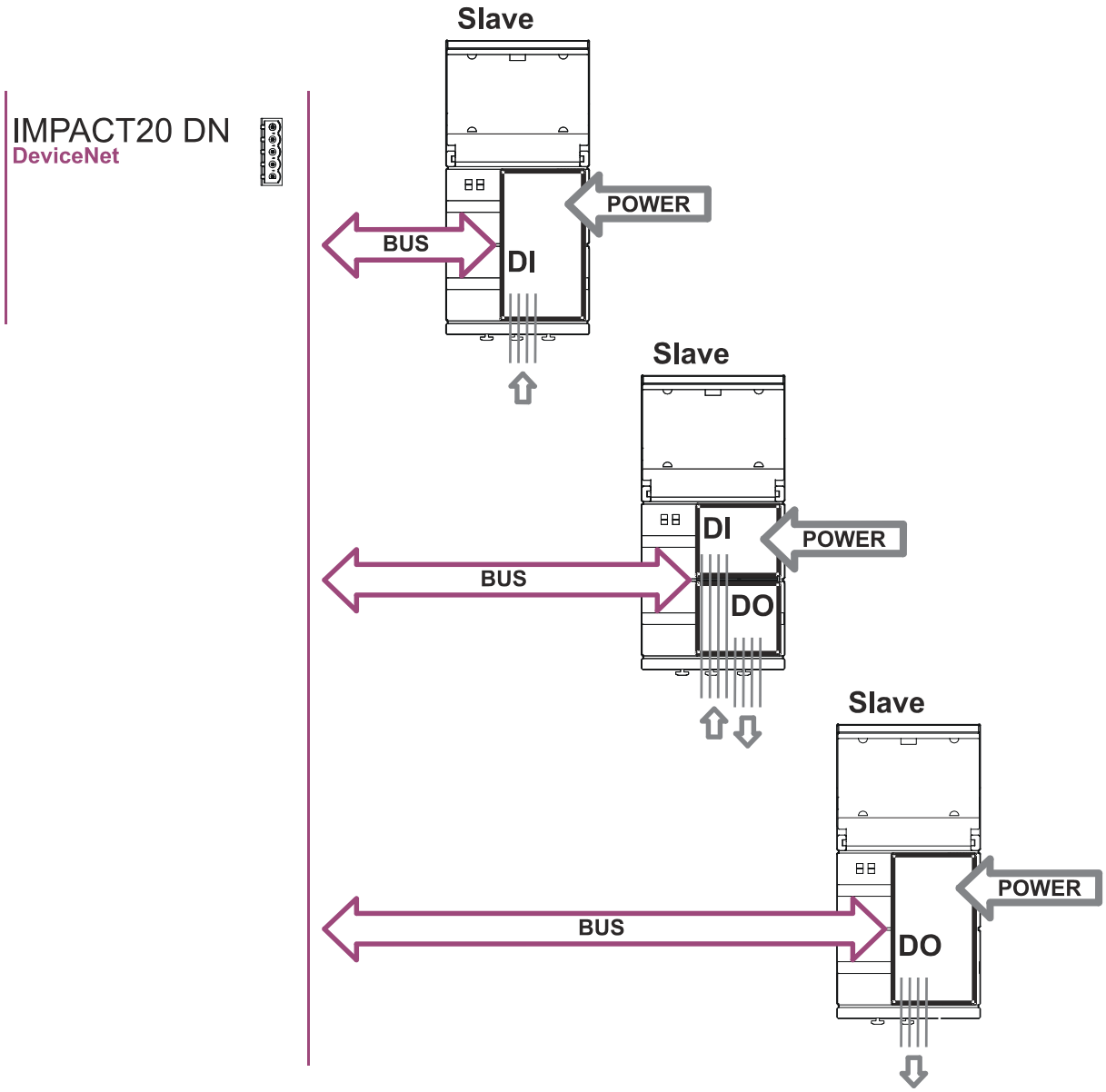


Fig. 2: System Design Principle

1.3.2 Terminal Overviews of Impact20 Modules

1.3.2.1 DI16 Modules

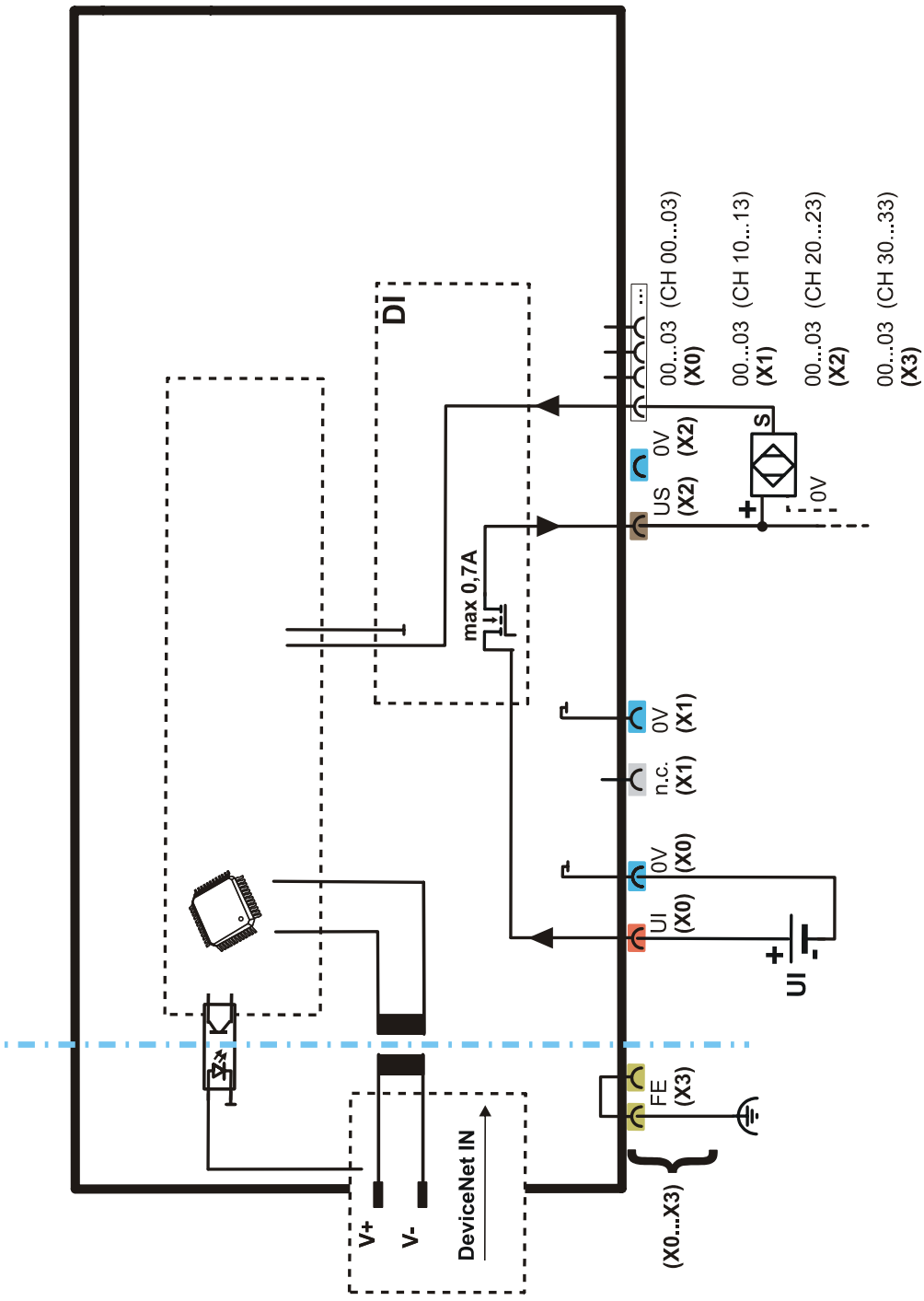


Fig. 3: Terminal Overview of Impact20 DI16 Modules

1.3.2.2 DI8 DO8 Modules

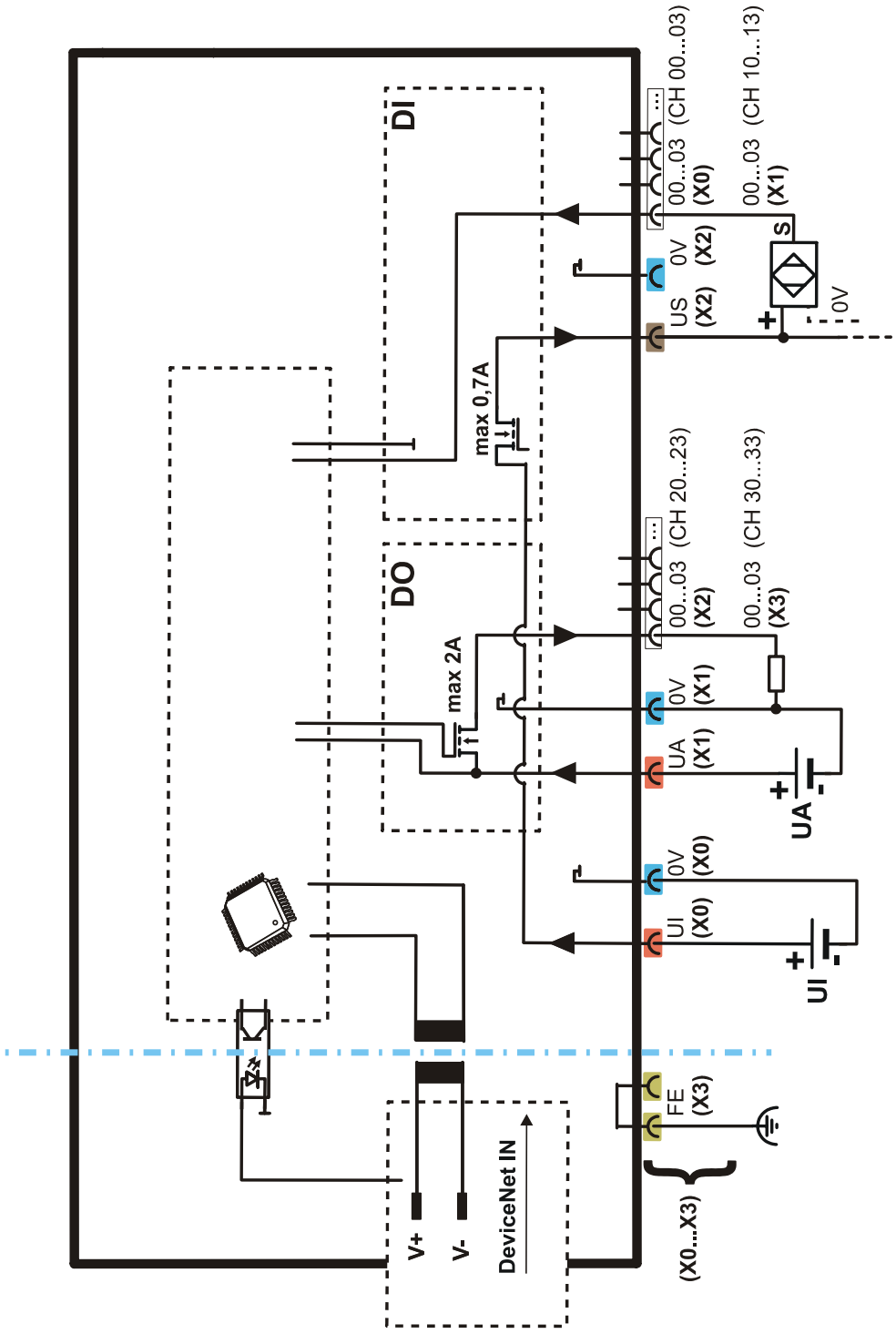


Fig. 4: Terminal Overview of Impact20 DI8DO8 Modules

1.3.2.3 DO16 Modules

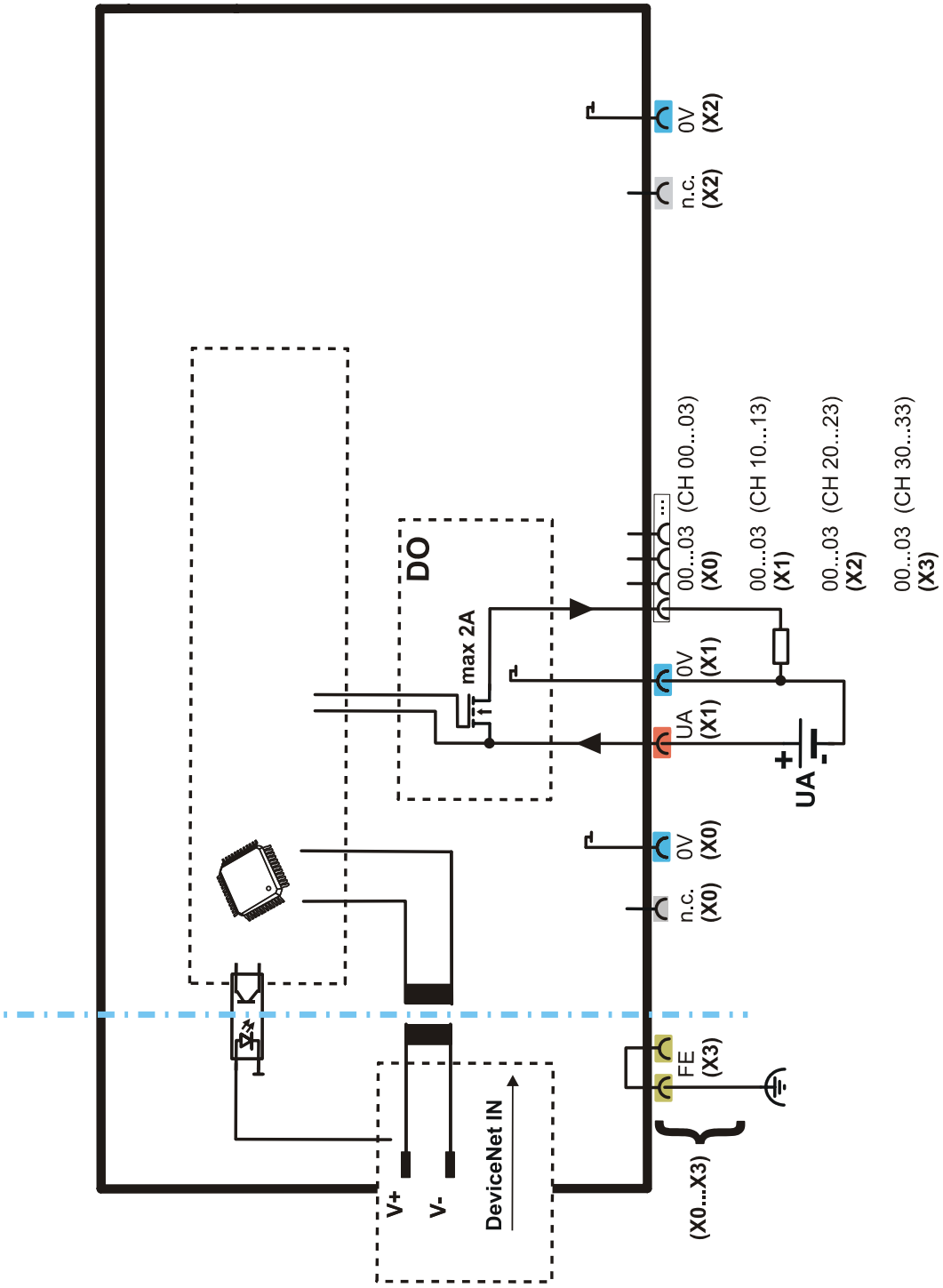


Fig. 5: Terminal Overview of Impact20 DO16 Modules

2 Configuration

This chapter contains information that is relevant during the electromechanical planning phase.

2.1 Power Supply

2.1.1 Configuration Notes

Bus modules require a DC voltage power supply of typically 24 VDC (SELV / PELV) that must comply with the regulations for conventional industrial power supplies.

To optimize immunity from interference, we advise you to tap sensor, bus, and actuator power supply from a number of different power sources. Primary switched-mode or regulated power supplies should be used.

Power supply unit performance is dependent on the number and power requirements of the connected users.

In any case, make sure that the system voltage – measured at the most remote slave – does not drop below 18 VDC when viewed from the system power supplies. System behavior becomes undefined is the sensor and bus power supply drops below 18 VDC. Impact20 modules then generate an undervoltage diagnostic visually and over the fieldbus.

Primary switched-mode power supply units generally permit an increase in output voltage via nominal voltage in order to compensate for line losses.

Modules with digital inputs support the direct connection of commercially available sensors. Depending on the total power requirements resulting from the number of slaves or the use of sensors with high power consumption, a separate power supply may be required for the sensors.

2.2 Galvanic Isolation

To optimize electromagnetic compatibility and increase bus stability, the bus must be galvanically isolated from the remaining electronics. This also applies to the power supply of Impact20 DeviceNet modules where the modules are powered via the Open Style Connector.

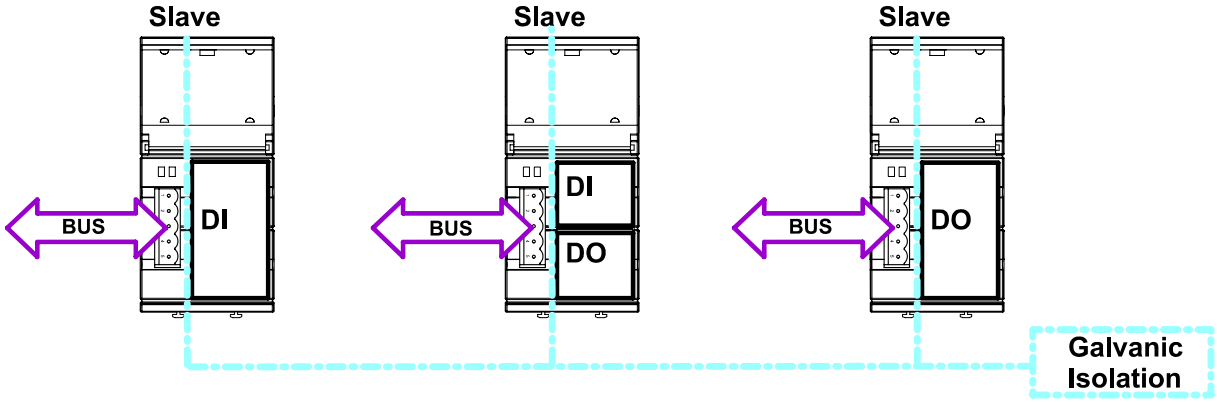


Fig. 6: Impact20 Modules – Galvanic Isolation

2.3 Recommended Power Supply Units

Primary switched-mode power supply units from Murrelektronik are specially designed to power automation systems. For this reason, we recommend this system type to power modules.

We recommend Class 2 power supply units to power DeviceNet buses.

Please contact out sales assistants for information about these power supply units certified to ODVA.

Phases	Output power	Input voltage 95 to 132 VAC	Input voltage 185 to 265 VAC
1	240 W / 10 A	85086	85085
1	480 W / 20 A	85088	85087

Table 2: Recommended Power Supply Units, MCSPower+ Single-Phase

Phases	Output power	Input voltage 3 x 340 to 460 VAC
3	240 W / 10 A	85095
3	480 W / 20 A	85097
3	960 W / 40 A	85099

Table 3: Recommended Power Supply Units, MCSPower+ Three-Phase

➔ ***Murrelektronik offers a comprehensive selection of primary switched-mode power supply units.***
Refer to our catalog or visit our inline shop at www.murrelektronik.com.

2.4 Wire Cross-Sections

AWG	mm²
25	0.14
24	0.25
22	0.34
21	0.5
20	0.75
19	0.75
18	1
16	1.5
14	2.5

Table 4: Converting Wire Cross-Sections

Refer here to Fig. 14: Wiring Terminals

2.5 Electromagnetic Compatibility (EMC)

The units comply with the requirements of EC Directive 2004/108/EC "Electromagnetic Compatibility".

These are units conformant with Class A devices. They may cause radio interference in residential areas. In this case, the operator may be required to implement suitable countermeasures.

The devices described in this manual meet the relevant standards for electromagnetic compatibility in themselves. However, this does not assume that their electromagnetic compatibility is also guaranteed when built into a system.

For this reason, the user is urgently advised to observe the instructions below concerning installation in accordance with EMC requirements.

Protection against Electrostatic Discharge

The products described in this manual contain complete semiconductor components that may be destroyed or damaged by electrostatic discharge (ESD).

Damage does not necessarily lead to an immediately detectable failure or malfunction. However, it may become evident with a delayed reaction or sporadically.

When handling these devices, make sure that the safety precautions for ESD-sensitive devices that are well-known in general practice are maintained. In particular, note the following items:

Do not disconnect or connect plugs or connectors live.

