

WAGO-SPEEDWAY 767

Manual



767-1401

FC DeviceNet 8DI 24V DC DeviceNet Fieldbus Coupler

Version 2.2.0

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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

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We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally protected by trademark or patent.

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1 Notes about this Documentation

The fieldbus coupler shall only be installed and operated in conjunction with these operating instructions and the system description.



Note

Always retain this documentation!

This documentation is part of the product. Therefore, retain the documentation during the entire service life of the product. Pass on the documentation to any subsequent user. In addition, ensure that any supplement to this documentation is included, if necessary.



WARNING

Observe release notes!

Please note that, within the SPEEDWAY system, a function is provided **without restriction** only if all system's components have the same system-wide firmware release. Therefore, always observe the appropriate release notes on products used.

NOTICE

Supply layout!

In addition to these operating instructions, you will need the “WAGO *SPEEDWAY 767*, System Description and Information” manual, which can be downloaded at www.wago.com. There you will find information regarding supply layout, etc.

1.1 Validity of these Operating Instructions

These operating instructions are only applicable to the WAGO SPEEDWAY 767 Series fieldbus coupler FC DeviceNet 8DI 24V DC, 767-1401.

1.2 Copyright

This Manual, including all figures and illustrations, is copyright-protected. Any further use of this Manual by third parties that violate pertinent copyright provisions is prohibited. Reproduction, translation, electronic and phototechnical filing/archiving (e.g., photocopying) as well as any amendments require the written consent of WAGO Kontakttechnik GmbH & Co. KG, Minden, Germany. Non-observance will involve the right to assert damage claims.

1.3 Symbols



DANGER

Personal Injury!

Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.



DANGER



Personal Injury Caused by Electric Current!

Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Personal Injury!

Indicates a moderate-risk, potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Personal Injury!

Indicates a low-risk, potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Damage to Property!

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.



NOTICE

Damage to Property Caused by Electrostatic Discharge (ESD)!

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.



Note

Important Note!

Indicates a potential malfunction which, if not avoided, however, will not result in damage to property.



Information

Additional Information:

Refers to additional information which is not an integral part of this documentation (e.g., the Internet).

1.4 Number Notation

Table 1: Number Notation

Number Code	Example	Note
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	In quotation marks, nibble separated with dots (.)

1.5 Font Conventions

Table 2: Font Conventions

Font Type	Indicates
<i>italic</i>	Names of paths and data files are marked in italic-type. e.g.: <i>C:\Program Files\WAGO Software</i>
Menu	Menu items are marked in bold letters. e.g.: Save
>	A greater-than sign between two names means the selection of a menu item from a menu. e.g.: File > New
Input	Designation of input or optional fields are marked in bold letters, e.g.: Start of measurement range
“Value”	Input or selective values are marked in inverted commas. e.g.: Enter the value “4 mA” under Start of measurement range .
[Button]	Pushbuttons in dialog boxes are marked with bold letters in square brackets. e.g.: [Input]
[Key]	Keys are marked with bold letters in square brackets. e.g.: [F5]

2 Important Notes

This section includes an overall summary of the most important safety requirements and notes that are mentioned in each individual section. To protect your health and prevent damage to devices as well, it is imperative to read and carefully follow the safety guidelines.

2.1 Legal Bases

2.1.1 Subject to Changes

WAGO Kontakttechnik GmbH & Co. KG reserves the right to provide for any alterations or modifications that serve to increase the efficiency of technical progress. WAGO Kontakttechnik GmbH & Co. KG owns all rights arising from the granting of patents or from the legal protection of utility patents. Third-party products are always mentioned without any reference to patent rights. Thus, the existence of such rights cannot be excluded.

2.1.2 Personnel Qualification

All sequences implemented on the module may only be carried out by electrical specialists with sufficient knowledge in automation. The specialists must be familiar with the current standards and guidelines for the module and automation environment.

2.1.3 Use in Compliance with Underlying Provisions

The fieldbus coupler for DeviceNet is used to record and process digital and analog field signals. These can then be transmitted to higher-level controllers.

The fieldbus coupler shall not be used to control safety-related functions; i.e., emergency-off devices shall not be operated with this fieldbus coupler.

The fieldbus coupler may only be operated in combination with components of the WAGO SPEEDWAY 767 Series.

The fieldbus coupler was developed for applications requiring IP 67 (NEMA type 6, 6P) protection.

The fieldbus coupler is expandable by a maximum of 64 I/O modules from the WAGO SPEEDWAY 767 Series.

Applications other than those described in this manual are not permitted.

2.1.4 Technical Condition of Specified Devices

The devices to be supplied ex works are equipped with hardware and software configurations, which meet the individual application requirements. WAGO Kontakttechnik GmbH & Co. KG will be exempted from any liability in case of changes in hardware or software as well as to non-compliant usage of devices.

Please send your request for modified and new hardware or software configurations directly to WAGO Kontakttechnik GmbH & Co. KG.

2.2 Safety Advice (Precautions)



DANGER

Electric voltage!

Operate the 767 Series components exclusively with 24 VDC PELV (Protective Extra Low Voltage) or SELV (Safety Extra Low Voltage) voltage sources. Failure to comply may result in electric shock.



CAUTION

Hot connection sockets!

Even when taking into account derating, high surface temperatures on the metallic connection sockets and on the enclosure can arise during operation. If the 767 Series component has been in operation, allow it to cool off before moving it.

NOTICE

The highest current carrying capacity of the supply contacts is 4 A!

Always observe the maximum current carrying capacity per supply line (U_{LS} , U_A) for each 767 Series component and the overall power consumption for all 767 components. Neither of these values shall exceed 4 A since an increase in current causes the contacts to overheat and damages the 767 Series components. Information regarding the power demand of each 767 Series component can be found in the corresponding data sheet, which is available from www.wago.com.

NOTICE

Exposed connections!

If connections have not been closed with protective caps, liquid or dirt can penetrate the components of the 767 Series module and ruin it. Therefore, close all unnecessary connections with protective caps, which must be ordered separately, in order to maintain the IP67 degree of protection. (See section “Accessories” of the fieldbus coupler/controller manual.)

- Always keep the cover cap of the DIP switch closed.
- Disconnect the power supply from the system on which you wish to mount the 767 Series device.
- Observe the appropriate accident prevention regulations for your system during assembly, start-up, maintenance, and repairs. For example, BGV A3, “Electrical systems and equipment”.
- The operating instructions for the 767 Series module and the system description must be laid out ready on site.
- Observe the exact positioning (coding) between plug and socket.

- The 767 Series device shall not come into contact with substances having seeping and insulating properties. Otherwise, additional measures shall be taken for the device, such as installation of an enclosure that is resistant to the above-mentioned substance properties.
- Electronic components fulfilling the ESD requirements according to the IEC 61000-6-2 are integrated in the 767 device. As higher voltages may occur, under unfavorable circumstances, due to electrical charge in the field, discharge must be ensured before performing work on the 767 system.
- Ensure that the potential equalization is correctly laid out.
- Keep all cables a sufficient distance away from electromagnetic sources of interference in order to maintain a high level of interference resistance of the 767 system against electromagnetic emissions. Use only shielded cables at the necessary locations, and always observe the appropriate standards for EMC-suitable installations.
- For the power supply and for the S-BUS, use only pre-assembled WAGO system cables, so the specified characteristics of the technical data can be achieved.
- Replace defective or damaged modules (e.g., deformed connections), else function disruptions can occur in the respective fieldbus stations or nodes.
- When laying any cables, make sure that you do not lay them within the shear range of movable machine parts.
- For each activity, observe the corresponding personnel qualification in the corresponding section.
- Observe the marking on the front and rear side of the module.

2.3 Safety Equipment

All 767 Series products are designed to meet the requirements of IP67. This includes complete protection against accidental contact with electrical voltage and currents – even when wet.

2.4 Notes on Operation

When integrating the 767 module in your machine or system, all the currently applicable norms, regulations and guidelines shall be observed during all activities: for example, BGV A3, “Electrical systems and equipment”, DIN EN 418, EN 60204. The emergency stop equipment shall remain effective in all operating modes of the system and machine.

For protection from electromagnetic interferences

- Connect your system to protective earth (PE), and
- Ensure that the cable routing and the installation of the fieldbus cable, S-BUS cable, supply cable, and sensor or actuator cable are correct.

The following elements for 24 V supply shall be present:

- Outer lightning protection on buildings
- Inner lightning protection of supply lines and signal lines
- Safe electrical separation of low voltage 24 VDC through PELV (Protective Extra Low Voltage) or SELV (Safety Extra Low Voltage) voltage sources

3 System description

CAN ("Controller Area Network") was developed in the mid-1980s for data transmission in automobiles. CAN is a multi-master bus system. Contrary to other fieldbus systems, the bus devices connected to the CAN are not addressed; instead, the telegrams are identified. The users are always allowed to send telegrams when there is data traffic on the CAN bus. Bus conflicts are solved because the telegrams are assigned a specific priority. This priority is determined by the COB ID ("Communication Object Identifier") and is unambiguously assigned to a communication object. The smaller the identifier, the higher the priority.

DeviceNet is a fieldbus protocol based on the CAN serial bus system. It is particularly characterized by the ability to smoothly connect and remove running devices.

Simple sensors and actuators, as well as more complex devices such as motor control units and frequency converters, can be connected to the control system (master or scanner).

Characteristics of DeviceNet:

- Maximum of 64 devices possible
- Power supply conducted in cable
- Baud rates of 125 Kbaud, 250 Kbaud and 500 Kbaud possible
- Reaction-free coupling and decoupling of devices
- Use of trunk/drop line topology
- Service data ("explicit message") and process data ("I/O data"), including fragmenting

The Open DeviceNet Vendor Association (ODVA) is the user organization for DeviceNet and describes via specifications the ISO/OSI communication model above the "Data Link Layer."

The "Common Industrial Protocol" (CIP) is found above the transport layer. CIP is also used by the ControlNet, CompoNet and EtherNet/IP protocols as a network-independent standard. Transferring an application on one of these systems can therefore be easily achieved. The data exchange is based on an object model. Thus, ControlNet, CompoNet and EtherNet/IP all have the same application protocol and can therefore collectively use device profiles and object libraries. These objects enable plug-and-play interoperability between complex devices from different manufacturers.

OSI Model of the CIP Protocol

To clarify the commonalities between DeviceNet, ControlNet, CompoNet and EtherNet/IP, the following representation shows the classification of the ISO/OSI communication model.

Table 3: OSI Model of the CIP Protocol

CIP Motion7 application layer	Object library (Communications, applications, time synchronization)			Safety object library	Common Industrial Protocol (CIP)
6 Presentation layer	Data management services Explicit and I/O messages			Safety services and messages	
5 Session layer	Connection management, routing				
4 Transport layer	TCP/UDP	CompoNet Network in transport	ControlNet Network in transport	DeviceNet Network in transport	Network Adaptations of CIP
3 Network layer	Internet protocol				
2 Data link layer	ETHERNET CSMA/CD	CompoNet Time slot	ControlNet CTDMA	CAN CSMA/NBA	
1 Physical layer	ETHERNET	CompoNet	ControlNet	DeviceNet	

The Common Industrial Protocol (CIP) is described in Volume 1 of the specification; the adaptation to DeviceNet is described in Volume 3 of the ODVA specification. In Volume 3 ("DeviceNet Adaptation of CIP") of the specification, the ODVA defines DeviceNet as a uniform application layer and specifies technical and functional characteristics for device linking. For example, the specification states that up to 64 devices total can be operated in one DeviceNet network. Network reach depends on the selected baud rate, which can be set at 125 Kbaud, 250 Kbaud or 500 Kbaud.



Note

Informations about DeviceNet

The "Open DeviceNet Vendor Association" (ODVA) provides information on the Internet. Please see <http://www.odva.org>.

3.1 Network Topology

The DeviceNet network is set up as a linear topology with terminating resistors (120 Ohm). In this network, all devices are wired in parallel. The drop lines are used to connect the DeviceNet nodes to the trunk line. This requires the DeviceNet cable to be looped through without disruption. The maximum length of a line branch shall not exceed 6 m.

An example of the topology is shown in the following figure:

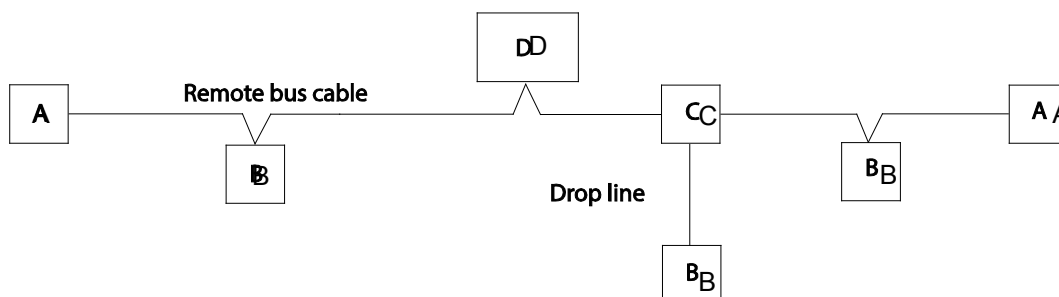


Figure 1: Graphical illustration of possible topologies

Table 4: Description graphical illustration of possible topologies

Position	Description
A	Terminating resistor (DeviceNet terminator)
B	DeviceNet node
C	Branch
D	Power supply for DeviceNet cable (preferably placed in the center of the DeviceNet network)

All devices in the DeviceNet network communicate with the same baud rate. The bus structure enables devices to be coupled and decoupled in a non-reactive manner; it also enables progressive startup of the DeviceNet network. Later upgrades have no effect on DeviceNet nodes that are already in operation. Any device malfunctions or the addition of a device to the DeviceNet network is automatically detected.



Note

Information about topology

Details on the topology can be found in Volume 3 of the specification. This is provided by ODVA at <http://www.odva.org>.

Repeater

If repeaters are used, the network reach (bus length) can be expanded. Although the reach of the DeviceNet network depends on the transfer rate, CAN can also be used for large networks by means of repeaters. However, when using repeaters the internal delay of the repeaters should be taken into account when calculating the network reach.

Another advantage of the repeaters is error suppression. Without repeaters, all communication in the DeviceNet network would fail if a short circuit arose between CAN_High and CAN_Low. Using repeaters would cause the error to only have an effect on the subsegment that is disconnected by the repeaters. The rest of the DeviceNet network would continue to function without constraint. In addition, repeaters can also enable the implementation of subsegments with fiber optic cable.

This illustrates the advantage of isolating high-frequency interference signals, through which segments can be conducted even in an area with electrical interference.

3.2 Physical Transmission Technology

DeviceNet is based on CAN, which is standardized as a communication medium in the ISO 11898 specification.

3.2.1 Wiring with Symmetrical Copper Cable

Signal transmission through symmetrical copper cable ("twisted pair") is established with a transfer rate of 125 Kbit/s – 500 Kbit/s. STP ("shielded twisted pair") is to be used as a transmission medium.

The DeviceNet fieldbus can be set up using a trunk line and several drop lines. The DeviceNet specification distinguishes between two cable types in this regard:

- **Thick cable**
For trunk lines with a maximum of 8 A or for DeviceNet networks with a network reach of over 100 m. The trunk line topology is linear; i.e., it is not additionally branched. However, a branch-off from the trunk line is possible through drop lines (see "Thin cable"). Terminating resistors (DeviceNet terminators) must be fastened to each end of a trunk line.
- **Thin cable**
For drop lines with a maximum of 3 A or for DeviceNet networks with a network reach of under 100 m. One or more DeviceNet nodes can be connected to the drop line. The length of the individual drop lines may be up to 6 m and is measured from the branching point to the connection point of the DeviceNet node. The total length of all drop lines depends on the baud rate (see section "Maximum Bus Lengths in DeviceNet Networks").

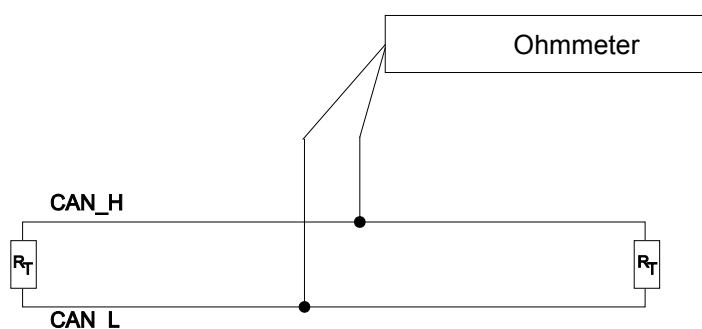
Each DeviceNet node forms the V_{Diff} differential voltage from the CAN_H and CAN_L bus signal levels as follows: $V_{\text{Diff}} = V_{\text{CAN_H}} - V_{\text{CAN_L}}$.

The differential signal transmission offers the benefit of insensitivity to common mode interferences and potential differences between the DeviceNet nodes.

If the bus signal levels are found to be recessive, a differential voltage of 0 V is present between CAN_L and CAN_H.

If the bus signal levels are found to be dominant, a differential voltage of 2 V is present between CAN_L and CAN_H.

Check to ensure correct installation of the terminating resistors (DeviceNet terminator) by using an ohmmeter to measure resistance. Please see the following figure:



$R_T = 120 \text{ Ohm}$

Figure 2: Measuring principle to check CAN bus before startup

Table 5: Measured values

Measurement Between-...	Measured Value	Description
V- & CAN_L	Infinite	Ok
	0	Short circuit between CAN_H & CAN_L
V- & CAN_H	Infinite	Ok
	0	Short circuit between CAN_H & CAN_L
CAN_L & CAN_H	Approx. 60 Ω	Ok; two terminating resistors in DeviceNet network
	Approx. 120 Ω	Only one terminating resistor in DeviceNet network
	< 50 Ω	More than two terminating resistors in DeviceNet network



Note

Detailed specification on cable types

The detailed specification on cable types is contained in Volume 3 of the specification. Additional information can be found at <http://www.odva.org>.

3.2.2 Maximum Bus Lengths in DeviceNet Networks

The length of a DeviceNet network is limited by the signal propagation delay and must therefore be adjusted to the baud rate. The permitted cable length is shown in connection with the baud rate in the table below. A distinction is made between the maximum lengths for transmission with thick and thin cable.

Table 6: Maximum bus lengths in connection with the preset baud rate

Baud Rate	Bus Length			Drop Cable Length	
	Thick and Thin Cable	Thick Cable Only	Thin Cable Only	Individual	Total
500 Kbit/s	$L_{\text{Thick}} + L_{\text{Thin}} \leq 100 \text{ m (328 ft)}$	100 m (328 ft)	100 m (328 ft)	6 m (19.6 ft)	39 m (127.9 ft)
250 Kbit/s	$L_{\text{Thick}} + 2.5 \times L_{\text{Thin}} \leq 250 \text{ m (820.2 ft)}$	250 m (820.2 ft)			78 m (255.9 ft)
125 Kbit/s	$L_{\text{Thick}} + 5 \times L_{\text{Thin}} \leq 500 \text{ m (1640.4 ft)}$	500 m (1640.4 ft)			156 m (511.8 ft)

Specifying maximum cable lengths ensures that interference-free communication can take place between two devices in the DeviceNet network with the maximum possible distance between them.

3.3 Grounding the DeviceNet Network

The DeviceNet network may only be grounded at one location. Grounding is particularly important at the infeed of the power supply for the DeviceNet cable. This should always be placed as close as possible to the center of the entire DeviceNet network to optimize output and to minimize interferences. Thus, the V- wire and the DeviceNet cable shield are placed on ground potential.

3.4 Communication

Contrary to other fieldbus systems, in CAN the bus devices connected to the network are not addressed; instead, the messages are identified. The devices are allowed to send messages whenever data transfer is absent on the CAN bus. Bus conflicts are solved by assigning telegrams a specific priority.

The DeviceNet telegrams are divided into several groups to enable different prioritizations:

- Message group 1
For exchanging I/O data via I/O messages
- Message group 2
Intended for the master/slave applications
- Message group 3
For exchanging configuration data via explicit communication links
- Message group 4
System administration (e.g., offline connection set)

The so-called connection ID ("CAN identifier"), which determines message priority, is established by the various message groups and the MAC ID that is set on the fieldbus coupler. The smaller the identifier is, the higher the priority.

I/O data contain data such as status/control information and target/actual values, and they typically utilize identifiers with a high priority. This time-critical data is exchanged between a producing device and one or more consuming devices. DeviceNet allows many forms of I/O data transmission, such as cyclical or event-driven data transmission. Data retrieval and data transmission initiate by the application are also possible.

Explicit data consists of typical question/answer messages between two devices. As a general rule, use identifiers with a low priority. These are used for configuration and diagnostics.

Message distribution takes place in accordance with the broadcast principle, and data exchange takes place in accordance with the producer-consumer model. A DeviceNet node sends data that can be received by either one or several other DeviceNet nodes. Messages with a data length of more than 8 bytes can be fragmented.

DeviceNet communication is always carried out in a connection-based manner. All data and functions of a DeviceNet node are described using an object model. To exchange messages, connections should therefore initially be established to the desired devices after switching on a DeviceNet node. Communication objects should also be created or activated. For access to internal functions, DeviceNet defines an object-based addressing parameter that consists of the node address (MAC ID), class, instance and attribute.

4 Device Description

This section contains a short overview of the fieldbus coupler structure and the most important features. Detailed information can be found in the appropriate sections.

The fieldbus coupler assists in attaching the 767 series to a DeviceNet network. Up to 63 fieldbus couplers with 64 I/O modules each can be connected. In addition, all transfer rates of 125 Kbit/s, 250 Kbit/s or 500 Kbit/s can be set if supported by the DeviceNet specification.

The following transmission types are available for process data exchange:

- Polled I/O connection
- Change of state/cyclic connection
- Bit-strobed connection

In addition, the fieldbus coupler sends a message when it switches to *Offline* mode. This is stated in the "Device Shutdown Message" specification. Sending this message enables a defined log-off of the device in the DeviceNet network. Another message is the heartbeat message, which is sent in a cyclical manner. The device uses this message to disclose its communication capability.

Summary of fieldbus coupler properties:

- Eight digital inputs, type 1, 24VDC
- USB interface for service purposes, as well as parameterization and configuration
- Sealable operation panel for the operating mode switch and address switch (DIP switch)
- Modular and extendable by up to 64 external I/O modules

Detailed information regarding the fieldbus coupler can be found in section "Technical Data".

4.1 Connectors

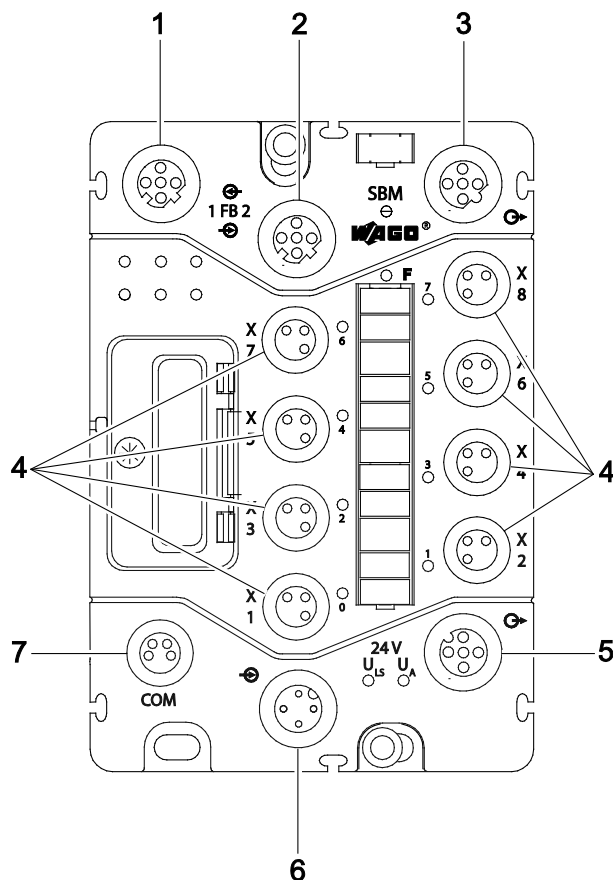


Figure 3: Connectors

Table 7: Legend for figure "Connectors"

Position	Description	Function
1	DeviceNet input, M12 plug, A-coded	Physical connections for the integration of the fieldbus coupler into the DeviceNet network.
2	DeviceNet output M12 socket, A-coded	
3	S-BUS output M12 socket, B-coded	Physical connection for connecting I/O modules to the S-BUS and for closing the S-BUS.
4	Digital inputs X1 – X8 M8 socket	For connecting digital sensors (e.g., initiators or limit switches).
5	Supply output M12 socket, A-coded	Use of the system and/or field supply for the following I/O module.
6	Supply input M12 plug, A-coded	Infeed of system and field power supply
7	USB interface M8 socket, 4 poles	Parameterization independent of fieldbus, configuring and diagnosing entire fieldbus station and updating device software.

4.2 Marking Possibilities and Fastening

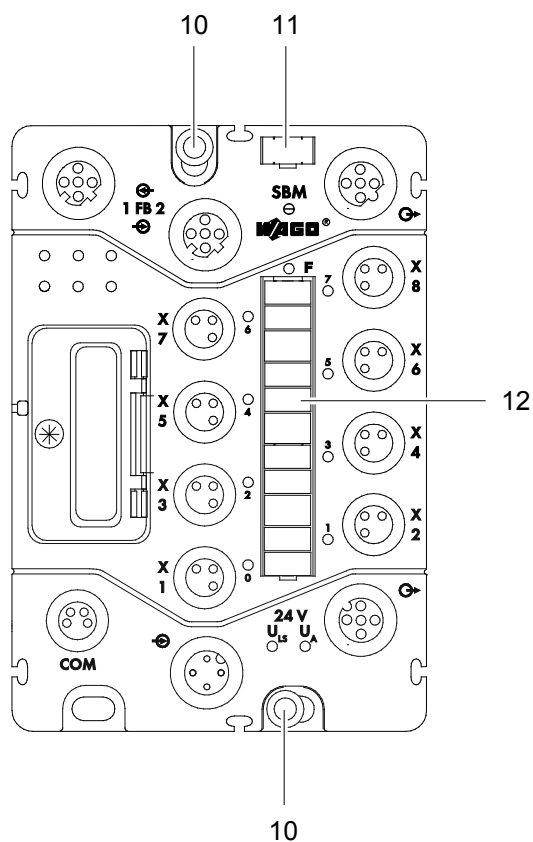


Figure 4: Marking possibilities and fastening

Table 8: Legend for figure “Marking possibilities and fastening”

Position	Description	Function
10	Mounting holes	With integrated function earth (FE) socket for fastening and grounding the fieldbus coupler.
11	Module marker card	For identifying the fieldbus coupler inside a fieldbus station.
12	Channel marker strip	For identifying input channels.

4.3 Display Elements

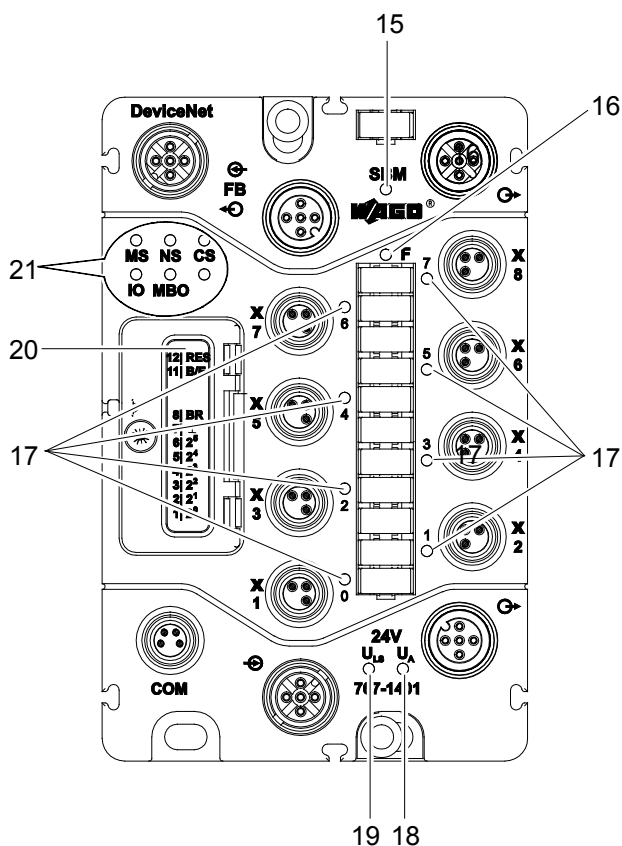


Figure 5: Display elements

Table 9: Legend for Figure “Display Elements”

Position	LED/ Operating element	Color	Meaning
15	SBM	Green, red	Status of S-BUS Master
16	F	Red	Diagnostic information of digital inputs is available.
17	LEDs 0 to 7	Yellow	Input signal pending
18	U_A	Green	Actuator supply is present
19	U_{LS}	Green	Logic supply and sensor supply are present.
20	Address and Operating Mode Switch (DIP Switch)	-	Setting the DeviceNet node address. Setting the baud rate. Executing a hardware reset.

Position	LED/ Operating element	Color	Meaning
21	MS	Red/green	Coupler status in accordance with DeviceNet specification
	NS	Red/green	Network status in accordance with DeviceNet specification
	CS	Red/green	Fieldbus coupler status
	IO	Red/green	Status of connected inputs and outputs
	MBO	Orange	Setting the MAC ID and the baud rate



Note

Detailed information

Detailed information can be found in Section "Diagnostics".

4.4 Operating Elements

Use the DIP switch to set the DeviceNet node address for the fieldbus coupler. The fieldbus coupler is available at this address via the DeviceNet network. Moreover, the DIP switch makes it possible to set the baud rate and execute a hardware reset of the fieldbus coupler. A sealable, transparent cover protects the DIP switch. The assignment of values is as follows:

Table 10: Default settings of DIP switch

Switch	1	2	3	4	5	6	7	8	9	10	11	12
Binary value/ Functions	2 ⁰	2 ¹	2 ²	2 ³	2 ⁴	2 ⁵	Baud	Baud	DS	-	Boot/ Execute	Reset
Switch Setting	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off

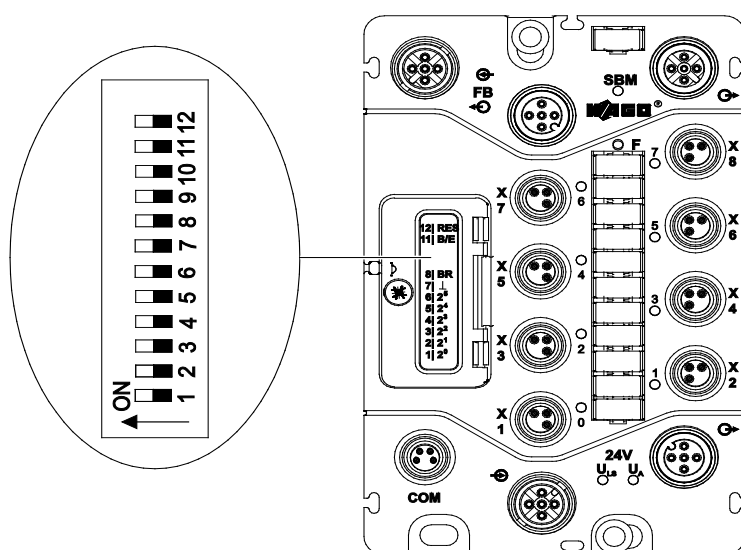


Figure 6: DIP switch. All switches are set on "Off" at delivery

Table 11: Explanation of DIP switch

Switch	On	Off
1 ... 6	Use this switch to set the DeviceNet node address of the fieldbus coupler. Node addresses in the range of 0 to 63 are permitted.	
7, 8	Use this switch to set the baud rate of the fieldbus coupler. You may choose between 125 Kbit/s, 250 Kbit/s and 500 Kbit/s.	

Table 11: Explanation of DIP switch

Switch	On	Off
9	Use this switch to activate or deactivate the address or baud rate setting for switches 1 – 8. If the switch is deactivated, set the baud rate and the DeviceNet node address via switches 1 – 8. If the switch is activated, the internally stored values for the DeviceNet node address and the baud rate are implemented.	
10	No function.	
11	This DIP switch must always be set to „Off“.	
12	This switch is used to initiate a hardware reset of the fieldbus coupler. You can override this status by returning the switch to "Off."	Normal operation.

Detailed information can be found in Section "Setting the DeviceNet Node Address".

4.5 Labeling

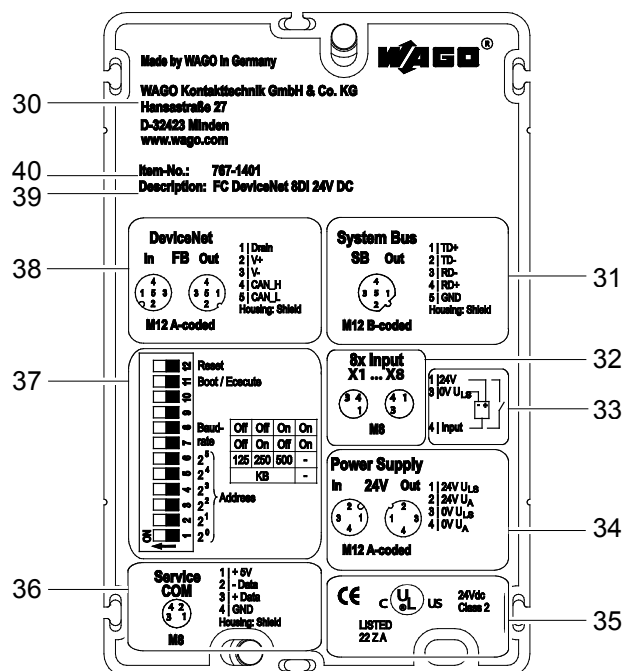


Figure 7: Labeling on the Back Side

Table 12: Legend for Figure “Labeling on the Back Side”

Position	Description
30	Manufacturer's mailing address
31	Connection assignment of S-BUS
32	Connection assignment of digital inputs
33	Connection example
34	Connection assignment of supply input and output
35	Information on approvals and CE marks
36	Connection assignment of USB interface
37	Labeling and assignment of DIP switch
38	Connection assignment of field bus input and output
39	Clear labeling of fieldbus coupler
40	Item number

On the side of the fieldbus coupler a label is printed providing information which is helpful in case of warranty claims:

- BA: Work order number (50)
- SN: Serial number (50)
- Manufacturing number (51)

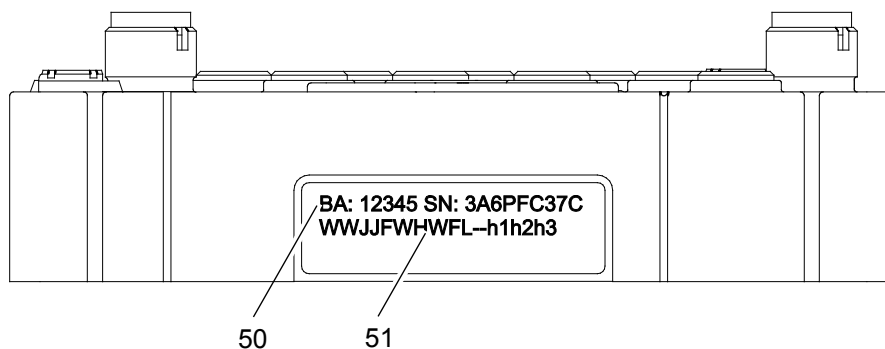


Figure 8: Label on fieldbus coupler

Table 13: Description of manufacturing number

Abbreviation	Description
WW	Week of production
JJ	Year of production
FW	Firmware release index When updating the firmware, please note that, the firmware release index may not be conformed to the printed firmware release index on the side of the fieldbus coupler. The “Electronic Type Label” (see section “Electronic Type Label”) shows the actual firmware release index.
HW	Hardware release index
FL	Firmware loader release index
h1h2h3	Internal manufacturer information

4.6 Schematic Diagram

The following schematic diagram provides an overview of the power supply and principle of operation of the power supply connections, as well as the digital inputs of the fieldbus coupler (see also section “Connecting the Supply Cable” and “Connecting the Sensor Cables”).

Please note that the common power supply of the sensors is distributed to all connections (pin 1 each) of the fieldbus coupler.

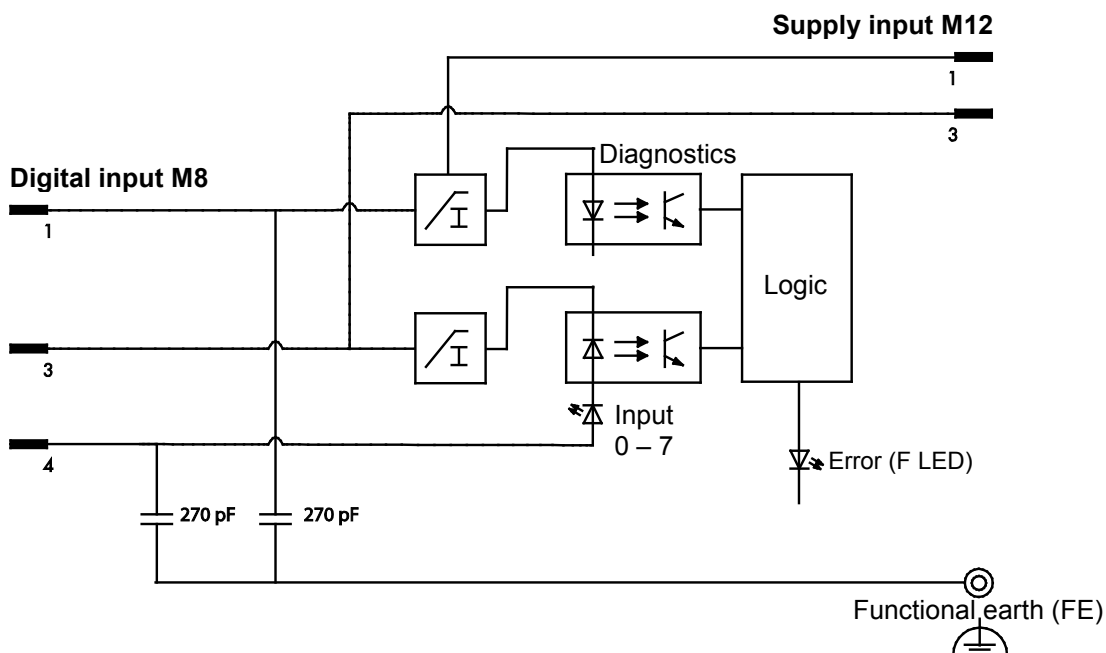


Figure 9: Schematic diagram

4.7 Dimensions

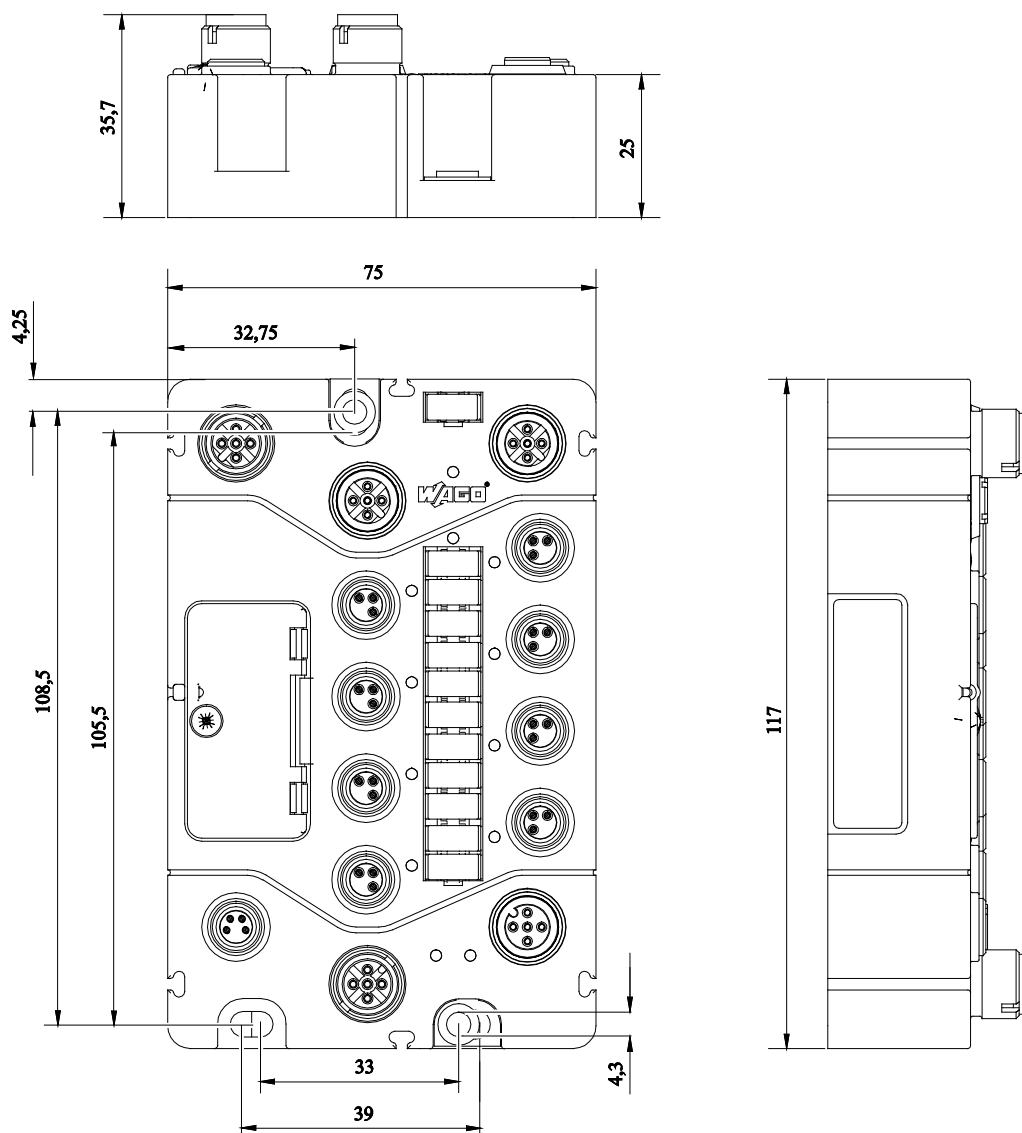


Figure 10: Dimensions of fieldbus coupler in mm

4.8 Technical Data



Note

Different technical data for applications in hazardous areas!

If the device is used in an application in the hazardous area, the technical data contained in the ATEX/IECEx certificate are binding in this application!

4.8.1 Device Data

Table 14: Technical data – Device data

Width	75 mm
Height	35.7 mm
Length	117 mm
Weight	Approx. 388 g

4.8.2 System Data

Table 15: Technical data – System data

Device type	DeviceNet slave
Connection type	M12 connectors, A coded, 5 poles
Baud rate	125/250/500 Kbit/s
Transmission medium	Copper cable
Station address	0-63 (adjustable via operation panel)
Protocols	DeviceNet
Additional data	See DeviceNet specification

4.8.3 Supply

Table 16: Technical data – Supply

Connection type	M12 connectors, A coded, 4 poles *
Protections	Reverse voltage protection for $U_{LS} + U_A$ and short-circuit protection for sensor supply
Current carrying capacity of the supply connections	Maximum 8 A (U_{LS} : 4 A, U_A : 4 A)
Supply voltage Logic and sensor voltage U_{LS} Actuator voltage U_A **	24 VDC (-25 % ... +30 %) 24 VDC (-25 % ... +30 %)
Supply current Logic and sensor current I_{LS} Actuator current I_A	Typically 80 mA + sensors (max. 400 mA) 5 mA

* Derating should be observed.

** Also required for supply transmission.

4.8.4 Communication

Table 17: Technical Data – Communication

Connection type	Shielded M12 connector, B coded, 5 poles
Number of expandable modules	64

4.8.5 Inputs

Table 18: Technical Data – Inputs

Number of inputs	8
Connection type	M8 connectors, 3 poles
Wire connection	2- to 3-wire
Input Filter	Parametrizable
Input characteristic	Type 1, acc. to IEC 61131-2
Signal voltage 0	-3 VDC ... +5 VDC
Signal voltage 1	+15 VDC ... +30 VDC
Input wiring	High-side switching
Input voltage	24 VDC (-30 VDC < U_{IN} < +30 VDC)
Input current	Typically 2.8 mA
Cable length, unshielded	≤ 30 m
Wrong connection of inputs	No effect

4.8.6 Configurable Functions

Table 19: Technical Data – Configurable Functions

Fieldbus coupler	See section “Parameterization”
Digital inputs	
Input filter (per channel)	0.1/0.5/3/15 /20 ms/filter off
Inversion (per channel)	on/off (only via FDT/DTM)
Online simulation (per channel)	Lock/unlock; simulation value: 0/1 (only via FDT/DTM)
Diagnostics (per module)	Enable/disable

4.8.7 Diagnostics

Table 20: Technical Data – Diagnostics

Per module	Short circuit/wire break of sensor supply
Per module	Undervoltage ($U_{LS} + U_A$)

4.8.8 Process Image

Table 21: Technical Data – Process Image

Input process image	2048 bytes
Output process image	2048 bytes

4.8.9 Indicators

Table 22: Technical Data – Indicators

MS: DeviceNet module status	LED (green/red)
IO: IO status	LED (green/red)
NS: DeviceNet network status	LED (green/red)
MBO: MAC-ID/Baud rate overwritten	LED (orange)
CS: Fieldbus coupler status	LED (green/red)
X1 ... X8: Input signal status	LED (yellow)
F: Error status	LED (red)
U _{LS} + U _A : Supply status	LED (green)
SBM: Status of S-BUS Master	LED (green/red)
Indicators	Non-storing

4.8.10 Service Interface COM

Table 23: Technical Data – Service Interface

Type	USB standard 1.1
Connection type	M8 connectors, 4 poles

4.8.11 Isolation

Table 24: Technical Data – Isolation

Channel - Channel	No
U _{LS} , U _A , S-BUS, fieldbus	500 VDC each

4.9 Approvals

The following approvals have been granted to 767-1401 fieldbus coupler:



Conformity Marking



cUL_{us}

UL508

The following Ex approvals are pending for 767-1401 fieldbus coupler:



BVS 15 ATEX E098X

II 3 G Ex nA IIC T5 Gc

II 3 D Ex tc IIIB T90°C Dc

IECEX BVS 15.0083X

Ex nA IIC T5 Gc

Ex tc IIIB T90°C Dc

4.10 Standards and Guidelines

The fieldbus coupler 767-1401 meets the following standards and guidelines:

DeviceNet IEC 62026-3, EN 50325-2

EC EMC Directive	2004/108/EC
EMC CE-Immunity to interference	acc. to EN 61000-6-2
EMC CE-Emission of interference	acc. to EN 61000-6-4
Ex Directive	94/9/EC
Explosive atmosphere Devices – General requirements	EN 60079-0
Explosive atmosphere Equipment protection by type of protection “n”	EN 60079-15
Explosive atmosphere Equipment dust ignition protection by enclosure “t”	EN 60079-31
Explosive atmospheres General requirements	IEC 60079-0
Explosive atmospheres Equipment protection by type of protection "n"	IEC 60079-15
Explosive atmospheres Equipment dust ignition protection by enclosure "t"	IEC 60079-31

5 Mounting

The fieldbus coupler can be fastened directly to your system using screws. It can also be mounted on a carrier rail using an adapter (WAGO accessory) or fastened to a profile rail using a surface mounting profile (WAGO accessory).

For mounting on a flat surface, WAGO offers spacers to assist in the mounting process that can be inserted between the 767 Series component. This helps by providing sufficient mounting distance for compact direct mounting, as well as eliminating gaps where dirt could accumulate. A cable tie can be fastened through each of two mounts in the spacer, which together serve to relieve strain from the sensor and actuator cables.

5.1 Information on Mounting

The following information shall always be observed:

- Disconnect the power supply from the system before you start with installation.
- The maximum diameter of the drill hole of the fieldbus coupler's mounting holes is not to exceed 4 mm.
Otherwise, a full contact with function earth (FE) socket of the fieldbus coupler not be guaranteed. This may lead to restrictions in the shielding.
- The cover cap of the DIP switch must be closed and bolted.
- To protect the fieldbus coupler from tensile forces that may arise, do not bridge spaces with it.
- Screw down the fieldbus coupler down only on flat contact surfaces to protect it from warping.
- Ensure that the connectors are not soiled during installation. Dirt and other such substances damage the contacts, allowing corrosion to develop.
- To avoid damaging the fieldbus coupler, do not mount it in shear areas of moving devices.
- Arrange for a sufficient potential equalization in your system.
- Use all mounting holes to mount the fieldbus coupler to your system so all FE connections lie on a ground potential.

Any mounting position is possible.



Note

Ensure a safe mounting position!

In explosion hazardous environments no increased mechanical loads must be present at the installation location. If shocks are possible, a shock protection must be installed between the device and the possible source of the shock.

5.2 Tools and Accessories Required for Mounting

Depending on the mounting type, the following tools are required for installation:

- A screwdriver for M4 fixing screws
- Drilling machine to pre-drill the mounting holes for the fieldbus coupler to be mounted to the system and, if applicable, for the imperforated carrier rail.
- M4 thread cutter (bottoming tap or hand tap set)

The WAGO accessories listed below are required for mounting. The associated item numbers can be found in the “Accessories” section.

- Carrier rail adapter, including fixing screws and perforated or imperforated carrier rails (DIN 35 x 7.5) according to EN 60715, also available from WAGO.

or

- Profile adapter, including fixing screws
- Spacer (optional)

Three M4x12 screws are required for direct mounting of the fieldbus coupler. The length of the screw shaft is to be selected according to the mounting type.

Bore measurements

When fastening the 767 Series component without a threaded hole, the clearance hole must not be wider than 4mm so as to ensure safe contact of the FG (functional ground) connections.

5.3 Direct Mounting on Your System

Mount the fieldbus coupler directly on a level surface of your system, without using WAGO accessories. Direct mounting of the fieldbus coupler is to be carried out as follows:

1. Disconnect the power supply from those devices on which you wish to mount the fieldbus coupler.
2. Mark the drill holes using the hole drilling template printed on the packaging. You can also hold the fieldbus coupler in the desired position and mark the drill holes. Ensure that there is sufficient space around the 767 Series component to enable you to connect all cable without problems.

Note



Direct Mounting

We recommend using WAGO spacers for compact direct mounting. If these are used, the resulting additional distance from the second 767 Series component is to be noted. See section “Mounting the Module” > “Mounting the Spacer in the Case of Compact Arrangement”.

3. Fasten the fieldbus coupler to the grounded frame of your system or to another grounding point with the M4x12 screws via the three mounting holes.

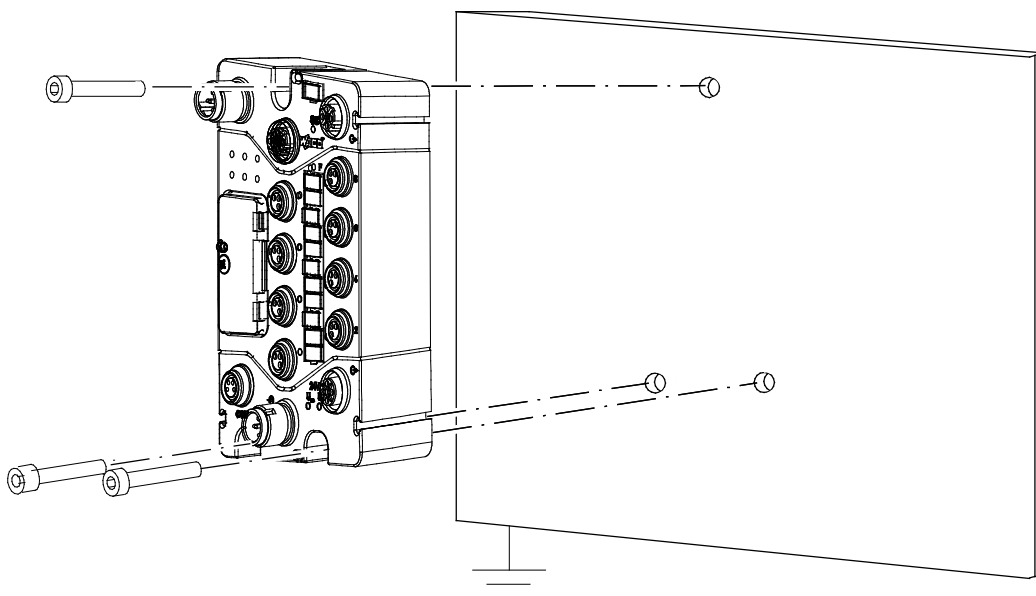


Figure 11: Mounting the fieldbus coupler on the grounded system

5.4 Mounting on a Carrier Rail (only with WAGO Accessories)

5.4.1 Fastening the Carrier Rail Adapter to the Fieldbus Coupler

A carrier rail adapter is required to mount the fieldbus coupler on carrier rails.

Screw together the fieldbus coupler and carrier rail adapter using the M4 threaded screws provided, as shown in the following figure.

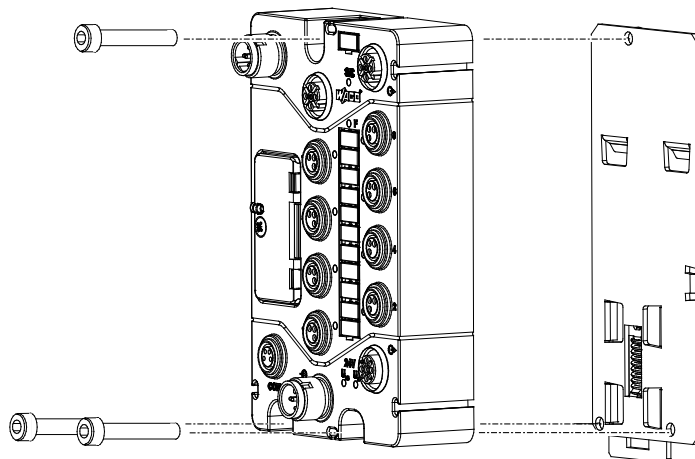


Figure 12: Fastening the fieldbus coupler to the carrier rail adapter

5.4.2 Fastening the Fieldbus Coupler with Carrier Rail Adapter to a Carrier Rail

In order to provide a clear representation, the carrier rail adapter in the figure below is shown without the fieldbus coupler.

When mounting the fieldbus coupler to a carrier rail (DIN rail 35 x 7.5) using a carrier rail adapter, proceed as follows:

1. Disconnect the power supply from those devices on which you wish to mount the fieldbus coupler.
2. Set the fieldbus coupler onto the edge of the carrier rail (61) with the two notches (60).
3. Press the undersurface against the lower carrier rail edge until the latch (62) locks in place.

Note



Use end stops

When mounting the rail vertically or if shock or vibration loading should occur, the use of end stops (item no.: 249-116 or 249-117) for stabilization is required.

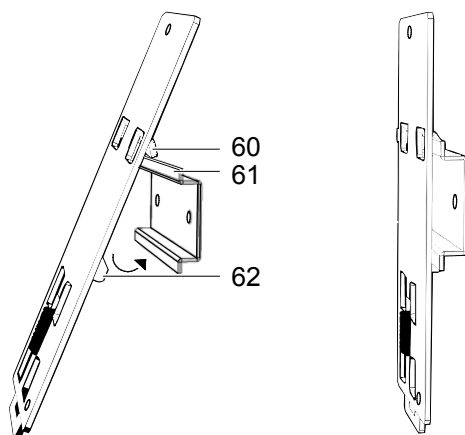


Figure 13: Mounting the carrier rail adapter

5.5 Mounting on a Profile Rail (only with WAGO Accessories)

5.5.1 Fastening the Profile Adapter to the Fieldbus Coupler

Aside from using carrier rail adapters to fasten the fieldbus coupler, you also have the option to fasten it to a profile rail using the profile adapter and nuts, provided that this mounting type is supported by your system. You are to supply the necessary nuts.

Screw together the fieldbus coupler and the profile adapter using the M4 threaded screws provided, as shown in the following figure.

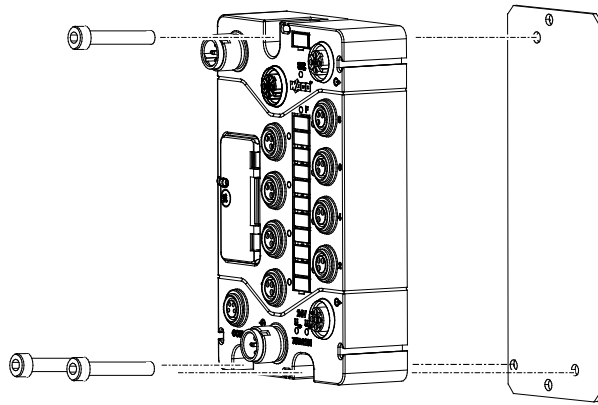


Figure 14: Fastening the fieldbus coupler to the profile adapter

5.5.2 Fastening the Fieldbus Coupler with Profile Adapter to a Profile Rail

To fasten the fieldbus coupler to a profile rail of your system, two nuts are required with one screw each (length of screw threads must be compatible with your system).

1. Disconnect the power supply from those devices on which you wish to mount the fieldbus coupler.
2. Insert the two screws into the holes above and beneath the fastened fieldbus coupler on the profile adapter.
3. Fasten an appropriate nut on each of these screws.
4. Insert the profile adapter with the attached fieldbus coupler into the profile rail of your system. Position it and tighten the screws.

5.6 Replacing the Marker Card and Strip

A blank module marker card (11) and channel marker strip (12) are attached when delivered. For labeling them, proceed as follows:

1. Press the slot screwdriver (maximum slot width: 3mm) into the small opening under the cover and lever it up.
2. Remove the protective cover.
3. Mark the marker card resp. marker strip with a waterproof pen.
4. Reinsert the protective cover and press it firmly in place.

New cards, strips and pens can be obtained from WAGO.

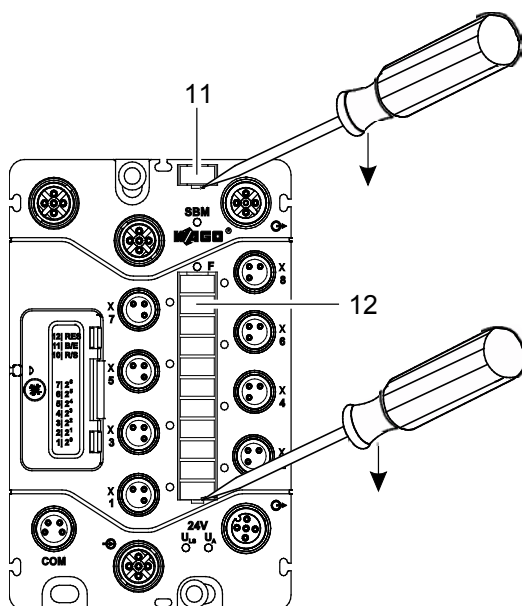


Figure 15: Replacing the marker card and strip

5.7 Mounting the Spacer in the Case of Compact Arrangement

By using the spacer, a sufficient mounting distance can be achieved when directly mounting the 767 Series components, and gaps can be eliminated where otherwise dirt and other substances could accumulate. In addition, it is possible to optimize the cable routing of the sensors and actuators. For this purpose, two fastening lugs each are included on the spacer for cable ties.

1. Disconnect the power supply from those devices on which you wish to mount the fieldbus coupler.
2. The spacer can only be inserted into the appropriate openings of the fieldbus coupler from the bottom. To bind both components, place the fieldbus coupler on the spacer or push the spacer from the bottom into the coupler.
3. Fasten the components on a flat surface by fastening the fieldbus coupler to the grounded frame of your system or to another grounding point with three M4 screws via the mounting holes.

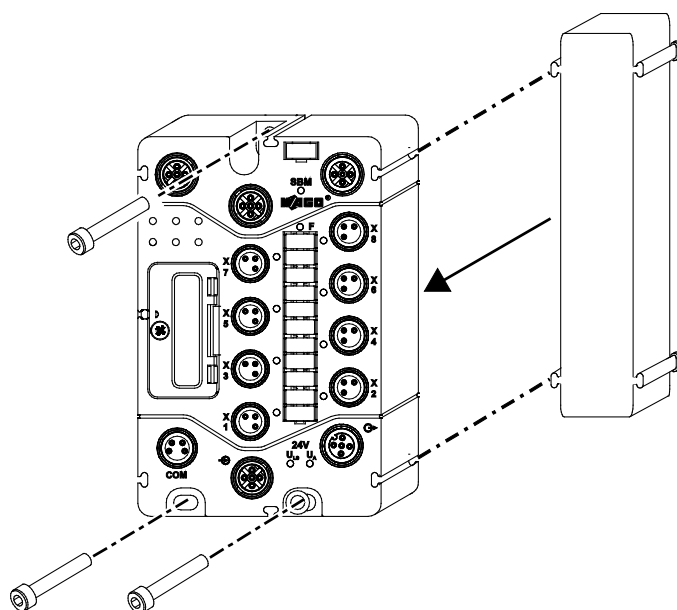


Figure 16: Attaching a spacer

4. When attaching 767 Series component, only one 767 component connected with a spacer can be attached and screwed on to the preceding component due to the mounting direction. The last 767 component is fastened without a spacer.

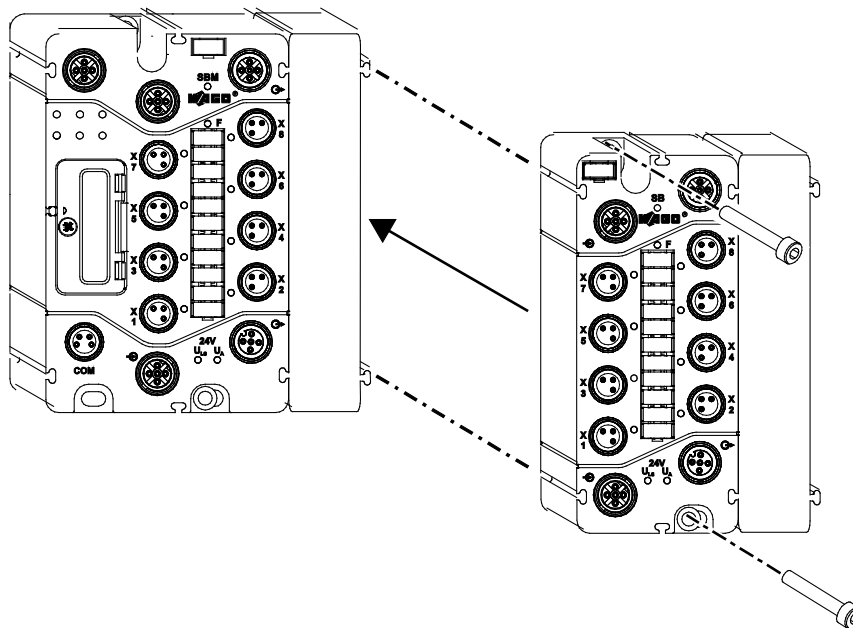


Figure 17: Attaching another 767 component to the fieldbus coupler

6 Connecting Data and Supply Cables

6.1 Notes



DANGER

Electric voltage!

Operate the 767 Series components exclusively with 24 VDC PELV (Protective Extra Low Voltage) or SELV (Safety Extra Low Voltage) voltage sources. Failure to comply may result in electric shock.

NOTICE

The highest current carrying capacity of the supply contacts is 4 A!

Always observe the maximum current carrying capacity per supply line (U_{LS} , U_A) for each 767 Series component and the overall power consumption for all 767 components. Neither of these values shall exceed 4 A since an increase in current causes the contacts to overheat and damages the 767 Series components. Information regarding the power demand of each 767 Series component can be found in the corresponding data sheet, which is available from www.wago.com.

NOTICE

Exposed connections!

If connections have not been closed with protective caps, liquid or dirt can penetrate the components of the 767 Series module and ruin it. Therefore, close all unnecessary connections with protective caps, which must be ordered separately, in order to maintain the IP67 degree of protection. (See section “Accessories” of the fieldbus coupler/controller manual.)

- The connectors must be disconnected from the power supply when screws are tightened.
- Tighten the connectors by hand. To achieve the required torque (see below) for the connector, use the torque wrench with the order number **206-701**.

Torque for M8 connectors:	0.6 Nm
Torque for M12 connectors:	1.0 Nm

NOTICE

Use torque wrench 206-701!

Only use the specified torque wrench. Using mechanical tools can cause the threads to strip.

In this case, replace the module!

- Observe the exact positioning (coding) between plug and socket.

- For both power supply and S-BUS (system bus), use only pre-assembled WAGO system cables. This is the only means whereby the specified characteristics of the technical data can be achieved.
- Keep all cables a sufficient distance away from electromagnetic sources of interference in order to maintain a high level of interference resistance of the 767 system against electromagnetic emissions.
- Observe the minimum bending radiuses of the WAGO system cable. For more information, see the technical data at www.wago.com.
- When laying all cable, ensure that you do not lay it in shear areas of moving machine parts.
- The cable shield of the fieldbus cable must be connected with functional ground on both ends over a wide area.
- Observe the correct layout of the potential equalization.

6.2 Required Accessories

The WAGO accessories listed below are required for connecting the data and supply cable. The associated item numbers can be found in the “Accessories” section.

- S-BUS M12 terminator, IP 67
- S-BUS and supply cables, pre-assembled on both ends, IP 67
- USB cable pre-assembled on both ends, IP 67
- DeviceNet M12 terminator in the IP 67 safety class

6.3 Connecting the Fieldbus Cable

DeviceNet assists in the communication between a higher-level controller and the fieldbus coupler.

If you are not using a pre-assembled DeviceNet cable, shielded M12 connectors with the IP 67 degree of protection is to be connected to this.

The following table outlines the assignment of the DeviceNet connections:

Table 25: DeviceNet connection assignment

Connection		Contact	Description
 IN	 OUT	1	DRAIN
		2	V+
		3	V-
		4	CAN_H
		5	CAN_L
		Connecting thread	Shielded

6.3.1 Connecting the Fieldbus Coupler to a DeviceNet Network

To connect the fieldbus coupler to the DeviceNet network, proceed as follows:

1. Disconnect the power supply from those devices on which you have mounted the fieldbus coupler.
2. Connect the fieldbus coupler with the DeviceNet network by plugging the socket of the DeviceNet cable (W) into the IN connection  (1).
3. Tighten the socket using the knurled-head screw.
4. Connect the DeviceNet terminator to the OUT connection  (2) and tighten it.

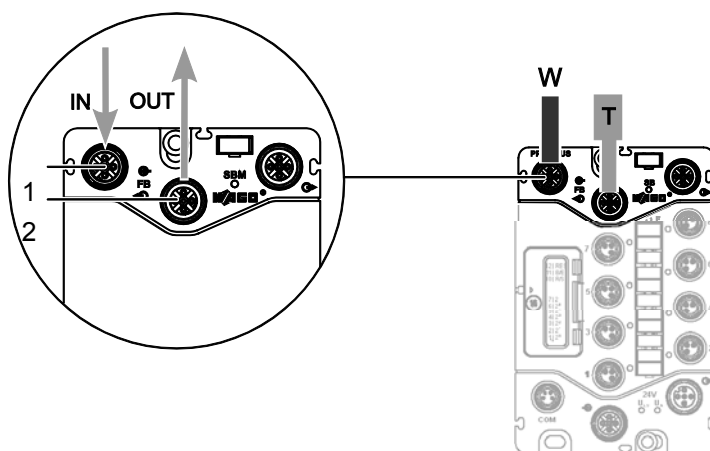


Figure 18: Connecting fieldbus to a fieldbus coupler

6.3.2 Connecting Several Fieldbus Couplers Within a DeviceNet Network

Up to 63 fieldbus couplers can be connected to the DeviceNet network on the line topology. Connecting several fieldbus couplers to the DeviceNet network can be carried out as follows:

1. Disconnect the power supply from those devices on which you have mounted the fieldbus coupler.
2. Connect the first fieldbus coupler to the DeviceNet network by plugging the socket of the DeviceNet cable (W) into the IN connection $\oplus$ (1).
3. Tighten the socket using the knurled-head screw.
4. To connect two fieldbus couplers together, attach the DeviceNet cable (W1) to the OUT connection $\ominus$ (2) of the first fieldbus coupler and the IN connection $\oplus$ (1) of the second, as shown in the following figure.
5. Tighten the plugs and sockets using the knurled-head screw.
6. Attach the DeviceNet terminator (T) to the OUT connection $\ominus$ (2) of the last fieldbus coupler, as shown in the image, and tighten it.

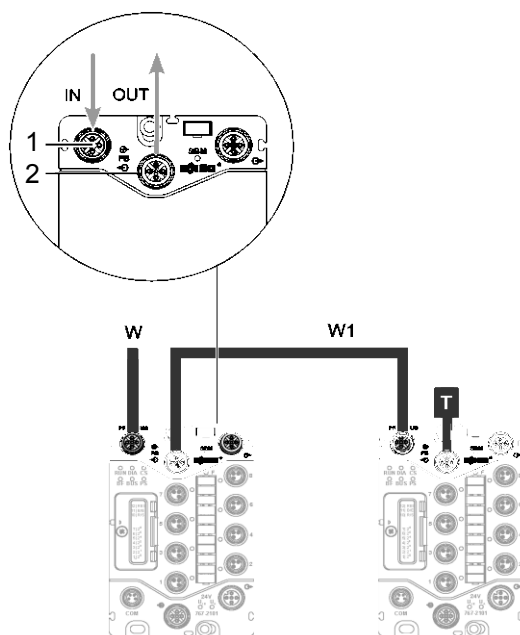


Figure 19: Two fieldbus couplers within one fieldbus network

6.4 Connecting the S-BUS Cable

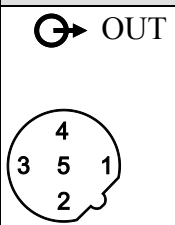
The S-BUS is used for communication between the fieldbus coupler and the connected I/O modules.

Requirement:

- A WAGO S-BUS cable pre-assembled on both ends is readily available to you. This is necessary for optimal signal transmission.
- The S-BUS terminator is available to you, which is necessary for communication.

The following table outlines the assignment of the S-BUS connection.

Table 26: S-BUS connection assignment

Connection	Contact	Description
	1	TD +
	2	TD -
	3	RD -
	4	RD +
	5	GND
	Connecting thread	Shielded

To connect the S-BUS cable to fieldbus couplers and I/O modules, proceed as follows:

1. Disconnect the power supply from those devices on which you have mounted the fieldbus coupler.
2. Connect the S-BUS cable (S1) with the OUT connection  (3) of the fieldbus coupler and the IN connection  (8) of the subsequent I/O module. For example, if two I/O modules have been connected to the fieldbus coupler, connect the S-BUS cables (S1, S2) to the associated IN and OUT connections, as shown in the following figure.
3. Tighten the plugs and sockets using the knurled-head screws.
4. Attach the S-BUS terminator (T) to the last I/O module as shown in the figure and tighten it.

If you do not connect any I/O modules to the S-BUS, screw the S-BUS terminator (T) onto the S-BUS OUT output  (3) and the DeviceNet terminator (T1) onto the OUT output  (2) of the fieldbus coupler.

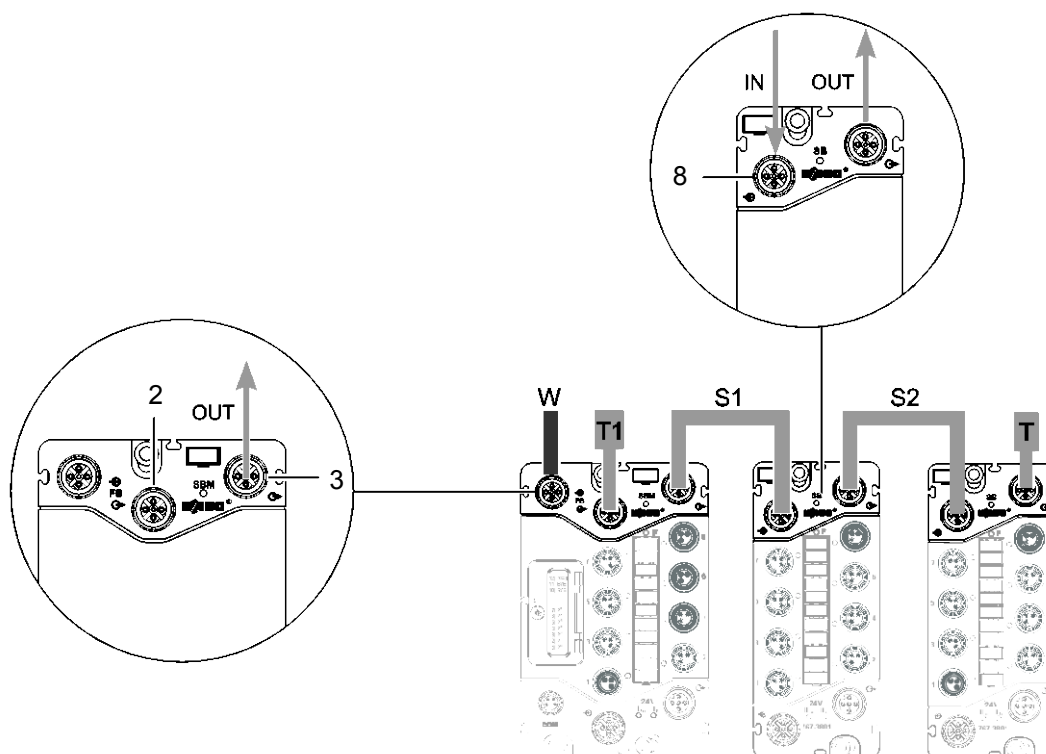


Figure 20: S-BUS is connected to fieldbus coupler and I/O modules

6.5 Connecting the Supply Cable

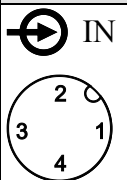
The supply cable provides power to the fieldbus coupler and the connected I/O modules.

Requirement:

- A supply cable for +24 VDC and 0 VDC must be connected to the supply input (6 in the figure on the next page) via appropriate fuses.
- The WAGO supply cable pre-assembled on both ends must be available (K1 and K2 in the figure on the following page).

The following table outlines the assignment of the supply connections:

Table 27: Supply connection assignment

Connection	Contact	Description
	1	24 VDC U_{LS}
	2	24 VDC U_A
	3	0 V U_{LS}
	4	0 V U_A
	1	24 VDC U_{LS}
	2	24 VDC U_A
	3	0 V U_{LS}
	4	0 V U_A

NOTICE

The highest current carrying capacity of the supply contacts is 4 A!

Always observe the maximum current carrying capacity per supply line (U_{LS} , U_A) for each 767 component and the overall power consumption for all 767 components. Neither of these values shall exceed 4A since an increase in current causes the contacts to overheat and damages the 767 components. Information regarding the power demand of each 767 component can be found in the corresponding data sheet, which can be downloaded at www.wago.com.

To connect the supply cable to the fieldbus coupler and I/O modules, proceed as follows:

1. Disconnect the power supply from those devices on which you have mounted the fieldbus coupler.
2. Connect the power supply cable (K0) with the fieldbus coupler by plugging the socket in the IN connection  (6) of the fieldbus coupler.
3. Tighten the socket using the knurled-head screw.
4. Connect the power supply transmission cable (K1) with the OUT connection  (5) of the fieldbus coupler and the IN connection  (8) of the subsequent I/O module.
For example, if two I/O modules have been connected to the fieldbus coupler, connect the power supply transmission cables (K1, K2) to the associated IN and OUT connections as shown in the following figure.
5. Tighten the plugs and sockets using the knurled-head screw.