The person handling the devices must discharge themselves electrostatically before they come in direct contact with the devices, e.g. by touching a grounded part of the system, or by wearing an ESD antistatic wrist strap connected to ground.

Grounding

A short (as short as possible) low-impedance connection is required between the grounding point and reference ground to discharge interference voltages that act between the device and reference ground.

The inductance of standard FE lines represents a high impedance for high-frequency interference voltages.

Make sure that the DIN mounting rail to which the device is mounted has a low-impedance connection to ground.

Wiring Arrangement

Avoid EMC problems by keeping to the following basic rules of wiring arrangement:

- Route the data wiring at the greatest possible distance from the power lines. Keep a minimum distance of 10 cm.
- Only cross data and power lines at right angles.
- Route data wires and power cables in separate, shielded ducts.
- Take into consideration the potential interference of other devices or wires when arranging wires.
- Keep the greatest possible distance from frequency converters, motor cables, and other devices, and from cables that emit high-frequency interference.

Power Failures and Dips

Transient power failures and dips (<10 ms) do not normally impair operation since the power supply to the electronics is buffered by integrated capacitors. However, this does not apply to the power supply of sensors and actuators connected to the module. Their high power demand can not be met by capacitors integrated in the device. For this reason, short-term interruptions in actuator voltage may cause undesired switching operations.

If the input signal of less than 1 ms changes, integrated input filters prevent any change to the input state reported to the controller. Longer interruptions to sensor power supply may lead to an input signal change.

Separate Powers Supplies

Sensors and actuators can be powered by a separate power supply unit. A separate power supply improves the electromagnetic compatibility of the overall system.

Suppression of Inductive Loads

The outputs of the devices described in this manual have an integrated protection circuit against high-energy interference voltages, e.g. that occur when inductive loads are switched.

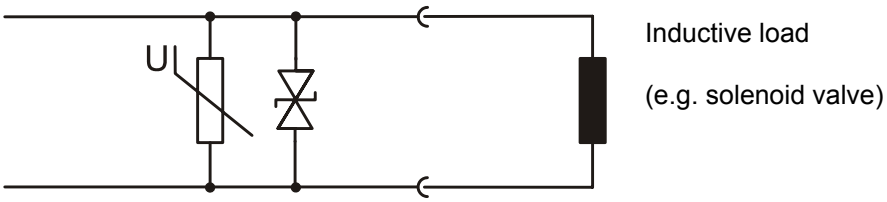


Fig. 7: Suppression of Inductive Loads

A suppressor diode guarantees a rapid reduction in the energy stored in the magnetic field of an inductive load. However, with inductive loads, in particular loads within the maximum current carrying capacity range of a channel and at switching frequencies > 1 Hz, we advise the use of commercially available protection circuits that are capable of reducing the energy stored in the connected inductances.

The high voltages when inductive loads are switched off generate strong fields in the wiring and this may lead to interference in adjacent circuits or devices.

➔ ***Murrelektronik offers a comprehensive selection of suppressor products.*** Refer to our catalog or visit our inline shop at ***www.murrelektronik.com***

Other Measures and Limits

In specific system configurations, the requirements for interference emission and immunity from interference can only be met with additional measures since the EMC within a system is dependent on the individual components made by other manufacturers.

Mains filters are a suitable measure to reduce cable-bound interference. Various manufacturers offers optical-fiber converters. This type of data transmission is basically immune to EMC interference. However, it does not apply to the converter electronics. Therefore, use of fiber-optics does not eliminate all EMC problems.

Our accredited test center will answer any further queries you may have concerning EC. There you will receive advice on certain methods to conform with the EMC Directive for the systems you have built.

Murrelektronik-Prüfzentrum (Test Center),

Grabenstrasse 27,

D-71570 Oppenweiler,

Phone +49 7191 47-334,

Fax +49 7191 47-323,

pruefzentrum@murrelektronik.de

2.6 Connecting Sensors and Actuators

WARNING

Devices from the IMPACT20 series are not safety devices conforming to the relevant standards.

Do not use the OFF state of the outputs to implement safety-related requirements of the system/machine.

2.6.1 Sensor Power Supply

Sensor can be powered by the IMPACT20 module. The sensor power supply is protected by a self-resetting short-circuit proof transistor for each module. The maximum current draw for the sensor power supply is 0.7 A per module.

2.6.2 Actuators

The maximum current draw of Impact20 modules is 2 A per channel. Please remember that the max. total current of 8 A at the UA terminal must not be exceeded.

CAUTION

The module may be damaged if the actuator power supply polarity is reversed.