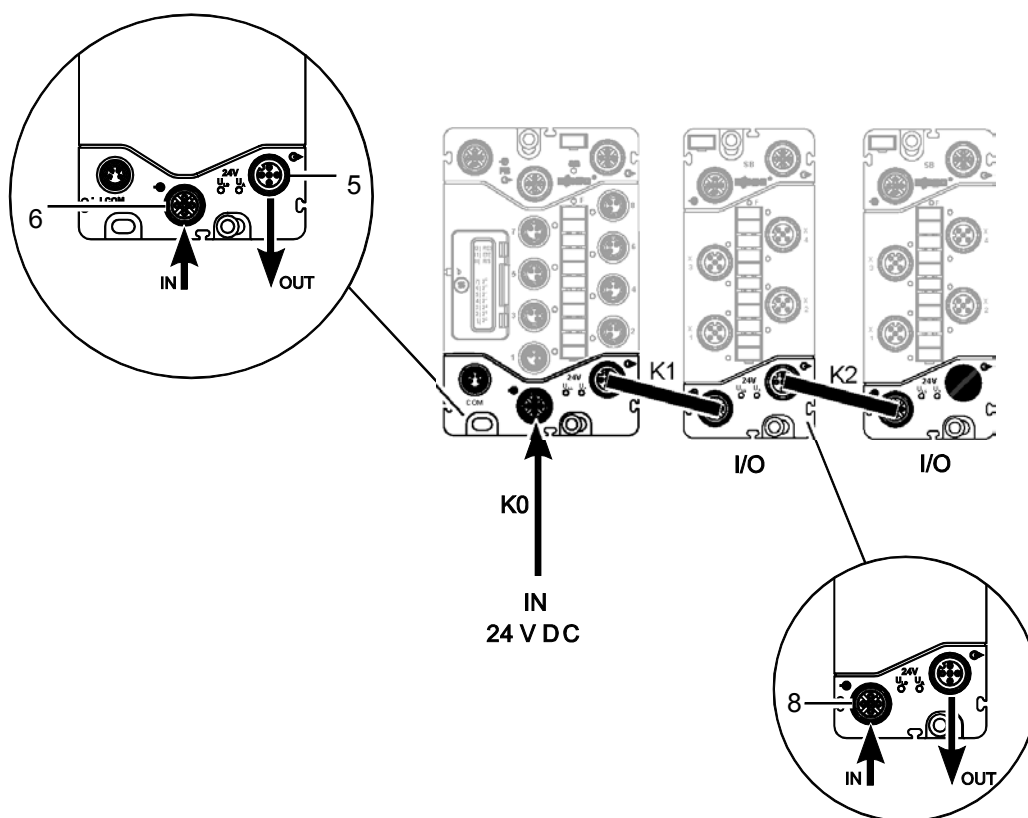


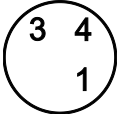
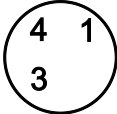
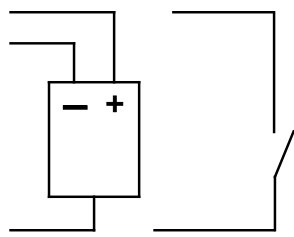
Figure 21: Supply cable connected with fieldbus coupler and I/O modules

6.6 Connecting the Sensor Cables

The sensor cables provide power to the connected sensors and transmit the sensor signals.

When using cables that have not been pre-assembled, make sure that these cables are equipped with M8 plugs rated to IP 67. The following table outlines the assignment of the sensor connections:

Table 28: Connection assignment of digital inputs

Connection		Connection diagram
IN  X1, X3, X5, X7	IN  X2, X4, X6, X8	1: 24 V 3: 0 V U_{LS}  4: Input

NOTICE

The highest current carrying capacity of the supply contacts is 4 A!

Ensure that the sensors are supplied with power from the U_{LS} supply line. The sensors' power consumption is to be taken into consideration when determining the present power demand for the U_{LS} supply line.

NOTICE

The total maximum power consumption of the sensors must not exceed 400 mA!

Please note that the combined power consumption of all connected sensors is not to exceed 400 mA. The distribution of power among the existing connections is depending on the individual power requirements of the sensors.

To connect the sensors to the digital inputs X1 ... X8, proceed as follows:

1. Disconnect the power supply from those devices/machines on which you have mounted the fieldbus coupler.
2. Insert the sensor cable plug into a digital input socket (4) of the fieldbus coupler, and tighten it via knurled nut.
3. Screw a protective cap on all unused input sockets to ensure that IP67 degree of protection is provided.

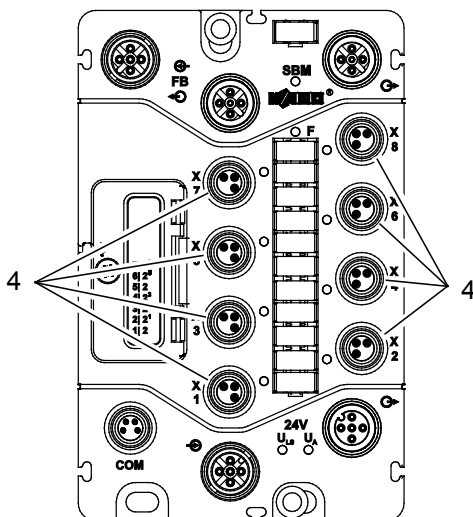


Figure 22: Digital inputs

6.7 Connecting the USB Cable

The fieldbus coupler's USB connection can be used to either configure the fieldbus coupler with an FDT/DTM frame application or to use general service functions. To use the USB connection, the USB driver “WAGO_767_USB_DRIVER_Setup” (item no.: 759-922) must be installed on your computer. This driver can be obtained on the Internet at www.wago.com.

The USB driver is also included on the “WAGOframe” CD-ROM (item no.: 759-370).

After installing the WAGO USB driver, the following COM port is supplied by the USB connection:

- **I/O-Service**
This COM port is needed to configure the fieldbus coupler using WAGOframe.

Note

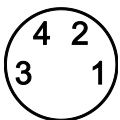


Communication disruption due to faulty data transmission

When using the USB connection, a faulty USB data transmission or an outage can cause communication disruptions. This can be due to additional or inappropriate USB distributors (hubs) or to USB cables that are too long (max. 5 m) or inappropriate. One should therefore refrain from using additional devices if possible.

When using a USB cable that has not been pre-assembled, M8 plugs with the IP 67 degree of protection are to be connected. The following table outlines the assignment of the USB connection:

Table 29: USB connection assignment

Connection	Contact	Description
IN 	1	+ 5 V
	2	- Data
	3	+ Data
	4	GND
	Connecting thread	Shielded

1. Connect your PC with the fieldbus coupler by inserting the USB cable plug into the fieldbus coupler's USB connection COM (7) and tightening it.
2. Switch on the fieldbus coupler. Please refer to section “Switching on the Fieldbus Coupler” for more information. After the fieldbus coupler has been switched on, your operating system detects a new device and installs the USB driver.

Note



Driver installation

During installation of the driver, an MS Windows message may appear several times informing you that the Windows Logo Test failed. Ignore this message and click **[Continue with installation]**.

3. When the USB connection is not in use, screw a protective cap on it to comply with the IP 67 degree of protection.

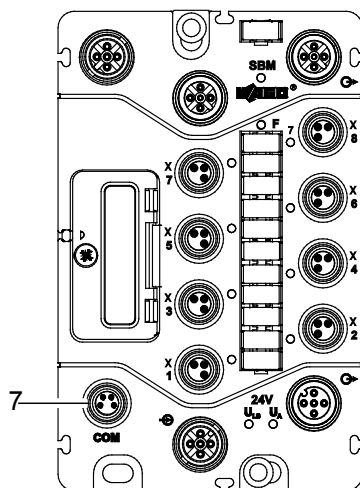


Figure 23: USB interface

7 Commissioning

NOTICE

Exposed connections!

If connections have not been closed with protective caps, liquid or dirt can penetrate the components of the 767 Series module and ruin it. Therefore, close all unnecessary connections with protective caps, which must be ordered separately, in order to maintain the IP67 degree of protection. (See section “Accessories” of the fieldbus coupler/controller manual.)

Before starting up the 767 node, ensure that the following requirements are met:

- The fieldbus coupler is mounted properly (see section “Mounting the Fieldbus Coupler”).
- All necessary supply and sensor lines, as well as the S-BUS and fieldbus cable, are securely fastened onto the appropriate connections (see section “Connection to the Data and Supply Cable”).
- The S-BUS terminator is fastened (see section “Connecting Data and Supply Cables”).
- An appropriate potential equalization is implemented in your system.
- The shielding is carried out properly.
- The DeviceNet terminator is fastened (see Section "Connection to the Data and Supply Cable").
- The power supply of the higher-level controller is switched on (see associated manual).

7.1 Setting the DeviceNet Node Address

To integrate the fieldbus coupler in a DeviceNet network, it must be assigned a unique DeviceNet node address. If assignment of the node address is desired via the DIP switch, then switch off switch 9 when disconnected from power. You can then set the node address using switches 1 through 6. When delivered, switch 1 is set to "On" and the others are set to "Off."

Table 30: Default settings of DIP switch

Switch	1	2	3	4	5	6	7	8	9	10	11	12
Binary value/ Functions	2^0 (1)	2^1 (2)	2^2 (4)	2^3 (8)	2^4 (16)	2^5 (32)	Baud	Baud	DS	-	Boot/ Execute	Reset
Switch Setting	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off

Requirement:

The fieldbus coupler must not be connected to the power supply.

To set the node address via the DIP switches, proceed as follows:

1. Open the cover by unscrewing the M3 screw with a screwdriver.
2. Set the DeviceNet node address by switching the switches 1 – 6 on ("On") or off ("Off") accordingly. With the six available switches you can set addresses from 0 to 63.
3. Close the cover and screw it securely in place to maintain degree of protection IP 67.

Note



Connect the power supply!

The DeviceNet node address is only active when the fieldbus coupler is connected to the power supply.

In the following example, switches 3, 5 and 6 are switched on. Thus, the DeviceNet node address of the fieldbus coupler in this example is 52 ($2^2 + 2^4 + 2^5 = 4 + 16 + 32 = 52$).

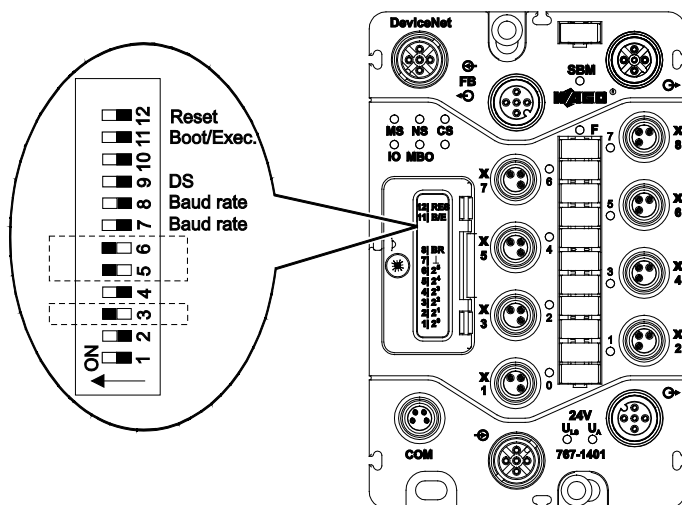


Figure 24: DIP switch set for node address 52

You can also use the address stored internally. To do so, you must set switch 9 to "On". This removes the possibility of setting the device address and baud rate via DIP switches (DS = Disable Switch). The fieldbus coupler is now using the internally stored node address.

During operation, the device address can be set via the DeviceNet object (see section "DeviceNet Object (03hex)") or via WAGOframe (see section "DeviceNet-Specific Parameters"). Restart the fieldbus coupler to activate the new node address.

Note



Overwrite the node address!

If switch 9 is in position "Off" when starting-up the fieldbus coupler, the internally stored address is overwritten by the node address previously set via DIP switches.

7.2 Setting the Baud Rate

Switches 7 and 8 are used to set the baud rate of the fieldbus coupler. You may choose between 125 Kbit/s, 250 Kbit/s and 500 Kbit/s.

The assignment of the switch position to the baud rate is shown in the table below.

Table 31: Assignment of switch position to baud rate

Switch	Switch Setting			
7	Off	On	Off	On
8	Off	Off	On	On
Baud rate	125 Kbit/s	250 Kbit/s	500 Kbit/s	Not valid

Note



Activate the baud rate

The baud rate is only active when the fieldbus coupler is connected to the power supply.

You can also use the baud rate stored internally. To do so, you must set switch 9 to "On". As a result, baud rate setting via DIP switches is disabled. The fieldbus coupler is now using the internally stored baud rate.

During operation, the baud rate can be set via the DeviceNet object (see Section "DeviceNet Object") or via WAGOframe (see Section "DeviceNet-Specific Parameters"). Restart the fieldbus coupler to activate the new baud rate.

Note



Overwrite the baud rate

If switch 9 is in position "Off" when starting-up the fieldbus coupler, the internally stored baud rate is overwritten by the baud rate previously set via DIP switches.

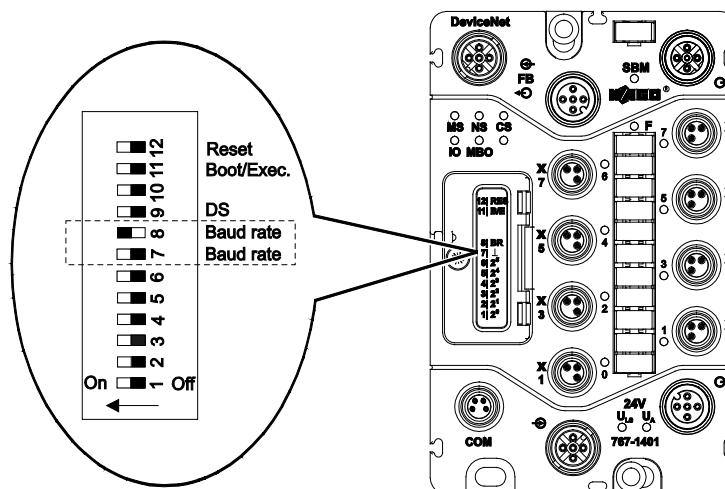


Figure 25: DIP switches set for a 500kbit/s baud rate

7.3 Switching on the Fieldbus Coupler

After you have set the PROFIBUS station address on the fieldbus coupler, turn on the power supply. The fieldbus coupler and all connected I/O modules are ready for operation after the initialization phase.

Note



Disruption during operation

None of the 767 Series devices are to be removed or added during operation, as this causes a disruption in the 767 station.

8 DeviceNet

8.1 EDS File

The EDS file contains the characteristics of the fieldbus coupler and information regarding its communication capabilities. The EDS file is imported and installed by the corresponding configuration software.

The EDS file can be obtained at www.wago.com. When installing the EDS file, please refer to the information provided in the documentation of the configuration software you are using.

8.2 Process Image

After starting up the fieldbus coupler, it automatically identifies all connected I/O modules. The fieldbus coupler uses this to create a local process image, divided into an input and output data range.

The process image has a word structure (word alignment). Data larger than one byte is displayed internally in Intel format (Little Endian). If both analog and digital I/O modules are plugged in to the DeviceNet node, the digital input and output data are combined byte by byte and attached behind the analog data in the process image.

The size of the process image of an DeviceNet node can be identified from the connected 767 components. The process image has a total size of 4096 bytes: 2048 bytes of input data and 2048 bytes of output data.

You can obtain access to the process image via the assembly instances or directly via the DeviceNet objects.

The assembly object provides a statically configured process image in instances 101 through 113. By setting the "Produced Connection Path" and the "Consumed Connection Path" for individual I/O connections (poll, bit strobe, change of state or cyclic), the desired process image can be selected. Additional details can be found in Section "Connection Object (05_{hex})".

8.3 Process Data Exchange

The assembly instances are required in order to exchange process data between the higher-level controller (master/scanner) and the fieldbus coupler. Using these assembly instances, you can write and read the inputs and outputs of the 767 components.

Process data exchange between a higher-level controller and the I/O modules is conducted via the following connections:

- "Polled I/O connection"
With this connection type the higher-level controller sends data in a cyclical manner, after which the slave also sends its current data (polling).
- "Change of state/cyclic"
Change of state messages are sent by either the master or the slave in a cyclical manner or in the case of a state change. The data is transmitted between master and slave in the form of objects. These objects are classified as either input and output objects. The object structure is determined by the assembly objects, which is used to group attributes of different application objects. I/O data from different objects can thus be combined into a data block and sent via a message connection.
- "Bit Strobe"
The higher-level controller uses a command to poll all slaves.

8.3.1 Assembly Instances

A process data exchange is initiated using the assembly instances. From the existing static assembly instances (see Section "Assembly Object (04_{hex})"), select one instance for each sending direction.

For transmission of process data from the higher-level controller (originator) to the fieldbus coupler (target), the following assembly instances are available:

- Instance 101: for analog and digital output data
- Instance 102: for digital output data
- Instance 103: for analog output data
- Instance 113: for analog and digital output data with diagnostic acknowledgement

For transmission of process data from the fieldbus coupler to the higher-level controller, the following assembly instances are available:

- Instance 104: for analog and digital input data, including status byte
- Instance 105: for digital input data, including status byte
- Instance 106: for analog input data, including status byte
- Instance 107: for analog and digital input data
- Instance 108: for digital input data
- Instance 109: for analog input data
- Instance 112: for analog and digital input data with status byte, current error and diagnostics



Note

Assembly instance without status information

If you select an assembly instance without status information (107 – 109), information such as fieldbus errors, pending diagnostics and process data status (valid/invalid) are not available and cannot be integrated into the application of the higher-level controller. The status byte is described in class 64_{hex}, attribute 5.

8.3.2 Identifying the Data Length

After you have selected the necessary assembly instance, you need to identify the length of the data in each sending direction of the respective instance for the configuration software of the higher-level controller. You have the following options:

Reading out the lengths via the assembly instances

The simplest option involves reading out the instance attribute 4 from each assembly instance between 101 and 113, which should be used. Attribute 4 of the assembly classes (ID = 4) indicates the total number of data bytes transmitted in this direction.

This number includes the overall size of the respective input or output data, including status byte, error and diagnostics.

The individual data sizes are not identified by reading out the assembly instances. This is only possible using the instance attribute of class 64_{hex}.

Reading out the lengths via class 64_{hex}, instance 1 (see "Section Bus Coupler Configuration Class Object (64_{hex})")

The bit lengths of the analog and digital I/O modules connected to the ETHERNET node are read out via the instance attributes 7 – 10.

Depending on which assembly instance you select for exchanging the input and output data, the status byte is also to be added, as well as three bytes for the current error and/or diagnosis. The lengths of the diagnostic data is made up of a fixed quantity of 10 bytes and a variable quantity. The variable quantity is dependent on the I/O modules connected to the 767 node. This quantity of bytes can be read out via attribute 53.

Detailed information regarding the instance attributes can be found in the corresponding table of class 64_{hex}.

8.3.3 Example with Assembly Instances 101 and 104

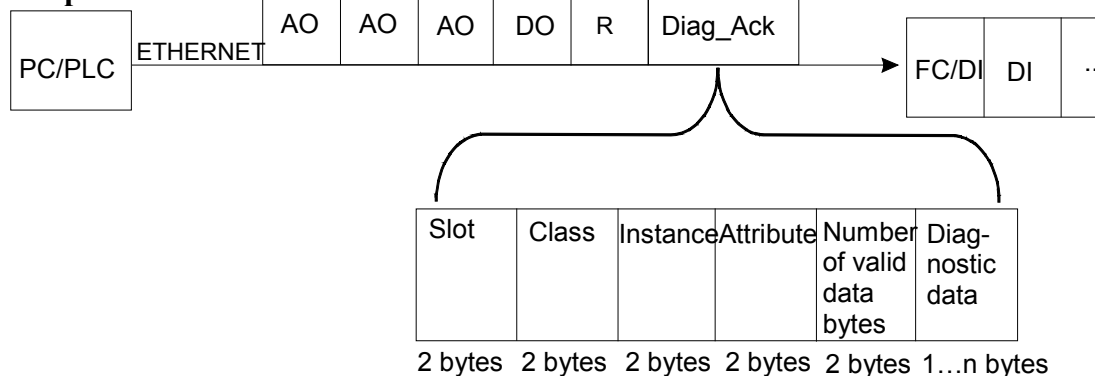
In this example, the assembly instance 101 is used for exchanging data between the higher-level controller and the fieldbus coupler and includes all analog and digital output data. The assembly instance 104, which includes the status byte in addition to the analog and digital input data, is used for exchanging data between the fieldbus coupler and the higher-level controller.

A sample configuration results in the following structure of process data, which is sent from the higher-level controller to the fieldbus coupler:

Physical structure



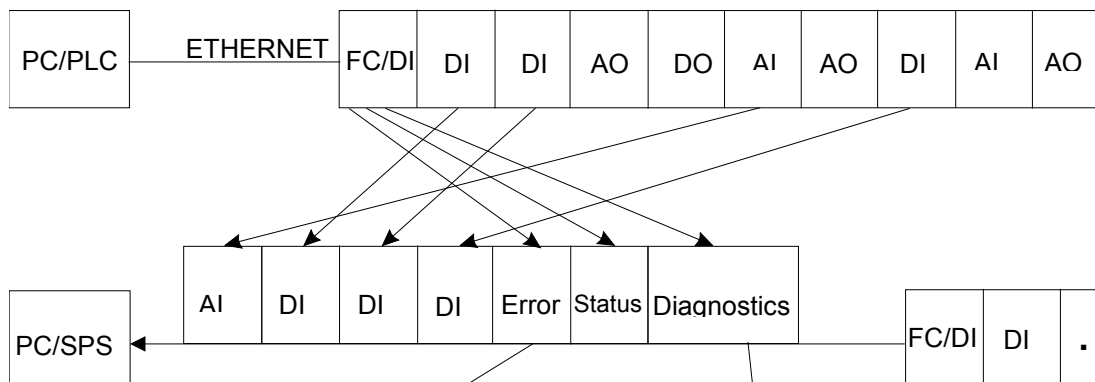
Output data



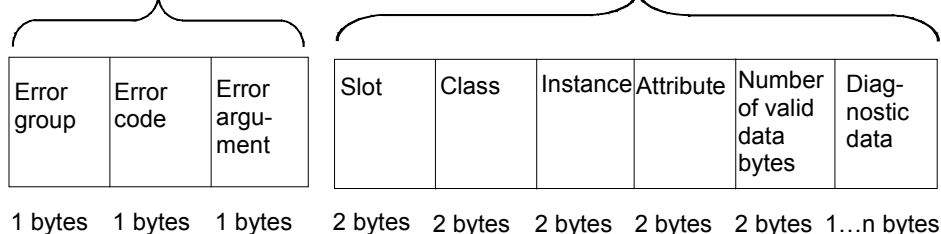
FC/DI: Digital inputs on the fieldbus coupler
 DI: Digital input, 8 bits
 DO: Digital output, 8 bits
 AI: Analog input, 8 bytes
 AO: Analog output, 8 bytes
 Diag_Ack: Diagnostic acknowledgment, 10 bytes + x bytes
 R: Reserved, 4 bytes

Process data sent from the fieldbus coupler to the higher level controller:

Physical structure



Input data



DI: Digital input, 8 bits
 DO: Digital output, 8 bits
 AI: Analog input, 8 bytes
 AO: Analog output, 8 bytes
 Error: 3 bytes
 Status: Error group, Error code, Error argument 1 byte
 Diagnostics: Diagnostic message, 10 bytes + x bytes

8.4 Diagnostics

Certain diagnostic information is made available to you in the network. This can include, for example, error messages and warnings from the fieldbus coupler or the connected I/O modules. You have several options for receiving diagnostic information from the fieldbus coupler:

- Diagnostics integrated in the input and output data,
- Diagnostics via explicit messages,
- Diagnostics mixed via input and output data and explicit messages

The diagnostic information of all connected I/O modules and of the fieldbus coupler is stored in the latter for collection. When storing diagnostic information, bit 3 is also set in the status byte. If more diagnostic information is reported to the fieldbus coupler than is collected, an overflow of the internal memory can occur. If this condition arises, bit 2 is set in the status byte, through which a loss of diagnostic information is reported. From this point on, the respective current diagnostic information is stored and the oldest is discarded. More information on status bytes can be found in the next chapter and under attribute 5 of the configuration class ("Bus Coupler Configuration Class Object (64_{hex})") of the fieldbus coupler.

The following sections describe how to access diagnostic information via the EtherNet/IP protocol. As with the process data, the data here that is larger than one byte is displayed in Intel format ("Little Endian").

8.4.1 Diagnostics Integrated in the Input and Output Data

Using this option, diagnostic information is attached behind the process image. This is performed using assembly instances 104 to 106, 112 or 113. Assembly instances 104 to 106 add the status byte into the process image. A diagnostic information is provided if bit 3 is set in this status byte. For these assembly instances, the information content is not provided via input and output data, but can be read out via explicit messages, for example. For more information, see Section "Diagnostics via Explicit Messages".

In addition to the status byte, the assembly instance 112 also contains additional diagnostic information, which describes the diagnostic type and origin. The fieldbus coupler communicates to the higher-level controller its status and the diagnostic information via the assembly instance 112. Instead of the status byte, the assembly instance 113 has a reserved byte whose content is irrelevant.

The diagnostic information is divided up as follows:

Status byte 1 byte	Slot 2 bytes	Class 2 bytes	Instance 2 bytes	Attribute 2 bytes	Number of valid data bytes 2 bytes	Diagnostic data 1 ... n bytes
-----------------------	-----------------	------------------	---------------------	----------------------	---	----------------------------------

Diagnostics

Example:

In the entire 767 node, the analog output modules deliver a maximum of 4 bytes of diagnostic data. This number can also be read out with an explicit message on class 100, instance 1, attribute 35. The digital output module on slot 3 reports a recent error, which contains the following data:

Diagnostic Message	Status byte	Slot 2 bytes	Class 2 bytes	Instance 2 bytes	Attribute 2 bytes	Number of valid data bytes 2 bytes	Diagnostic data 1 ... n bytes
Data	0x08	0x0003	0x0009	0x0005	0x0081	0x0001	0x01 0x00 0x00 0x00

Status byte:

By means of the placed bit 3 in the status byte (0x08), a pending diagnostic message is displayed.

Slot:

The slot 0x0003 indicates that the third I/O module in the 767 node has displayed a diagnostic message.

Class:

0x0009 designates the "Digital Output Point" class as an error class assigned to the digital output modules.

Instance:

The instance 0x0005 identifies channel 5 of the digital output module as the source of the error.

Attribute:

The attribute 0x0081 (129) indicates the "Open Load" error. The description of the diagnostic source on the basis of class, instance and attribute (CIA) can be found in the manuals of the respective I/O modules (appendix).

Number of valid data bytes:

The length of the diagnostic data is identified by the I/O module that can deliver the greatest number of diagnostic bytes. If only a portion of the diagnostic data is used in a current diagnostic message, this portion is determined by the "Number of valid data bytes". Beginning with the next byte, only the number of bytes specified here is valid.

In the example, the value 0x01 indicates that only the next byte in the diagnostic data contains a valid value. The subsequent 3 bytes are reserved and their content is irrelevant.

Diagnostic data:

The first byte of diagnostic data contains a 1 and thus indicates an incoming diagnosis on channel 3 of the digital output module, such as "Open Load". The value 0 indicates an outgoing diagnosis.

Some diagnostic messages require a confirmation. By means of the assembly instance 113, the diagnostic confirmations are transmitted from the higher-level controller to the fieldbus coupler. The data contents are shown in the following table:

Data from fieldbus coupler to higher-level controller			
Process image	Error (3 bytes)	Status byte	Diagnostic message (10 + x bytes)
Data from higher-level controller to fieldbus coupler			
Process image	Reserved (4 bytes)		Diagnostic confirmation (10 + x bytes)

By reserving 4 bytes, the beginning of the diagnostic message and diagnostic confirmation is identical as it relates to the process image (offset of 4 bytes).

Note



Diagnostic messages

If several diagnostic messages are pending simultaneously, they are transmitted back-to-back. Therefore, the individual diagnostic messages are only available in a cycle; i.e., in an ETHERNET telegram. If available, the next diagnostic message would then be transmitted in the next ETHERNET telegram.

Information

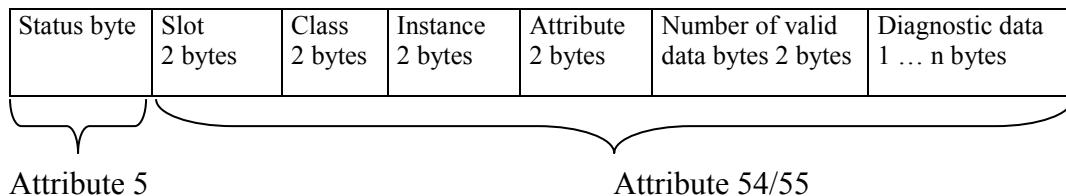


Diagnosis

To confirm the diagnosis, copy the data from the diagnostic message into the diagnostic confirmation.

8.4.2 Diagnostics via Explicit Messages

Using explicit messages, the complete diagnosis can also be read out via attributes. The individual data contents of the diagnostic message or confirmation can be read out from the attributes of class 64_{hex}, instance 1.



Attribute 5: This attribute contains the status byte.

Attribute 54: This contains the diagnostic message, which is composed of slot, class, instance, attribute, number of valid data bytes and diagnostic data.

Attribute 55: This contains the diagnostic confirmation, which is composed of slot, class, instance, attribute, number of valid data bytes and diagnostic data.

The descriptions of individual contents, such as slot, etc., can be found in Section "Diagnostics Integrated in the Input and Output Data".

The status byte can be read out via attribute 5 by bit 3 indicating whether or not a diagnosis is pending. This bit remains set as long as diagnostic messages are pending. If the diagnosis is only processed via explicit messages, attribute 5 should be read out in certain time intervals in order to detect a diagnostic message. If a diagnostic message is pending, the diagnostic source can be read out via attribute 54 of this class. If a confirmation of the diagnosis is necessary, the user can employ attribute 55 for this purpose.

The data structure of attribute 54 and 55 corresponds to the structure as sent in the input and output data (see figure shown above). Please note that the data is sent in "little endian" format and that you also confirm it in this format. If no other diagnostic is available, it is then indicated by resetting bit 3 of attribute 5. Furthermore, the whole data content of attribute 54 is set to zero.

Note



Diagnostic message

A diagnostic message can only be read out via attribute 54! If another read action is implemented, either the next pending diagnostic message is delivered or none at all (data content of attribute 54 is zero).

Information



Diagnosis

To confirm the diagnosis, copy the data from the diagnostic message into the diagnostic confirmation.

8.4.3 Diagnostics Mixed via Input and Output Data and Explicit Messages

There are several options for receiving and confirming the diagnosis mixed via input and output data and explicit messages. The assembly instances 104, 105 and 106 offer these alternatives:

- **Instance 104**
For analog and digital input data, including status byte.
- **Instance 105**
For digital input data, including status byte.
- **Instance 106**
For analog input data, including status byte.

In these assembly instances, the status byte is integrated and gives information about a pending diagnosis (bit 3 set). The actual diagnosis can then be read out by means of the explicit messages from class 100, instance 1, attribute 54. With attribute 55 of the same class, the diagnosis is confirmed. For more information, see Section "Diagnostics via Explicit Messages".

Other possibilities for combinations of input and output data and explicit messages are also available to link the diagnostic information to the overall concept.

8.4.4 Diagnostic Counter

The quality of the established network and the connected 767 node can be determined using the diagnostic counter. For this purpose, the diagnostic counter, which is described in the DeviceNet specification, is implemented as attribute 12 of the “DeviceNet Object” class (see section “DeviceNet Object (03_{hex})”). This attribute contains the supported diagnostic counter and the current values of each individual diagnostic counter.

A 16-bit value is used to identify the supported diagnostic counter that has been implemented. When a bit is set, the corresponding counter is implemented in the fieldbus coupler. Below is an overview of possible diagnostic counters:

Table 32: Overview of diagnostic counters

Bit	Diagnostic Counter
0	Arbitration loss
1	Overload error
2	Bit error
3	Stuff error
4	Ack error
5	Form error
6	CRC error
7	Rx message loss
8	Warning error
9	Rx error
10	Tx error
11 – 15	Reserved (shall be 0)

You can access these diagnostic counters via explicit messages on attribute 12.

Access via input data is also possible. The status byte (see section “Bus Coupler Configuration Class Object (64_{hex})”, attribute 5) is enlarged by the fourth bit. If this bit is set, at least one of the implemented diagnostic counters has changed. This status byte is located behind the input data of the I/O module when selecting assembly instances 104, 105, 106 and 112 (see section “Diagnostics integrated in the input and output data”). This makes it possible to denote a change to the diagnostic counter in the input data. The exact value of the diagnostic counters is determined via the explicit messages upon request of attribute 12.

An additional expansion is attribute 58 of the “Bus Coupler Configuration Class Object” class. This attribute is used to specify which diagnostic counters are to affect the fourth bit of the status byte. This attribute is a 16-bit value, with each bit representing a diagnostic counter. See also the overview of diagnostic counters. By setting the bits in attribute 58, you select the diagnostic counter that is to influence the fourth bit in the status byte.

Examples:

If Rx Error and Tx Error are the only diagnostic counters to affect the fourth bit in the status byte, bits 9 (Rx Error) and 10 (Tx Error) should be set under attribute 58 (value = 0x0600).

If the loss of received telegrams (bit 7: Rx Message Loss) is all that is reported in the status byte, attribute 58 should be set to value 0x0080.

8.5 Object Model

For network communication, EtherNet/IP utilizes an object model in which all functions and data of the fieldbus coupler are described. Each node in the network is depicted as a collection of objects.

The object model contains terms that are defined as follows:

- **Object:**
An object is an abstract representation of individual, related components within a device. It is determined by its data or attributes, its outwardly applied functions or services, and by its defined behavior.
- **Class:**
A series of objects which all represent the same type of system components. A class is the generalization of an object. All objects in a class are identical in form and behavior, but can comprise differing attribute values.
- **Instance:**
A specific and physical occurrence of an object. For example, New Zealand is an instance of the "land" object class. The terms "object," "instance" and "object instance" all refer to a specific instance.
- **Attribute:**
The description of an externally visible characteristic or of an object's function. Attributes typically deliver status information or regulate the function of an object. For example, the ASCII name of an object and the repetition frequency of a periodic object.
- **Service:**
A function supported by an object and/or an object class. CIP defines a group of common services that are applied to the attributes.
- **Behavior:**
Specification of how an object functions. The functions result from various occurrences, which are determined by the object, e.g. receiving service requests, recording internal errors or the sequence of timers.

8.6 CIP Classes

The CIP class are included in the CIP specification of ODVA. They describe the properties (band 1) of ETHERNET and CAN independent of their physical interface. The physical interface is described in a separate specification. For DeviceNet, this is band 3, which describes the adaptation of DeviceNet to CIP.

The classes in the following table are described in more detail in subsequent sections. The description of WAGO-specific classes begins in Section WAGO-Specific Classes.

Table 33: CIP classes

Class	Name
01 _{hex}	Identity Object
02 _{hex}	Message Router Object
03 _{hex}	DeviceNet Object
04 _{hex}	Assembly Object
05 _{hex}	Connection Object
2B _{hex}	Acknowledge Handler Object

Table 34: Explanation of table headers

Column Header	Description
Attribute ID	Integer value which is assigned to the respective attribute
NV	NV (non-volatile): The attribute is permanently saved in the fieldbus coupler. V (volatile): The attribute is not permanently saved in the fieldbus coupler.
Name	Identification of the attribute.
Data type	Identification of the CIP data type of the attribute.
Description	Brief description of the attribute.
Default Value	Factory setting
Access	Set: The attribute can be accessed using the Set_Attribute service (writing/modifying the attribute value). Note: If an attribute supports the Set_Attribute service, it can also be accessed with the Get_Attribute service. Get: The attribute can be accessed using the Get_Attribute services (reading the attribute value). Get_Attribute_All: Delivers the content of all attributes. Set_Attribute_Single: Modifies an attribute value. Reset: Performs a restart. 0: Emulates a restart. 1: Emulates a restart and restores the default settings.

8.6.1 Identity Object (01_{hex})

The identity class provides general information about the fieldbus coupler that clearly identifies it.

Class Attributes

Table 35: "Identity Object" class: class attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max instance	UINT	Maximum instance	1 (0x0001)

Instance Attribute 1

Table 36: "Identity Object" class: instance attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Vendor ID	UINT	Manufacturer identification	40 (0x0028)
2	Get	Device type	UINT	General type designation of fieldbus coupler	12 (0x000C)
3	Get	Product code	UINT	Identification of fieldbus coupler	1401 (0x0515)
4	Get	Revision	STRUCT of:	Version of identity object	Firmware dependent
		Major revision	USINT		
		Minor revision	USINT		
5	Get	Status	WORD	See *	Dependent on current status
6	Get	Serial number	UDINT	Serial number	-
7	Get	Product name	SHORT_String	Product name	WAGO FC DEVICENET 8DI 24VDC
10	Get/Set	Heartbeat interval	USINT	Cyclical heartbeat message	0

*

- Bit 0:** Assignment to a master;
Bit 1: =0 (reserved);
Bit 2: Configured: (= 0: configuration is unchanged; =1: configuration differs from manufacturer's parameters);
Bit 3: =0 (reserved);
Bit 4-7: Extended Device Status: (= 0010: at least one faulty I/O connection, = 0011: no I/O connection established);
Bit 8-11: unused;
Bit 12-15: =0 (reserved)

Overview of Services

Table 37: "Identity Object" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
05hex	No	Yes	Reset	Carries out the reset service. Service parameter: 0: Emulates a restart 1: Emulates a restart and restores the default settings
0E hex	No	Yes	Get_Attribute_Single	Delivers content of respective attribute

8.6.2 Message Router Object (02_{hex})

The “message router object” provides connection points (in the form of classes or instances) which can use a client for addressing services (reading, writing). These messages can be transmitted both when connected and when unconnected from the client to the fieldbus coupler.

No attributes or services are available.

8.6.3 DeviceNet Object (03_{hex})

The DeviceNet class is used to describe the physical interface and its status.

Class Attributes

Table 38: “DeviceNet Object” class: class attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	2 (0x0002)

Instance Attribute 1

Table 39: “DeviceNet Object” class: instance attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get/Set	MAC ID	USINT	Node address	63
2	Get/Set	Baud rate	USINT	Baud rate	0
3	Get/Set	BOI	BOOL	<i>Bus-Off</i> Interrupt 0: Keep CAN in <i>Bus-Off</i> mode 1: Restart the CAN chip	1
4	Get/Set	Bus-Off Counter	USINT	Number of times CAN is switched to <i>Bus-Off</i> mode	Dependent on current status
5	Get	Allocation Information	Struct of		
		Allocation Choice Byte	BYTE	Selection in allocation byte Bit 0: Explicit messages Bit 1: “Polled” Bit 2: “Bit Strobed” Bit 3: “Multicast Polling” Bit 4: “Change Of State” Bit 5: “Cyclic” Bit 6: “Acknowledge Suppression” Bit 7: Reserved	Dependent on current status of connections

Table 39: “DeviceNet Object” class: instance attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
		Master's MAC ID	USINT	MAC ID of master	Dependent on current MAC ID of master
6	Get	MAC ID Switch Changed	BOOL	Node address on DIP switch has been changed since start-up 0: No change 1: Change since last start-up	Dependent on current DIP switch setting
7	Get	Baud Rate Switch Changed	BOOL	Baud rate on DIP switch has been changed since start-up 0: No change 1: Change since last start-up	Dependent on current DIP switch setting
8	Get	MAC ID Switch Value	USINT	Current node address of DIP switch	Dependent on current DIP switch setting
9	Get	Baud Rate Switch Value	USINT	Current baud rate of DIP switch	Dependent on current DIP switch setting
12	Get	Diagnostic Counters	Struct of	List of diagnostic counters	
		Diagnostic Counters Descriptor	WORD	Designation of implemented diagnostic counter. For more information, see section “Diagnostic counter”.	0x07FC
		Arbitration Loss Count	UINT	Per CAN specification	0x0000
		Overload Count	UINT	Per CAN specification	0x0000
		Bit Error Count	UINT	Per CAN specification	0x0000
		Stuff Error Count	UINT	Per CAN specification	0x0000
		Ack Error Count	UINT	Per CAN specification	0x0000
		Form Error Count	UINT	Per CAN specification	0x0000
		CRC Error Count	UINT	Per CAN specification	0x0000
		Rx Message Loss Count	UINT	Loss of a received telegram	0x0000
		Warning Error Count	UINT	Per CAN specification	0x0000
		Rx Error Counter	UINT	Counter of erroneously received telegrams	0x0000

Table 39: “DeviceNet Object” class: instance attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
		Tx Error Counter	UINT	Counter of erroneously sent telegrams	0x0000
			UINT [5]	Reserved	0x0000

Overview of Services

Table 40: “DeviceNet Object” class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	No	Yes	Get_Attribute_Single	Delivers content of respective attribute
10hex	No	Yes	Set_Attribute_Single	Modifies an attribute value
4B hex	No	Yes	Allocate_Master/Slave_Connection	Allocation of the defined master/slave connection types
4C hex	No	Yes	Release_Group_2_Identifier_Set	Release of the defined master/slave connection types

8.6.4 Assembly Object (04_{hex})

By means of the assembly classes, even several diverse objects can be combined. These could be, for example, input and output data, status and control information or diagnostic information. WAGO uses the manufacturer-specific instances in order to provide these objects for you in various arrangements. This gives you an efficient way to exchange process data. The following is a description of the individual instances with their contents and arrangements.

Class Attributes

Table 41 "Assembly Object" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	2 (0x0002)
2	Get	Max Instance	UINT	Highest instance	113 (0x0071)

Instance Attributes 101 (65 hex)

This assembly instance contains analog and digital output data.

Table 42: "Assembly Object" class: instance attributes 101 (65 hex)

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get/Set	Data	ARRAY of BYTE	Only analog and digital output data are contained in the process image	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	-

Instance Attributes 102 (66 hex)

This assembly instance contains digital output data only.

Table 43: “Assembly Object” class: instance attributes 102 (66 hex)

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get/Set	Data	ARRAY of BYTE	Only digital output data is contained in the process image	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	-

Instance Attributes 103 (67 hex)

This assembly instance contains analog output data only.

Table 44: “Assembly Object” class: instance attributes 103 (67 hex)

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get/Set	Data	ARRAY of BYTE	Only analog output data is contained in the process image	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	-

Instance Attributes 104 (68 hex)

This assembly instance contains analog and digital input data and the status only.

Table 45: “Assembly Object” class: instance attributes 104 (68 hex)

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get	Data	ARRAY of BYTE	Only analog and digital input data and the status are contained in the process image.	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	-

Instance Attributes 105 (69 hex)

This assembly instance contains digital input data and the status only.

Table 46: “Assembly Object” class: instance attributes 105 (69 hex)

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get	Data	ARRAY of BYTE	Only digital input data and the status are contained in the process image	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	-

Instance Attributes 106 (6A_{hex})

This assembly instance contains analog input data and the status only.

Table 47: “Assembly Object” class: instance attributes 106 (6A_{hex})

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get	Data	ARRAY of BYTE	Only analog input data and the status are contained in the process image	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	-

Instance Attributes 107 (6B_{hex})

This assembly instance contains analog and digital input data.

Table 48: “Assembly Object” class: instance attributes 107 (6B_{hex})

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get	Data	ARRAY of BYTE	Only analog and digital input data are contained in the process image	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	-

Instance Attributes 108 (6C_{hex})

This assembly instance contains digital input data.

Table 49: “Assembly Object” class: instance attributes 108 (6C_{hex})

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get	Data	ARRAY of BYTE	Only digital input data is contained in the process image	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	-

Instance Attributes 109 (6D_{hex})

This assembly instance contains analog input data.

Table 50: “Assembly Object” class: instance attributes 109 (6D_{hex})

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get	Data	ARRAY of BYTE	Only analog input data is contained in the process image	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	-

Instance Attributes 112 (70_{hex})

This assembly instance contains analog and digital input data, current errors, the status and the diagnosis.

Table 51: “Assembly Object” class: instance attributes 112 (70_{hex})

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get	Data	ARRAY of BYTE	Only analog and digital input data, current errors, the status and the diagnosis are contained in the process image.	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	-

Instance Attributes 113 (71_{hex})

This assembly instance contains analog and digital output data, 4 reserved bytes^{*}, the status and the diagnostic confirmation.

Table 52: "Assembly Object" class: instance attributes 113 (71_{hex})

Attribute ID	Access	Name	Data Type	Description	Default Value
3	Get/Set	Data	ARRAY of BYTE	Only analog and digital output data, 4 reserved bytes [*] , the status and the diagnostic confirmation are contained in the process image.	-
4	Get	Data Size	ARRAY of BYTE	Number of bytes in process image	

^{*} These reserved bytes merely assist in providing the identical data width of the status and diagnostic information as the assembly instance 112: 1 byte status + 3 byte error.

Overview of Services

Table 53: "Assembly Object" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute.
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value.

The software inspects the writing of attribute 3 of assembly instances 101 through 103 ... 113. If the limit value has been exceeded, it is identified and, if necessary, corrected. However, a write request is not rejected. This means that if less data is received than expected, only this data is written. If more data is received than expected, the received data at the upper limit is deleted. In the case of explicit messages, however, a defined CIP is generated even though the data has been written

8.6.5 Connection Object (05_{hex})

The connection class manages the internal resources for the explicit messages and the I/O messages. For each connection mentioned, a separate instance is created that describes the respective connection.

Instance 0

Table 54: "Connection Object" class: class attribute

Attribute ID	Utilization in FC	Access	Name	Data Type	Description	Default Value
1	Needed	Get	Revision	UINT	Object version	0x0001

Table 55: Description of instances

Instance ID	Description
1	Describes the explicit messaging connection
2	Describes the poll I/O connection
3	Describes the bit-strobe I/O connection
4	Describes the change of state or cyclic I/O connection

Instance 1 (Explicit Messaging)

Table 56: "Connection Object" class: class attribute

Attribute ID	Utilization in FC	Access	Name	Data Type	Description
1	Available	Get	State	USINT	Connection status
2	Needed	Get	Instance_type	USINT	Connection type: 0: "Explicit Messaging" 1: "I/O" 2: "CIP Bridged"
3	Needed	Get	TransportClass_trigger	USINT	Defines the connection response
4	Needed	Get	Produced_connection_id	UINT	Send CAN Identifier
5	Needed	Get	Consumed_connection_id	UINT	Receive CAN Identifier
6	Needed	Get	Initial_comm_characteristics	USINT	Defines the message group for this connection
7	Needed	Get	Produced_connection_size	UINT	Number of bytes sent via this connection
8	Needed	Get	Consumed_connection_size	UINT	Number of bytes received via this connection
9	Needed	Get/Set	Expected_packet_rate	UINT	Defines the time response of the connection
10-11	N/A	Get	N/A	N/A	Not used

Table 56: "Connection Object" class: class attribute

Attribute ID	Utilization in FC	Access	Name	Data Type	Description
12	Needed	Get/Set	Watchdog_timeout_action	USINT	Action when inactivity/watchdog timer is exceeded 1: Delete connection 3: Delayed connection deletion
13	Needed	Get	Produced_connection_path_length	UINT	Number of bytes in "produced_connection_path" attribute
14	Needed	Get	Produced_connection_path	Array of USINT	Describes the object that is sent
15	Needed	Get	Consumed_connection_path_length	UINT	Number of bytes in "consumed_connection_path" attribute
16	Needed	Get	Consumed_connection_path	Array of USINT	Describes the object that is received
17	Needed	Get	Production_inhibit_time	UINT	Defines the minimum amount of time between two data transfers

Instance 2 (Poll I/O Connection)

Table 57: "Connection Object" class: class attribute

Attribute ID	Utilization in FC	Access	Name	Data Type	Description
1	Available	Get	State	USINT	Connection status
2	Needed	Get	Instance_type	USINT	Connection type: 0: "Explicit Messaging" 1: "I/O" 2: "CIP Bridged"
3	Needed	Get	TransportClass_trigger	USINT	Defines the connection response
4	Needed	Get	Produced_connection_id	UINT	Send CAN Identifier
5	Needed	Get	Consumed_connection_id	UINT	Receive CAN Identifier
6	Needed	Get	Initial_comm_characteristics	USINT	Defines the message group for this connection
7	Needed	Get	Produced_connection_size	UINT	Number of bytes sent via this connection
8	Needed	Get	Consumed_connection_size	UINT	Number of bytes received via this connection
9	Needed	Get/Set	Expected_packet_rate	UINT	Defines the time response of the connection
10-11	N/A	Get	N/A	N/A	Not used

Table 57: "Connection Object" class: class attribute

Attribute ID	Utilization in FC	Access	Name	Data Type	Description
12	Needed	Get/Set	Watchdog_timeout_action	USINT	Action when inactivity/watchdog timer is exceeded 0: Connection has exceeded time limit 1: Delete connection 2: Restart timer
13	Needed	Get	Produced_connection_path_length	UINT	Number of bytes in "produced_connection_path" attribute
14	Needed	Get/Set	Produced_connection_path	Array of USINT	Describes the object that is sent
15	Needed	Get	Consumed_connection_path_length	UINT	Number of bytes in "consumed_connection_path" attribute
16	Needed	Get/Set	Consumed_connection_path	Array of USINT	Describes the object that is received
17	Needed	Get/Set	Production_inhibit_time	UINT	Defines the minimum amount of time between two data transfers

Instance 3 (Bit-Strobe I/O Connection)

Table 58: "Connection Object" class: class attribute

Attribute ID	Utilization in FC	Access	Name	Data Type	Description
1	Available	Get	State	USINT	Connection status
2	Needed	Get	Instance_type	USINT	Connection type: 0: "Explicit Messaging" 1: "I/O" 2: "CIP Bridged"
3	Needed	Get	TransportClass_trigger	USINT	Defines the connection response
4	Needed	Get	Produced_connection_id	UINT	Send CAN Identifier
5	Needed	Get	Consumed_connection_id	UINT	Receive CAN Identifier
6	Needed	Get	Initial_comm_characteristics	USINT	Defines the message group for this connection
7	Needed	Get	Produced_connection_size	UINT	Number of bytes sent via this connection
8	Needed	Get	Consumed_connection_size	UINT	Number of bytes received via this connection
9	Needed	Get/Set	Expected_packet_rate	UINT	Defines the time response of the connection
10-11	N/A	Get	N/A	N/A	Not used
12	Needed	Get/Set	Watchdog_timeout_action	USINT	Action when inactivity/watchdog timer is exceeded 0: Connection has exceeded time limit 1: Delete connection 2: Restart timer
13	Needed	Get	produced_connection_path_length	UINT	Number of bytes in "produced_connection_path" attribute
14	Needed	Get/Set	produced_connection_path	Array of USINT	Describes the object that is sent
15	Needed	Get	consumed_connection_path_length	UINT	Number of bytes in "consumed_connection_path" attribute
16	Needed	Get/Set	consumed_connection_path	Array of USINT	Describes the object that is received
17	Needed	Get/Set	production_inhibit_time	UINT	Defines the minimum amount of time between two data transfers

Instance 4 (Change of State and Cyclic I/O Connection)

Table 59: "Connection Object" class: class attribute

Attribute ID	Utilization in FC	Access	Name	Data Type	Description
1	Available	Get	State	USINT	Connection status
2	Needed	Get	Instance_type	USINT	Connection type: 0: "Explicit Messaging" 1: "I/O" 2: "CIP Bridged"
3	Needed	Get	TransportClass_trigger	USINT	Defines the connection response
4	Needed	Get	Produced_connection_id	UINT	Send CAN Identifier
5	Needed	Get	Consumed_connection_id	UINT	Receive CAN Identifier
6	Needed	Get	Initial_comm_characteristics	USINT	Defines the message group for this connection
7	Needed	Get	Produced_connection_size	UINT	Number of bytes sent via this connection
8	Needed	Get	Consumed_connection_size	UINT	Number of bytes received via this connection
9	Needed	Get/Set	Expected_packet_rate	UINT	Defines the time response of the connection
10-11	N/A	Get	N/A	N/A	Not used
12	Needed	Get/Set	Watchdog_timeout_action	USINT	Action when inactivity/watchdog timer is exceeded 0: Connection has exceeded time limit 1: Delete connection 2: Restart timer
13	Needed	Get	Produced_connection_path_length	UINT	Number of bytes in "produced_connection_path" attribute
14	Needed	Get/Set	Produced_connection_path	Array of USINT	Describes the object that is sent
15	Needed	Get	Consumed_connection_path_length	UINT	Number of bytes in "consumed_connection_path" attribute
16	Needed	Get/Set	Consumed_connection_path	Array of USINT	Describes the object that is received
17	Needed	Get/Set	Production_inhibit_time	UINT	Defines the minimum amount of time between two data transfers

Overview of Services

Table 60: "Connection Object" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0x0E	Yes	Yes	Get_Attribute_Single	Returns the content of a special attribute.
0x10	No	Yes	Set_Attribute_Single	Modifies content of a special attribute.

The instances are unavailable when the connection is in "non-existent" mode.

8.6.6 Acknowledge Handler Object (2B hex)

The "message router object" provides connection points (in the form of classes or instances) which can use a client for addressing services (reading, writing). These messages can be transmitted both when connected and when unconnected from the client to the fieldbus coupler.

Class Attributes

Table 61: "Acknowledge Handler Object" class: class attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max. instance	UINT	Maximum number of instances	1 (0x0001)

Instance Attribute 1

Table 62: "Acknowledge Handler Object" class: instance attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get/Set	Acknowledge timer	UINT	Wait time to acknowledgement	20 ms (0x0014)
2	Get/Set	Retry limit	USINT	Number of acknowledge timeouts that must pass before the application is informed.	1 (0x01)
3	Get	COS Producing connection Instance	UINT	Connection object instance that is notified by the acknowledge handler	4 (0x0004)
4	Get	Ack List Size	BYTE	Maximum number of elements in the list	1
5	Get	Ack List	BYTE Array of UINT	List of active connection objects that receive the acknowledgement	1 0x0004
6	Get	Data with Ack Path List Size	BYTE	Maximum number of elements in attribute 7	1

Table 62: "Acknowledge Handler Object" class: instance attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
7	Get	Data with Ack Path List	BYTE Array of UINT USINT Padded EPATH	List of connection object instances to which the acknowledgement data is transferred.	1 0x0004 0x06 0x20 0x04 0x24 0x01 0x30 0x03

Overview of Services

Table 63: "Acknowledge Handler Object" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

8.7 WAGO-Specific Classes

This manufacturer-specific addition contains information on the 767 Series components that is not contained in the CIP classes. The WAGO-specific classes are listed in the appendix.

Table 64: WAGO-specific classes

Name	Class	Information
Coupler configuration Object	64 _{hex}	For more information, refer to the relevant sections.
Node information class	82 _{hex}	
Discrete Input Point	65 _{hex}	
Discrete Input Point Extended 1	69 _{hex}	
Discrete Input Point Extended 2	6D _{hex}	
Discrete Input Point Extended 3	71 _{hex}	
Discrete Output Point	66 _{hex}	
Discrete Output Point Extended 1	6A _{hex}	
Discrete Output Point Extended 2	6E _{hex}	
Discrete Output Point Extended 3	72 _{hex}	
Analog Input Point	67 _{hex}	
Analog Input Point Extended 1	6B _{hex}	
Analog Input Point Extended 2	6F _{hex}	
Analog Input Point Extended 3	73 _{hex}	
Analog Output Point	68 _{hex}	
Analog Output Point Extended 1	6C _{hex}	
Analog Output Point Extended 2	70 _{hex}	
Analog Output Point Extended 3	74 _{hex}	
IOM Input Point Class	83 _{hex}	
IOM Output Point Class	84 _{hex}	

9 Diagnostics

9.1 LED Signaling

For the local diagnostic, the fieldbus coupler contains various LEDs that display the operating state of both the fieldbus coupler and the S-BUS. This information can also be displayed with WAGOframe. For more information, see section “Readout of Blink Codes using WAGO DTMs”.

9.2 DeviceNet Status Messages via LED Signals

The following table lists the DeviceNet status messages that are signaled by the LEDs (21) on the fieldbus coupler. Information regarding remedies of certain causes is also provided.

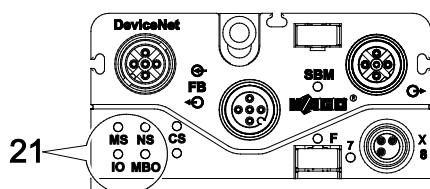


Figure 26: LEDs which display status messages

Table 65: DeviceNet status messages

LED	Color	Cause	Remedy/information
MS	Off	The fieldbus coupler is not connected to the power supply.	Connect the fieldbus coupler to the power supply.
	Red, blinking	A minor error is present.	One or more diagnoses are present. Remove the cause of the diagnosis.
	Red	An error is present that cannot be repaired.	The fieldbus coupler must be replaced. Contact WAGO support.
	Green, flashing	The fieldbus coupler is working properly. However, errors are present upon receipt of I/O data.	The master has sent too much I/O data or, in the case of a COS/cyclic connection, it has not sent an acknowledgement. The flashing stops when all messages are read via the fieldbus.
	Green	The fieldbus coupler is working smoothly.	-
NS	Off	The fieldbus coupler is not connected to the power supply or is not in the <i>online</i> state.	Connect the fieldbus coupler to the power supply and to the DeviceNet cable.
	Red, flashing	Error in I/O connection	Timeout during data connection.
	Red	Critical error. The fieldbus coupler is in the <i>offline</i> state.	The fieldbus coupler has been disconnected from the DeviceNet network. The following may be causes: double MAC ID, Bus-Off in CAN Chip or an internal error.

Table 65: DeviceNet status messages

LED	Color	Cause	Remedy/information
	Green, flashing	The fieldbus coupler is in the <i>online</i> state but is not connected to the master.	The fieldbus coupler is working properly but has not established a data connection with the master/scanner.
	Green	The fieldbus coupler is in the <i>online</i> state.	The fieldbus coupler is working properly and has established at least one data connection with another DeviceNet node.
IO	Off	The fieldbus coupler is not connected to the power supply or is in the initialization phase.	Connect the DeviceNet cable to the fieldbus coupler. Connect the power supply via the DeviceNet cable.
	Green, flashing	The S-BUS is working properly, but the fieldbus coupler is not receiving I/O data from another DeviceNet node.	Establish a data connection with the master/scanner (PC or PLC) so that the I/O modules can receive data from the master/scanner.
	Red, flashing	S-BUS error	The I/O modules are not receiving data from the master/scanner via the fieldbus coupler. Check the S-BUS connections between the fieldbus coupler and the I/O modules.
		Timeout of I/O data connection	The I/O modules are not receiving data from the master/scanner. Check the DeviceNet cable and the settings in the master/scanner.
		Idle data from the master/scanner	The master has sent an I/O data telegram with no data content. Check the settings in the master/scanner.
	Green	I/O modules send and receive data from the fieldbus coupler.	-
MBO	Off	The MAC ID and the baud rate are consistent with the stored MAC ID and baud rate.	-
	Orange	The MAC ID and/or baud rate are not consistent with the stored MAC ID and/or baud rate.	The MAC ID or the baud rate has been overwritten by the other values.

9.3 Operational Messages of the Fieldbus Coupler

The following table lists the operational messages that are signaled via LEDs. Information regarding remedies of certain causes is also provided.

Note



Disable diagnoses

Use the diagnostic overview (see section “Parameterizing” > “Diagnostic Overview and Parameters of Inputs”) to disable specific diagnostics (see F-LED). In this case, the LED is disabled (off).

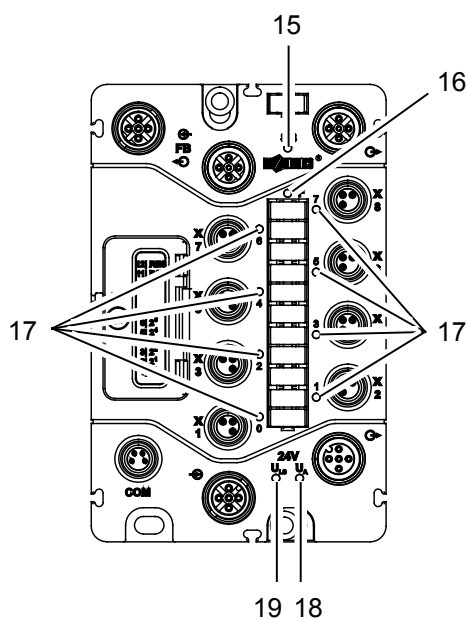


Figure 26: LEDs which display operational messages

Table 66: Operational messages of the fieldbus coupler

Pos.	LED	Color	Cause	Correction
15	SBM	Green flashing	S-BUS is being started.	-
		Green	S-BUS is functioning without problems.	-
		Red	Disruption on the S-BUS.	Check whether all components are connected to the S-BUS. Also check the S-BUS connection and S-BUS cable
16	F	Red	Group error. At least one diagnostic message is available on the digital inputs.	Check the power supply of the connected sensors.
17	I/O	Yellow	Input signal pending	-
18	U _A	Green	Actuator supply is present.	-
		OFF	Actuator supply is not present.	Connect the power supply and check the voltage level, if applicable.
19	U _{LS}	Green	Logic supply and sensor supply are present.	-
		OFF	Logic supply and sensor supply are not present.	Connect the power supply and check the voltage level, if applicable.

9.4 Error Messages from the Fieldbus Coupler via LED Signals

Error messages or warnings from the fieldbus coupler are displayed in WAGOframe. They are also displayed via the CS LED (21) as a blink code.

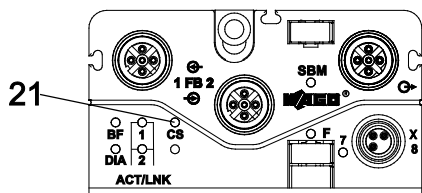


Figure 27: Indicator of blink codes via CS LED

An error is always displayed as **three blinking sequences** in a cyclic manner:

1. The first blinking sequence indicates the **group number**.
The starting point in identifying the error is the group number, from which the error groups can be determined. The number of blink pulses indicates the specific error group.
Example:
Group number 1: Group of S-BUS errors.
2. After a short pause, the second blinking sequence appears and indicates the **error code**. The number of blink pulses indicates the specific error code that describes the type of error.
Example:
Error code 5: S-BUS terminator not attached to last I/O module.
3. After another pause, the third blinking sequence appears and indicates the error argument. The number of blink pulses indicates the **error argument**, which provides supplemental descriptions of the error; for example, on which of the 767 components an error is present.
Example:
Entry 0 ... 63: In which of the connected I/O modules this error has arisen.
For example, if “5” is indicated in the blink code, the error arose in the fifth I/O module (the “0” denotes the digital inputs of the fieldbus coupler)

The group number, error code and error argument are displayed as blink codes that are to be converted into numbers. The blink code can display numbers with single, double or triple digits. A zero is always expressed in four cycles of 20 Hz; zeroes preceding a digit(s) are ignored.

9.4.1 Progression of Blink Sequence

The following table outlines the progression of the blink codes over time. If there is no number in the second position (“1” in the number “10”) or third position (“1” in the number “100”) for the group number, error code or error argument, the subsequent pause does not take place; instead, the next sequence is initiated (designated in ***bold and cursive*** font in the following table).

Table 67: Overview of the blink codes

Description	Frequency	Additional explanations
Start sequence blinks	10 cycles with 12.5 Hz each (12.5 times per second)	Initiation of start phase
Pause	1 s	
Group number		
Group number (third (100) position)	Repeats: 0.5 s on and 0.5 s off	Repeats according to group number
Pause	2 s	-
Group number (second (10) position)	Repeats: 0.5 s on and 0.5 s off	Repeats according to group number
Pause	2 s	-
Group number (first (1) position)	Repeats: 0.5 s on and 0.5 s off	Repeats according to group number
<i>Pause</i>	<i>2 s</i>	-
<i>Blinks</i>	<i>40 ms</i>	Initiation of error code
<i>Pause</i>	<i>2 s</i>	
Error code		
Error code (third (100) position)	Repeats: 0.5 s on and 0.5 s off	Repeats according to error code
Pause	2 s	-
Error code (second (10) position)	Repeats: 0.5 s on and 0.5 s off	Repeats according to error code
Pause	2 s	-
Error code (first (1) position)	Repeats: 0.5 s on and 0.5 s off	Repeats according to error code
<i>Pause</i>	<i>2 s</i>	-
<i>Blinks</i>	<i>40 ms</i>	Initiation of error argument
<i>Pause</i>	<i>2 s</i>	
Error argument		
Error argument (third (100) position)	Repeats: 0.5 s on and 0.5 s off	Repeats according to error argument
Pause	2 s	-
Error argument (second (10) position)	Repeats: 0.5 s on and 0.5 s off	Repeats according to error argument
Pause	2 s	-
Error argument (first (1) position)	Repeats: 0.5 s on and 0.5 s off	Repeats according to error argument
Pause	4 s	-
Progression restarts when start sequence blinks		

9.4.2 Example of an Error Message via Blink Code

The following example clarifies an error message as indicated by the blink code. An S-BUS error is displayed when the software update for the sixth I/O module fails.

Initialization:

1. The CS LED begins with the initiation of the start phase: quick flashing of about 1 s
2. A one-second pause occurs.

Group number 1: S-BUS error

3. The CS LED blinks once for the first digit: 0.5 s on and off.
4. The initiation of the error code follows with a pause of two seconds, 40ms of blinking and another pause of two seconds.

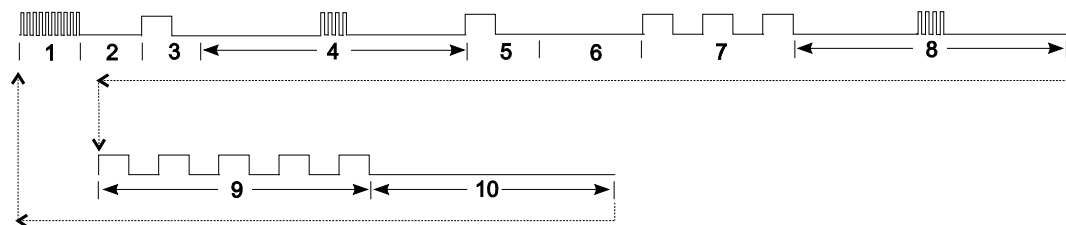
Error code 13: software update for I/O module failed

5. The CS LED blinks once for the first digit.
6. A two-second pause occurs.
7. The CS LED blinks 3 times for the second digit.
8. The initiation of the error argument follows with a pause of two seconds, 40ms of blinking and another pause of two seconds.

Error argument 5: I/O module in the sixth slot

9. The CS LED blinks 5 times for the first digit.
10. A four-second pause occurs.

The blink code starts when the start phase is initiated. This process is repeated if only one error is present; if more are present, the next pending error is processed.



9.4.3 Meaning of the Blink Codes and Procedures for Correcting Them

In this section, all errors and warnings are listed that are given by the CS LED and BUS LED.

The errors and warnings are divided into the following error groups:

Table 68: List of error groups

Group Number	Description	Indicator
1	S-BUS error	CS LED
2	S-BUS warning	
3	-	
4	-	
5	General internal hardware errors	
6	General internal hardware warnings	
7	General software errors	
8	General software warnings	
9	-	
10	-	
11	Fieldbus-specific software errors	
12	Fieldbus-specific software warnings	
13	Firmware loader error	
14	Error with firmware download	

If the subsequent errors and warnings are not corrected with the indicated measures, please contact the WAGO AUTOMATION Support. Be ready to give them the blink code that is displayed.

Phone: +49 571 887 555
 Fax: +49 571 887 8555
 E-mail: support@wago.com

Table 69: Group Number 1: S-BUS Error

Error code	Error argument	Cause	Correction
1	0 ... 64	Error during S-BUS initialization.	Check the cable for damage. Perform a restart by disconnecting the power supply and then reconnecting it.
2			
3			
4			
5	0 ... 64	Error during S-BUS initialization. The last I/O module could not be initialized.	Check the cables to and from the last I/O module. Make sure that the S-BUS terminator is plugged into the last I/O module or are not connected to the fieldbus coupler as 64 I/O modules.
6		Error when starting S-BUS. An S-BUS disruption exists on the I/O module that is located in front of the I/O module indicated by the error argument.	
7	0 ... 64	The "Restart" function (see "S-BUS-Master" in section "Parameterization") is deactivated; a short disruption occurred on the S-BUS. This could not be localized since the disruption on the S-BUS no longer existed during investigation of the disruption point.	Check the cable for damage. Perform a restart by disconnecting the power supply and then reconnecting it.
8			
9			
10			
11	1	A disruption in the S-BUS has arisen.	Check whether the S-BUS cable is connected properly. Check the S-BUS cable for damages.
12	1	Switching to software update mode is not possible.	Perform a restart by disconnecting the power supply and then reconnecting it.
13	0 ... 64	Software update for I/O module failed.	
14	1	Authentication failed.	Perform a restart by disconnecting the power supply and then reconnecting it.
	2		

Table 69: Group Number 1: S-BUS Error

Error code	Error argument	Cause	Correction
15	0 ... 64	Current software is defective. S-BUS operation only possible in recovery mode to load new software.	Perform a firmware update of the I/O modules.
16	1	Error when starting the S-BUS.	
	2		
	3	Error when stopping the S-BUS	
17	0	Error at the digital inputs of the fieldbus coupler	Perform a restart by disconnecting the power supply and then reconnecting it.
18	0 ... 64	Communication test with an I/O module failed. The physical address of this module is indicated by the error argument.	
19	0	Error when initializing the S-BUS	Perform a restart by disconnecting the power supply and then reconnecting it. If you cannot eliminate the error, please contact WAGO support.
...	255		
23			
24			
25	0 ... 64	The parameters of an I/O module are invalid.	Retry the IOM update via WAGOframe.
26		The physical address of this module is indicated by the error argument.	

Table 70: Group Number 2: S-BUS Warnings

Error code	Error argument	Cause	Correction
1	1	Cycle time of S-BUS cannot be applied.	Specify a higher cycle time.
2	1	Restart of S-BUS was performed.	-
	2	Communication on the S-BUS was stopped.	-
	3	Error reaction of S-BUS was activated.	-
3	0	Invalid OPH configuration	Check the maximum configuration definition, the configuration level definition and the physical node configuration.
4	255	Firmware update of I/O module	The modules switch to the mode for updating the firmware. In this mode, no process data is exchanged.
5	0 ... 255	User settings for sensor-/actor delay are invalid.	Change user settings for sensor-/actor delay.

Table 71: Group Number 5: General Internal Hardware Errors

Error code	Error argument	Cause	Correction
1	1	Error when accessing flash memory.	Perform a restart by disconnecting the power supply and then reconnecting it.
	2		
	7	Error when initializing the USB stack.	
2	1	EEPROM error	Contact WAGO support.
	2		
	3	Real-time clock (RTC) is defective.	
	4		
3	1	RAM error	
	2		
	3		
4	1	Error in internal coprocessor.	Perform a restart by disconnecting the power supply and then reconnecting it. If you cannot eliminate the error, please contact WAGO support.
	2		
	3		
	4		
5	1		
	2		
	3		
	4		
6	1	Combination of hardware and software not allowed.	Perform a firmware update on the fieldbus coupler
	9	EEPROM error	Perform a restart by disconnecting the power supply and then reconnecting it.
7	255	Internal fault	These blink codes assist the support team in further error investigation. Please be ready to give them the group number, error code and error argument.
...			
18			

Table 72: Group Number 6: General Internal Hardware Warnings

Error code	Error argument	Cause	Correction
1	1	Fieldbus coupler has not been connected to power supply for six days (back-up capacitor of RTC empty).	Set the real-time clock via WAGOframe.

Table 73: Group Number 7: General Software Errors

Error Code	Error Argument	Cause	Correction
1	0 – 254	Internal fault	Perform a restart by disconnecting the power supply and then reconnecting it. If you cannot eliminate the error, please contact WAGO support.
2	1 – 7		
3	1 – 5		
4	1		
6	1 – 10		
7	1		
8	1 – 31		
9	1	Internal fault	Perform a restart by disconnecting the power supply and then reconnecting it. If you cannot eliminate the error, please contact WAGO support.
	2		
	3		
	4		
	5		
	10	Error in the parameter database of the fieldbus coupler.	Select the checkbox “Create nominal system configuration” in the SPH-DTM to save the current parameters of the I/O modules again to the file system of the fieldbus coupler (parameter database is created). If you cannot eliminate the error, please contact WAGO support.
	11	Parameter database version is not supported.	
	12	The number of I/O modules does not match the number entered in the parameter database (I/O module removed or added).	
	13	Error in the parameter database of the fieldbus coupler.	
	14	Internal fault	Perform a restart by disconnecting the power supply and then reconnecting it. If you cannot eliminate the error, please contact WAGO support.
	15		
	16		
	20	Order number(s) for I/O module(s) differ(s) from that saved in the parameter database (e.g., 767-6401 instead of 767-6402).	Replace the I/O module by the I/O module with the correct order number. The “Bus address of the first faulty component” parameter appears in the SPH-DTM. This shows you the I/O module to be replaced (e. g., “Bus address 3” refers to the 3rd I/O module on the fieldbus coupler).
9	21	The firmware release index from I/O module(s) does not match that saved in the parameter database. (Only occurs when the “FW/HW Release Index Check I/O Module” checkbox is enabled in the SPH.)	Update the firmware of the I/O module affected.

Table 73: Group Number 7: General Software Errors

Error Code	Error Argument	Cause	Correction
	22	The hardware release index from I/O module(s) does not match that saved in the parameter database. (Only occurs when the “FW/HW Release Index Check I/O Module” checkbox is enabled in the SPH.)	Update the parameter database in the fieldbus coupler for the I/O module affected. Enter the position of the respective I/O module in the “Bus address of I/O modul to update” parameter.
	23	Internal fault	Perform a restart by disconnecting the power supply and then reconnecting it. If you are unable to correct the problem using the aforementioned measures, contact WAGO Support.
	24		
	25	The saved parameters cannot be transferred to the I/O module because: - There is an incompatible firmware version (after creating the parameter database, one or more modules that have an incompatible firmware version as opposed to the original(s) were switched from a 767 node. or - A communication error has occurred.	Perform a restart by disconnecting the power supply and then reconnecting it. If this does not correct the error, update the firmware of the I/O module affected. If you are unable to correct the problem using the aforementioned measures, contact WAGO Support.
	30	Error in the parameter database of the fieldbus coupler.	Select the checkbox “Create nominal system configuration” in the SPH-DTM to save the current parameters of the I/O modules again to the file system of the fieldbus coupler (parameter database is created). If the problem persists, contact WAGO support.
	31	Internal fault	Perform a restart by disconnecting the power supply and then reconnecting it. If you cannot eliminate the error, please contact WAGO support.
	32		
	33		
	34		
	40		

Table 73: Group Number 7: General Software Errors

Error Code	Error Argument	Cause	Correction
10	1 – 9	Internal fault	These blink codes assist the support team in further error investigation. Please be ready to give them the group number, error code and error argument.
11	1		
12	1	The construction of the 767-station has changed. It 767 components were removed or added.	Perform a restart by disconnecting the power supply and then reconnecting it

Table 74: Group number 8: general software warnings

Error Code	Error Argument	Cause	Correction
2	2	Automatic parameterization of the I/O modules is not permitted.	Select the “Do not overwrite I/O module parameters” checkbox in the SPH. Disable this option if you want to allow automatic parameterization for all I/O modules or to update the parameter database.

Table 75: Group Number 9: Specific Hardware Errors

Error code	Error argument	Cause	Correction
The blink codes for the general software warnings assist the WAGO support team in further error investigation. Please be ready to give them the group number, error code and error argument.			

Table 76: Group Number 11: Fieldbus-specific Software Error

Error code	Error argument	Cause	Correction
1	1	Invalid MAC address contained in the memory.	Set switch 9 of DIP switch to "Off". Perform a restart by disconnecting the power supply and then reconnecting it.
	2	Invalid baud rate contained in the memory.	
	3	Invalid baud rate set via DIP switch.	Set one of the following valid baud rates via DIP switch: 125 kbit/s, 250 kbit/s or 500 kbit/s. Perform a restart by disconnecting the power supply and then reconnecting it.
1	4	Internal error during CAN initialization.	Perform a restart by disconnecting the power supply and then reconnecting it. If the problems persists, contact WAGO support.
2	1	Error during DeviceNet protocol driver initialization.	Perform a restart by disconnecting the power supply and then reconnecting it. If the problems persists, contact WAGO support.
5	1	Internal error during diagnostic confirmation transfer.	Contact WAGO support.
	2	Internal process image could not be created.	
	3	Internal process image could not be deleted.	
	4	Internal error when addressing the I/O modules.	Perform a restart by disconnecting the power supply and then reconnecting it. Contact WAGO support if this error recurs.
	5	Internal error when addressing the I/O modules.	
	6	Internal error when addressing the S-BUS.	