In order to reactivate an output after a short circuit or overload has been rectified, the following procedure must be observed:

1. Set output 1 to "0".

2. Set output to "1"

or

1. Switch off voltage at UA.

2. Switch on voltage at UA.

2.6.3 Overview of Channel Assignment

Row	16 DI			
X0	00 (DI)	01 (DI)	02 (DI)	03 (DI)
	CH 00	CH 01	CH 02	CH 03
X1	00 (DI)	01 (DI)	02 (DI)	03 (DI)
	CH 10	CH 11	CH 12	CH 13
X2	00 (DI)	01 (DI)	02 (DI)	03 (DI)
	CH 20	CH 21	CH 22	CH 23
X3	00 (DI)	01 (DI)	02 (DI)	03 (DI)
	CH 30	CH 31	CH 32	CH 33
	24 V / current as per input characteristic Type 3			

Table 5: Channel assignment for DI modules

Row	16 DO			
X0	00 (DO)	01 (DO)	02 (DO)	03 (DO)
	CH 00	CH 01	CH 02	CH 03
X1	00 (DO)	01 (DO)	02 (DO)	03 (DO)
	CH 10	CH 11	CH 12	CH 13
X2	00 (DO)	01 (DO)	02 (DO)	03 (DO)
	CH 20	CH 21	CH 22	CH 23
X3	00 (DO)	01 (DO)	02 (DO)	03 (DO)
	CH 30	CH 31	CH 32	CH 33
	24 V / max. 2			

Table 6: Channel assignment for DO modules

Row	DI8 / DO8			
X0	00 (DI)	01 (DI)	02 (DI)	03 (DI)
	CH 00	CH 01	CH 02	CH 03
X1	00 (DI)	01 (DI)	02 (DI)	03 (DI)
	CH 10	CH 11	CH 12	CH 13
X2	00 (DO)	01 (DO)	02 (DO)	03 (DO)
	CH 20	CH 21	CH 22	CH 23
X3	00 (DO)	01 (DO)	02 (DO)	03 (DO)
	CH 30	CH 31	CH 32	CH 33
	DI: 24 V / current as per input characteristic Type 3 DO: 24 V / max. 2			

Table 7: Channel assignment for DIDO modules

3 Mounting and Installation

3.1 Mounting

3.1.1 Dimensioning

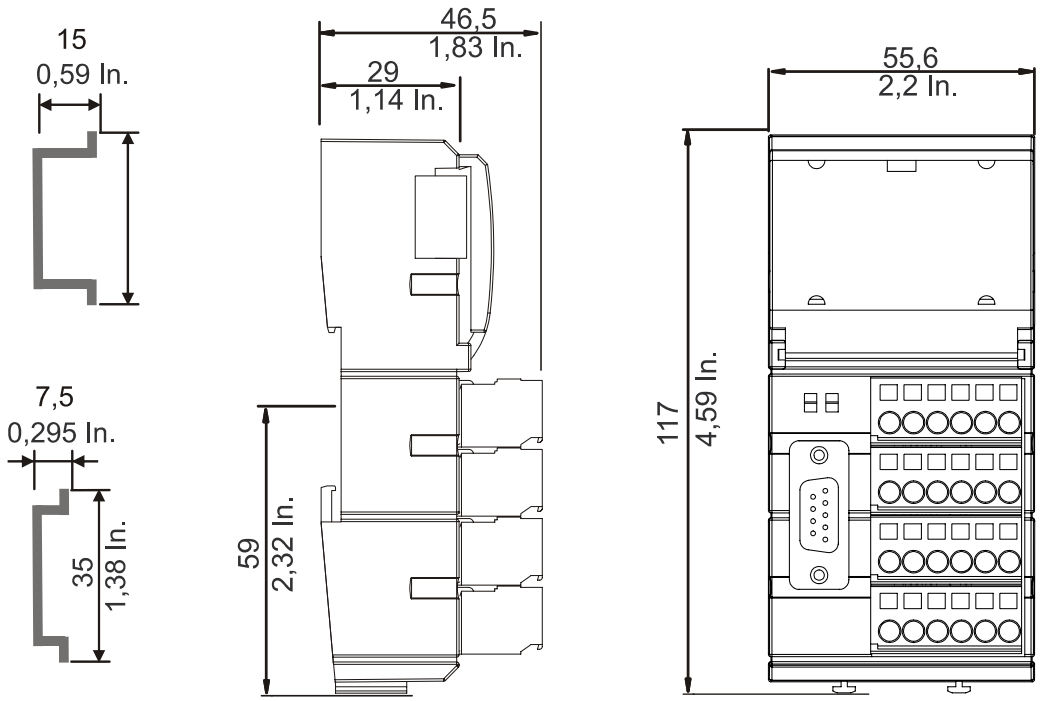


Fig. 8: Dimensioning

The dimensions of all IMPACT20 modules are identical.

3.1.2 Distances

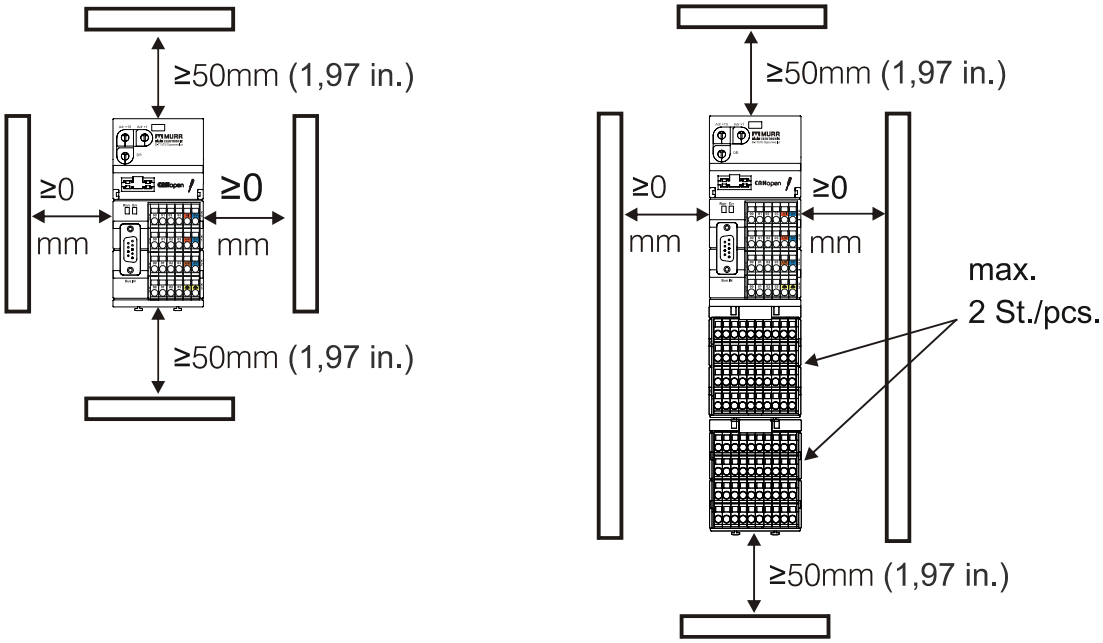


Fig. 9: Distances

3.1.3 Installation Position

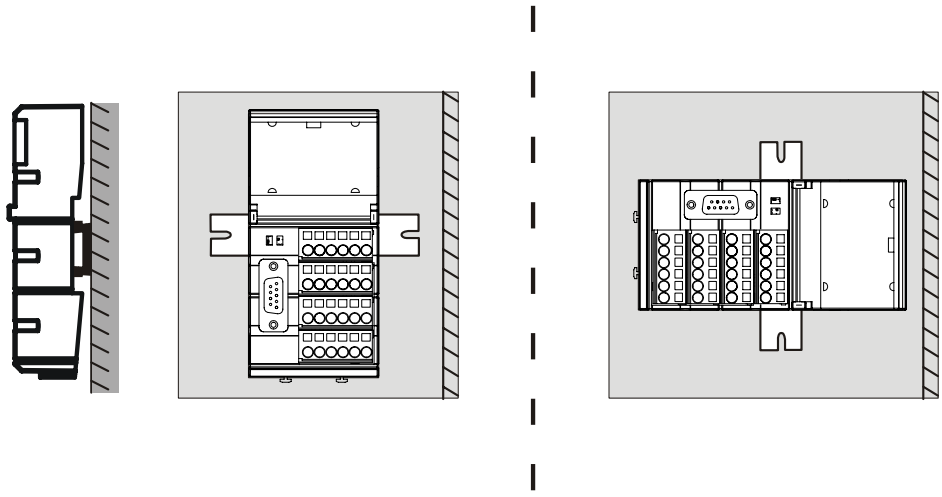


Fig. 10: Installation position

3.1.4 Mounting IMPACT20 Modules on DIN Mounting Rails

Make sure that the DIN mounting rail, on which the device is mounted, has a low-impedance connection to ground.

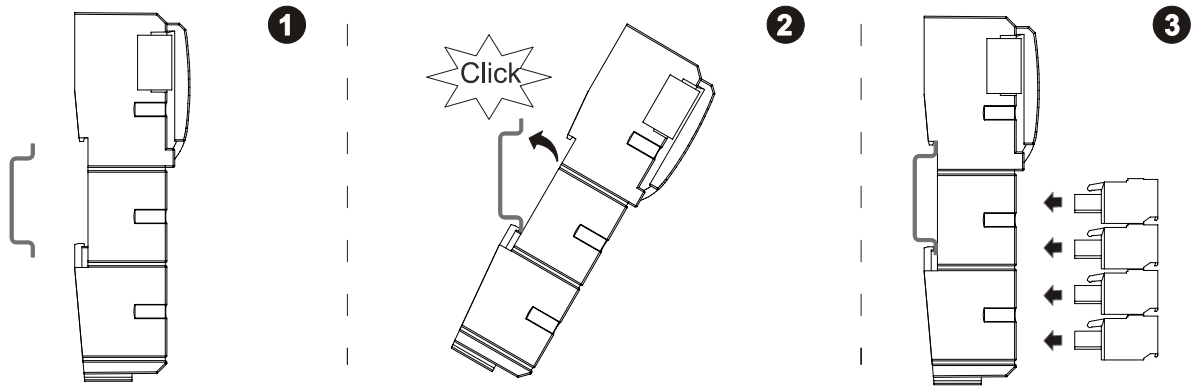


Fig. 11: Mounting IMPACT20 modules on DIN mounting rails

3.1.5 Removing Terminals

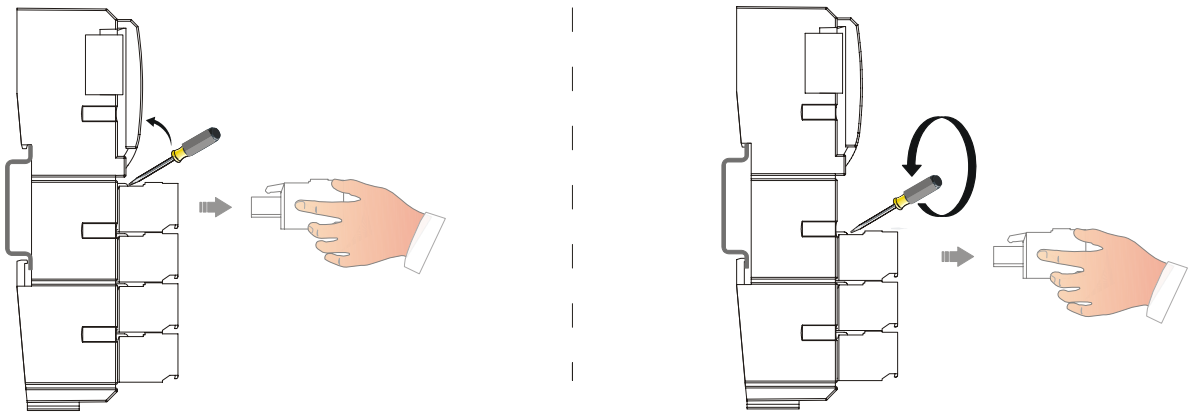


Fig. 12: Removing terminals

3.2 Installation

3.2.1 Terminal Connection

3.2.1.1 Labeling Terminals / Terminal Overview

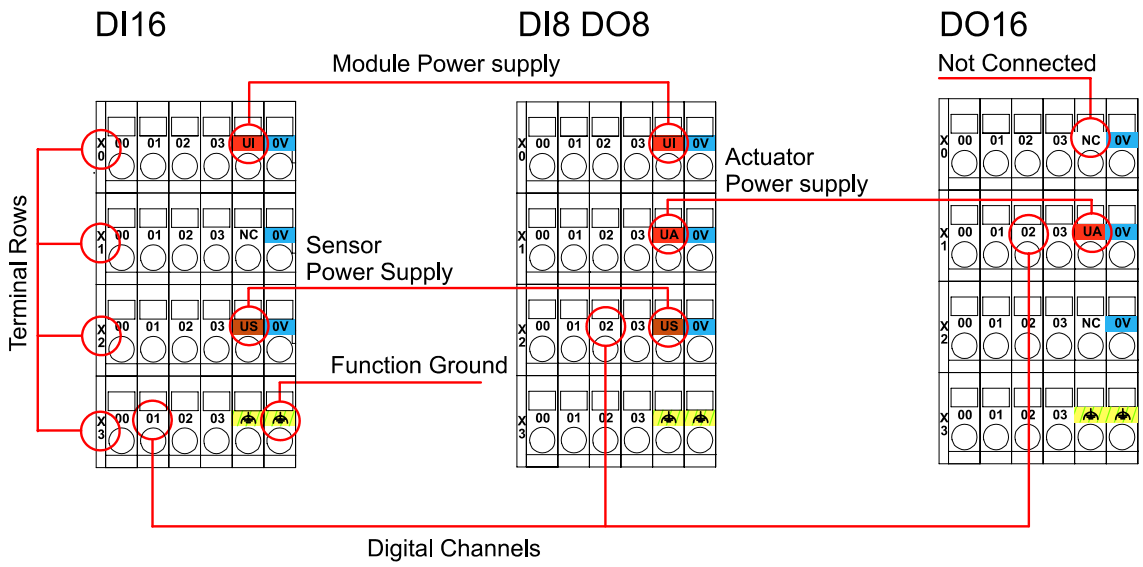


Fig. 13: Labeling Terminals

IMPACT20 DeviceNet modules are powered over the bus cable.

UI	Power supply of the internal module and sensor power supply
NC	Not connected
UA	Power supply for actuators
US	Power supply for sensors. The US terminal obtains its energy from the UI terminal with a max. current of 700 mA.
0 V	0 Volt potential
	Function ground
X0 to X3	Designation of up to 4 terminal rows, where the topmost starts with X0.
00 to 03	Digital channels (inputs and outputs) The labeling also corresponds to the channel number and bit position.

➔ ***Murrelektronik supplies label sheets Art. No. 56113 for the simple labeling of terminals. Refer to our catalog or visit our inline shop at www.murrelektronik.com***

3.2.1.2 Wiring Terminals

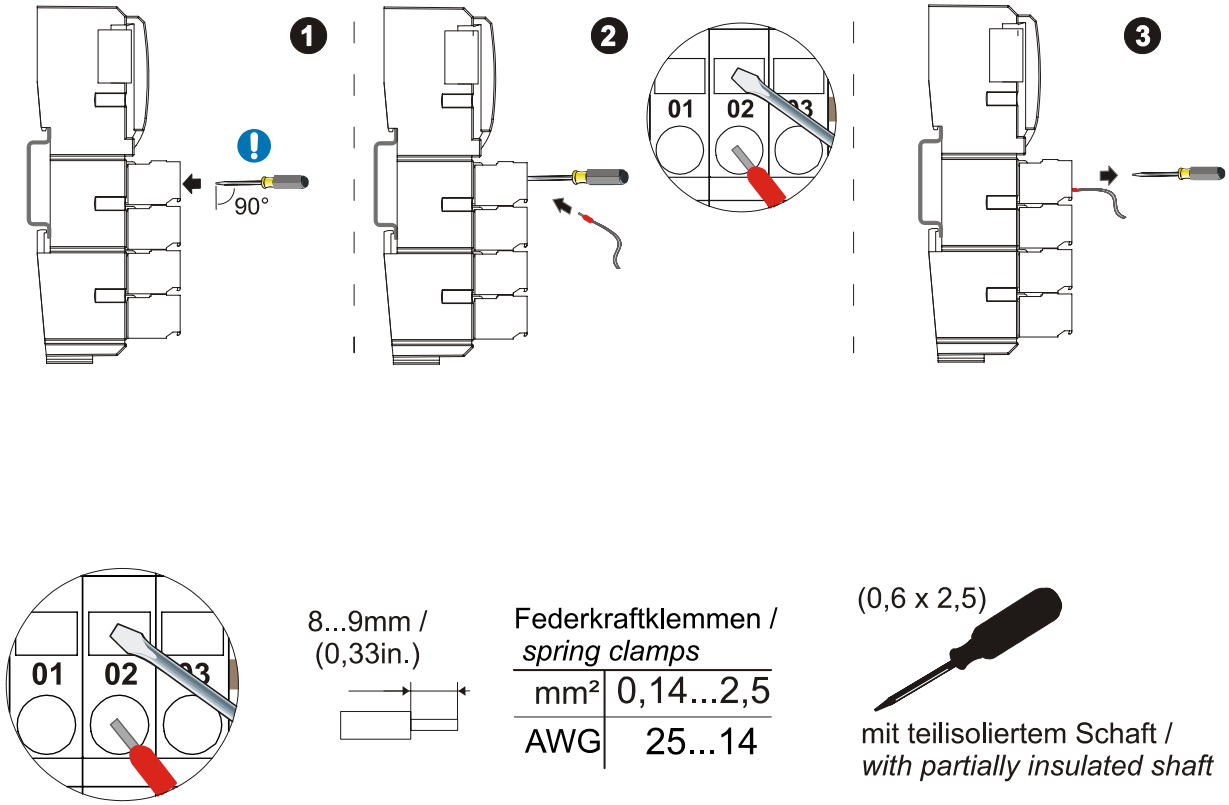


Fig. 14: Wiring Terminals

Refer here to Table 4: Converting Wire Cross-Sections

4 LED Diagnostics

The fieldbus diagnostics and the function of the bus LED is described in the chapters relating to the field buses.

The following diagnostics are displayed visually and signaled over the fieldbus:

- Sensor short-circuit as group signal
- Actuator short-circuit by channel and group signal
- Module power supply undervoltage UI (module power supply is less than 18 V).
- Actuator power supply undervoltage UA (actuator power supply is less than 18 V).

4.1 LED Indicators

All IMPACT20 modules have separate well-arranged LEDs to indicate device and I/O status. These displays are located on the front of the device.

4.1.1 LED for Module and Actuator Power Supply

An LED is provided for each of the module power supply terminals "UI" and actuator power supply terminals "UA". They light up red for undervoltage (< 18 V) and green in normal state (> 18 V).

- The LEDs under "**UI**" indicate the status of the internal power supply voltage US.

Please note that the sensor power supply voltage (US terminal) is connected internally to the module power supply voltage (UI terminal). This ensures that the two terminals have the same voltage.

On modules of the DeviceNet series, the module is powered over the bus cable. The LEDs of the UI terminal only indicate the status of the sensor power supply.

- The LEDs under **"UA"** indicate the status of the actuator power supply voltage.

LED display UI and UA	Response	State
	green	Power supply OK (≥ 18 V)
	red	Undervoltage (< 18 V)
	off	Voltage ≤ approx. 12 V

Table 8: LED module power supply

4.1.2 LED for Sensor Power Supply

- The LEDs under **"US"** indicate the status of the sensor power supply voltage.

LED display US	Response	State
	off	Power supply OK
	red	Overload or short-circuit of sensor power supply.

Table 9: LED periphery power supply

4.1.3 Signal-Logic Display and LED Behavior

Each input and output is assigned a separate status display This is labeled **"00 to 03"**. The label indicates the channel number and bit position. It is arranged under the associated terminal and assigns the status of the peripheral components.

Relationship of signal-logic display and LED behavior at the input

LED Display		Logic Value	Voltage at Input	Signal
	off	0	< 11 V	Input with NO contact function
	yellow	1	11 to 30.2 V (dependent on US)	

Table 10: LED at input of digital modules

Relationship of signal-logic display and LED behavior at the output

LED Display		Logic Value	Voltage at output	Signal
	off	0	0 V	Output
	yellow	1	12 to 30.2 V (dependent on UA)	
	red	1	-	Output in overload / short-circuit case

Table 11: LED at output of digital modules

4.2 Short-Circuit or Overload of Sensor Power Supply US

Reaction of IMPACT20 modules to short-circuit or overload of sensor power supply:

- The diagnostic LEDs light up red on the associated terminal.
- The bus transmits the diagnostic data to the Master.

After rectification of the overload or short-circuit, the sensor power supply is immediately available again.

4.3 Thresholds of Module Power Supply

There are three thresholds for undervoltage detection:

12 V < UI < 18 V	The device continues to function but • the UI LED lights up red. • the respective diagnostic was transferred to the Master.
UI < 12 V	The bus communication still functions but: All outputs are reset to 0.

4.4 Short-Circuit or Overload of Actuators

Reaction of IMPACT20 modules to short-circuit or overload:

- The diagnostic LEDs light up red on the associated terminal.
- The respective diagnostic data are transferred over the bus to the Master.

In order to reactivate an output after a short-circuit or overload has been rectified, the following procedure must be observed:

1. Set output 1 to "0".

2. Set output to "1"

or

1. Switch off voltage at UA.

2. Switch on voltage at UA.

4.5 Undervoltage of Actuator Power Supply UA

There are two thresholds of undervoltage detection:

12 V < UA < 18 V	The device continues to function but • The UA LED lights up red. • The respective diagnostic was transferred to the Master.
0 V < UA < 12 V	The bus communication still functions but: • The UA LED goes out. • All outputs are reset to 0.

5 DeviceNet Bus System

5.1 Description of DeviceNet Protocol

DeviceNet is based on international standards (EN50325 and IEC62026). Its use is widespread in CAN (Controller Area Network) technology (OSI Layers 1 and 2) and it uses standard protocol circuits.

The DeviceNet application layer uses the producer-consumer process and permits a highly efficient data transfer. This is achieved by multicast and broadcast transmissions, polls, strobes, and time-controlled and event-controlled transmissions (change of state).

Explanation (example) of DeviceNet communication modes for input and output data:

Polling	The Master module ("scanner") sends output data cyclically to the assigned users and receives input data in the response telegram.
Change Of State (COS)	Telegrams are sent as soon as their content changes. In this case, only changes to the process map are transmitted in each case, not the process map itself.
Cyclic	The modules send the data automatically when the cycle time expires.
Strobed	The scanner requests the data in a broadcast telegram sent to all users.

The "strobed" communication type is not supported by IMPACT20 modules.

Up to 8 bytes of useful data per message and fragmentation services for large messages are the best conditions for optimized data acquisition and the diagnosis of simple through to intelligent field devices.

Three transmission rates are available for various bus lengths: 125, 250, and 500 Kbps.

The diagnostic functions of Murrelektronik DeviceNet devices include rapid fault localization. Diagnostic messages are sent over the bus and summarized by the Master. The status of the network connection, the device status of the module and inputs/outputs, and the power supply are displayed by LEDs (standardized).

DeviceNet is a simple, cost-efficient wiring system based on a 4-wire cable: one wire pair to transmit data and one wire pair to transmit auxiliary power to sensors over a distance of up to 500 m. System expansions > 500 m are possible, but require the use of repeaters.

Installation is greatly simplified through the use of preterminated cables. Wiring errors are avoided and setup is more rapidly successful.

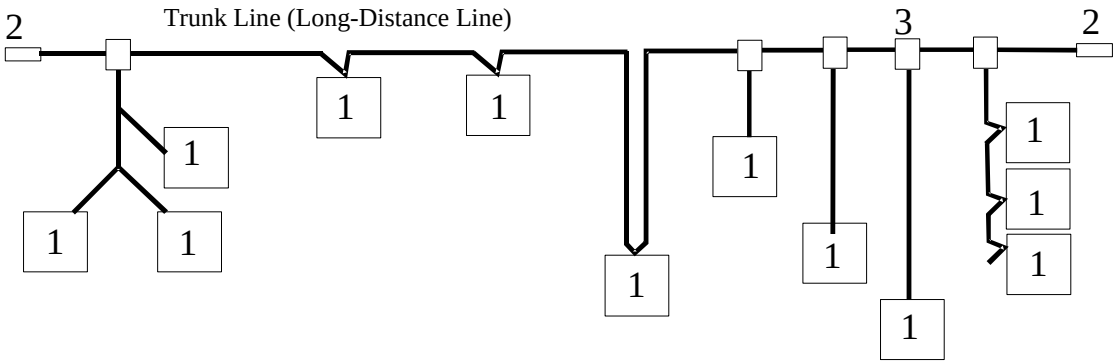
➔ ***The product portfolio of Murrelektronik GmbH covers fieldbus cables, power cords, and sensor cables, as well as accessories, such as terminating resistors and T fittings. Freely terminatable connectors and cables are also available.***
Refer to our catalog or visit our inline shop at ***www.murrelektronik.com*.**

DeviceNet specifications are available to any member of the independent and open user organization "Open DeviceNet Vendor Association" (ODVA). We supply the source codes for Master and Slave devices made by Murrelektronik GmbH.

Devices made by Murrelektronik GmbH are certified by the ODVA and bear the DeviceNet Conformance Tested logo.

Fig. 15: DeviceNet Conformance Tested Logo

The figure below shows an example of the topology of a DeviceNet network. Characteristic of Device-Net is the bus cable that comprises a power supply for DeviceNet users.



1 Network node

2 Terminating resistor

3 Tap[1]

Fig. 16: DN System Topology

[1] Tap – T fitting

5.2 Bus Physics

5.2.1 System Data

The table below illustrates the most important system data.

Topology	Tree Topology
Transmission network	Twisted shielded four-wire cable, separate conductors for data (white/blue) and power (black/red)
Line lengths	Main line max. 500 m, spur lines max. 6 m
Number of bus devices	Max. 64
Number of I/O points	Control-dependent
Addresses	One specific MAC ID per device in the range from 0 to 63
Addressing	MAC ID, Serial Number (32 bits)
Transmission rates	Dependent on the cable length (max. 500 Kbps): 500 Kbps up to 100 m (thick cable) 250 Kbps up to 250 m (thick cable) 125 Kbps up to 500 m (thick cable) Maximum length of main line with repeaters 3 km
User data	8 bytes per telegram
Terminating resistors	121 Ω, always at each end of the data cable
Error recognition	Identification of faulty messages, automatic repetition
Power supply	24 VDC tolerance (total) ± 4%

Table 12: DeviceNet System Data

5.2.2 DeviceNet Bus Line

➔ ***Murrelektronik offers a number of preterminated and matching round cables.***
Refer to our catalog or visit our inline shop at www.murrelektronik.com

Matched to the requirements of various applications, the fieldbus-side system cables can be implemented using round cables, or the gray profile ribbon cable typical of DeviceNet.