Table 77: Group Number 12: Fieldbus-specific Software Warnings

Error code	Error argument	Cause	Correction
5	1	No diagnostic data available.	Perform a restart by disconnecting the power supply and then reconnecting it. Contact WAGO support if this error recurs.
	2	Configured response to a fieldbus error cannot be set.	
	3		
	4	Internal error of diagnostic data length.	

Table 78: Group Number 13: Firmware Loader Error

Error code	Error argument	Cause	Correction	
1	1	No firmware in fieldbus coupler.	Perform a firmware update using the USB interface.	
	2	Firmware checksum error.		
	3			
2	1	USB communication disrupted.	Perform a restart by disconnecting the power supply and then reconnecting it.	
	2			
	3			
	4			
	5			
	6			
	7			
	8			
3	1	EEPROM error or incompatible firmware	Perform a restart by disconnecting the power supply and then reconnecting it.	
	2			
	3			
	4			
	5			
	6			
	7			
4	1	Internal fault		
	2			
5	1			
	2			
6	1	Access to flash memory not possible		Perform a firmware update using the USB interface
	2			
	3			
	4	Wrong firmware version		
	5	Internal fault		
7	1	Error in firmware file		
	2			
	3			
	4			
	5			
	6			
	7			
8	1	Real-time clock (RTC) is defective	-	
	2			
	3			

Table 78: Group Number 13: Firmware Loader Error

Error code	Error argument	Cause	Correction
9	1	Code processor error	Perform a restart by disconnecting the power supply and then reconnecting it.
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
10	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
11	1	Error when accessing Interrupt Controller.	
	2		
12	1	SDRAM error	

Table 79: Group Number 14: Error with Firmware Download

Error code	Error argument	Cause	Correction
1	0	Switching to software update mode is not possible.	Perform a restart by disconnecting the power supply and then reconnecting it.
2	0 ... 64	Software update for I/O module failed. The error argument indicates the logical module address.	
3	1	Internal fault	These blink codes assist the support team in further error investigation. Please be ready to give them the group number, error code and error argument.
	2		
	3		
	4		

9.5 Readout of Blink Codes using WAGO DTMs

Error messages or warnings from the fieldbus coupler are also displayed in WAGOframe under the “Blink code” entry. For this to function, the WAGOframe software (or another FDT border application) and the WAGO DTMs must be installed on your PC. For more information, see section “Parameterization via FDT/DTM”. An overview of the meaning of the blink codes can be found in section “Meaning of the Blink Codes and Procedures for Correcting Them”.

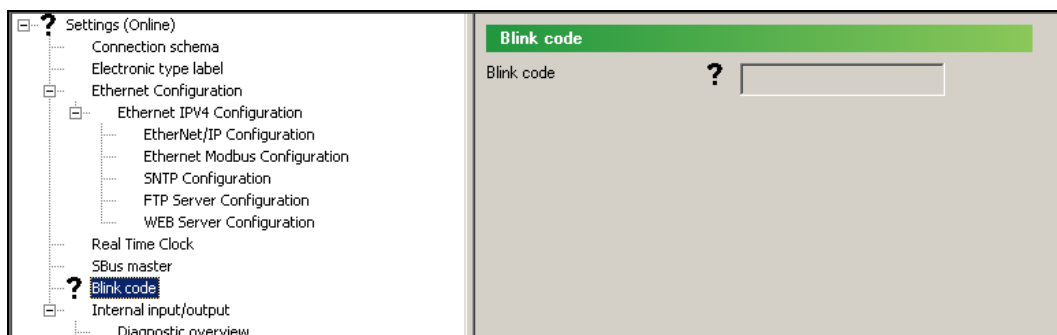


Figure 28: Example of the blink code display under the “Blink code” parameter in WAGOframe

10 Parameterizing

This section explains device parameterization with the help of an FDT border application (FDT/DTM) using WAGOframe.



DANGER

Changing parameters!

When parameters are incorrectly modified with an FDT/DTM border application (e.g. WAGOframe), machine components could be placed in a dangerous state and personnel and machines could be at risk.

Before changing the parameters, ensure that the machine components are in a safe and defined state and switch off the higher-level controller.

Also ensure before start-up that no personnel remain in the danger area of the machine components.

FDT is an abbreviation for “Field Device Tool”. This refers to an application that can be utilized for parameterization of the fieldbus devices independent of the fieldbus being used. For this purpose, the application needs supplementation in the form of software components, which establish the communication with the individual devices and supply the adjustable parameters. These software components are called DTM (Device Type Manager) and produced by the device manufacturers.

FDT/DTM represents an open concept in which the individual components of various manufacturers work together. The concept thus reduces the number of proprietary, manufacturer-specific software solutions and cultivates a uniform operating concept inside a comprehensive operating program.

For the parameterization of a 767 node, an appropriate DTM is available for each 767 component. Use this DTM to parameterize the 767 components. The 767 components can be parameterized either online or offline. The offline mode enables the parameterization of a 767 component that is not yet present. In the offline mode, first store the parameter in a project and later transfer it to the 767 components.

In the online mode, there is a direct connection between the display and the connected 767 components. If a 767 component is in the online mode, its name is displayed in **bold** and *italic* font in the network window.

10.1 Installing the FDT/DTM Components

The following sections deal exclusively with WAGOframe.

When using another FDT/DTM frame application, install only the USB driver (item no.: 759-922), the Service Interface DTM (item no.: 759-371) and the WAGO DTM (item no.: 759-361) on your computer. These can be obtained on the Internet at www.wago.com.

Information on configuring the fieldbus coupler using WAGO DTM can be obtained in section “Parameterizing”.

1. Insert the “WAGOframe” CD into your CD-ROM drive.
2. The start screen appears. Select the desired installation language. A product selection window opens. If Autostart is not activated, open the “Language.htm” file.



Figure 29: Start screen of WAGOframe CD

3. To install the necessary 767 programs, click on the appropriate link. A window opens displaying the corresponding installation programs.

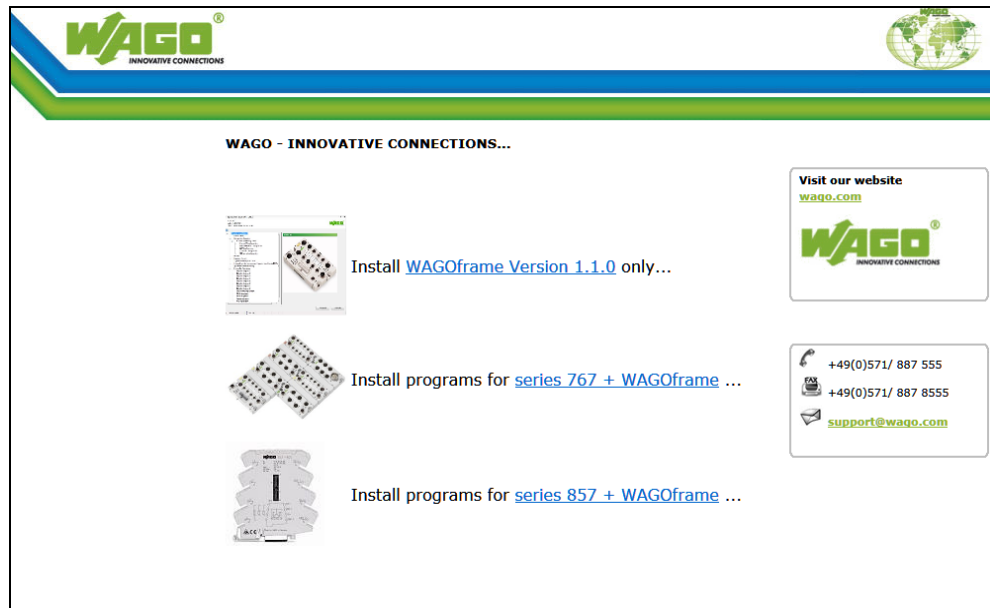


Figure 30: Window for product selection 1

4. To enable you to use the devices of the 767 series, install the FDT/DTM components shown below by clicking on the appropriate link. The “File Download” dialog box opens. To install the programs, click **[Open]**.
 - USB driver, 759-922
 - WAGOframe (installation is only necessary if an FDT/DTM border application has been installed on your PC), 759-370
 - WAGO service interface DTM, 759-371
 - DTM for the fieldbus coupler and I/O modules, 759-361
 - DTM for the system update, 759-362

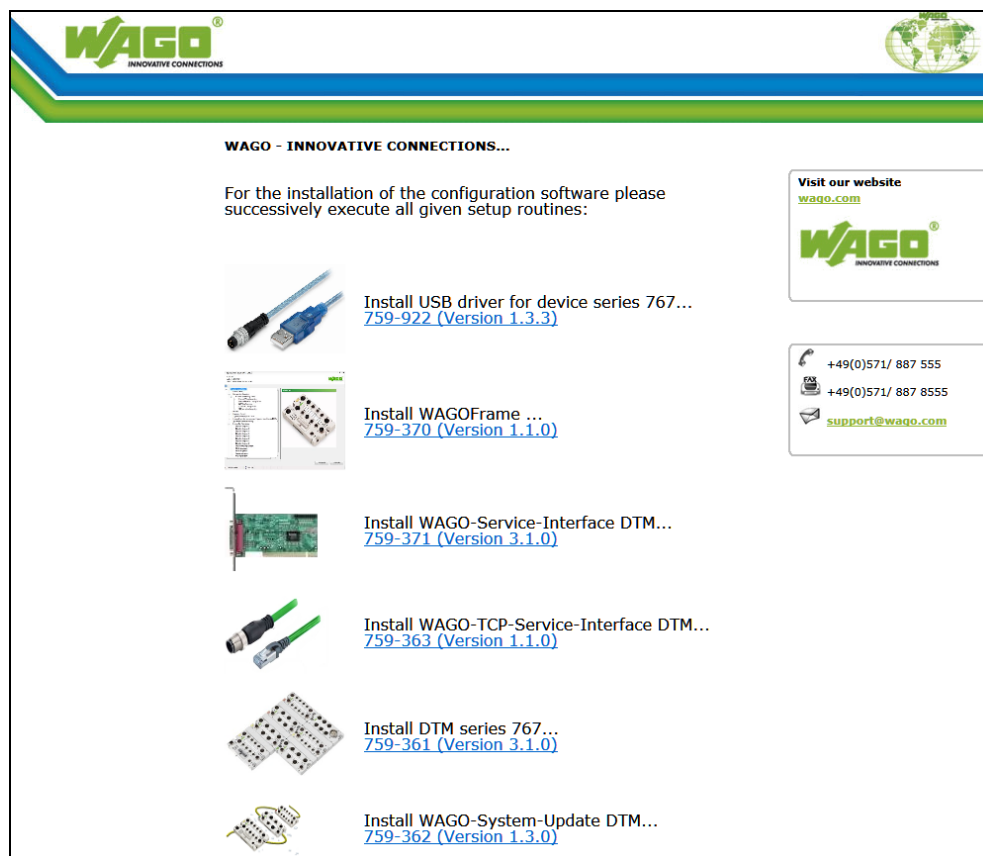


Figure 31: Window for product selection 2

5. After installing all necessary 767 programs connect your computer with the fieldbus coupler via the USB cable. See also section "Connecting Data and Supply Cables" > "Connecting the USB Cable".

10.2 Starting WAGOframe

1. Start the FDT border application by double-clicking on the WAGOframe logo on your desktop.



Figure 32: WAGOframe logo

2. You can also start WAGOframe from the start menu of your operating system by clicking on “Start” and selecting **Programs > WAGO Software > WAGOframe**.
3. When the “Device Selection Wizard” opens, select “Expert Mode”. The “Point to Point Mode” only applies to the configuration of directly connected devices with no S-BUS (such as WAGO Jumpflex). Click [Next].

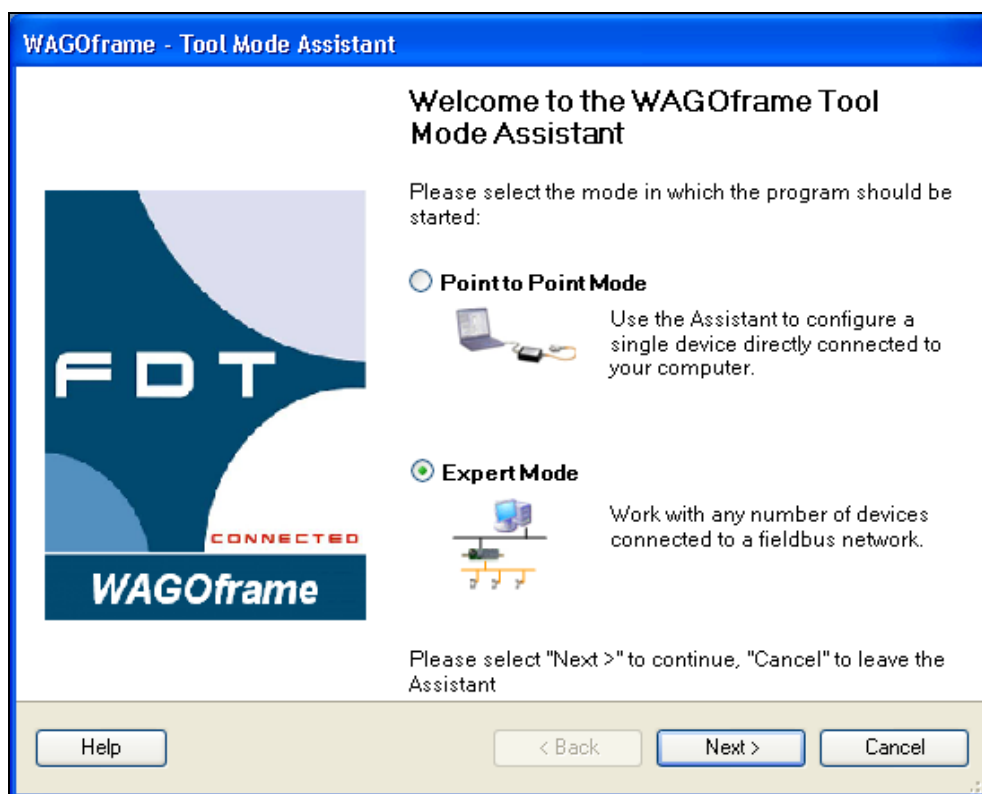


Figure 33: “Device Selection Wizard”

4. When opened for the first time, the “Query WAGOframe” dialog box appears. Click [Yes] to automatically set up the device catalog on your PC. After the device catalog has been updated, all 767 components for which a DTM is installed are listed.

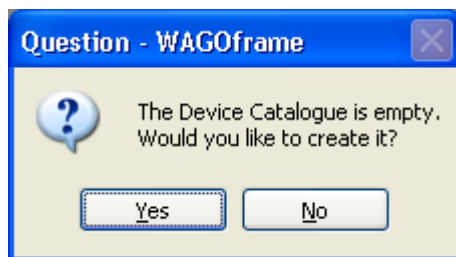


Figure 34: “Query WAGOframe” dialog box (exemplary)

10.3 Expansion of Device Catalog to include 767 Components

WAGOframe automatically detects newly installed DTMs at the next start-up. To expand the device catalog, proceed as follows:

1. To update the device catalog, navigate to the menu bar and select **View > Device Catalog**.
2. In the “Query WAGOframe” dialog box, click [Yes] to update the device catalog.

After updating, the device drivers for the 767 components appear in the device catalog.

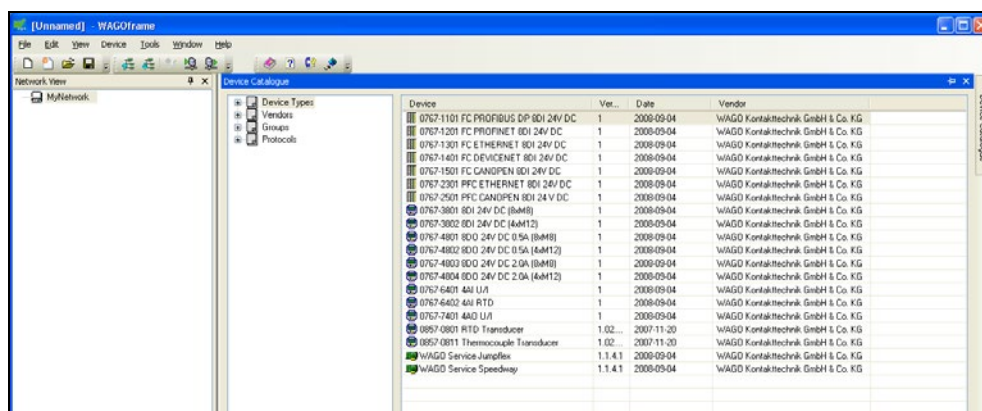


Figure 35: View of device catalog (example)

10.4 Setting Up Network Manually

In order to work with the 767 components, the exact node structure topology must be copied into the “Network View” of WAGOframe.



Note

Setting up the network

Depending on the application, you can create the network manually (see this section), automatically (see section “Set up network automatically”) or using the Life list (see section “Life list”).

10.4.1 Adding the Communication DTM

So that you can parameterize the fieldbus coupler and the I/O modules connected with it, establish a connection to your PC via the USB interface.



Note

Access via ETHERNET

You can access WAGOframe also via ETHERNET (only 767-1201, -1301, -2301). See section “Parameterization via WAGOframe” > “Service Communication via ETHERNET”.

1. Right-click on “Network” in the “Network View” pane.
2. In the context menu, select **Add...**. The “Add...” dialog box opens.

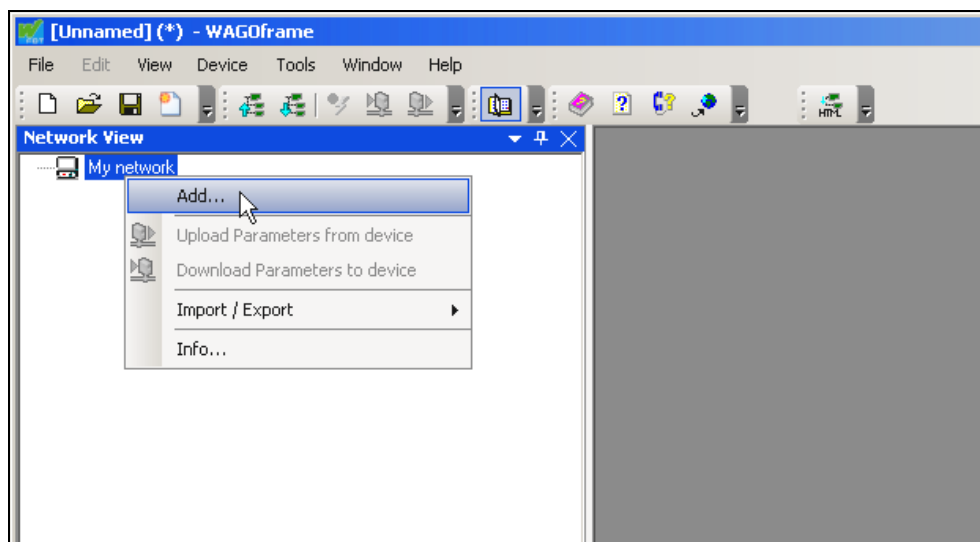


Figure 36: Adding the communication DTM (example)

3. In the “Add” dialog box, select “WAGO Service Speedway”.
4. Click **[OK]** to confirm your selection.

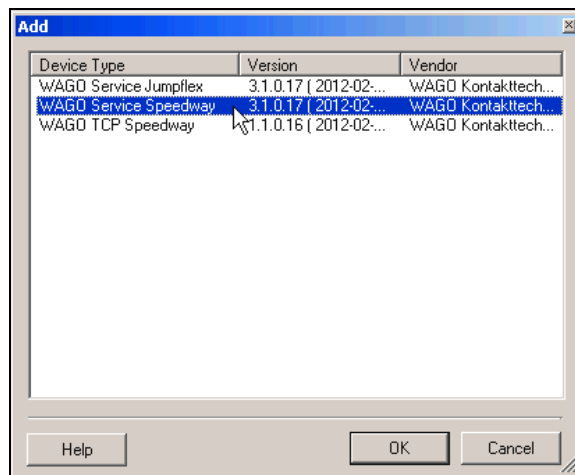


Figure 37: Selecting the communication DTM (example)

10.4.2 Selecting the Communications Interface for WAGOframe

This chapter is only relevant if you use “Online Parameter Setting”.

Requirement:

The fieldbus coupler must be switched on and your PC must be connected with the USB interface. For more information, see section “Connection to the Data and Supply Cable” > “Connecting the USB Cable”.

1. Double-click on the “WAGO Service Speedway” DTM in the “Network View” pane. The DTM for the interface configuration opens.
2. Select the COM port that you use from the **Interface selection** box. If the list of available interfaces is empty, check whether the fieldbus coupler is switched on and connected to your PC via the USB cable.
If you establish the connection via **[Go online]** later, the COM port is checked. If it is incorrect, it is automatically selected.
3. Click **[Apply]** and then **[Close]**.

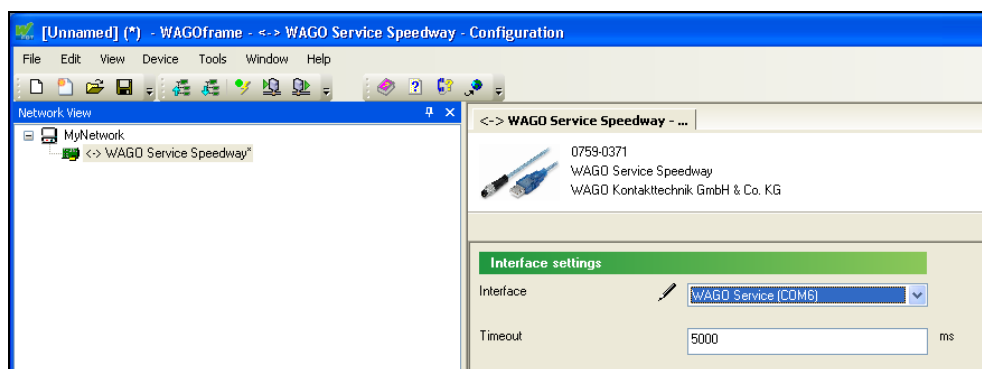


Figure 38: The DTM for the interface configuration (example)

Note



COM Port

This COM port number remains constant for the fieldbus coupler currently connected. When connecting a different fieldbus coupler to the PC, the COM port also changes. In this case, “WAGO Service Speedway” attempts to select the new COM port automatically. If several fieldbus couplers are connected to the PC, select the correct COM port.

The “WAGO SPEEDWAY Portmapper” is used to specify a constant COM port. The software is contained on the “WAGOframe” CD-ROM.

10.4.3 Adding a Fieldbus Coupler

To incorporate the fieldbus coupler into WAGOframe, proceed as follows:

1. Right-click on the “WAGO Service Speedway” DTM in the “Network View” pane.
2. In the context menu, select **Add....** The “Add...” dialog box opens.

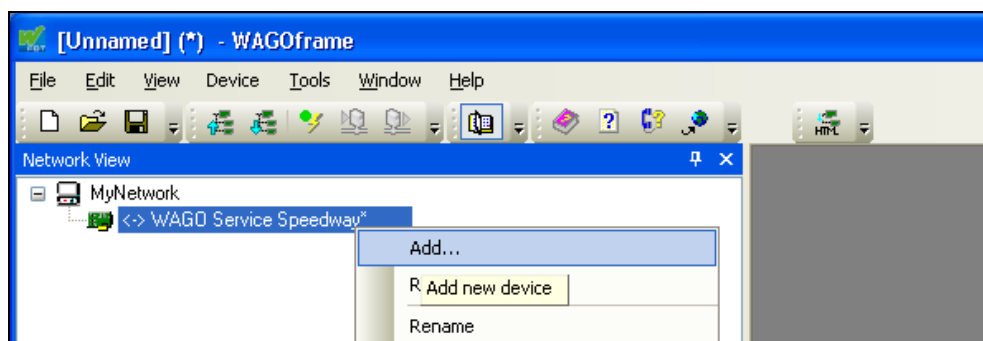


Figure 39: Adding a fieldbus coupler (example)

3. In the “Add...” dialog box, select the fieldbus coupler that you use.
4. Click [OK] to submit your selection.

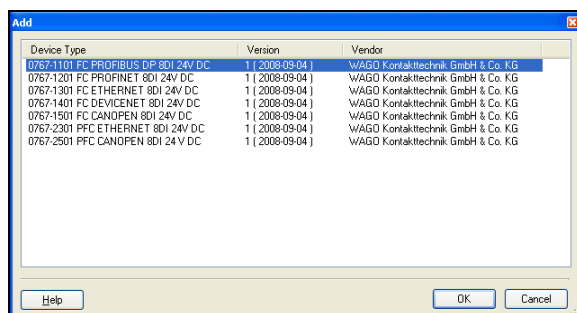


Figure 40: Adding the fieldbus coupler (example)

10.4.4 Adding the I/O Modules

To incorporate the I/O modules that you use into WAGOframe, proceed as follows:

1. Right-click on the “<Speedway:> 0767-xxxx” device driver in the “Network View” pane.
2. In the context menu, select **Add...**. The “Add...” dialog box opens.

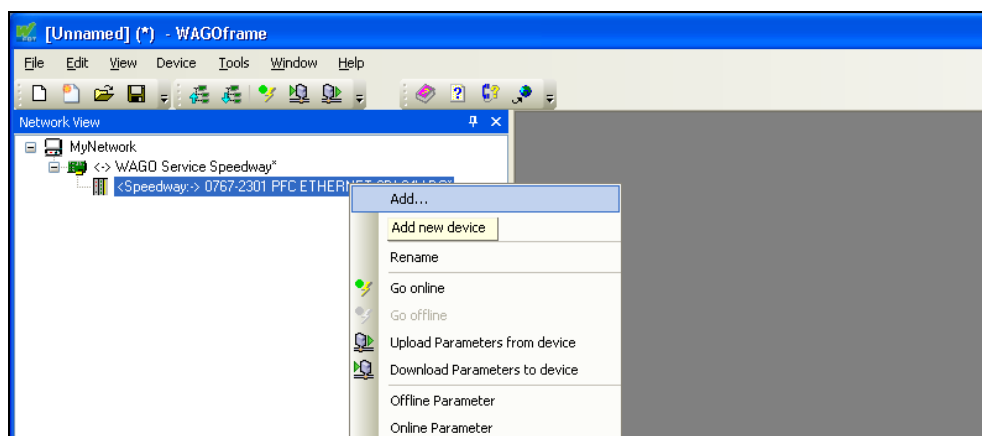


Figure 41: Adding the I/O modules (example)

3. In the “Add...” dialog box, select the I/O module's device type.
4. Click **[OK]** to confirm your selection.

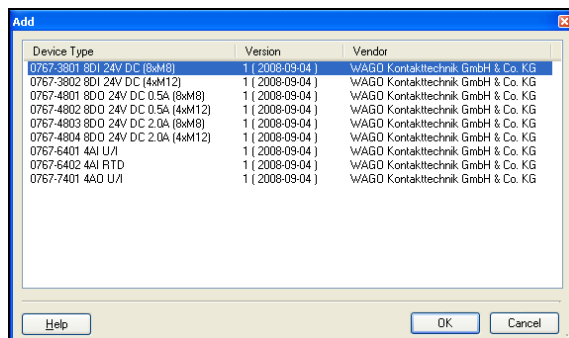


Figure 42: Selecting an I/O module (example)

- Repeat steps one through four until the module arrangement is concordant with your fieldbus node. In our example, two I/O modules were added.

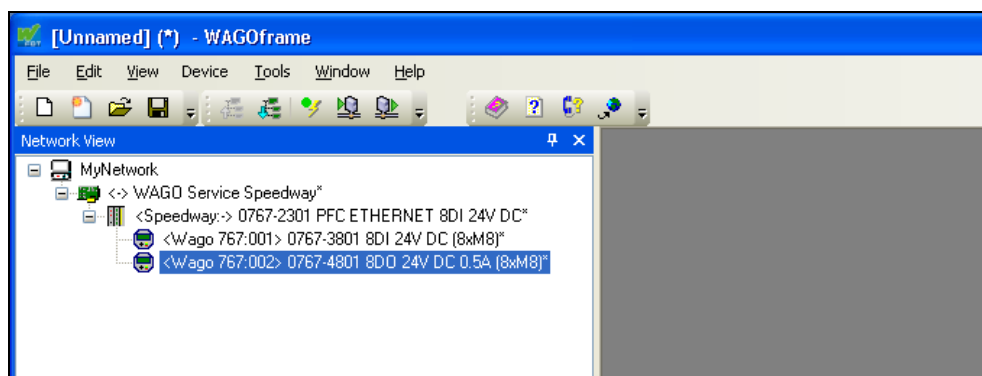


Figure 43: Two added I/O modules

To avoid having to apply the physical process image of the 767 components created in WAGOframe in the “Network View” again, you can save the topology as a project file. Click **[File] > [Save]**.

10.5 Online and Offline Parameter Setting

The options of online and offline parameter setting are available for configuring the 767 components. The offline mode enables the parameterization of a 767 component that is not yet present. In the offline mode, first store the parameters in a project and later transfer them to the 767 components. In the online mode, there is a direct connection between the display and the connected 767 components. If a 767 component is in the online mode, its name is displayed in ***bold and italic*** font in the network window.

10.5.1 Offline Parameter Setting

Requirement:

To configure the fieldbus coupler in offline mode, the network structure of the 767 node must have been transferred to WAGOframe (see section “Parameterization via WAGOframe” > “Setting Up Network Manually”).

For offline configuration, proceed as follows:

1. Right-click on the “<Speedway:> 0767-xxxx” device driver of the fieldbus coupler in the “Network View” pane.
2. In the context menu, select **Offline Parameter**. The configuration interface opens with the fieldbus coupler parameters. Details on these parameters can be found in section “Parameterizing”.

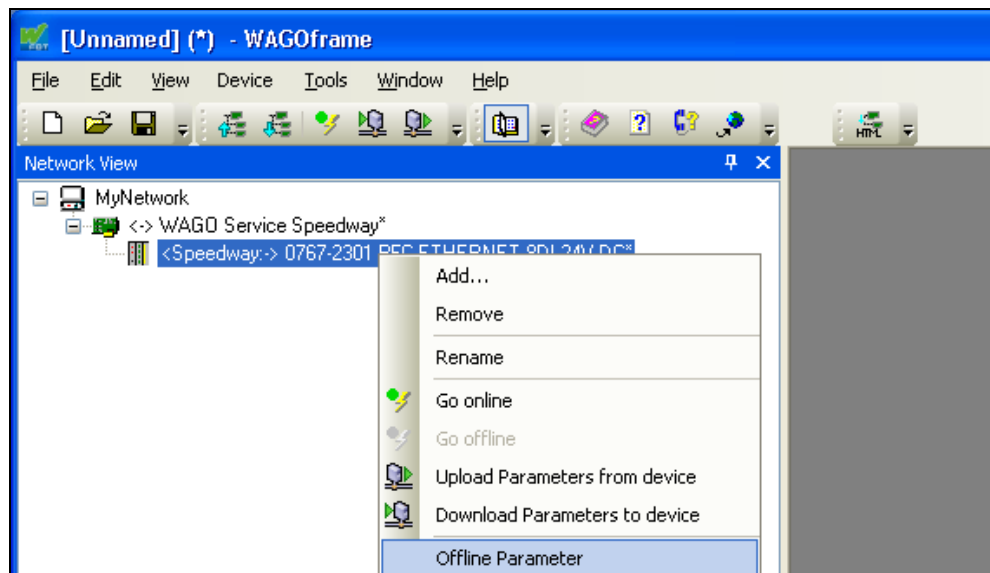


Figure 44: Opening the configuration interface (offline, example)

3. To configure the I/O modules, right-click on one of the I/O modules in the “Network View”.
4. In the context menu, select **Offline Parameter**. The configuration interface opens with the corresponding I/O module parameters. Information on these parameters can be found in the respective I/O module manual.

5. Save the configuration in a project by clicking on **[Accept]** and **[File] > [Save]**.
6. Transfer the project file to the respective 767 component. To transfer parameters, right-click on the fieldbus coupler or on the respective I/O module and select **Download Parameters to device** from the context menu.

10.5.2 Online Parameter Setting

Requirement:

To configure the fieldbus coupler in online mode, the network structure of the 767 node must have been transferred to WAGOframe (see section “Parameterization via WAGOframe” > “Setting Up Network Manually”). You can also utilize the “Set Up Network” option as described in section “Parameterizing” > “Setting Up Network Manually”.

For offline configuration, proceed as follows:

1. Right-click on the “<Speedway:> 0767-xxxx” device driver in the “Network View” pane.
2. In the context menu, select **Go online**. When the progress bar reaches 100%, a connection to the fieldbus coupler has been established. Repeat this step for each desired I/O module.

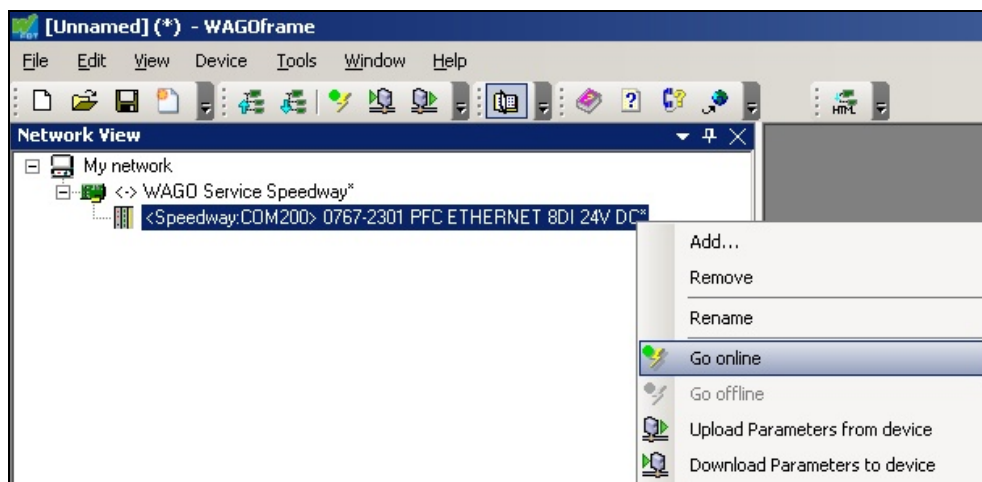


Figure 45: Setting up a connection to the fieldbus coupler (example)

3. In the context menu, select **Online Parameter**. The configuration interface opens with the fieldbus coupler parameters. Details on these parameters can be found in section “Parameterizing”.

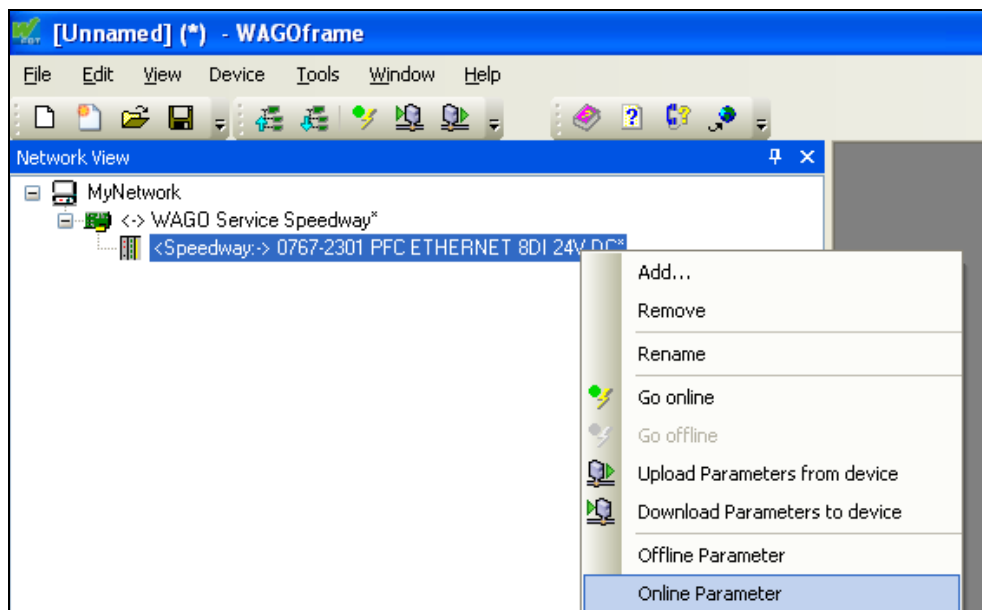


Figure 46: Opening the configuration interface (online, example)

4. To configure the I/O modules, right-click on one of the I/O modules in the “Network View”.
5. In the context menu, select **Online Parameter**. The configuration interface opens with the corresponding I/O module parameters. Information on these parameters can be found in the respective I/O module manual.

Note



Online Parameter Setting

If you are unable to select the “Online Parameter Setting” entry, the “Offline Parameter Setting” interface may still be open. Close the interface.

6. To save the parameters in the respective 767 components, click **[Write]**.
7. To read the current parameterization in the respective 767 components, click **[Read]**.

10.6 The “Additional Functions” and “Scan” Selections

Requirement:

You have switched on the fieldbus coupler, connected your PC with the USB connection and established a communication link to the 767 components (“Go online” in the context menu).

The “**Additional Functions**” selection from the context menu provides the following additional functionalities in addition to the possibility of parameterization:

- **Change bus address**
Here you can change the S-BUS addresses for individual I/O modules.
- **I/O owner assignment**
Here you can specify to which process image (e.g., fieldbus) an I/O module should belong (irrelevant for this fieldbus coupler).
- **Diagnostics setup**
Here you can enable or disable synchronous diagnostics and diagnostic confirmation of the I/O modules, as well as the integrated digital inputs of the fieldbus coupler.
- **Service page**
You can use the Service page to restore the default state for selected 767 components.
- **User administration**
Irrelevant.
- **File system**
Irrelevant.

The “**Scan**” selection from the context menu offers the following options:

- **Set up network**
Add all 767 components connected to the PC by the USB cable to the network view.
- **Life list**
Add individual 767 components connected to the PC by the USB cable to the “Network View”.

10.6.1 Changing the Bus Address

Requirement: Disconnect the communication link to the fieldbus coupler (“Go offline” in the context menu).

If you wish to simply configure select I/O modules instead of the entire topology, add these I/O modules manually to the Network View. For these I/O modules to be accessible at the correct bus address, you must assign them the correct addresses. To do so, please proceed as follows:

1. Right-click on the coupler in the “Network View” pane.
2. In the context menu, select **Additional Functions > Change bus addresses**. A window opens with a list of the bus nodes.