The DC resistance (wire cross-section) is decisive for the selection of suitable transmission cables by reason of auxiliary power transmission:

The cable make-up is based on 4 conductors. Due to the transmission technology, cable shielding is necessary.

Actuators require an additional auxiliary power supply.

The tables and figures below show the cable make-up.

CAUTION:

The maximum permitted current is dependent on the system cable used and is max. 8 A. (See ODVA DeviceNet "Planning and Installation" Manual.)

Cable	Conductors	Assignment
lilac DeviceNet bus line	white	Fieldbus system cable (CAN_H)
	blue	Fieldbus system cable (CAN_L)
	blank	Shielding conductor
	red	24 VDC auxiliary power (+24 VDC)
	black	24 VDC auxiliary power (0 V)

Table 13: Conductor Assignment of DeviceNet Cable

Make-up of DeviceNet round cable

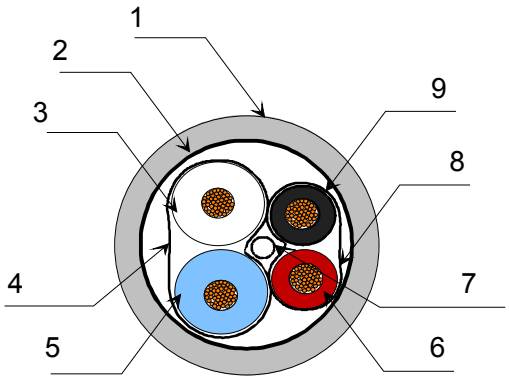


Fig. 17: DN round cable

1	Jacket	6	Power conductor, red (+24 V)
2	Cable shield	7	Shield conductor
3	Bus conductor, white (CAN_H)	8	Power line pair shield
4	Bus line pair shield	9	Power conductor, black (0V)
5	Bus conductor, blue (CAN_L)		

Make-up of DeviceNet Profile flat cable

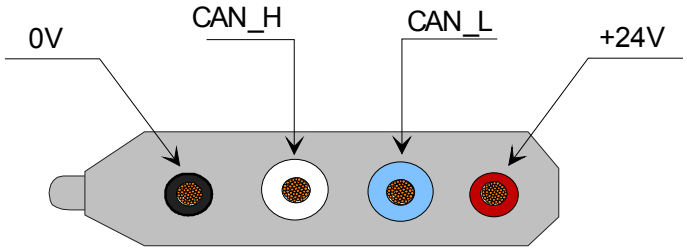


Fig. 18: DN profile line

DeviceNet products with direct connection for the profile flat cable have a geometric code dependent on their type. This results in a reliable protection against incorrect electrical polarity.

With the various line types (thin, thick, flat), there is a relationship between the transmission rate (used) and the length of the main cable.

Data Rate	Length of main line (thick cable)	Length of main line (thin cable)	Length of main line (flat cable)	Cumulative total length of drop lines
500 Kbps	100 meters	100 meters	75 meters	39 meters
250 Kbps	250 meters	100 meters	200 meters	78 meters
125 Kbps	500 meters	100 meters	420 meters	156 meters

Table 14: Relationship between transmission rate and main cable length

The max. length of a drop line is 6 m.

Make sure of the correct termination for the DeviceNet bus cable at the ends between CAN_H and CAN_L (121 Ω).

Calculating cable length:

If the distance from a branch in the main cable to the most remote module is greater than the distance to the next terminator, this drop line length (Drop A-C) is calculated in the total cable length.

Example:

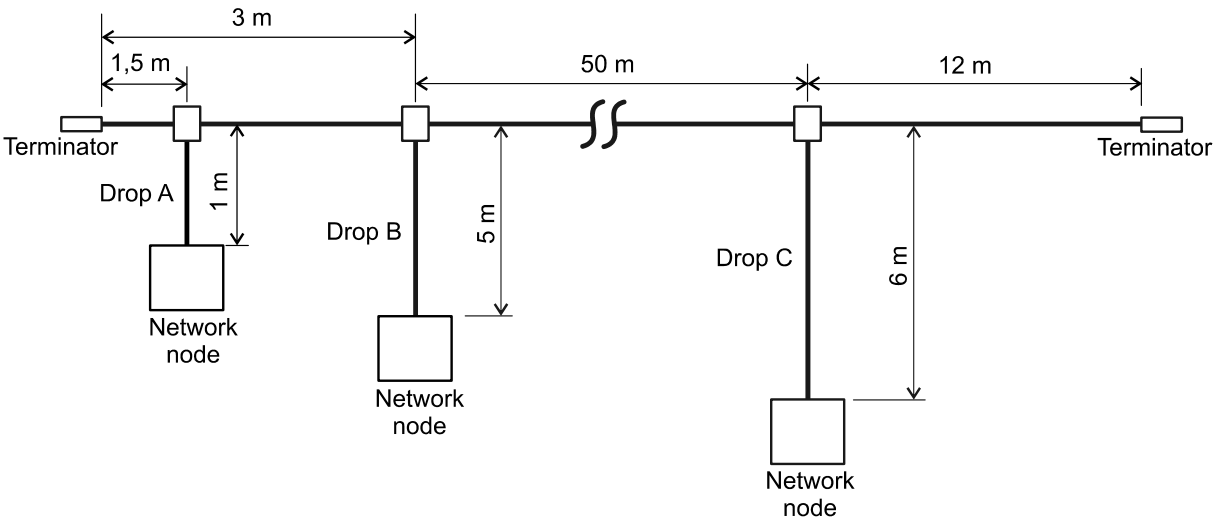


Fig. 19: Example network for cable length calculation

Drop A:	does not appear in the total cable length	1.5 m > 1 m
Drop B:	is calculated in the total cable length	3 m < 5 m
Drop C:	does not appear in the total cable length	12 m > 6 m

Calculated total cable length: 5 m + 50 m + 12 m = 67 m

The cumulative drop line length results from the sum of all drop lines in the cable system. This sum may not exceed the maximum cumulative length, referred to the transmission rate (see Table 14:).

For example, if the cumulative drop line length is 45 m, a maximum data rate of 250 Kbps may be used if a thick cable is installed.

5.2.3 System Power Supply

DeviceNet modules require a DC voltage power supply of typically 24 VDC (Class 2) that must comply with the regulations of DeviceNet industrial power supplies.

Power supply unit performance is dependent on the number and power requirements of the connected users.

Recommendation:

Use different power supplies to power the sensors and actuators in order to achieve greater immunity from interference and decoupling.

Use primary switched-mode power supplies to power the DeviceNet bus and supply the sensors and actuators.

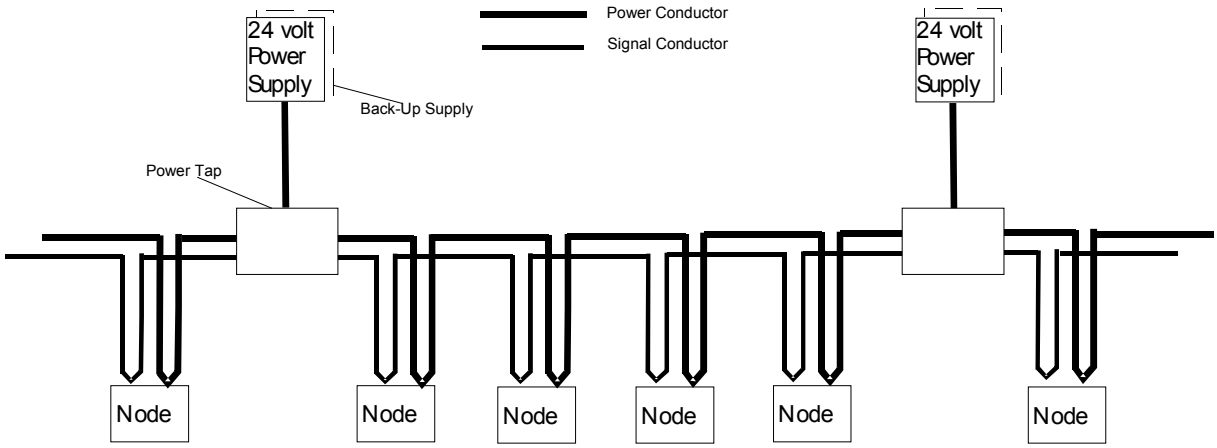


Fig. 20: DeviceNet power supplies

DeviceNet systems require a power supply DC voltage (power supply unit) ranging from 24 V ± 1% that must comply with the IEC regulations for "Protective Extra-Low Voltage" (PELV).

A power supply unit can be placed at any point in the network.

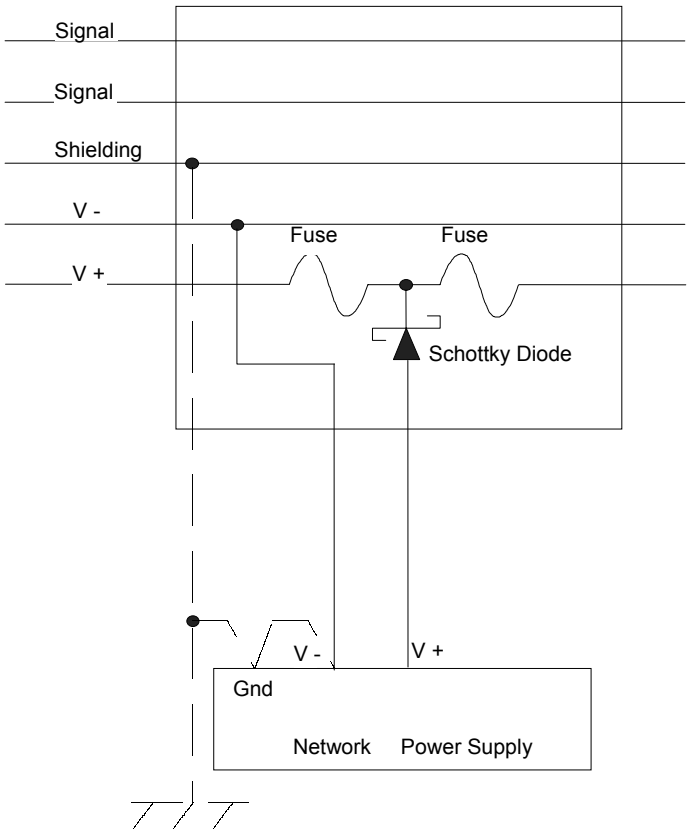


Fig. 21: DeviceNet Power Tap

System-related limit values regarding system power supply must be strictly observed if maximum functional safety and fault-free operation are to be maintained.

Always make sure that the system power, measured at the most remote device from the power supply, does not drop below 23.04 V (24 V - 4%).

A load current-related voltage drop across the power supply cable occurs due to the central power supply of the DeviceNet users, including all their connected sensors, from the DeviceNet system power supply unit.

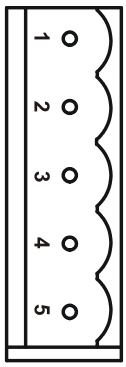
In critical cases, an optimization is achievable, for example due to a change of location of the system power supply within the whole system and the use of power supply cables with a larger cable cross-section (thick cable, thin cable, flat cable).

The electronics of the IMPACT20 are powered from the DeviceNet bus. Additional auxiliary power is required to power the sensors and actuators. At least two voltages (bus voltage and sensor power supply) are required for regular system operation. The sensor power supply is fed via the UI terminal. The module can communicate with the bus as soon as it is powered over the DeviceNet bus.

The actuator power supply UA terminal can be executed as a switch-off device (only DO modules).

5.3 Starting Up the fieldbus

5.3.1 PIN Assignment of DeviceNet Connector



PIN	Assignment	Color
1	V+	red
2	CAN_H	White
3	⏚	
4	CAN_L	blue
5	V-	black

Fig. 22: PIN assignment of DeviceNet connector

5.3.2 Startup Requirements

- The fieldbus is set up and tested in accordance with system and technical requirements.
- The EDS files of the IMPACT20 modules are integrated in the software.
- The fieldbus and scanner have been started.
- The scanner scans the network with the aid of a software tool (incl. hardware).

The DeviceNet users are recognized in the sequence in which they were addressed on the bus. If there are devices on the bus that are addressed by a software, the devices may only be connected to the bus sequentially since they all have the same preset MAC ID.

When the project engineering is completed for the overall system, and the bus communication is active, additional devices can be connected to the bus at any time. The precondition here is a correctly set MAC ID and baud rate.

Typical errors during setup include: damage to the bus cable, incorrect baud rate, duplicate MAC IDs, CAN_H and CAN_L swapped on the bus connection, power (auxiliary power, in particular sensor power supply) not applied, bus not correctly terminated, and EDS files incorrectly or not at all integrated.

Users with identical MAC ID do not continue the MAC ID test completely to the end. After the self-test, the NS-LED lights up red.

Each device type possesses an EDS file (*.eds) and a graphic (*.ico).

5.3.3 Terminating DeviceNet Bus Segments

Each segment must be terminated with a terminating resistor of 121 Ω at the start and end.

5.3.3.1 EDS Files

The EDS file is created for the device type (I/O). The consequence is that, in the IMPACT20 series, each device is assigned a separate EDS file with the extension "*.eds". The devices are assigned a uniform icon with the extension "*.ico".