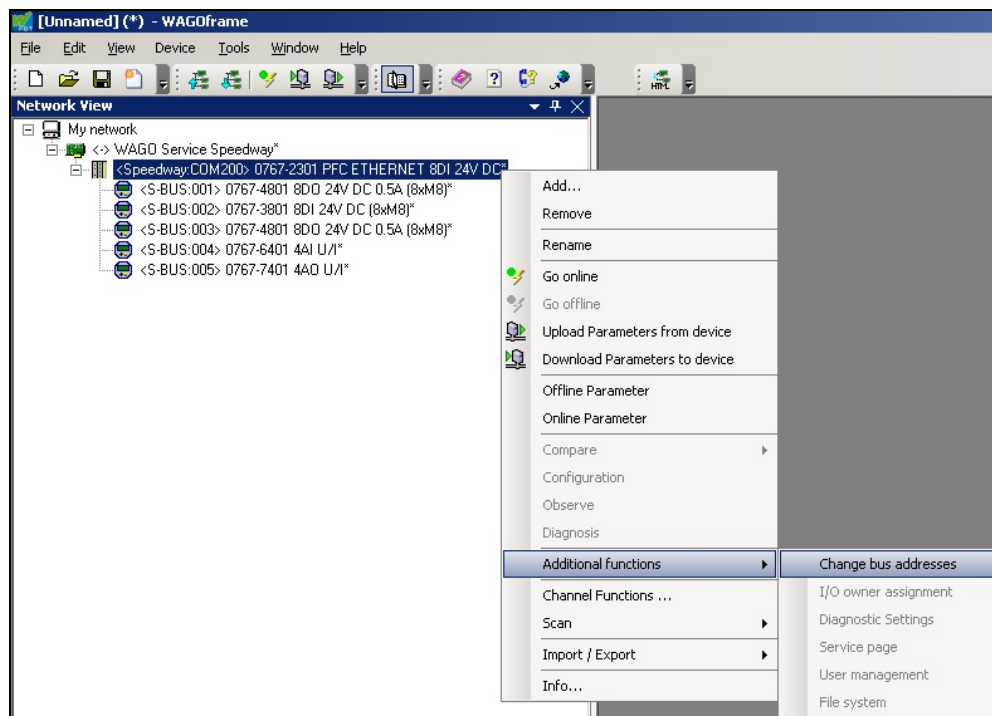


Figure 47: Opening the “List of Bus Nodes” window (example)

3. Now select an I/O module from the “List of Bus Nodes” to which you wish to assign a new bus address. The current address is displayed in the **New Bus Address** field. Enter here the desired new address and click [Apply].

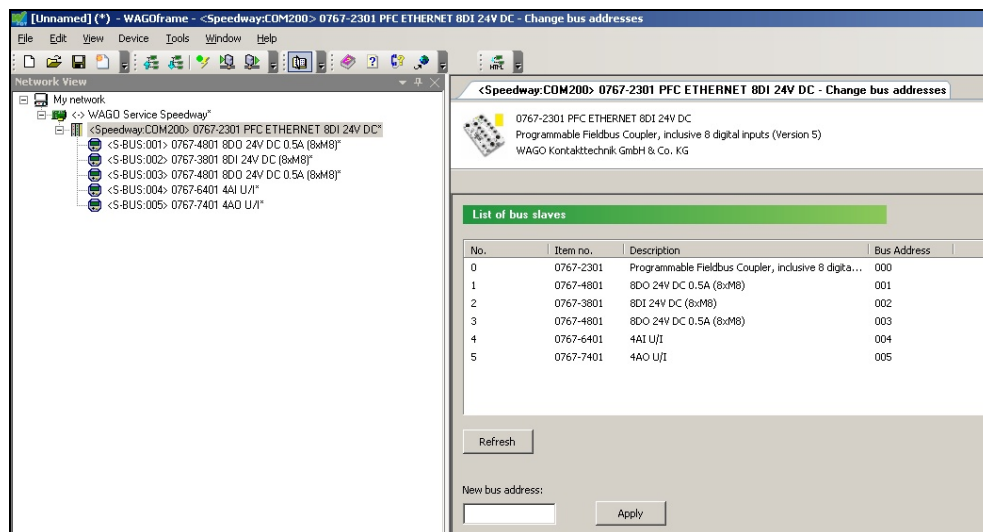


Figure 48: Assigning new bus addresses for the I/O modules (example)

10.6.2 Service Page

The Service page is used to restore the default state for selected 767 components.

1. Right-click on the fieldbus coupler in the “Network View” window.
2. In the context menu, select **Additional Functions > Service Page**.

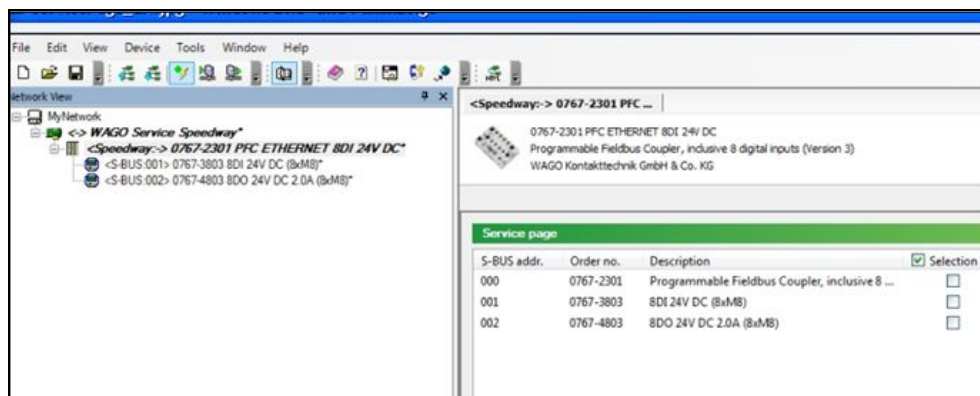


Figure 49: Service page (example)

Table 80: Service page

Parameter/button	Description
S-BUS Addr.	Displays the physical position of the devices in the 767 node. 000: Fieldbus coupler 001: First I/O module connected to the fieldbus coupler 002: Second I/O module connected to the fieldbus coupler
Item No.	Item number of a 767 component
Designation	Designation of a 767 component
Selection	Selection of the 767 components that should be reset to the default state.
[Update list]	Update the 767 components displayed in the DTM after changing the physical topology (e.g., I/O module removed or added).
[Restore factory]	Reset the selected 767 components to the default state.
[Reset]	Reset of the 767 components

10.6.3 Set up network automatically

This involves inserting all 767 components into the topology that are connected to the USB connection.

1. Right-click on a coupler in the “Network View” pane or directly on the “WAGO Service Speedway” DTM.
2. In the context menu, select **Scan > Create Network**.
If the “WAGO Service Speedway” DTM is selected, all components connected to the 767 nodes will be carried over into the topology. If your coupler is selected, only the I/O modules will be attached to the coupler.

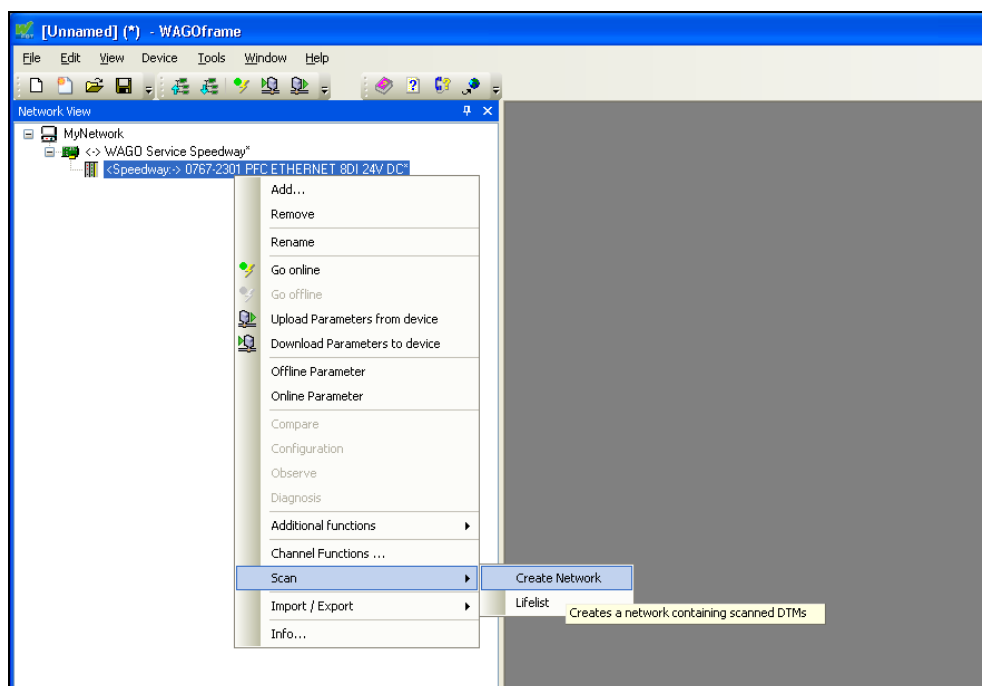


Figure 50: Setting up the network (example)

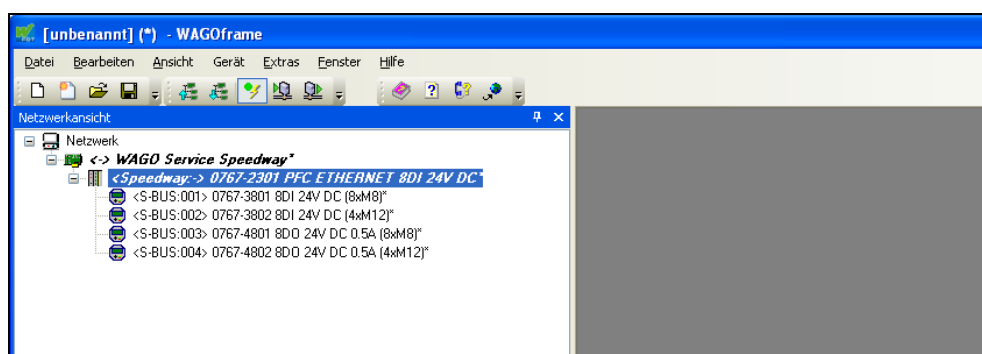


Figure 51: Components connected to the 767 node (example)

10.6.4 Life List

The life list is used to search for all devices connected to the S-BUS in order to select them for configuration directly.

You have the option to use the “WAGO Service Speedway” DTM to search for the connected fieldbus coupler or to use the device driver for the fieldbus coupler to search for I/O modules connected to it.

To search for fieldbus couplers or I/O modules, proceed as follows:

1. Right-click on the respective device driver in the “Network View” pane. In this example, the device driver for the fieldbus coupler is selected to search for the I/O modules connected to it.
2. In the context menu, select **Scan > Life List**. The life list opens.

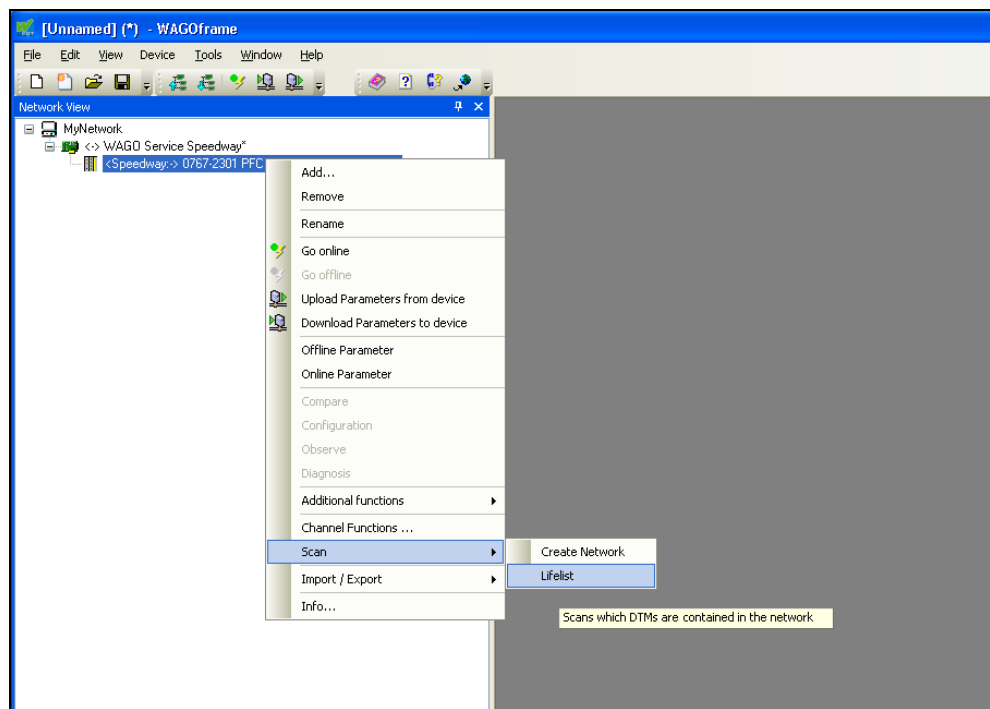


Figure 52: Searching for connected I/O modules using the life list (example)

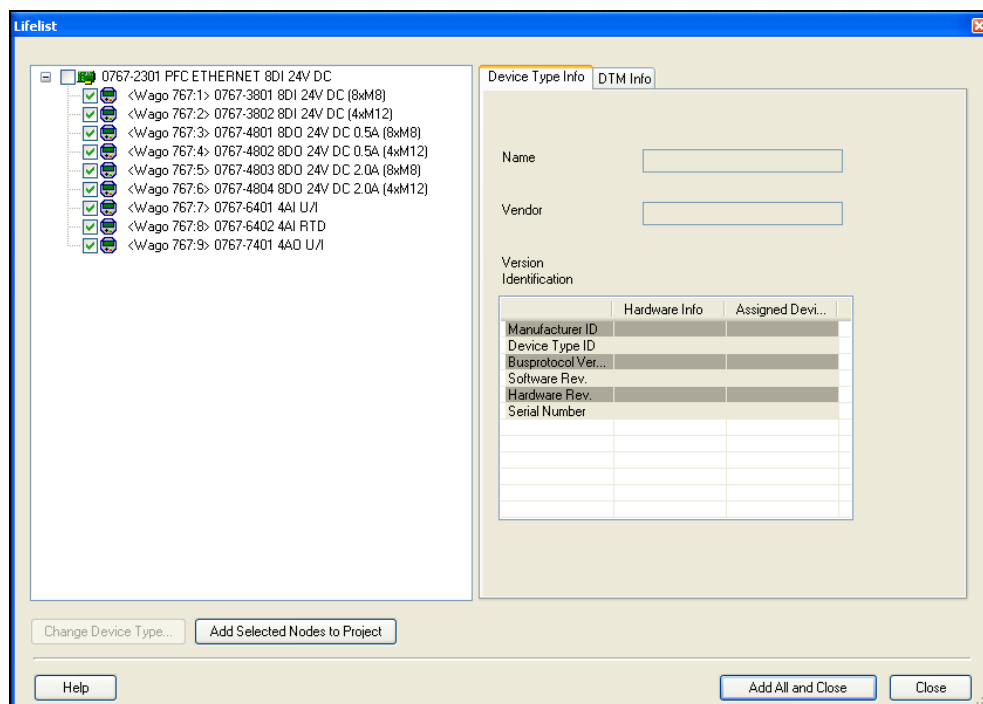


Figure 53: Connected I/O modules of the selected fieldbus coupler (example)

- Now select from the list those devices that you wish to carry over into the “Network View” for configuration. Click **[Add Selected Nodes to Project]** and then **[Close]**.

10.6.5 System Update

10.6.5.1 Notes on System Update

Firmware update for the 767 Series components is performed via system update. To ensure that the fieldbus node remains consistent and executable after updating the firmware, system update must be performed for both fieldbus coupler and connected I/O modules.

NOTICE

System update!

Before updating, observe the following measures to prevent any possible damage to the 767 system:

- The power supply must not be disconnected while updating!
- To exclude any interference by the fieldbus, the fieldbus cable must be disconnected before updating!

Requirement for update via USB:

- You have installed the DTM (759-370) WAGOframe
- You have installed the DTM (759-371) WAGO service interface
- You have installed the DTM (759-922) USB driver
- You have installed the DTM (759-362) system update.
- Update packages are available for the connected 767 Series components.

System Update Procedure

To perform a system update for each 767 Series component, please complete the following steps:

1. Read 767 components' parameters and save them on your PC.
2. Update 767 Series components' firmware.
3. Rewrite parameters from your PC to the 767 Series components.
4. Set parameters to valid and finish the procedure.

10.6.5.2 Service Communication via USB

This section describes how to access your SPEEDWAY node via the WAGO USB communication cable (756-4101/0042-0030).

10.6.5.2.1 Adding the Communication DTM USB

So that you can parameterize the fieldbus coupler and the I/O modules connected with it via the USB connection, establish a connection between your PC and the 767 node via the WAGO communication cable.

1. Select the respective COM port (I/O Service Port COM (xx)) in the interface settings.



Note

Access to the port

Make sure that the selected port is not blocked by other applications.

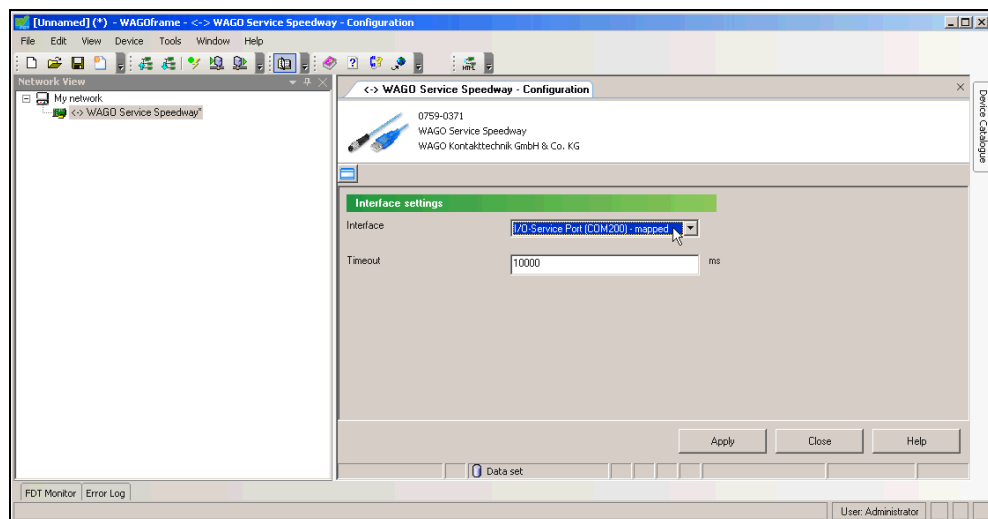


Figure 54: Select COM port

2. Right-click on “Network” in the “Network View” window.
3. In the context menu, select **Add**. The “Add...” dialog opens.

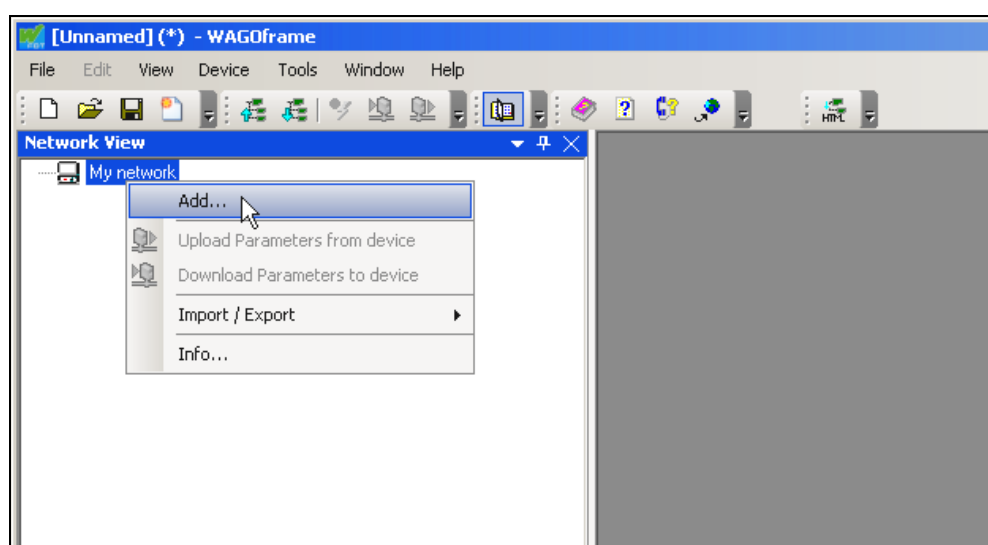


Figure 55: Adding the communication DTM

4. In the “Add” dialog, select “WAGO Service Speedway”.

5. Click **[OK]** to confirm your selection.

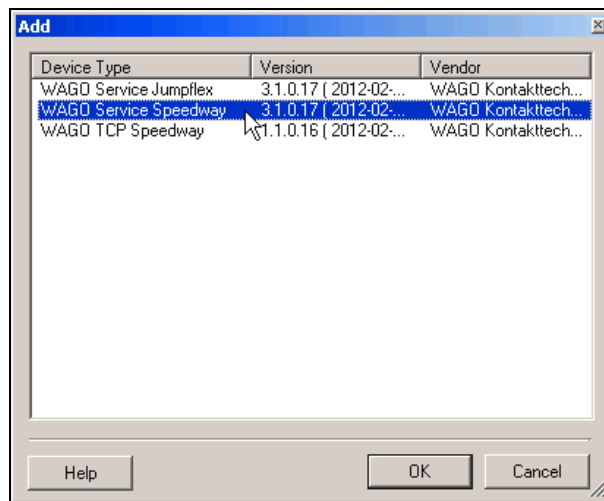


Figure 56: Selecting the communication DTM USB

10.6.5.2.2 Adding the DTM System Update

To add the DTM system update to WAGOframe, please proceed as follows:

1. In “Network View”, right-click on the “WAGO Service Speedway” DTM.
2. In the **Add...** context menu, select “Add”. The “Add” dialog box opens.

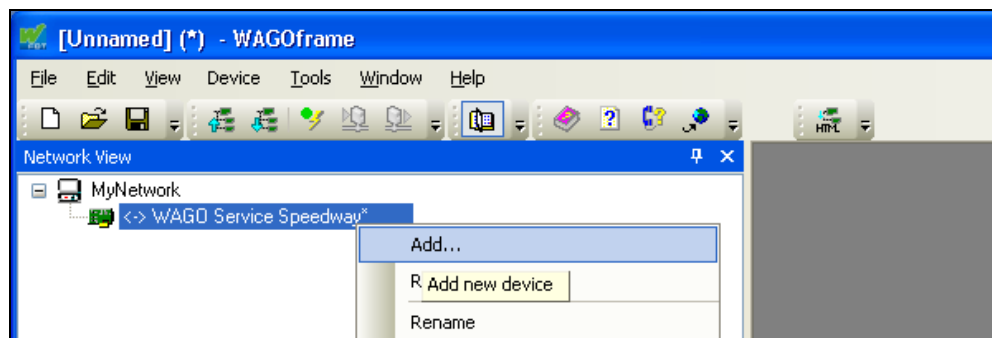


Figure 57: Adding the DTM system update

3. In the “Add” dialog box, select the DTM **0767 System Update**.
4. Click **[OK]** to confirm your selection.

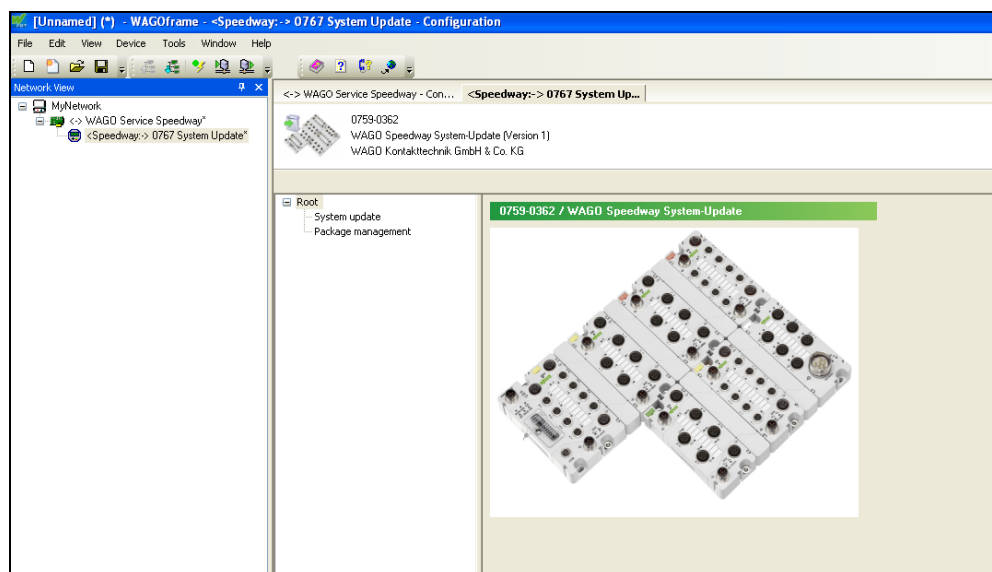


Figure 58: System update 1 (example)

10.6.5.2.3 Go online to 767 Nodes using Update DTM

The firmware can only be updated when a communication connection exists between Update DTM and 767 node. Please proceed as follows:

1. In the “Network View”, right-click on the “<Speedway:> 0767 System Update” device driver.
2. In the context menu, select **Go online**. When the progress bar displays 100% and the entry is displayed in ***bold italics***, the communication connection is established.

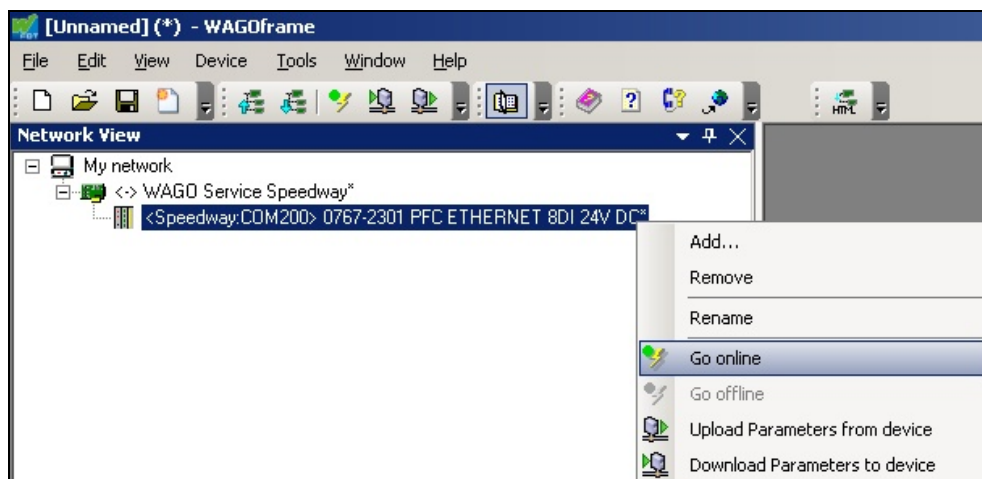


Figure 59: Go online to 767 node (example)

10.6.5.2.4 Updating the 767 Components

The current firmware is available from WAGO Support. Send an e-mail with the subject “Current Speedway Firmware” and the item number of the respective 767 components to: support@wago.com.

Import firmware packages

To use the received firmware packages, import them into the DTM system update. Please proceed as follows:

1. Save the received firmware packages with the “*.wup” extension to any directory on your PC.
2. Open the DTM user interface by double clicking “**0767 System Update**” in the network view.

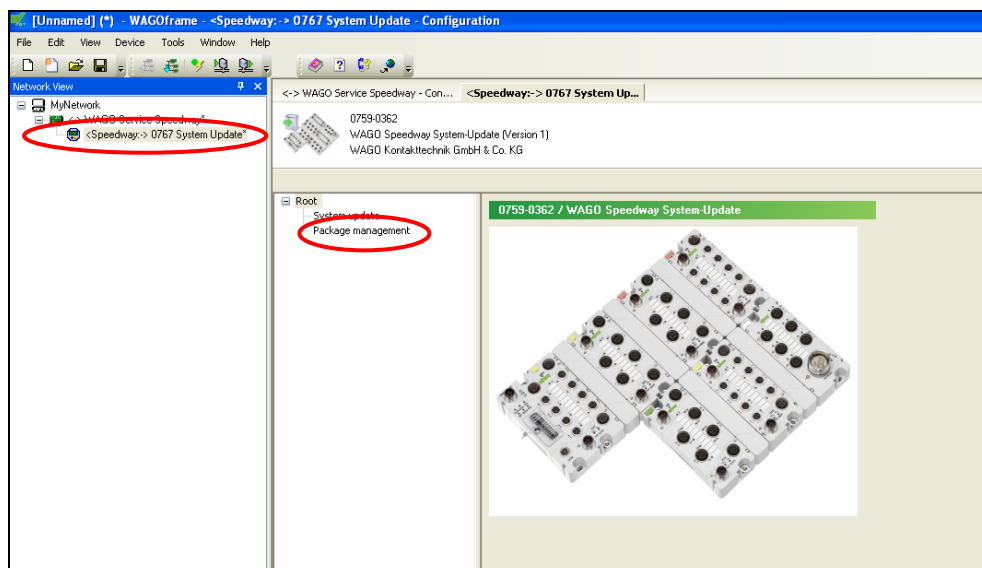


Figure 60: Package management 1 (example)

3. Click “Package Management” in the left window of WAGOframe.
4. To import the received firmware files, click **[Import]**. In the window that opens, go to the directory where you have saved the firmware files and select the file to be used. Click **[Open]** to apply the files.

Note



Adding firmware files.

Multiple firmware files can be added by selecting more than one.

Delete firmware packages

To maintain a clear “Package Management” interface, you can remove unneeded update packages from the view. Please proceed as follows:

1. Select the required firmware files in the right window.
2. Click **[Delete]** to remove the selected firmware packages.

Note



Context menu.

“Select/deselect all” is possible from the context menu.

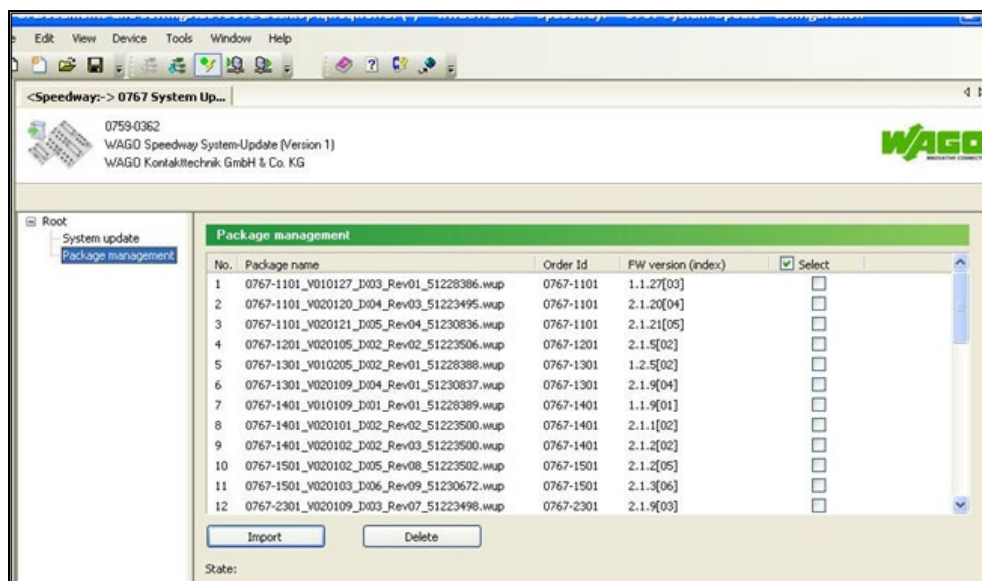


Figure 61: Package management 2 (example)

System update



Note

Updating the firmware

When updating the firmware of the fieldbus coupler, the saved module parameters may be overwritten. Therefore, check your existing configuration after updating the firmware.

Perform the system update here. The module settings you made normally remain unchanged. Otherwise, a corresponding warning message appears. If you still want to update the firmware, the 767 components are returned to their default state.

1. Click “System Update” in the left window.

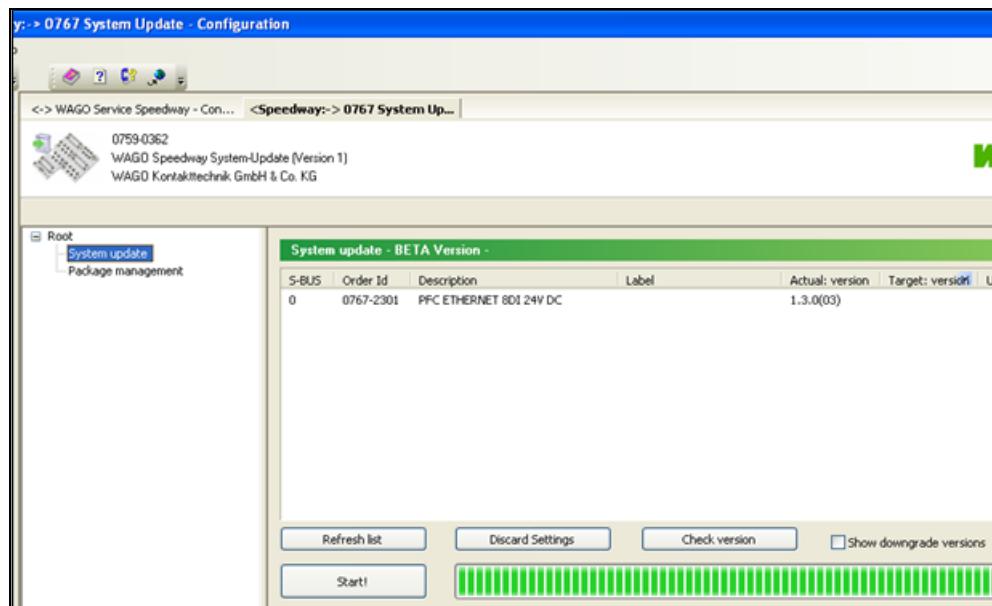


Figure 62: System update 2 (example)

2. The fieldbus coupler and all connected I/O modules are listed in the right window. All 767 components that can be updated are pre-selected. If the pre-selection is incorrect or if specific 767 components should not be updated, deselect them ("Update?" column).
 "Actual: Version": Firmware currently present on the device
 "Target: Version": Version of the firmware that should be loaded into the 767 components. If multiple "Target" versions can be selected, select the one relevant to you.
3. Click [**Start!**] to update the system. The 767 components are marked in yellow while being updated.

Note



Firmware actualization

During the firmware updating process, the fieldbus coupler disconnects each of its COM ports. A PC equipped with Windows 2000 will detect this, and a Windows message appears. This is not an error message. Confirm the message by pressing [OK].

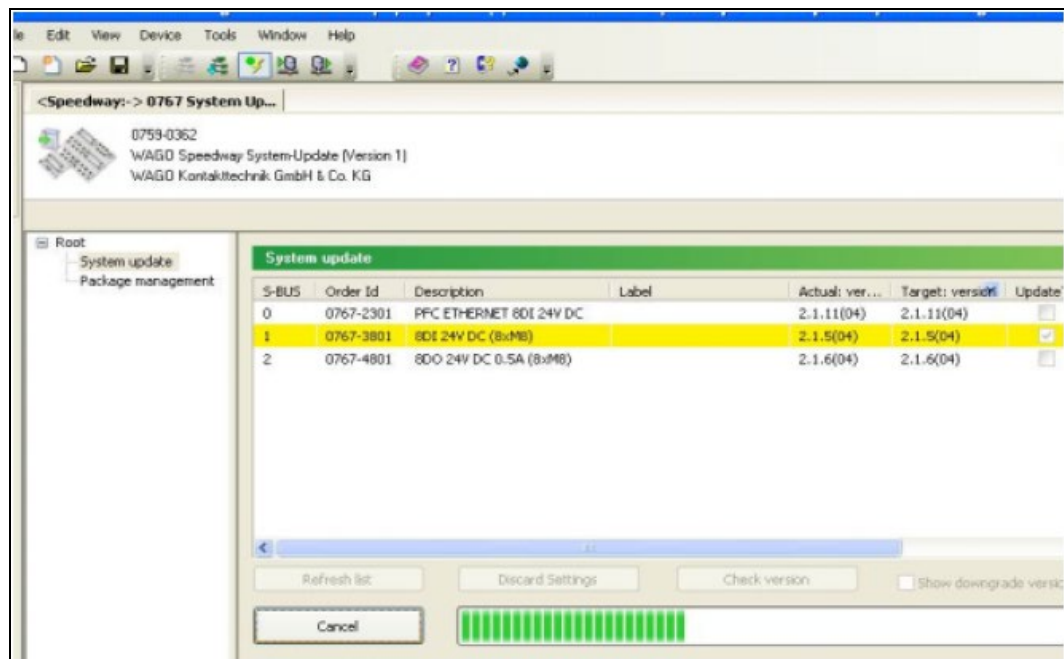


Figure 63: System Update 2 (example)

Table 81: Buttons

Button	Description
[Update List]	Use this function to read the node design and the view updates.
[Discard Settings]	Discard the selections and settings performed by you.
Display downgrade versions	If this checkbox is selected, the versions to downgrade a device are also displayed in the list of target versions.
[Start!]/[Abort]	Start/abort system update.

4. If the system update is finished, the updated 767 components are displayed in green (see figure).

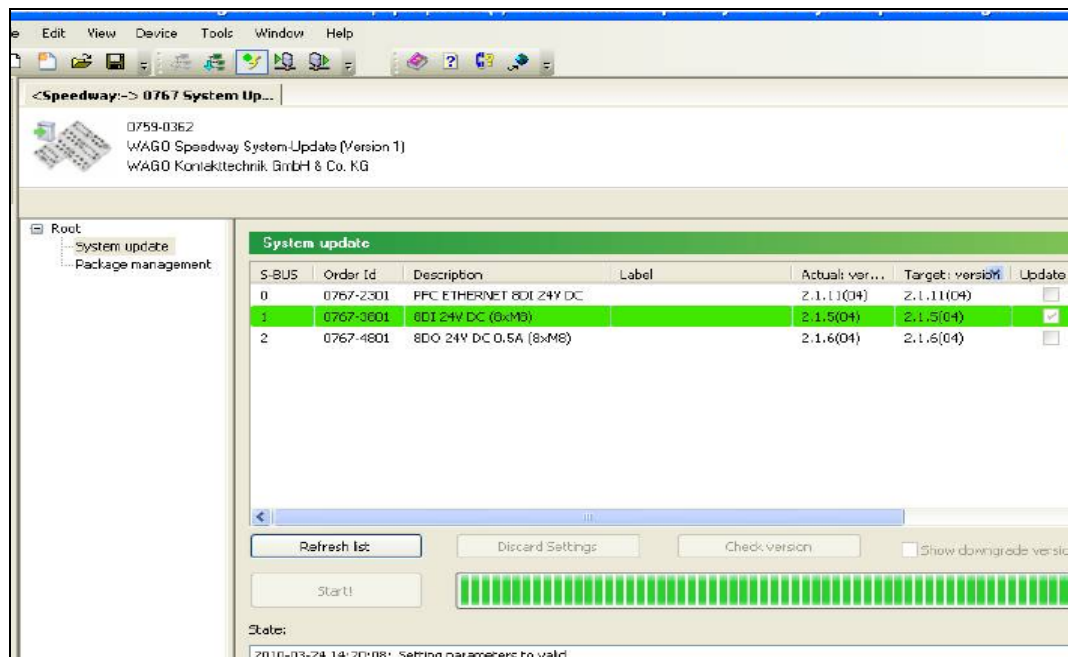


Figure 64: System Update 3 (example)

During system update, all relevant information is stored on your PC. Update can be repeated subsequently if the system update fails (components are displayed in red). In this case, original parameters remain unchanged.

If the update for a device fails, please contact WAGO Support.

10.7 Parameterization

All parameters listed here can be set using WAGOframe (or another FDT/DTM border application) for the fieldbus coupler. If you use a fieldbus for the parameterization, only certain parameters are configurable, depending on fieldbus type.

The following sections contain information on the parameters and their descriptions.

To open the parameterization user interface (DTM) of a 767 component, double-click on the appropriate 767 component in the “Network View”. The parameterization user interface can also be opened by right-clicking on **Offline Parameter** or **Online Parameter** in the context menu.

If several parameterization user interfaces are open, select one via the corresponding tabs. If you switch a 767 component from the online mode to the offline mode or vice versa, close the parameterization user interface and reopen it.

Depending on the selection of parameterization user interfaces, various buttons are at your disposal:

Table 82: DTM buttons

Button	Description
[Read] (Online mode only)	Reads and displays the parameters found in the 767 components.
[Write] (Online mode only)	Writes the modified values to the 767 components.
[Close] (Online and offline mode)	Closes the parameterization user interface (DTM).
[Apply] (Offline mode only)	Applies the entries in the project. Please note that the project should also be subsequently saved (File > Save).
[Help] (Online and offline mode)	Opens the online help for an entry that has been previously selected in the DTM (e.g., digital inputs, global setting).
	Shows/hides parameter overview.
	Displays the product data sheet. A PDF reader must be installed on your PC.
	Opens the DTM online help.

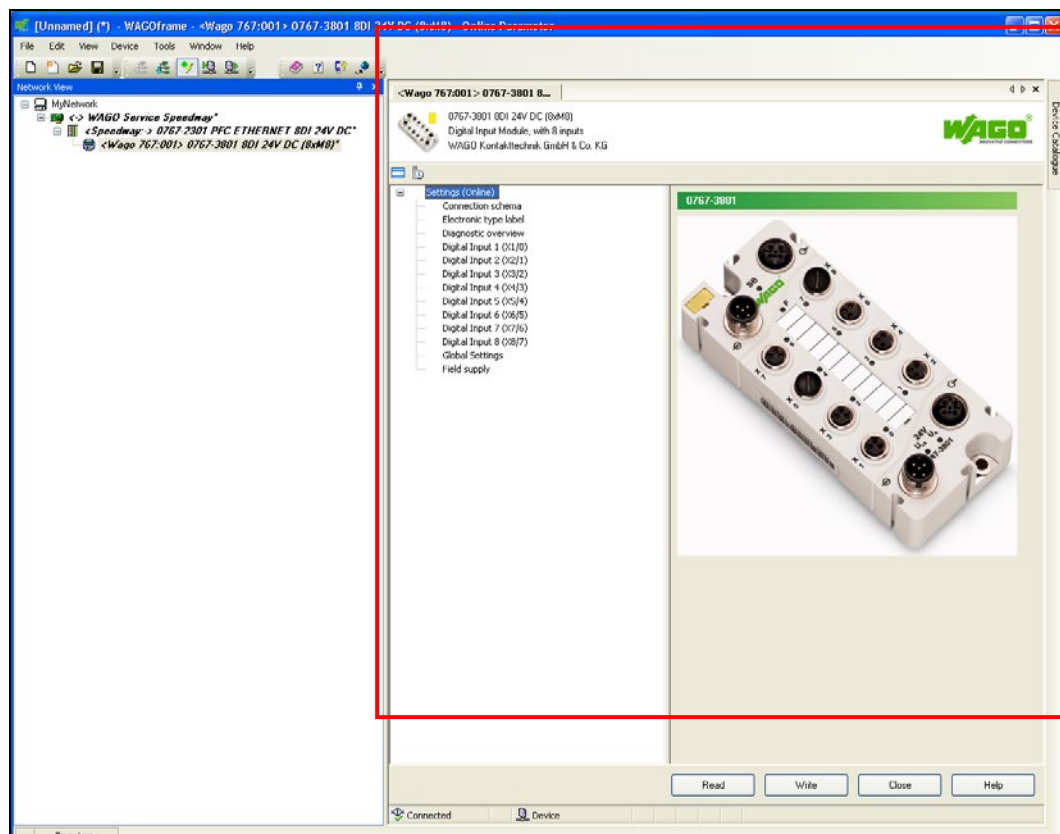


Figure 65: Example of an opened DTM with the available parameters

10.7.1 General Parameters

Electronic type label

Table 83: Information about the fieldbus coupler

Parameter	Description
Vendor	Manufacturer
Release index	FW.HW.FL FW: Actual firmware release index When updating the firmware, please note that the firmware release index may not be conformed to the printed firmware release index on the side of the fieldbus coupler. HW: Hardware release index FL: Actual firmware loader release index
Firmware revision	General information on the module
Firmware loader revision	
Order number	
Description	
Serial number	
Date of production	
Designation	Electronic marking field (max. 40 characters)

General fieldbus information

Table 84: General fieldbus information

Parameter	Description
Cyclic data exchange enabled	Enable or disable here a cyclic data exchange with the fieldbus. Checkbox selected: Cyclic data exchange enabled. Checkbox not selected: Cyclic data exchange disabled.

Date/Time

Table 85: Time settings

Parameter	Description
Daylight saving time	Activate or deactivate summer time here.
Time zone	Select your time zone here.
Actual time	Set the date and time here.
UTC	World time display

To transfer the current local time from your PC to the fieldbus coupler, click **[Apply PC time]** and then **[Write]**.

DIP switch

Display of the switch positions of the existing DIP switches on the fieldbus coupler.

S-BUS Master

Table 86: S-BUS master

Parameter	Description
Max. restarts	In the input field, enter how often the fieldbus coupler should start up again following an S-BUS disruption. 0x0: No restart 0x1 – 0xFFFFFFFF: Number of restarts 0xFFFFFFFF: Endless restarts
Actual baud rate	Actual baud rate
Actual S-BUS cycle time	Actual S-BUS cycle time

Blink Code

Table 87: Display of errors

Parameter	Description
Blink code	Display of blink code (error group, error code and error argument).

A list of blink codes and error descriptions, as well as information on error correction, can be found in section “Meaning of the Blink Codes and Procedures for Correcting Them”.

System Parameter Handling (SPH)

The SPH identifies changes to the configuration of a 767 node and automatically parameterizes I/O modules. When a configured I/O module must be replaced due to a defect, you do not need to set the parameters of the new I/O module. The stored parameters are automatically transferred to the new I/O module.

Requirement: The exchanged I/O module must have the same item number as the previous one.

To activate the SPH function, proceed as follows:

1. Select “Create nominal system configuration” to store the currently set parameters of the I/O modules in the file system of the fieldbus coupler (parameter database is created).
2. If you consider the firmware status of the new I/O module relevant, select the “FW/HW release index check I/O modules” checkbox. This requires that the exchanged I/O module has the same firmware and hardware status as the defective I/O module. If the firmware status is deviant, a blink code is

emitted in the “Error Code” field and on the CS LED of the fieldbus coupler. In this case, the firmware should be updated. For more information, see section “System Update”.

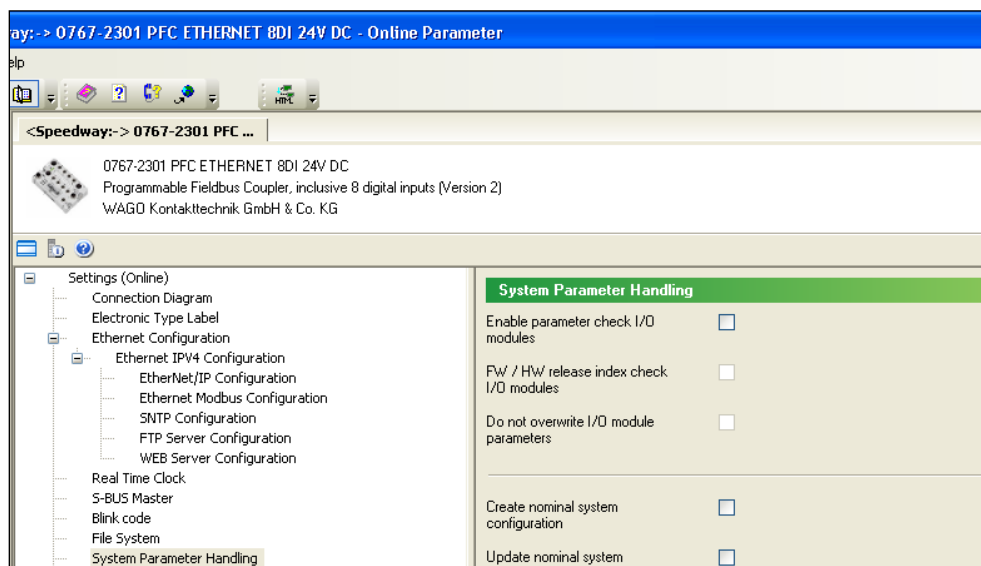


Figure 66: System parameter handling 1 (example)

3. Select “Enable parameter check I/O modules” to enable automatic configuration. A dialog box appears. Click **[YES]** if you have not created a database yet. Click **[NO]** if you have already created a database (step 1). Otherwise, you will overwrite the existing database.

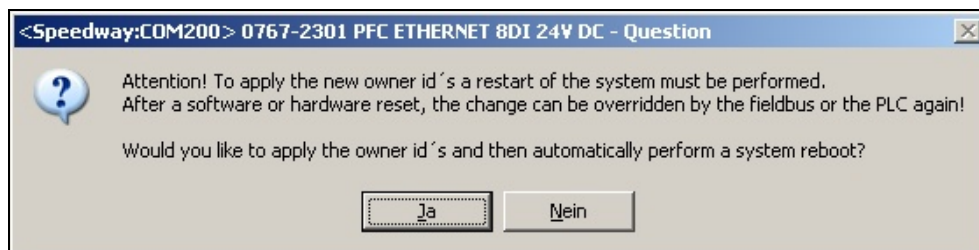


Figure 2: Warning (example)

The stored parameters are now compared with the current parameters at each start-up. If this process reveals that parameters differ, these parameters are automatically overwritten by the stored values in the I/O module.

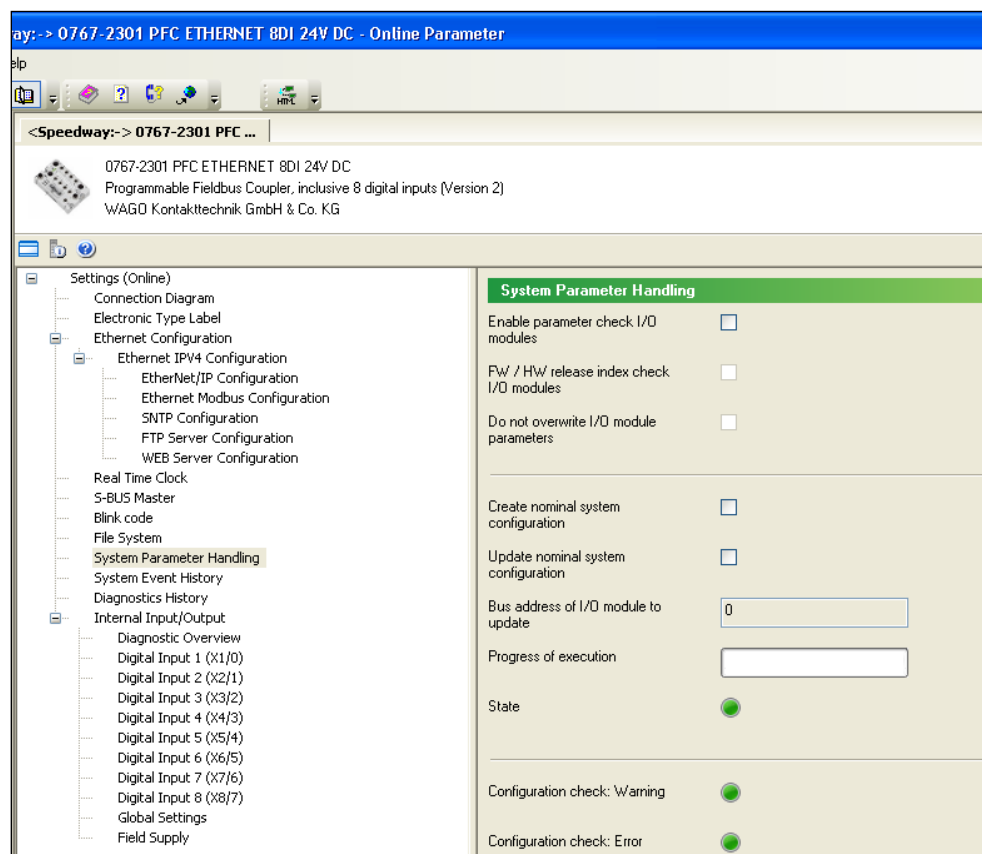


Figure 67: System parameter handling 2 (example)

Table 88: Overview of adjustable parameters for “System Parameter Handling SPH”

Parameter	Description
Enable parameter check I/O modules	Select this checkbox to enable the parameter check for the I/O modules and for the integrated inputs of the fieldbus coupler.
FW/HW release index check I/O modules	Select this checkbox to check the FW/HW release index of the I/O modules. The checkbox is only activated when “Enable parameter check I/O modules” is checked.
Do not overwrite I/O module parameters	Select this checkbox to prevent an automatic overwrite of the I/O module parameters. The checkbox is only activated when “Enable parameter check I/O modules” is checked.
Create nominal system configuration	Select this checkbox to create the parameter database.
Update nominal system configuration	Select this checkbox to update the system configuration for an I/O module. To do this, select the address of the I/O module from the “Bus address of I/O module to update” field. To update the I/O area of the coupler, select address 0.
Bus address of I/O module to be updated	Enter here the bus address of the I/O module that is to be updated. The checkbox is only activated when “Enable parameter check I/O modules” is checked. The first I/O module on the fieldbus coupler has bus address 1, the second has bus address 2, etc.
Progress of execution	The progress of the “Create nominal system configuration” and “Update nominal system configuration” parameters is shown here.

Table 88: Overview of adjustable parameters for “System Parameter Handling SPH”

Parameter	Description
State	The status of the “Create nominal system configuration” and “Update nominal system configuration” parameters is shown here: Green: Procedure OK Yellow: Procedure active Red: Error
Button [Export]	Use [Export] to store the SPH data on the PC.
Button [Import]	Use [Import] to import the SPH data from the PC to the fieldbus coupler.
Configuration check: Warning	The warning message is displayed when the “I/O module parameter not overwritten” parameter is activated, but a change between stored and current parameters has been detected. Green: No warning during configuration check Red: Warning during configuration check
Configuration check: Error	An error message is shown here when an error is discovered during the configuration check or the automatic configuration (see Section “Meaning of the Blink Codes and Procedures for Troubleshooting”): Green: No error during configuration check Red: Error during configuration check
Error code	The error code is displayed here for the configuration check error or warning that has occurred. The display is only activated when a warning or error has arisen.
Bus address of first failed component	The bus address of the first failed I/O module is displayed here. The display is only activated when a warning or error has arisen. If the error cannot be localized, the address “65535” (hex.: 0xFFFF) is displayed.

System Event History

The system event history contains a display of all system events from the fieldbus coupler. These events are also displayed as a blink code via the CS LED (see Section “Meaning of the Blink Codes and Procedures for Correcting Them”). The system events are permanently saved in the fieldbus coupler.

Table 89: Overview of system event history

Parameter	Description
Memory overflow	The status of the circular buffer is displayed here. Green: Circular buffer OK Red: Circular buffer overflow (old events are overwritten)
Entries	All events are displayed in the table. No.: Ongoing number of events Error: Notification type (Incoming: incoming notification Outgoing: outgoing notification) Error code: Error code (see Section “Meaning of the Blink Codes and Procedures for Correcting Them”) Data: Additional information on the error code Counter: Event counter (increases with repeated occurrence of identical events) Time stamp: Occurrence of events in local time of fieldbus coupler
Clear entries	Select this checkbox to delete all events.

Diagnostics History

All diagnostics of the fieldbus coupler and I/O modules are stored in the diagnostics history. The collective diagnostics are not permanently saved.

Table 90: Overview of diagnostics history

Parameter	Description
Entries	The entries of the diagnostics history are displayed in the table. The last chronological entry is always first in the table. ID: Current number of diagnostic entry S-BUS address: Bus address of the fieldbus coupler/I/O module Param. add.: Parameter address Time stamp: Occurrence of diagnostics in local time of fieldbus coupler Data: Additional information on the diagnostics
Clear entries	Input here the number of entries to be deleted. The oldest entries are deleted first. When the quantity entered is greater than the current number of entries, all entries are deleted.
Stop update	Stop the cyclic reading of the diagnostic messages.
ID of last entry	The consecutive number of the last entry in the history is displayed here.
Maximum size of history	The maximum size of the diagnostics history is displayed here in bytes.
Current history size	The current size of the diagnostics history is displayed here in bytes.
[Save]	Saves the diagnostic messages to the PC.

10.7.2 DeviceNet-Specific Parameters

DeviceNet Configuration

Table 91: Overview of DeviceNet-specific parameters

Parameter	Description
ODVA vendor ID	General information about the fieldbus coupler.
Device type	
Product code	
DeviceNet serial number	
MAC ID (active)	
MAC ID (device storage)	Here you can set a value between 0 and 63 as the MAC ID of the fieldbus coupler. This is stored in the device memory.
Baud rate (active)	Indication of current baud rate.
Baud rate (device storage)	Set the baud rate for the fieldbus coupler here. You have the following options: - 125 Kbit/s - 250 Kbit/s - 500 Kbit/s
ODVA product name	WAGO FC DeviceNet 8DI 24 V DC

DeviceNet Configuration, Fieldbus

Table 92: Overview of DeviceNet-specific parameters of the DeviceNet configuration

Parameter	Description
Fieldbus error reaction	Set the desired response of the fieldbus coupler to a fieldbus error here. - Set outputs to 0 Sets the outputs of the I/O modules to 0 - Keep last values Retains the last values of the outputs of the I/O modules
Producing class, polled I/O	Select here the application object class that is to be sent in the case of a polled I/O connection.
Producing instance, polled I/O	Enter here the application object instance that is to be sent in the case of a polled I/O connection.
Consuming class, polled I/O	Select here the application object class that is to be received in the case of a polled I/O connection.
Consuming instance, polled I/O	Enter here the application object instance that is to be received in the case of a polled I/O connection.
Producing path, COS/cyclic	Select here the application object class that is to be sent in the case of a COS/cyclic connection.
Producing instance, COS/cyclic	Enter here the application object instance that is to be sent in the case of a COS/cyclic connection.
EPR, explicit message	The expected data rate for explicit messages is given here in milliseconds.

Table 92: Overview of DeviceNet-specific parameters of the DeviceNet configuration

Parameter	Description
Watchdog timeout action, explicit message	In the case of a timeout (data rate not implemented) of the explicit messages, select here one of the following actions for the connection: - Delete automatically - Delay deletion
EPR, polled I/O	The expected data rate for polled I/O messages via the master is given here in milliseconds. This is the maximum amount of time that can elapse before an action is triggered.
Watchdog timeout action, polled I/O	In the case of a timeout (data rate not implemented) of the polled I/O messages, select here one of the following actions for the connection: - Transition to timeout - Delete automatically - Reset automatically
EPR, bit-strobe I/O	The expected data rate for bit-strobe I/O messages via the master is given here in milliseconds. This is the maximum amount of time that can elapse before an action is triggered.
Watchdog timeout action, bit-strobe I/O	In the case of a timeout (data rate not implemented) of the bit-strobe I/O messages, select here one of the following actions for the connection: - Transition to timeout - Delete automatically - Reset automatically
EPR, change of state I/O	The expected data rate for COS I/O messages via the master is given here in milliseconds.
Watchdog timeout action, change of state I/O	In the case of a timeout (data rate not implemented) of the COS I/O messages, select here one of the following actions for the connection: - Transition to timeout - Delete automatically - Reset automatically
Bus Off interrupt	Select the action that should be carried out if the CAN chip enters the <i>Bus Off</i> state: - Retain Bus Off state of CAN chip - Reset CAN chip and continue communication
Release polled I/O action	If the polled I/O connection is released, you can set an action here: - No action - Execute fieldbus fault reaction
Release change of state I/O action	If the COS I/O connection is released, you can set an action here: - No action - Execute fieldbus fault reaction

Table 92: Overview of DeviceNet-specific parameters of the DeviceNet configuration

Parameter	Description
Release bit-strobe I/O action	If the bit-strobe I/O connection is released, you can set an action here: - No action - Execute fieldbus fault reaction

DeviceNet Coupler Configuration, Device

Table 93: Overview of DeviceNet-specific parameters of the DeviceNet coupler configuration

Parameter	Description
S-BUS error reaction	The response of the fieldbus coupler to an S-BUS error appears: - Set input values to 0 (sets the process value of the input modules to 0)
Disable diagnostics on MS LED	Here you can disable the display of a diagnosis on the MS LED (red, flashing). Checkbox unselected: A pending diagnosis is displayed on the MS LED Checkbox selected: A pending diagnosis is not displayed on the MS LED
Process data input error	If this checkbox is selected, there is an error with the process input data.
Process data output error	If this checkbox is selected, there is an error with the process output data.
Diagnostic message buffer overrun	If this checkbox is selected, the fieldbus coupler has lost one or more diagnostic messages because the pending diagnoses were not retrieved or were not retrieved fast enough (internal diagnostic storage overflow).
Diagnostic message	If this checkbox is selected, at least one diagnosis is available.
Fieldbus error	If this checkbox is selected, a fieldbus error exists (e.g., timeout of I/O connection).
CAN diagnostics	This checkbox indicates whether an error counter selected under "CAN Diagnostics" has been modified. See the following page.

DeviceNet Coupler Configuration, CAN Diagnostics

Table 94: Overview of DeviceNet-specific parameters of the DeviceNet coupler configuration

Parameter	Description
Bit error counter	Error counter per CAN specification (Version 2.0). Only displays number of errors.
Bit error sets CAN diagnostic	If this checkbox is selected, the "CAN Diagnostics" parameter will indicate a change of the error counter. See previous page.
Stuff error counter	Error counter per CAN specification V2.0. Only displays number of errors.
Stuff error sets CAN diagnostic	If this checkbox is selected, the "CAN Diagnostics" parameter will indicate a change of the error counter. See previous page.
Acknowledge error counter	Error counter per CAN specification V2.0. Only displays number of errors.
Acknowledge error sets CAN diagnostic	If this checkbox is selected, the "CAN Diagnostics" parameter will indicate a change of the error counter. See previous page.
Format error counter	Error counter per CAN specification V2.0. Only displays number of errors.
Format error sets CAN diagnostic	If this checkbox is selected, the "CAN Diagnostics" parameter will indicate a change of the error counter. See previous page.
CRC error counter	Error counter per CAN specification V2.0. Only displays number of errors.
CRC error sets CAN diagnostic	If this checkbox is selected, the "CAN Diagnostics" parameter will indicate a change of the error counter. See previous page.
Rx message loss error counter	The fieldbus coupler has lost an incoming message due to an internal event.
Rx message loss sets CAN diagnostic	If this checkbox is selected, the "CAN Diagnostics" parameter will indicate a change of the error counter. See previous page.
Warning error counter	Error counter per CAN specification V2.0. Only displays number of errors.
Warning error sets CAN diagnostic	If this checkbox is selected, the "CAN Diagnostics" parameter will indicate a change of the error counter. See previous page.
Rx error counter	Error counter per CAN specification V2.0. Only displays number of errors.
Rx error sets CAN diagnostic	If this checkbox is selected, the "CAN Diagnostics" parameter will indicate a change of the error counter. See previous page.
Tx error counter	Error counter per CAN specification V2.0. Only displays number of errors.
Tx error sets CAN diagnostic	If this checkbox is selected, the "CAN Diagnostics" parameter will indicate a change of the error counter. See previous page.

10.7.3 Diagnostic Overview and Parameters of Inputs

Diagnostic Overview

The currently pending diagnostics existing on the module are displayed here. In this view of the DTM, you can enable simulation of the diagnostics, as well as disable transmission of the diagnostics. When disabling transmission, make sure that the display behavior of each LED changes that indicates the specific diagnostics (section “Operational Messages of the Fieldbus Coupler via LED Signals”).

The diagnostic overview is only available in online mode.

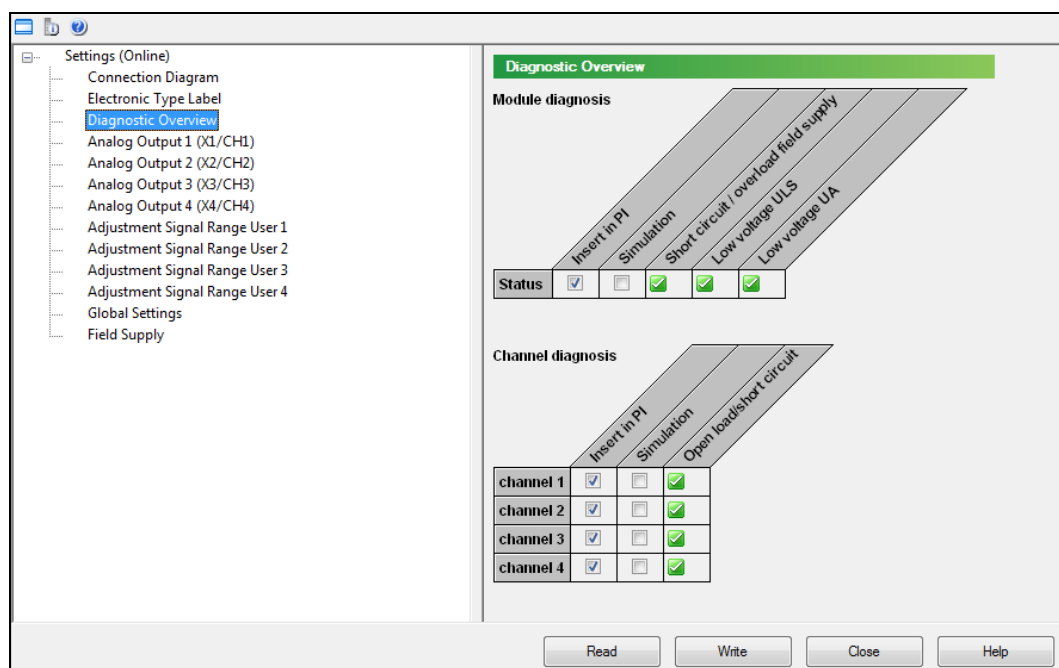


Figure 68: Diagnostic overview of the fieldbus coupler (example)

Table 95: Diagnostic setup

Parameter	Description
Insert in PI	This parameter disables/enables transmission of diagnostics. Doing so has no effect on the size of the process image, but does affect its content.
Simulation	If you have selected the “Insert in PI” checkbox, the “Simulation” parameter is released. You can select the diagnostics you want to simulate. Click the [Write] button to transfer the simulated values to the module.
Status	Displays whether there is a diagnostics: X mark: There is a diagnostic message. Check mark: There is no diagnostic message.

Table 96: Information about existing module diagnostics

Diagnostics	Description
Short circuit/overload field supply	The device has detected a short circuit or overload of the field supply (only possible when field supply is switched on).
Low voltage U_{LS}	If an undervoltage of the logic or sensor supply (U_{LS}) of $< 18\text{ V}$ occurs on the device, a corresponding diagnostic message is generated and the F-LED illuminates. The substitute value strategy that you have parameterized is used on the digital inputs.
Low voltage U_A	If an undervoltage of the actuator supply (U_A) of $< 18\text{ V}$ occurs on the device, a corresponding diagnostic message is generated and the F-LED illuminates. The undervoltage of the actuator supply has no functional effect on the device.

Parameters of Digital Inputs

Table 97: Adjustable parameters of the digital inputs

Parameter	Description
Designation	Electronic marking field (max. 40 characters).
Input value	The current input signal is displayed here. If the “Simulation Input Value” parameter has been selected, select here the input value that is to be simulated: If simulation is switched off* Checkbox unselected: Input value (0) Checkbox selected: Input value (1) If simulation is switched on Checkbox unselected: Input is simulated with value 0 Checkbox selected: Input is simulated with value 1
Signal inverting	You can invert the currently pending input signal here. Checkbox unselected*: Input signal is reproduced in the process image in the same manner as at the input Checkbox selected: Input signal is reproduced in the process image in an inverted manner
Filter time	Set the input filter for the measured signals here. You have the following options: none 0.1 ms 0.5 ms 3 ms* 15 ms 20 ms

Table 97: Adjustable parameters of the digital inputs

Parameter	Description
Substitute Value Strategy	This releases, if the field bus supports, the substitute value or the last input value in cases such as a fieldbus interruption. You have the following options: - Switch to substitute value* - Retain last value
Substitute Value	Enter here the process value that is used in case of an error. In the case of an error (fieldbus interruption), this value is used with the “Switch to Substitute Value” substitute value strategy. Checkbox unselected: 0* Checkbox selected: 1
Simulation input value	This simulation can be used to simulate input values. Checkbox unselected*: The value at the inputs is carried over into the process image. Checkbox selected: The simulation value is inserted into the process data independent of the input value. The “Input Value” parameter is selected.

* Default setting

Global Settings

Table 98: Adjustable parameters for the entire fieldbus coupler

Parameter	Description
Simulation diagnostic	If the checkbox is selected, you can simulate a low voltage diagnostic. To generate a low voltage diagnostic, one or both of the two checkboxes “Low voltage U_{LS} ” and “Low voltage U_A ” must be selected. <i>Default setting: unselected</i>
Low voltage U_{LS}	In the case of an undervoltage of the logic and sensor supply (U_{LS}) or the actuator supply (U_A), the corresponding diagnostic is displayed here.
Low voltage U_A	

Parameters of Field Supply

Table 99: Adjustable parameters of the field supply

Parameter	Description
Enable field supply	Switch on the field supply (24VDC) for the sensors here. <i>Default setting: selected</i>
Autorestart delay	In the event of a short circuit, the sensor supply is switched off for a parametrizable amount of time. Here, enter the delay time (in 100-ms increments); after this time, the sensor supply is restarted. If the short circuit still exists, the process is repeated.
Simulation diagnostic	The simulation can be used to simulate a short circuit. <i>Default setting: unselected</i>
Short circuit/overload	If simulation is deactivated, the respective error is displayed upon emergence. If simulation is activated, you can simulate one of the errors by selecting the appropriate parameter.

11 Service

This section contains information on maintenance and service.

11.1 Updating the Firmware

Information on updating the firmware can be found in section “System Update”.

11.2 Replacing the Fieldbus Coupler

To replace the fieldbus coupler, e.g., to change variants, proceed as described in the following sections.

11.2.1 Disconnecting the Cables

Before removing the connectors, clean the fieldbus coupler to ensure that no dirt or other material comes in contact with the connections. This can lead to damage of the contacts.

To unplug the cables, proceed as follows:

1. Disconnect the power supply from those devices on which you have mounted the fieldbus coupler.



CAUTION

Hot connection sockets!

Even when taking into account derating, high surface temperatures on the metallic connection sockets and on the enclosure can arise during operation. If the 767 Series component has been in operation, allow it to cool off before moving it.

2. Unscrew all screw connections and remove the cables.

11.2.2 Removing the Fieldbus Coupler from your System

To remove the fieldbus coupler from the framework of your system, proceed as follows:

1. Disconnect the power supply from those devices on which you have mounted the fieldbus coupler.
2. Release the fieldbus coupler from the framework of your system by unscrewing the M4 screws.

11.2.3 Removing the Fieldbus Coupler from the Carrier Rail

In order to keep a clear representation, the mounting rail adapter in the following figure (B, C) is shown without the fieldbus coupler.

If the fieldbus coupler is mounted on a mounting rail, proceed with the removal as follows:

1. Disconnect the power supply from those devices on which you have mounted the fieldbus coupler.
2. To remove the fieldbus coupler, press down the release eyebolt of the mounting rail adapter using a slot screwdriver (B) and remove it from the mounting rail (C).

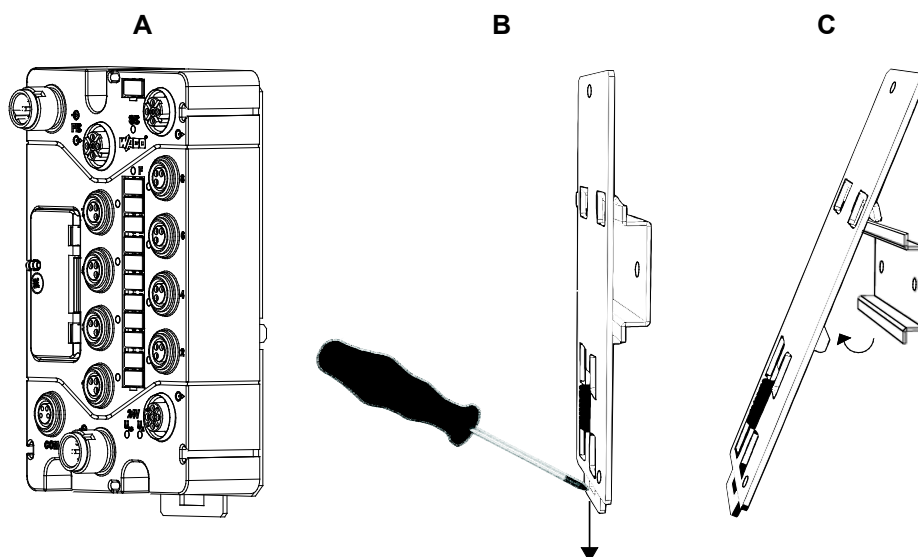


Figure 69: Removing the fieldbus coupler (with the mounting rail adapter) from the mounting rail

11.2.4 Removing the Fieldbus Coupler from the Profile Adapter

If the fieldbus coupler is mounted on a profile adapter, proceed with the removal as follows:

1. Disconnect the power supply from the device on which you have mounted the fieldbus coupler before attempting to remove.
2. Unscrew the screws on which the nuts are fastened and remove the fieldbus coupler from the profile rail of your system.
3. Unscrew the screws that connect the fieldbus coupler with the profile adapter.

11.2.5 Connecting a New Fieldbus Coupler

To connect the fieldbus coupler, proceed as described in sections “Mounting the Fieldbus Coupler” through “Start-Up”.

11.3 Disposal

Do not dispose of the 767 components in the household waste; observe the laws which apply to them. You can also contact a certified waste management company.

12 Use in Hazardous Environments

The modular system *WAGO-SPEEDWAY 767* (electrical equipment) is designed for use in Zone 2 and 22 hazardous areas.

The following sections include both the general identification of components (devices) and the installation regulations to be observed. The individual subsections of the “Installation Regulations” section must be taken into account if the fieldbus coupler and the I/O module of the series *WAGO-SPEEDWAY 767* has the required approval or is subject to the range of application of the ATEX directive.

12.1 Marking Configuration Examples

12.1.1 Marking for Europe According to ATEX and IEC-Ex

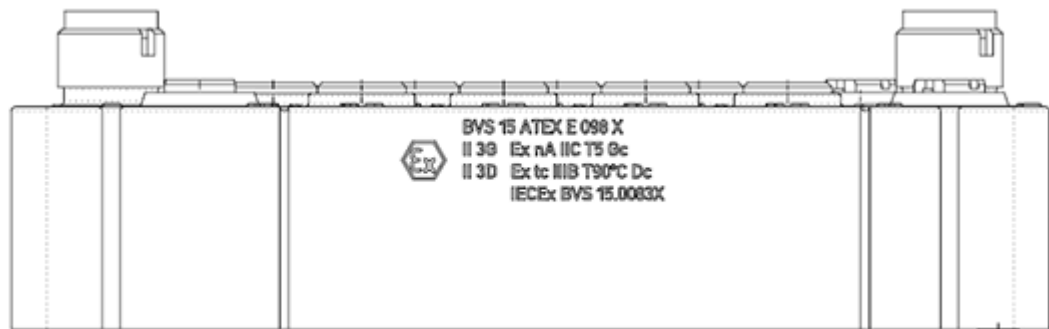


Figure 70: Side Marking Example for approved WAGO SPEEDWAY 767 Series Fieldbus Coupler according to ATEX and IECEx

Table 100: Legend for Figure “Side Marking Example for approved WAGO SPEEDWAY 767 Series Fieldbus Coupler according to ATEX and IECEx”

Printing on Text	Description
BVS 15 ATEX E098X IECEx BVS 15.0083X	Approving authority and certificate numbers
Dust	
II	Equipment group: All except mining
3D	Category 3 (Zone 22)
Ex	Explosion protection mark
Tc Dc	Type of protection and equipment protection level (EPL): protection by enclosure
IIIB	Explosion group of dust
T90°C	Max. surface temperature of the enclosure (without a dust layer)
Gases	
II	Equipment group: All except mining
3G	Category 3 (Zone 2)
Ex	Explosion protection mark
nA Gc	Type of protection and equipment protection level (EPL): Non-sparking equipment
IIC	Explosion group of gas and vapours
T5	Temperature class: Max. surface temperature 100 °C

12.2 Installation Regulations

For the installation and operation of electrical equipment in hazardous areas, the valid national and international rules and regulations which are applicable at the installation location must be carefully followed.