The EDS file contains device information, e.g. device type, manufacturer, vendor ID, Article Number, software version, hardware version, etc.

EDS files are module-specific. Only Murrelektronik technical personnel are allowed to perform system-specific modifications.

EDS files are assigned as shown in the table below:

Module type	Name of EDS file	Name of icon
IMPACT20 DN DI16	IMPACT20-DN DI16 56908.eds	IMPACT20.ico
IMPACT20 DN DI8 DO8	IMPACT20-DN DI8 DO8 56909.eds	IMPACT20.ico
IMPACT20 DN DO16	IMPACT20-DN DO16 56910.eds	IMPACT20.ico

Table 15: Assignment of EDS files

The latest EDS files are downloadable over the web from: http://www.murrelektronik.com. Navigate to the download section under configuration files.

5.3.3.2 Addressing

Fig. 23: Assignment of rotary switches for addresses and baud rate

DR	Rotary switch to set the data rate
NA x 10	Node ID switch ×10
NA x 1	Node ID switch ×1
Permitted addresses:	1 to 63

Set the Node ID using the two switches NA x10 (tens) and NA x1 (ones). Addresses 0 to 63 are permitted. It is normal to assign Address 0 to a DeviceNet scanner. We therefore recommend you to set the address starting with Address 1 for IMPACT20 modules. If an address greater than 63 is set, the device operates with default address 63. The Node ID is only assumed when the power supply is applied to the IMPACT20. As a result, a power reset must always be made after the Node ID is changed.

Make sure that the set Node ID is unique in the DeviceNet network. Otherwise, the module will not work in data exchange.

Setting the Data Rates

The data rate is set with a "DR" rotary switch. The following data rates can be set:

Switch Position	Data Rate
0, 3 to 9	125 Kbps
1	250 Kbps
2	500 Kbps

Table 16: Setting the data rate

5.3.4 Operating Modes

The following transmission services are selectable for I/O data exchange:

- **Polling**
- **Change-Of-State (COS)**
- **Cyclic**

The I/O data are exchanged using the polling transmission service via the default parameters defined in the EDS files.

5.3.4.1 Polling

Poll Command	The I/O message is sent to a single slave device (point-to-point). The scanner must send a separate poll command to each "poll" slave. The command contains the output data of the slave, provided the device is fitted with outputs.
Poll Response	When the "polled" slave supplies its input data, it sends its input data back. Typical poll times of a PLC: 10 ms.

5.3.4.2 Change-Of-State

Changing the State	The devices transfer their I/O data when their states change.
Heartbeat	Heartbeat is used in this operating mode as a device monitor. It checks cyclically (e.g. a cycle of 250 ms) whether the slave is connected to the network.

This efficient (for discrete I/O applications) can minimize bus load.

5.3.4.3 Cyclic

Cyclical data transfer	The devices transfer their I/O data using a user-defined time base.

This operating mode is suitable for highly efficient analog I/O applications.

5.3.5 Figure of I/O and Diagnostic Data

5.3.5.1 I/O Data

The scanner has received all the information about data width, operating mode, etc. via the device identification. Using this information, the scanner generates an adequate periphery map of all detected slaves in the DeviceNet system and maps the I/O data in the so-called scan list, depending on their physical arrangement.

The user can assign the scan list to the logic addresses in the PLC according to the periphery map of the bus users.

In manufacturer-specific instances 100 and 101, the I/O data of IMPACT20 modules in Class 4 are stored in Attribute 3 in each case and are also retrievable using the "Explicit Message" service. The data format is identical for the three supported operating modes.

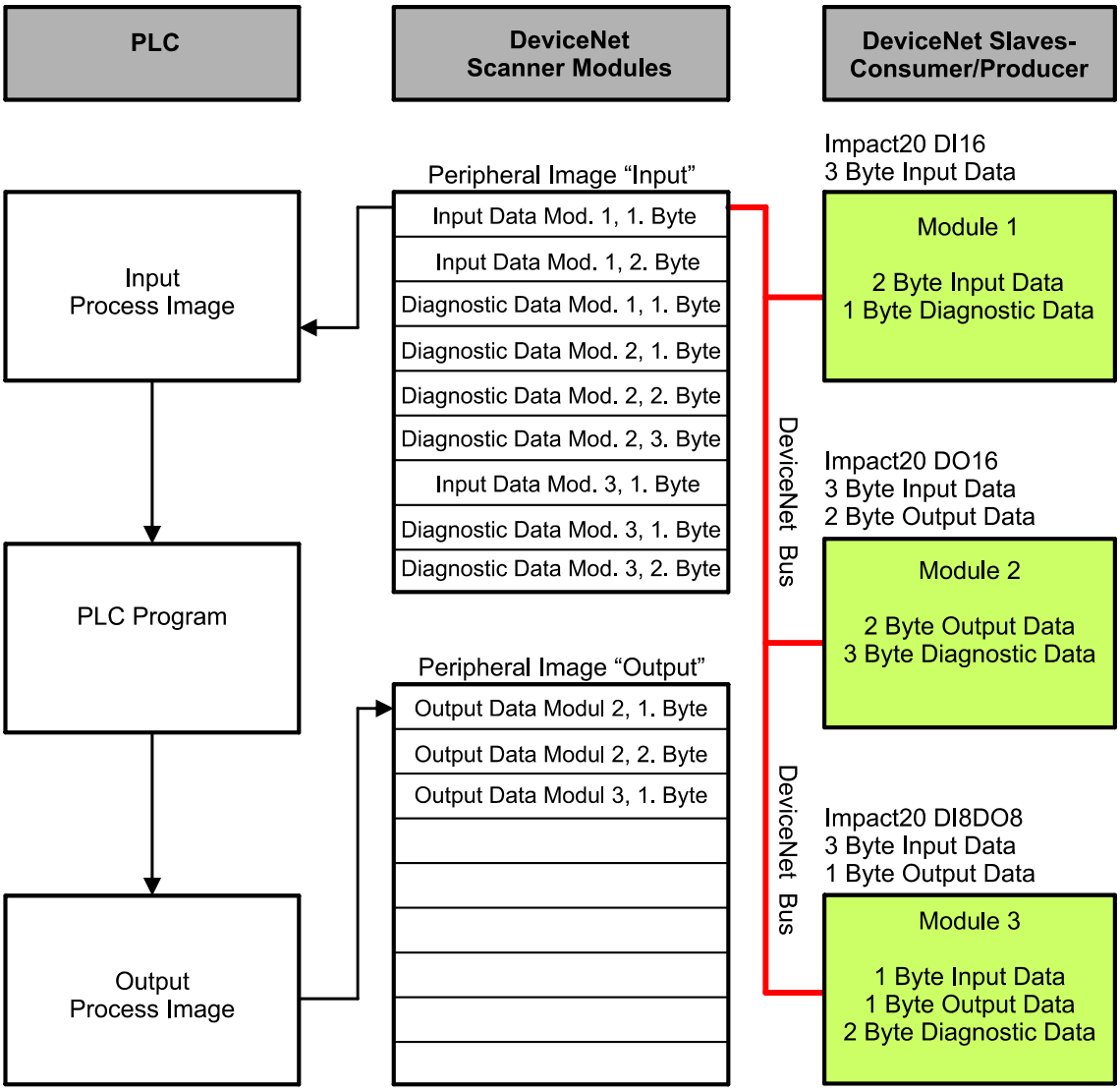


Fig. 24: Data exchange between PLC, interface module, and DeviceNet bus users

5.3.5.2 DeviceNet Diagnosis

Diagnostic information is signaled in the useful data on the DeviceNet fieldbus system. The sections below, "IMPACT20 I/O Data", describe in detail diagnostic information and their mapping in the useful data.

The following diagnostics are reported:

- Sensor short-circuit as group signal
- Actuator short-circuit by channel and as group signal
- Power supply UI undervoltage (< 18 V)
- Power supply UA undervoltage (< 18 V)

The group diagnosis consists of one byte. The corresponding bit for an error is set when an error occurs and is deleted as soon as the error is rectified.

5.3.5.3 IMPACT20 DN DI16 I/O Data Art. No. 56908

Manufacturer-specific format with 16-bit inputs, group diagnosis for the module. Assembly instance 100 is used.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Input channel 13	Input channel 12	Input channel 11	Input channel 10	Input channel 03	Input channel 02	Input channel 01	Input channel 00
1	Input channel 33	Input channel 32	Input channel 31	Input channel 30	Input channel 23	Input channel 22	Input channel 21	Input channel 20
2	-	-	-	-	-	Sensor short-circuit diagnosis (US)	Reserved	Sensor power supply (UI) undervoltage diagnosis

Table 17: IMPACT20 DN DI16 I/O Data Art. No. 56908, Assembly Instance 100

5.3.5.4 IMPACT20 DN DI8 DO8 /O Data Art. No. 55909

Manufacturer-specific format with 8-bit inputs and 8-bit outputs, group diagnosis for the module and actuator short-circuit diagnosis. Assembly instances 100 and 101 are used.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Input Channel 13	Input channel 12	Input channel 11	Input channel 10	Input channel 03	Input channel 02	Input channel 01	Input channel 00
1	-	-	-	-	Actuator short-circuit diagnosis	Sensor short-circuit diagnosis (US)	Actuator power supply (UA) undervoltage diagnosis	Sensor power supply (UI) undervoltage diagnosis
2	Actuator short-circuit channel 33	Actuator short-circuit channel 32	Actuator short-circuit channel 31	Actuator short-circuit channel 30	Actuator short-circuit channel 23	Actuator short-circuit channel 22	Actuator short-circuit channel 21	Actuator short-circuit channel 20

Table 18: IMPACT20 DN DI8 DO8 I/O Data Art. No. 55909, Assembly Instance 100

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Output channel 33	Output channel 32	Output channel 31	Output channel 30	Output channel 23	Output channel 22	Output channel 21	Output channel 20

Table 19: IMPACT20 DN DI8 DO8 I/O Data Art. No. 55909, Assembly Instance 101

5.3.5.5 IMPACT20 DN DO16 I/O Data Art. No. 56910

Manufacturer-specific format with 16-bit outputs, group diagnosis for the module and actuator short-circuit diagnosis. Assembly instances 100 and 101 are used.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	-	-	-	-	Actuator short-circuit diagnosis	Reserved	Actuator power supply (UA) undervoltage diagnosis	Sensor power supply (UI) undervoltage diagnosis
1	Actuator short-circuit channel 13	Actuator short-circuit channel 12	Actuator short-circuit channel 11	Actuator short-circuit channel 10	Actuator short-circuit channel 03	Actuator short-circuit channel 02	Actuator short-circuit channel 01	Actuator short-circuit channel 00

2	Actuator short-circuit channel 33	Actuator short-circuit channel 32	Actuator short-circuit channel 31	Actuator short-circuit channel 30	Actuator short-circuit channel 23	Actuator short-circuit channel 22	Actuator short-circuit channel 21	Actuator short-circuit channel 20

Table 20: IMPACT20 DN DO16 I/O Data Art. No. 56910, Assembly Instance 100

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Output channel 13	Output channel 12	Output channel 11	Output channel 10	Output channel 03	Output channel 02	Output channel 01	Output channel 00
1	Output channel 33	Output channel 32	Output channel 31	Output channel 30	Output channel 23	Output channel 22	Output channel 21	Output channel 20

Table 21: IMPACT20 DN DO16 I/O Data Art. No. 56910, Assembly Instance 101

5.3.5.6 IMPACT20 DN Diagnostic Data via Explicit Message Service

The diagnosis is sent for all modules in Class 4 Assembly Instance 100. In addition, there is the option of requesting the diagnostic byte using the explicit message service. The table below contains the information for polling the diagnosis using the Explicit Message service.

Module variants	Byte in the I/O Data (Class 4 Instance 100)	Polling using Parameter Object			Data Format
		Class	Instance	Attribute	
DI16 (Art. No. 56908)	2	15	4	1	Byte
DI8 DO8 (Art. No. 56909)	1	15	4	1	Byte
	2	15	7	1	Byte
DO16 (Art. No. 56910)	0	15	4	1	Byte
	1 and 2	15	7	1	Word

Table 22: Class overview for polling the diagnosis using EM service

5.3.6 Function of Bus Status LEDs

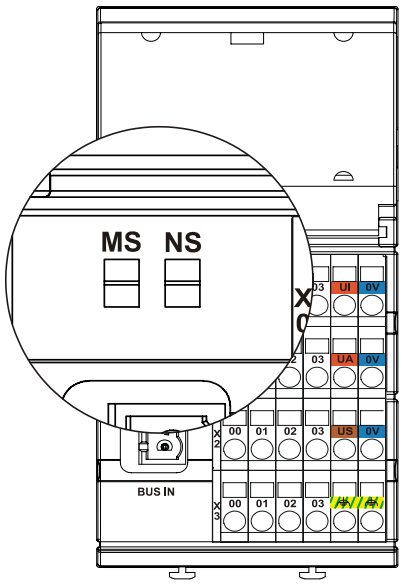


Fig. 25: DeviceNet module: Bus LEDs

The device performs a self-test as soon as the IMPACT20 is powered over the bus. The self-test lasts for approx. 2 s. It is followed by the DupMac Test. This checks whether there are other modules with an identical MAC ID on the bus. On completion of the DupMac Test, the NS-LED flashes green. If the DupMac Test fails, the NS-LED lights up red and a free address must be set using the rotary switches on the module. A power reset must be performed.

5.3.6.1 Signal States of Bus Status LEDs

LED Designation	LED Display	Response	Meaning
MS		off	Self-test not completed
MS		green	Self-test completed
NS		off	DupMac check not completed, no other bus user on the DeviceNet network
NS		flashing green	DupMac check completed, no link to Master
NS		green	Link to Master (explicit and/or I/O link)
NS		flashing red	Link to Master lost (timeout, bus link interrupted)
NS		red	Bus connection interrupted, general physical bus error, double MAC ID (power reset required)

Table 23: Bus status LEDs on module front panel

6 Technical Data

6.1 DeviceNet Slave Generic I/O Module IP20

	Impact20 DN DI16 Art. No.: 56908	Impact20 DN DI8 DO8 Art. No.: 56909	Impact20 DN DO16 Art. No.: 56910
General			
Terminal X0 and X1	16 inputs	8 inputs	16 outputs
Terminal X2 and X3		8 outputs	
EMC			
EN 61131-2	Product standard		
EN 61000-4-2 ESD	Contact ± 4 kV, air ± 8 kV		
EN 61000-4-3 RF-Field & GSM	10 V/m		
EN 61000-4-4 Burst	± 2 kV DC inputs, ± 1 kV signal lines asym./sym. ± 500 V (DC net input)		
EN 61000-4-5 Surge	Asym. ± 1 kV		
EN 61000-4-6 HF-asymmetric	10 V		
EN 61000-4-8 Magnetic field 50 Hz	30 A/m		
EN 55011 Emission	QP 40 dBµV/m (30 … 230 MHz) QP 47 dBµV/m (230 … 1000 MHz) Class B		
Ambient Conditions			
Operating temperature	0°C ... +55 °C		
Storage temperature	-20°C ... +70 °C		
Enclosure type according to EN 60529	IP 20		
Mechanical Ambient Conditions			
Oscillation according to EN 60068 Part 2-6	5 … 60 Hz: constant amplitude 0,35 mm; 60 … 150 Hz: constant acceleration 5 g		
Shock according to EN 60068 Part 2-27	Amplitude 15 g, 11 ms duration		
Miscellaneous			
Dimensions (LxWxH)	117 x 56 x 47 mm		
Mounting dimension (LxW)	117 x 56 mm		
Weight	Approx. 170 g		

	Impact20 DN DI16 Art. No.: 56908	Impact20 DN DI8 DO8 Art. No.: 56909	Impact20 DN DO16 Art. No.: 56910
Bus Data			
Transfer protocol	CAN, Layer 7 DeviceNet		
Transfer rates	125, 250, 500 Kbps		
Electrical isolation	500 V between bus and internal logic with optical coupler		
ODVA Vendor ID	640dec		
Operating modes	Poll, Change of State, Cycle		
I/O data length input and diagnostics	3 bytes	3 bytes	3 bytes
I/O data length output	-	1 byte	2 bytes
Connection Possibilities			
Sensor supply US	Cage clamp 2.5 mm²		-
Actuator supply UA	-	Cage clamp 2.5 mm²	
Bus connection	Open-Style male connector 5-Pin		
Inputs	4 x 4 terminal block connectors	2 x 4 terminal block connectors	-
Outputs	-	2 x 4 terminal block connectors	4 x 4 terminal block connectors
Power Supply			
Operating voltage range UB	18 … 30.2 V DC		
Current consumption (over bus cable, without I/O)	≤ 60 mA		
Voltage UI range	18 … 30.2 V DC		-
Actuator supply UA range	-	18 … 30.2 V DC	
Actuator current consumption over UA cage clamp	-	max. 8 A	
Reverse voltage protection module electronics (UB)	Yes		
Reverse voltage protection sensor supply (UI / US)	Yes		-
Reverse voltage protection actor supply (UA)	-	Yes	Yes
Overvoltage protection	Yes (suppressor diode)		
Core cross section	max. 2.5 mm^2		

	Impact20 DN DI16 Art. No.: 56908	Impact20 DN DI8 DO8 Art. No.: 56909	Impact20 DN DO16 Art. No.: 56910
Inputs			
Number of inputs	16	8	-
Delay time for signal change	2 ms		-
Input characteristics	EN 61131-2, Type 3		-
Maximum length of input cable	< 30 m		-
Outputs			
Number of outputs	-	8	16
Switching frequency	-	approx. 50 Hz, 50% duty ratio	
Actuator current load	-	approx. 2 A per actuator	
Switching frequency inductive load	-	approx. 10 Hz	
Lamp load	-	max. 40 W	
Maximum length of output cable	-	with 0.75 mm² max. 10 m with 0.34 mm² max. 5 m	
Sensor power supply US			
Max. current	0.7 A		-
Short circuit protection for sensors with automatic restart	Yes		-
Reverse polarity protection	Yes		-

7 Accessories

7.1 I/O Level

➔ ***Murrelektronik offers a wide product portfolio in the actuator/sensor field. This ranges from connectors, cables, and adapters through to special-purpose requirements.***
Refer to our catalog or visit our inline shop at www.murrelektronik.com

7.2 Voltage Terminal Block

Article Number	Description
56078	Voltage terminal block gray / gray / brown / blue
56079	Voltage terminal block gray / gray / yellow / blue
56080	Voltage terminal block yellow / blue / yellow / blue
56081	Voltage terminal block brown / blue / brown / blue
56109	Voltage terminal block brown / brown / blue / blue
56110	Voltage terminal block blue / blue / yellow / yellow
56111	Voltage terminal block blue / yellow / brown / blue

Table 24: Voltage Terminal Block Accessories

7.2.1 Description

Voltage terminal blocks are small aids that assist in the simple bridging or chaining of a required level or voltage.

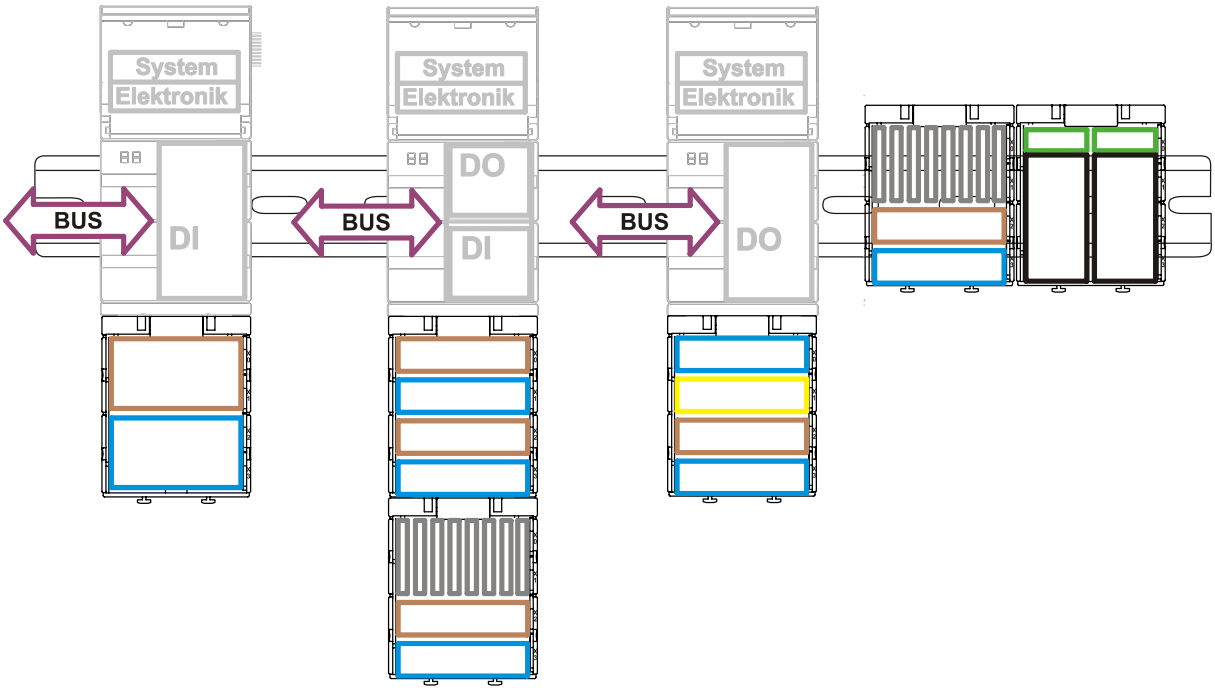


Fig. 26: Application information

7.2.2 Mounting Dimensions

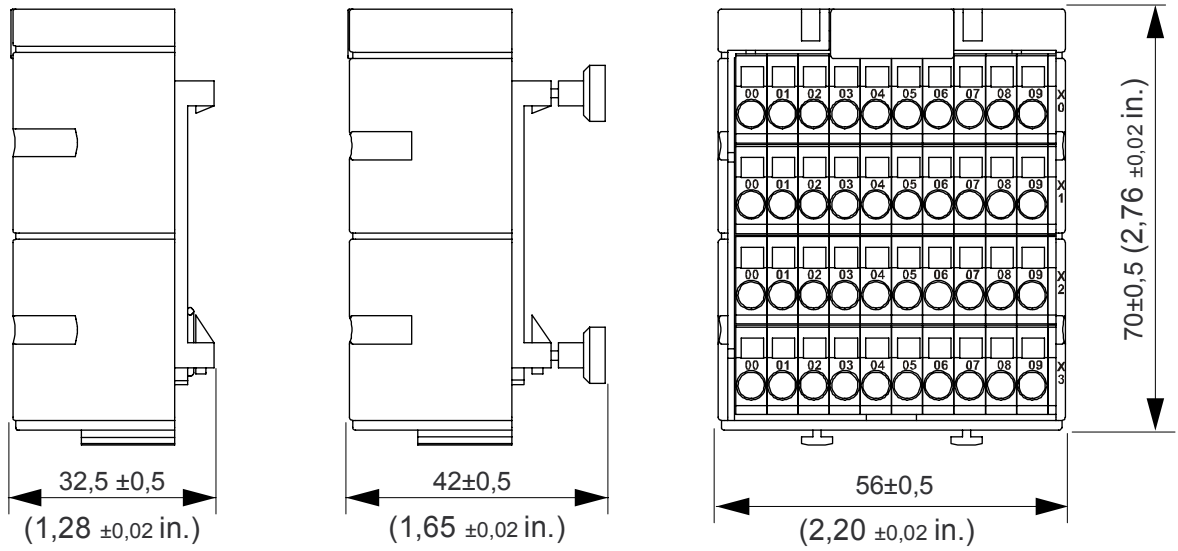


Fig. 27: Mounting Dimensions

7.2.3 Mounting Position/Distances

Einbaulage / Mounting position	beliebig / any
Abstand / Distance	beliebig / any

7.2.4 Mounting on DIN Mounting Rail and on Module

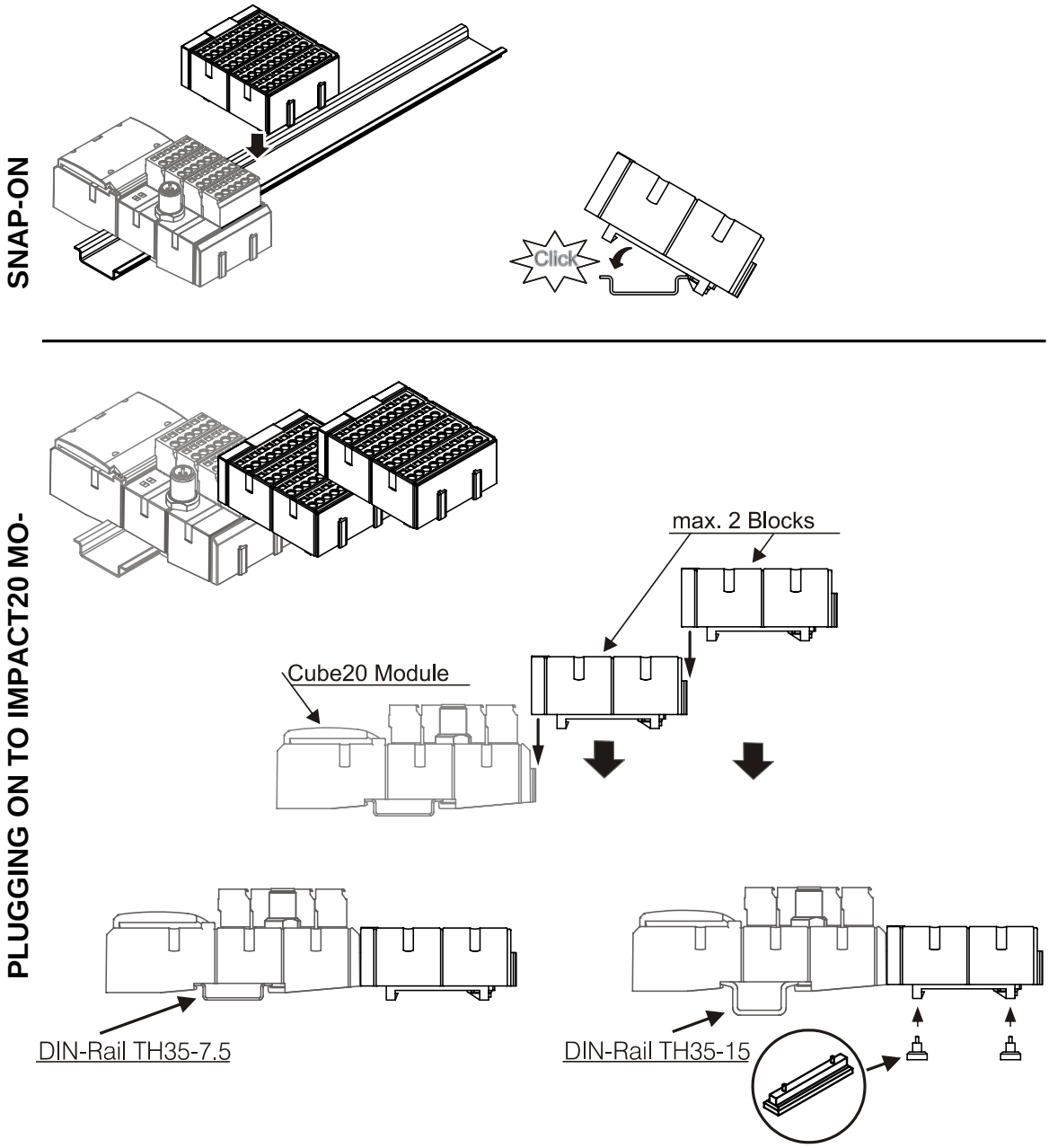
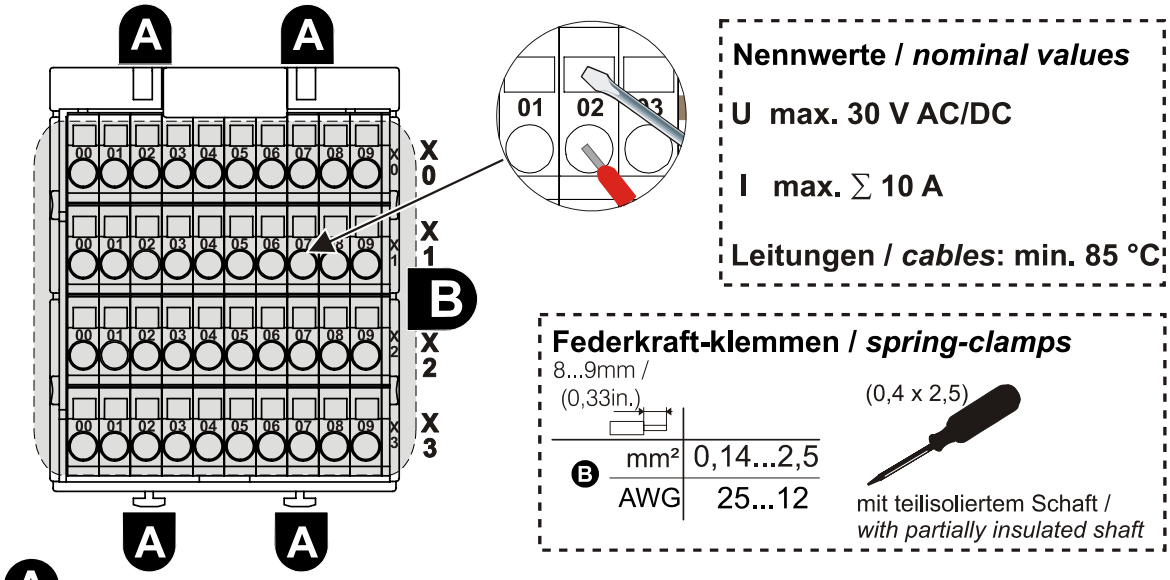


Fig. 28: Mounting the voltage terminal block on DIN mounting rails and on IMPACT20 module

7.2.5 Installation

7.2.5.1 Terminal Overview



A Modulverbindung / *Module-connection*

B

	Art.-No. 56078	Art.-No. 56079		
X0	grau / *grey*	grau / *grey*	X0	(00...09)
X1	grau / *grey*	grau / *grey*	X1	(00...09)
X2	braun / *brown* (Us +24 V)	gelb / *yellow* (FE)	X2	(00...09)
X3	blau / *blue* (0 V)	blau / *blue* (0 V)	X3	(00...09)

	Art.-No. 56080	Art.-No. 56081	Art.-No. 56111		
X0	gelb / *yellow* (FE)	braun / *brown* (Us +24 V)	blau / *blue* (0 V)	X0	(00...09)
X1	blau / *blue* (0 V)	blau / *blue* (0 V)	gelb / *yellow* (FE)	X1	(00...09)
X2	gelb / *yellow* (FE)	braun / *brown* (Us +24 V)	braun / *brown* (Us +24 V)	X2	(00...09)
X3	blau / *blue* (0 V)	blau / *blue* (0 V)	blau / *blue* (0 V)	X3	(00...09)

	Art.-No. 56109	Art.-No. 56110		
X0	braun / *brown* (Us +24 V)	blau / *blue* (0 V)	X0	(00...09)
X1	braun / *brown* (Us +24 V)	blau / *blue* (0 V)	X1	(00...09)
X2	blau / *blue* (0 V)	gelb / *yellow* (FE)	X2	(00...09)
X3	blau / *blue* (0 V)	gelb / *yellow* (FE)	X3	(00...09)

Fig. 29: Terminal Overview

7.2.5.2 Technical Data

The IMPACT20 voltage terminal block is an expansion module for all IMPACT20 modules. It is fitted with 4 terminal rows that are electrically connected in various ways.

Art.No.	x0	x1	x2	x3
56078	gray	gray	brown	blue
56079	gray	gray	yellow	blue
56080	yellow	blue	yellow	blue
56081	brown	blue	brown	blue
56109	brown	brown	blue	blue
56110	blue	blue	yellow	yellow
56111	blue	yellow	brown	blue

Table 25: IMPACT20 voltage terminal blocks

Technische Daten / *Technical data*	
Spannung / *voltage*	AC/DC max. 30 V
Strom / *current*	max. 10 A
Umgebungsbedingungen / Ambient conditions	
Arbeitstemperatur / Operating temperature	0°C to +55°C
Lagertemperatur / Storage temperature	-40°C to +85°C
Schutzart nach EN 60529 / Enclosure type according to IEC 60529	IP20
Mechanische Beanspruchung / Mechanical ambient conditions	
EN 60068 Part 2-6 Schwingprüfung / Oscillation according to DIN IEC 60068 Part 2-6	5 g
EN 60068 Part 2-27 Schockprüfung / Shock according to DIN IEC 60068 Part 2-27	15 g / 11 ms

Technische Daten / Technical data	
Anschlussmöglichkeiten / Connection possibilities	
Federkraftklemmen / Spring-loaded terminals	
Betätigungswerkzeug / Operation tool (Wago No. 210-619)	mit teilisoliertem Schaft; / with partly insulated shaft Klinge / blade (2.5 x 0.4) mm
Anschlussquerschnitt / Terminal cross-section	0.14 mm² to 2.5 mm², AWG 25 to AWG 12
Abisolierlänge / Stripping length	8 mm to 9 mm 0.33 in.
Sonstiges / Miscellaneous	
Gewicht / Weight	70 g
Maße (L x B x H) / Dimensions (L x W x H)	

Table 26: Technical Data of IMPACT20 Voltage Terminal Blocks

7.3 Label Sheets

Article Number	Description
56113	Label Sheets

Table 27: Accessories, Label Sheets

7.4 Coding Elements for Terminals

Article Number	Description
56115	Coding Elements for Terminals

Table 28: Accessories, Coding Elements for Terminals

7.5 Fieldbus Cable

Article Number	Description
7000-00000-8039999	Bus cable for DeviceNet, 100 m collar

Table 29: BUS cable

7.6 MICO

- – Fire protection (EN 60950-1)
- – Operating voltage protection (EN 61131-2)
- – Operating state memory device (EN 61131-1)

Article Number	Description	Nominal operating branch-circuit current (full load)	
9000-41034-0100400	MICO 4.4 (4 channels)	each 4 A	
9000-41034-0100600	MICO 4.6 (4 channels)	each 6 A	
9000-41034-0401000	MICO 4.10 (4 channels)	each 10 A	
9000-41042-0100400	MICO 2.4 (2 channels)	each 4 A	
9000-41042-0100600	MICO 2.6 (2 channels)	each 6 A	
9000-41042-0401000	MICO 2.10 (2 channels)	each 10 A	

Table 30: Overview of MICO variants

Glossary

Actuator short-circuit	Short-circuit or overload at an output results in output switchoff.
BN-P	Bus Node - Profibus, bus node – Profibus.
Bus Run LED	LED to signal bus status.
Bus segment	Due to the electrical specification of the RS-485 interface, the number of users on the RS485 network is restricted to 32 users. If more than 32 Profibus users are connected, the network must be divided into segments by means of repeaters.
Byte	Equivalent to 8 bits.
CAN	Controller Area Network
CiA	CAN in Automation e. V. Organization of CAN bus device manufacturers and users
CiA Draft Standard 102	Description of the physical CAN communication (Layer 2) for industrial applications
CiA Draft Standard 301	Description of application and communication profile for industrial systems
CiA Draft Standard 401	Description of device profile for generic input and output modules
CMS	CAN based Message Specification. A service element available to the application layer for the manipulation of objects.
COB	Communication Object. Messages are transmitted in the network in COBs and viewed as communication objects.
COB-ID	COB Identifier: Each communication object is unambiguously defined by the COB-ID. The COB-ID marks the communication object’s priority.
CSMA/CA	Carrier Sense Multiple Access / Collision Avoidance
DBT	COB-ID Distributor. A service element of the application layer; it assigns the COB-IDs to the communication objects of the CMS services.
DI	Digital Input
DIN	Deutsches Institut für Normung (German Standards Institute)
DIN TH35	Standardized DIN mounting rail (35x15mm, 35x7.5mm).
DN	DeviceNet
DO	Digital Output
DP	Decentral Periphery. Profibus protocol for the high-speed cyclic data exchange.
EDS	Electronic Data Sheets, device description file for CANopen, DeviceNet, and Ethernet/IP devices. Equivalent to the GSD file for Profibus devices.
EC Directive 2004/108/EC	EMC Directive.

EMC	Electromagnetic Compatibility.
EN	European Standard
ESD	Electrostatic Discharge
EEC	European Economic Community
FE	Function ground/earth.
Freeze Command	The slave input data are "frozen".
DDBF	The Device Data Base File describes the technical features of a Profibus product. This file is required to configure a Profibus system and is supplied by the device manufacturer.
I	Current.
I/O	Input/Output
ID number	A 16-bit number that identifies a Profibus product uniquely. It represents a reference for the DDB file. Several devices may also have the same ID number, provided they are describable in a common DDB file. This number is issues by the Profibus Nutzerorganisation e.V. (German Profibus User Organization).
IEC	International Electrotechnical Commission
IEC 61158	Profibus DP and FMS standard valid worldwide. Successor of international standard EN 50 170 Volume 2.
IP20	Ingress Protection Protection type as per DIN EN 60529 1st digit = protection against contact and foreign bodies 2nd digit = protection against water 2: Protection against the ingress of solid foreign bodies above a diameter of 12.5 mm, protection against access by finger 0: No protection against inclusion
ISO	International Standard Organization
LED	Light Emitting Diode
LMT	Layer Management. Enables the setting of layer-related parameters to a node.
LSB	Least significant bit.
FO	Fiber optics, optical fiber.
MS	Module status
MSB	Most significant bit.
Ni	Nickel.
NMT	Network Management. NMT provides services for initializing and monitoring the nodes in a network.
NS	Network status
ODVA	Open DeviceNet Vendor Association is an association of all DeviceNet users.

OSI	Open Systems Interconnection
PAA	Process map of outputs
PAE	Process map of inputs
PDO	Process Data Object. Object for process data exchange between various devices.
PELV	Protective Extra Low Voltage.
PNO	Profibus Nutzerorganisation e.V. (German Profibus User Organization)
Repeater	Coupling element to process signals between Profibus segments.
RTR	Remote Transmission Request. Request for data using the same identifier as used for data transmission.
SDO	Service Data Object, Objects for access and manipulation to data in the object directory
SELV	Safety Extra Low Voltage.
Simatic Manager	Programming software for program-logic controllers made by Siemens.
PLC	Program-logic controller
SYNC	Synchronization object
U	Voltage.
U/I	Voltage / current
UA	Actuator power supply
UI	Module and sensor power supply.
US	Sensor power supply.
VDMA	Verband Deutscher Maschinen- und Anlagenbau e.V. (Association of German Machinery and Industrial Equipment Manufacturers)
VZ	Sign (+ or -)
ZVEI	Zentralverband Elektrotechnik- und Elektronikindustrie e.V. (German Electrical and Electronic Manufacturers' Association).

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