12.2.1 Special Conditions for Safe Use (ATEX Certificate BVS 15 ATEX E098X)

1. The Modular I/O-System has to be protected against UV emitting light.
2. The permitted ambient temperature range is -25°C ... $+50^{\circ}\text{C}$.
3. The Modular I/O-System has to be installed in a way that it is protected against any mechanical and electrostatical hazards. This may be realized by a protection measure according to the documentation mentioned in the Test Report. In this case the earthing of the metal cage has to be established by the end user.
4. The plug shall be in accordance with all applicable clauses of IEC/EN 60079-0 and IEC/EN 60079-15. A minimum degree of protection IP54 according to IEC/EN 60529 shall be ensured. This may be realized by accessories series 756 of WAGO Kontakttechnik GmbH & Co. KG. In this case the torque is 0.6 Nm.

12.2.2 Special Conditions for Safe Use (IEC Ex Certificate IECEx BVS 15.0083X)

1. The Modular I/O-System has to be protected against UV emitting light.
2. The permitted ambient temperature range is $-25^{\circ}\text{C} \dots +50^{\circ}\text{C}$.
3. The Modular I/O-System has to be installed in a way that it is protected against any mechanical and electrostatical hazards. This may be realized by a protection measure according to the documentation mentioned in the Test Report. In this case the earthing of the metal cage has to be established by the end user.
4. The plug shall be in accordance with all applicable clauses of IEC/EN 60079-0 and IEC/EN 60079-15. A minimum degree of protection IP54 according to IEC/EN 60529 shall be ensured. This may be realized by accessories series 756 of WAGO Kontakttechnik GmbH & Co. KG. In this case the torque is 0.6 Nm.

13 Accessories

In this chapter you will find a list of the most important accessory components that you need to begin operating the fieldbus coupler. The carrier rails, spacers, etc., as well as the entire accessories program from the AUTOMATION field, can be found in the Internet www.wago.com or in the “AUTOMATION” catalog.

13.1 S-BUS Cable, Assembled on One End

Table 101: S-BUS cable, assembled on one end, B coded

Description	Length	Item number	PU
S-BUS cable, M12 socket, straight, one free cable end	2.0 m	756-1301/0060-0020	1
S-BUS cable, M12 socket, straight, one free cable end	5.0 m	756-1301/0060-0050	
S-BUS cable, M12 socket, straight, one free cable end	10.0 m	756-1301/0060-0100	
S-BUS cable, M12 socket, straight, one free cable end	20.0 m	756-1301/0060-0200	
S-BUS cable, M12 socket, right angle, one free cable end	2.0 m	756-1302/0060-0020	
S-BUS cable, M12 socket, right angle, one free cable end	5.0 m	756-1302/0060-0050	
S-BUS cable, M12 socket, right angle, one free cable end	10.0 m	756-1302/0060-0100	
S-BUS cable, M12 socket, right angle, one free cable end	20.0 m	756-1302/0060-0200	
S-BUS cable, M12 plug, straight, one free cable end	2.0 m	756-1303/0060-0020	
S-BUS cable, M12 plug, straight, one free cable end	5.0 m	756-1303/0060-0050	
S-BUS cable, M12 plug, straight, one free cable end	10.0 m	756-1303/0060-0100	
S-BUS cable, M12 plug, straight, one free cable end	20.0 m	756-1303/0060-0200	
S-BUS cable, M12 plug, right angle, one free cable end	2.0 m	756-1304/0060-0020	
S-BUS cable, M12 plug, right angle, one free cable end	5.0 m	756-1304/0060-0050	
S-BUS cable, M12 plug, right angle, one free cable end	10.0 m	756-1304/0060-0100	
S-BUS cable, M12 plug, right angle, one free cable end	20.0 m	756-1304/0060-0200	

13.2 S-BUS Cable, Assembled on One End, Suitable for Drag Chains

Table 102: S-BUS cable, assembled on one end, B coded, suitable for drag chains

Description	Length	Item number	PU
S-BUS cable, M12 socket, straight, one free cable end	2.0 m	756-1501/0060-0020	1
S-BUS cable, M12 socket, straight, one free cable end	5.0 m	756-1501/0060-0050	
S-BUS cable, M12 socket, straight, one free cable end	10.0 m	756-1501/0060-0100	
S-BUS cable, M12 socket, straight, one free cable end	20.0 m	756-1501/0060-0200	
S-BUS cable, M12 socket, right angle, one free cable end	2.0 m	756-1502/0060-0020	
S-BUS cable, M12 socket, right angle, one free cable end	5.0 m	756-1502/0060-0050	
S-BUS cable, M12 socket, right angle, one free cable end	10.0 m	756-1502/0060-0100	
S-BUS cable, M12 socket, right angle, one free cable end	20.0 m	756-1502/0060-0200	
S-BUS cable, M12 plug, straight, one free cable end	2.0 m	756-1503/0060-0020	
S-BUS cable, M12 plug, straight, one free cable end	5.0 m	756-1503/0060-0050	
S-BUS cable, M12 plug, straight, one free cable end	10.0 m	756-1503/0060-0100	
S-BUS cable, M12 plug, straight, one free cable end	20.0 m	756-1503/0060-0200	
S-BUS cable, M12 plug, right angle, one free cable end	2.0 m	756-1504/0060-0020	
S-BUS cable, M12 plug, right angle, one free cable end	5.0 m	756-1504/0060-0050	
S-BUS cable, M12 plug, right angle, one free cable end	10.0 m	756-1504/0060-0100	
S-BUS cable, M12 plug, right angle, one free cable end	20.0 m	756-1504/0060-0200	

13.3 S-BUS Cable, Assembled on Both Ends

Table 103: S-BUS cable, assembled on both ends, B coded

Description	Length	Item number	PU
S-BUS cable, M12 socket, M12 plug, straight	0.2 m	756-1305/0060-0002	1
S-BUS cable, M12 socket, M12 plug, straight	0.3 m	756-1305/0060-0003	
S-BUS cable, M12 socket, M12 plug, straight	0.5 m	756-1305/0060-0005	
S-BUS cable, M12 socket, M12 plug, straight	1.0 m	756-1305/0060-0010	
S-BUS cable, M12 socket, M12 plug, straight	2.0 m	756-1305/0060-0020	
S-BUS cable, M12 socket, M12 plug, straight	5.0 m	756-1305/0060-0050	
S-BUS cable, M12 socket, M12 plug, straight	10.0 m	756-1305/0060-0100	
S-BUS cable, M12 socket, M12 plug, straight	20.0 m	756-1305/0060-0200	
S-BUS cable, M12 socket, M12 plug, straight	50.0 m	756-1305/0060-0500	
S-BUS cable, M12 socket, M12 plug, angular	0.2 m	756-1306/0060-0002	
S-BUS cable, M12 socket, M12 plug, angular	0.3 m	756-1306/0060-0003	
S-BUS cable, M12 socket, M12 plug, angular	0.5 m	756-1306/0060-0005	
S-BUS cable, M12 socket, M12 plug, angular	1.0 m	756-1306/0060-0010	
S-BUS cable, M12 socket, M12 plug, angular	2.0 m	756-1306/0060-0020	
S-BUS cable, M12 socket, M12 plug, angular	5.0 m	756-1306/0060-0050	
S-BUS cable, M12 socket, M12 plug, angular	10.0 m	756-1306/0060-0100	
S-BUS cable, M12 socket, M12 plug, angular	20.0 m	756-1306/0060-0200	
S-BUS cable, M12 socket, M12 plug, angular	50.0 m	756-1306/0060-0500	

13.4 S-BUS Cable, Assembled on Both Ends, Suitable for Drag Chains

Table 104: S-BUS cable, assembled on both ends, B coded, suitable for drag chains

Description	Length	Item number	PU
S-BUS cable, M12 socket, straight, M12 plug, straight	0.2 m	756-1505/0060-0002	1
S-BUS cable, M12 socket, straight, M12 plug, straight	0.3 m	756-1505/0060-0003	
S-BUS cable, M12 socket, straight, M12 plug, straight	0.5 m	756-1505/0060-0005	
S-BUS cable, M12 socket, straight, M12 plug, straight	1.0 m	756-1505/0060-0010	
S-BUS cable, M12 socket, straight, M12 plug, straight	2.0 m	756-1505/0060-0020	
S-BUS cable, M12 socket, straight, M12 plug, straight	5.0 m	756-1505/0060-0050	
S-BUS cable, M12 socket, straight, M12 plug, straight	10.0 m	756-1505/0060-0100	
S-BUS cable, M12 socket, straight, M12 plug, straight	20.0 m	756-1505/0060-0200	
S-BUS cable, M12 socket, straight, M12 plug, straight	50.0 m	756-1505/0060-0500	
S-BUS cable, M12 socket, angular, M12 plug, angular	0.2 m	756-1506/0060-0002	
S-BUS cable, M12 socket, angular, M12 plug, angular	0.3 m	756-1506/0060-0003	
S-BUS cable, M12 socket, angular, M12 plug, angular	0.5 m	756-1506/0060-0005	
S-BUS cable, M12 socket, angular, M12 plug, angular	1.0 m	756-1506/0060-0010	
S-BUS cable, M12 socket, angular, M12 plug, angular	2.0 m	756-1506/0060-0020	
S-BUS cable, M12 socket, angular, M12 plug, angular	5.0 m	756-1506/0060-0050	
S-BUS cable, M12 socket, angular, M12 plug, angular	10.0 m	756-1506/0060-0100	
S-BUS cable, M12 socket, angular, M12 plug, angular	20.0 m	756-1506/0060-0200	
S-BUS cable, M12 socket, angular, M12 plug, angular	50.0 m	756-1506/0060-0500	

13.5 S-BUS Cable, Not Fitted With Connectors

Table 105: S-BUS cable, not fitted with connectors

Description	Length	Item number	PU
S-BUS cable, not fitted with connectors	25.0 m	756-1300/0000-0250	1
S-BUS cable, not fitted with connectors	50.0 m	756-1300/0000-0500	
S-BUS cable, not fitted with connectors	100.0 m	756-1300/0000-1000	

13.6 S-BUS Cable, Not Fitted With Connectors, Suitable for Drag Chains

Table 106: S-BUS cable, not fitted with connectors, suitable for drag chains

Description	Length	Item number	PU
S-BUS cable, not fitted with connectors	25.0 m	756-1500/0000-0250	1
S-BUS cable, not fitted with connectors	50.0 m	756-1500/0000-0500	
S-BUS cable, not fitted with connectors	100.0 m	756-1500/0000-1000	

13.7 S-BUS Terminator and USB Cable

Table 107: S-BUS terminator and USB cable

Description	Item number	PU
S-BUS terminator, M12 plug, straight, B coded	756-9409/0060-0000	1
USB communication cable	756-4101/0042-0030	

13.8 Accessories for S-BUS

Table 108: Accessories for S-BUS

Description	Item number	PU
M12 plug, straight, B coded can be preassembled; shielded spring clamp technology	756-9401/0060-0000	1
M12 plug, angular, B coded can be preassembled; shielded spring clamp technology	756-9403/0060-0000	
M12 socket, straight, B coded can be preassembled; shielded spring clamp technology	756-9402/0060-0000	
M12 socket, angular, B coded can be preassembled; shielded spring clamp technology	756-9404/0060-0000	
M12 terminator, connection straight	756-9405/0060-0000	

13.9 Power Supply Cable, Assembled on One End

Table 109: Power supply cable, assembled on one end, A coded

Description	Length	Item number	PU
Power supply cable, M12 socket, straight, one free cable end	2.0 m	756-3101/0040-0020	1
Power supply cable, M12 socket, straight, one free cable end	5.0 m	756-3101/0040-0050	
Power supply cable, M12 socket, straight, one free cable end	10.0 m	756-3101/0040-0100	
Power supply cable, M12 socket, straight, one free cable end	20.0 m	756-3101/0040-0200	
Power supply cable, M12 socket, right angle, one free cable end	2.0 m	756-3102/0040-0020	
Power supply cable, M12 socket, right angle, one free cable end	5.0 m	756-3102/0040-0050	
Power supply cable, M12 socket, right angle, one free cable end	10.0 m	756-3102/0040-0100	
Power supply cable, M12 socket, right angle, one free cable end	20.0 m	756-3102/0040-0200	
Power supply cable, M12 plug, straight, one free cable end	2.0 m	756-3103/0040-0020	
Power supply cable, M12 plug, straight, one free cable end	5.0 m	756-3103/0040-0050	
Power supply cable, M12 plug, straight, one free cable end	10.0 m	756-3103/0040-0100	
Power supply cable, M12 plug, straight, one free cable end	20.0 m	756-3103/0040-0200	
Power supply cable, M12 plug, right angle, one free cable end	2.0 m	756-3104/0040-0020	
Power supply cable, M12 plug, right angle, one free cable end	5.0 m	756-3104/0040-0050	
Power supply cable, M12 plug, right angle, one free cable end	10.0 m	756-3104/0040-0100	
Power supply cable, M12 plug, right angle, one free cable end	20.0 m	756-3104/0040-0200	

13.10 Power Supply Cable, Assembled on Both Ends

Table 110: Power supply cable, assembled on both ends, A coded

Description	Length	Item number	PU
Power supply cable, M12 socket, M12 plug, straight	0.2 m	756-3105/0040-0002	1
Power supply cable, M12 socket, M12 plug, straight	0.3 m	756-3105/0040-0003	
Power supply cable, M12 socket, M12 plug, straight	0.5 m	756-3105/0040-0005	
Power supply cable, M12 socket, M12 plug, straight	1.0 m	756-3105/0040-0010	
Power supply cable, M12 socket, M12 plug, straight	2.0 m	756-3105/0040-0020	
Power supply cable, M12 socket, M12 plug, straight	5.0 m	756-3105/0040-0050	
Power supply cable, M12 socket, M12 plug, straight	10.0 m	756-3105/0040-0100	
Power supply cable, M12 socket, M12 plug, straight	20.0 m	756-3105/0040-0200	
Power supply cable, M12 socket, M12 plug, angular	0.2 m	756-3106/0040-0002	
Power supply cable, M12 socket, M12 plug, angular	0.3 m	756-3106/0040-0003	
Power supply cable, M12 socket, M12 plug, angular	0.5 m	756-3106/0040-0005	
Power supply cable, M12 socket, M12 plug, angular	1.0 m	756-3106/0040-0010	
Power supply cable, M12 socket, M12 plug, angular	2.0 m	756-3106/0040-0020	
Power supply cable, M12 socket, M12 plug, angular	5.0 m	756-3106/0040-0050	
Power supply cable, M12 socket, M12 plug, angular	10.0 m	756-3106/0040-0100	
Power supply cable, M12 socket, M12 plug, angular	20.0 m	756-3106/0040-0200	

13.11 Power Supply Cable, Not Fitted With Connectors

Table 111: Power supply cable, not fitted with connectors

Description	Length	Item number	PU
Power Supply cable, not fitted with connectors	25.0 m	756-3100/0000-0250	1
Power Supply cable, not fitted with connectors	50.0 m	756-3100/0000-0500	
Power Supply cable, not fitted with connectors	100.0 m	756-3100/0000-1000	

13.12 Accessories for Power Supply Cable

Table 112: Accessories for power supply cable

Description	Item number	PU
M12 plug, straight, screw clamp connection PG9	756-9203/0040-0000	1
M12 plug, right angle, screw clamp connection PG9	756-9206/0040-0000	
M12 socket, straight, screw clamp connection PG9	756-9213/0040-0000	
M12 socket, right angle, screw clamp connection PG9	756-9216/0040-0000	

13.13 CANopen, DeviceNet Cable, Assembled on One End

Table 113: CANopen, DeviceNet cable, assembled on one end, A coded

Description	Length	Item number	PU
CANopen, DeviceNet cable, M12 socket, straight, one free cable end	2.0 m	756-1401/0060-0020	1
CANopen, DeviceNet cable, M12 socket, straight, one free cable end	5.0 m	756-1401/0060-0050	
CANopen, DeviceNet cable, M12 socket, straight, one free cable end	10.0 m	756-1401/0060-0100	
CANopen, DeviceNet cable, M12 socket, straight, one free cable end	20.0 m	756-1401/0060-0200	
CANopen, DeviceNet cable, M12 socket, angular, one free cable end	2.0 m	756-1402/0060-0020	
CANopen, DeviceNet cable, M12 socket, angular, one free cable end	5.0 m	756-1402/0060-0050	
CANopen, DeviceNet cable, M12 socket, angular, one free cable end	10.0 m	756-1402/0060-0100	
CANopen, DeviceNet cable, M12 socket, angular, one free cable end	20.0 m	756-1402/0060-0200	
CANopen, DeviceNet cable, M12 plug, straight, one free cable end	2.0 m	756-1403/0060-0020	
CANopen, DeviceNet cable, M12 plug, straight, one free cable end	5.0 m	756-1403/0060-0050	
CANopen, DeviceNet cable, M12 plug, straight, one free cable end	10.0 m	756-1403/0060-0100	
CANopen, DeviceNet cable, M12 plug, straight, one free cable end	20.0 m	756-1403/0060-0200	
CANopen, DeviceNet cable, M12 plug, angular, one free cable end	2.0 m	756-1404/0060-0020	
CANopen, DeviceNet cable, M12 plug, angular, one free cable end	5.0 m	756-1404/0060-0050	
CANopen, DeviceNet cable, M12 plug, angular, one free cable end	10.0 m	756-1404/0060-0100	
CANopen, DeviceNet cable, M12 plug, angular, one free cable end	20.0 m	756-1404/0060-0200	

13.14 CANopen, DeviceNet Cable, Assembled on Both Ends

Table 114: CANopen, DeviceNet cable, assembled on both ends, D coded

Description	Length	Item number	PU
CANopen, DeviceNet cable, M12 plug, straight, M12 plug, straight	2 m	756-1405/0060-0020	1
CANopen, DeviceNet cable, M12 plug, straight, M12 plug, straight	5 m	756-1405/0060-0050	
CANopen, DeviceNet cable, M12 plug, straight, M12 plug, straight	10 m	756-1405/0060-0100	
CANopen, DeviceNet cable, M12 plug, straight, M12 plug, straight	20 m	756-1405/0060-0200	
CANopen, DeviceNet cable, M12 plug, angular, M12 plug, angular	2 m	756-1406/0060-0020	
CANopen, DeviceNet cable, M12 plug, angular, M12 plug, angular	5 m	756-1406/0060-0050	
CANopen, DeviceNet cable, M12 plug, angular, M12 plug, angular	10 m	756-1406/0060-0100	
CANopen, DeviceNet cable, M12 plug, angular, M12 plug, angular	20 m	756-1406/0060-0200	

13.15 Accessories for CANopen and DeviceNet

Table 115: Accessories for CANopen and DeviceNet

Description	Item number	PU
M12 plug, straight, A coded can be preassembled; shielded spring clamp technology	756-9207/0060-0000	1
M12 plug, angular, A coded can be preassembled; shielded spring clamp technology	756-9211/0060-0000	
M12 socket, straight, A coded can be preassembled; shielded spring clamp technology	756-9208/0060-0000	
M12 socket, angular, A coded can be preassembled; shielded spring clamp technology	756-9210/0060-0000	
M12 terminator, connection straight	756-9209/0060-0000	

13.16 Torque Wrench M8 and M12

Table 116: Torque wrench M8 and M12

Description	Item number	PU
Torque Wrench M8 and M12	206-701	1

13.17 Carrier Rail / Profile Adapters and Spacer Module

Table 117: Carrier rail / profile adapters and spacer module

Description	Item number	PU
Carrier rail adapter	767-121	1
Profile adapter	767-123	
Spacer module	767-111	

13.18 Protective Caps

Table 118: Protective caps

Description	Item number	PU
M8 protective caps for connection sockets	756-8101	1
M12 protective caps for connection sockets	756-8102	
M12 protective caps for connection plugs	756-8103	

14 Appendix

14.1 WAGO-Specific Classes

The following table provides explanations of the column headers that can appear in the tables of the classes:

Table 119: Explanation of table headers

Column Header	Description
Attribute ID	Integer value which is assigned to the respective attribute
NV	NV (non-volatile): The attribute is permanently saved in the fieldbus coupler. V (volatile): The attribute is not permanently saved in the fieldbus coupler.
Name	Identification of the attribute.
Data type	Identification of the CIP data type of the attribute.
Description	Brief description of the attribute.
Default Value	Factory setting
Access	Set: The attribute can be accessed using the Set_Attribute service (writing/modifying the attribute value). Note: If an attribute supports the Set_Attribute service, it can also be accessed with the Get_Attribute service. Get: The attribute can be accessed using the Get_Attribute services (reading the attribute value). Get_Attribute_All: Delivers the content of all attributes. Set_Attribute_Single: Modifies an attribute value.

The following table provides an overview of all WAGO-specific classes:

Table 120: WAGO-specific classes

Name	Class	Information
Coupler configuration Object	64 _{hex}	See appropriate section.
Node information class	82 _{hex}	
Discrete Input Point	65 _{hex}	
Discrete Input Point Extended 1	69 _{hex}	
Discrete Input Point Extended 2	6D _{hex}	
Discrete Input Point Extended 3	71 _{hex}	
Discrete Output Point	66 _{hex}	
Discrete Output Point Extended 1	6A _{hex}	
Discrete Output Point Extended 2	6E _{hex}	
Discrete Output Point Extended 3	72 _{hex}	
Analog Input Point	67 _{hex}	
Analog Input Point Extended 1	6B _{hex}	
Analog Input Point Extended 2	6F _{hex}	
Analog Input Point Extended 3	73 _{hex}	
Analog Output Point	68 _{hex}	
Analog Output Point Extended 1	6C _{hex}	
Analog Output Point Extended 2	70 _{hex}	
Analog Output Point Extended 3	74 _{hex}	
IOM Input Point Class	83 _{hex}	
IOM Input Point Class	83 _{hex}	

14.1.1 Bus Coupler Configuration Class Object (64_{hex})

The fieldbus coupler configuration class allows reading and configuration of some important fieldbus process parameters. The following listings explain in details all supported instances and attributes.

Class Attribute

Table 121: "Bus coupler configuration class object" class: class attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max instance	UINT	Maximum number of instances	1 (0x0001)

Instance attribute 1

Table 122: "Bus coupler configuration class object" class: instance attribute

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
5	Get	V	Fieldbus process state	USINT	Fieldbus coupler state Bit 0: Error of process input data (0x01) Bit 1: Error of process output data (0x02) Bit 2: Loss of diagnostic information (0x04) Bit 3: Module diagnostics (0x08) Bit 4: Change of diagnostic counter (0x10) Bit 7: Fieldbus error (0x80)	0
7	Get	NV	Configured Length of analog outputs	UINT	Number of bits of analog outputs	-
8	Get	NV	Configured Length of analog inputs	UINT	Number of bits of analog inputs	-
9	Get	NV	Configured Length of digital outputs	UINT	Number of bits of digital outputs	-
10	Get	NV	Configured Length of digital inputs	UINT	Number of bits of digital inputs	-

Table 122: "Bus coupler configuration class object" class: instance attribute

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
11	Get/Set	NV	Fieldbus fault action	USINT	Action in case of fieldbus error/fault 1: Set all outputs to 0 2: No action	1 (0x0001)
12	Get/Set	NV	Stored polled I/O producing path	UINT Low byte = class High byte = instance	Power-up value for polled I/O send path Selection: Assembly (104 – 109, 112) DIPx (1 ... 255) AIPx (1 ... 255) X = 0 ... 3	26628 (0x6804)
13	Get/Set	NV	Stored polled I/O consuming path	UINT Low byte = class High byte = instance	Power-up value for polled I/O receive path Selection: Assembly (101 – 103, 113) DOPx (1 ... 255) AOPx (1 ... 255) x = 0 ... 3	25860 (0x6504)
14	Get/Set	NV	Stored COS/cyclic I/O producing path	UINT Low byte = class High byte = instance	Power-up value for polled I/O send path Selection: Assembly (104 – 109, 112) DIPx (1 ... 255) AIPx (1 ... 255) x = 0 ... 3	26884 (0x6904)
15	Get/Set	NV	Expected Packet Rate (EPR) Explicit message	UINT	Specifies the timeout for the explicit message connection	2500 ms (0x09C4ms)
16	Get/Set	NV	Explicit message watchdog timeout action	USINT	Action in case of a timeout of this connection 0: Transition timeout 1: Delete connection 2: Reset connection 3: Delayed deletion of connection	1 (0x01)
17	Get/Set	NV	Expected Packet Rate (EPR) Polled I/O	UINT	Specifies the timeout for the polled I/O connection	0 ms (0x0000ms)

Table 122: "Bus coupler configuration class object" class: instance attribute

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
18	Get/Set	NV	Polled I/O watchdog timeout action	USINT	Action in case of a timeout of this connection 0: Transition timeout 1: Delete connection 2: Reset connection 3: Delayed deletion of connection	0 (0x00)
19	Get/Set	NV	Expected Packet Rate (EPR) Bit-strobe I/O	UINT	Specifies the timeout for the bit-strobe I/O connection	0 ms (0x0000ms)
20	Get/Set	NV	Bit-strobe I/O watchdog timeout action	USINT	Action in case of a timeout of this connection 0: Transition timeout 1: Delete connection 2: Reset connection 3: Delayed deletion of connection	0 (0x00)
21	Get/Set	NV	Expected Packet Rate (EPR) COS/cyclic I/O	UINT	Specifies the timeout for the COS/cyclic I/O connection	0 ms (0x0000ms)
22	Get/Set	NV	COS/cyclic I/O watchdog timeout action	USINT	Action in case of a timeout of this connection 0: Transition timeout 1: Delete connection 2: Reset connection 3: Delayed deletion of connection	0 (0x00)
23	Get/Set	NV	Bus Off interrupt	BOOL	Action in case of <i>Bus Off</i> of CAN chip 0: No action 1: Restart CAN chip	1
24	Get/Set	NV	Reaction upon release polled I/O connection	USINT	Action in case of release of polled I/O connection 0: No action 1: Execute fieldbus fault reaction (attribute 11)	0 (0x00)

Table 122: "Bus coupler configuration class object" class: instance attribute

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
25	Get/Set	NV	Reaction upon release COS/cyclic I/O connection	USINT	Action in case of release of COS/cyclic I/O connection 0: No action 1: Execute fieldbus fault reaction (attribute 11)	0 (0x00)
26	Get/Set	NV	Reaction upon release bit-strobe I/O connection	USINT	Action in case of release of bit-strobe I/O connection 0: No action 1: Execute fieldbus fault reaction (attribute 11)	0 (0x00)
45	Get	V	Error code	USINT	Error code of I/O LED	0 = no error
46	Get	V	Error argument	USINT	Error argument of I/O LED	0 = no error
51	Get/Set	NV	Fieldbus coupler configuration	UINT	Bit 0: 0/1: MS LED blinks/does not blink with a diagnostic	0 (0x0000)
52	Get/Set	NV	S-BUS Fault Reaction	USINT	Action in case of S-BUS error/fault 1: Set all inputs to 0 2: No action	1 (0x0001)
53	Get	V	Maximum diagnostic data size	UINT	Maximum quantity of purely diagnostic data in bytes	-
54	Get	V	Diagnostic message	ARRAY OF USINT	Diagnostic consisting of diagnostic path and diagnostic data	-
55	Get/Set	V	Diagnostic message acknowledgement	USINT ARRAY	Diagnostic confirmation consisting of diagnostic path and diagnostic data	-
57	Get	V	Error group	USINT	Error group of the I/O LED	0 = no error

Table 122: "Bus coupler configuration class object" class: instance attribute

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
58	Get/Set	NV	Diagnostic counter mask	WORD	Action in case of change of diagnostic counter: 0: No action 1: Bit 4 in status byte is set (see attribute 5) Bit 0: Not supported Bit 1: Not supported Bit 2: Bit error count Bit 3: Stuff error count Bit 4: Ack error count Bit 5: Form error count Bit 6: CRC error count Bit 7: Rx message loss count Bit 8: Warning error count Bit 9: Rx error counter Bit 10: Tx error counter Bit 11: Reserved Bit 12: Reserved Bit 13: Reserved Bit 14: Reserved Bit 15: Reserved	0xFFFF

Overview of Services

Table 123: "Bus coupler configuration class object" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

14.1.2 Discrete Input Point Classes

There are 4 DIP classes allowing access to the node containing up to 1020 individual digital input points.

14.1.2.1 Discrete Input Point Class (65_{hex})

This class allows the reading of data of a particular digital input point. A digital input point (DIP) can be a part of digital input module or a digital input and output module. Each DIP can have a maximum width of 8 bits. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 124: "Discrete input point" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Digital Input Values 1 through 255)

Table 125: "Discrete input point" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get	V	Value	BYTE	Object value	-
2	Get	V	Value Length	BYTE	Value length in bits	-

Overview of Services

Table 126: "Discrete input point" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute

14.1.2.2 Discrete Input Point Extended 1 (69_{hex})

The extension of the "discrete input point" class enables the reading of data from a 767 node that contains over 255 digital input points (DIPs). The instance scope of this class covers DIPs from 256 to 510 in the node. Each DIP can have a width of up to 8 bits. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 127: "Discrete input point extended 1" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Digital Input Values 256 through 510)

Table 128: "Discrete input point extended 1" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get	V	Value	BYTE	Object value	-
2	Get	V	Value Length	BYTE	Value length in bits	-

Overview of Services

Table 129: "Discrete input point extended 1" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute

14.1.2.3 Discrete Input Point Extended 2 (6D_{hex})

The second extension of the "discrete input point" class enables the reading of data from a 767 node that contains over 510 DIPs. The instance scope of this class covers DIPs from 511 to 765. Each DIP can have a width of up to 8 bits. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 130: "Discrete input point extended 2" class: class attribute

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Digital Input Values 511 through 765)

Table 131: "Discrete input point extended 2" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get	V	Value	BYTE	Object value	-
2	Get	V	Value length	BYTE	Value length in bits	-

Overview of Services

Table 132: "Discrete input point extended 2" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute

14.1.2.4 Discrete Input Point Extended 3 (71_{hex})

The third extension of the "discrete input point" class enables the reading of data from a 767 node that contains over 765 DIPs. The instance scope of this class covers DIPs from 766 to 1020. Each DIP can have a width of up to 8 bits. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 133: "Discrete input point extended 3" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Digital Input Values 766 through 1020)

Table 134: "Discrete input point extended 3" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get	V	Value	BYTE	Object value	-
2	Get	V	Value length	BYTE	Value length in bits	-

Overview of Services

Table 135: "Discrete input point extended 3" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute

14.1.3 Discrete Output Point Classes

There are 4 DOP classes allowing access to the node containing up to 1020 individual digital output points.

14.1.3.1 Discrete Output Point Class (66_{hex})

This class enables data exchange for a particular digital output point. A digital output point (DOP) can be a part of digital output module or a digital input and output module. Each DOP can have a width of up to 8 bits. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 136: "Discrete output point" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Digital Output Values 1 through 255)

Table 137: "Discrete output point" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get/Set	V	Value	BYTE	Object value	-
2	Get	V	Value length	BYTE	Value length in bits	-

Overview of Services

Table 138: "Discrete output point" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

14.1.3.2 Discrete Output Point Extended 1 (6A_{hex})

The first extension of the "discrete output point" class enables data exchange in a 767 node that contains over 255 DOPs. The instance scope of this class covers DOPs from 256 to 510. Each DOP can have a width of up to 8 bits. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 139: "Discrete output point extended 1" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Digital Output Values 256 through 510)

Table 140: "Discrete output point extended 1" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get/Set	V	Value	BYTE	Object value	-
2	Get	V	Value length	BYTE	Value length in bits	-

Overview of Services

Table 141: "Discrete output point extended 1" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

14.1.3.3 Discrete Output Point Extended 2 (6E_{hex})

The second extension of the "discrete output point" class enables data exchange in a 767 node that contains over 510 DOPs. The instance scope of this class covers DOPs from 511 to 765. Each DOP can have a width of up to 8 bits. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 142: "Discrete output point extended 2" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Digital Output Values 511 through 765)

Table 143: "Discrete output point extended 2" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get/Set	V	Value	BYTE	Object value	-
2	Get	V	Value length	BYTE	Value length in bits	-

Overview of Services

Table 144: "Discrete output point extended 2" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

14.1.3.4 Discrete Output Point Extended 3 (72_{hex})

The third extension of the "discrete output point" class enables data exchange in a 767 node that contains over 765 DOPs. The instance scope of this class covers DOPs from 766 to 1020. Each DOP can have a width of up to 8 bits. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 145: "Discrete output point extended 3" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Digital Output Values 766 through 1020)

Table 146: "Discrete output point extended 3" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get/Set	V	Value	BYTE	Object value	-
2	Get	V	Value length	BYTE	Value length in bits	-

Overview of Services

Table 147: "Discrete output point extended 3" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

14.1.4 Analog Input Point Classes

There are 4 AIP classes allowing access to the 767 node containing up to 1020 individual analog input points.

14.1.4.1 Analog Input Point Class (67_{hex})

This class enables the reading of data of a particular analog input point. An analog input point is part of an analog input module. Each AIP can contain up to 65535 bytes. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 148: "Analog input point" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Analog Input Values 1 through 255)

Table 149: "Analog input point" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get	V	Value	BYTE ARRAY	Object value	-
2	Get	V	Value length	BYTE	Value length in bytes	-
3	Get	V	Extended value length	WORD	Extended value range of values larger than 254 bytes	-

Overview of Services

Table 150: "Analog input point" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute

14.1.4.2 Analog Input Point Extended 1 (6B_{hex})

The first extension of the "analog input point" class enables the reading of data from a 767 node that contains over 255 AIPs. The instance scope of this class covers AIPs from 256 to 510. Each AIP can contain up to 65535 bytes. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 151: "Analog input point extended 1" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Analog Input Values 256 through 510)

Table 152: "Analog input point extended 1" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get	V	Value	BYTE ARRAY	Object value	-
2	Get	V	Value length	BYTE	Value length in bytes	-
3	Get	V	Extended value length	WORD	Extended value range of values larger than 254 bytes	-

Overview of Services

Table 153: "Analog input point extended 1" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute

14.1.4.3 Analog Input Point Extended 2 (6F_{hex})

The second extension of the "analog input point" class enables the reading of data from a 767 node that contains over 510 AIPs. The instance scope of this class covers AIPs from 511 to 765. Each AIP can contain up to 65535 bytes. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 154: "Analog input point extended 2" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Analog Input Values 511 through 765)

Table 155: "Analog input point extended 2" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get	V	Value	BYTE ARRAY	Object value	-
2	Get	V	Value length	BYTE	Value length in bytes	-
3	Get	V	Extended value length	WORD	Extended value range of values larger than 254 bytes	-

Overview of Services

Table 156: "Analog input point extended 2" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute

14.1.4.4 Analog Input Point Extended 3 (73_{hex})

The third extension of the "analog input point" class enables the reading of data from a 767 node that contains over 765 AIPs. The instance scope of this class covers AIPs from 766 to 1020. Each AIP can contain up to 65535 bytes. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 157: "Analog input point extended 3" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Analog Input Values 766 through 1020)

Table 158: "Analog input point extended 3" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get	V	Value	BYTE ARRAY	Object value	-
2	Get	V	Value length	BYTE	Value length in bytes	-
3	Get	V	Extended value length	WORD	Extended value range of values larger than 254 bytes	-

Overview of Services

Table 159: "Analog input point extended 3" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute

14.1.5 Analog Output Point Classes

There are four AOP classes allowing access to the node containing up to 1020 individual analog output points.

14.1.5.1 Analog Output Point (68_{hex})

This class enables the reading of data of a particular analog output point. An analog output point is part of an analog output module. Every AOP can contain up to 65535 bytes. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 160: "Analog output point" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Analog Output Values 1 through 255)

Table 161: "Analog output point" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get/Set	V	Value	BYTE ARRAY	Object value	-
2	Get	V	Value length	BYTE	Value length in bytes	-
3	Get	V	Extended value length	WORD	Extended value range of values larger than 254 bytes	-

Overview of Services

Table 162: "Analog output point" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

14.1.5.2 Analog Output Point Extended 1 (6C_{hex})

The first extension of the "analog output point" class enables the reading of data from a 767 node that contains over 255 AOPs. The instance scope of this class covers AOPs from 256 to 510. Every AOP can contain up to 65535 bytes. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 163: "Analog output point extended 1" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Analog Output Values 256 through 510)

Table 164: "Analog output point extended 1" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get/Set	V	Value	BYTE ARRAY	Object value	-
2	Get	V	Value length	BYTE	Value length in bytes	-
3	Get	V	Extended value length	WORD	Extended value range of values larger than 254 bytes	-

Overview of Services

Table 165: "Analog output point extended 1" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

14.1.5.3 Analog Output Point Extended 2 (70_{hex})

The second extension of the "analog output point" class enables the reading of data from a 767 node that contains over 510 AOPs. The instance scope of this class covers AOPs from 511 to 765. Every AOP can contain up to 65535 bytes. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 166: "Analog output point extended 2" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Analog Output Values 511 through 765)

Table 167: "Analog output point extended 2" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get/Set	V	Value	BYTE ARRAY	Object value	-
2	Get	V	Value length	BYTE	Value length in bytes	-
3	Get	V	Extended value length	WORD	Extended value range of values larger than 254 bytes	-

Overview of Services

Table 168: "Analog output point extended 2" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

14.1.5.4 Analog Output Point Extended 3 (74_{hex})

The third extension of the "analog output point" class enables the reading of data from a 767 node that contains over 765 AOPs. The instance scope of this class covers AOPs from 766 to 1020. Every AOP can contain up to 65535 bytes. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 169: "Analog output point extended 3" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	-

Instance Attributes of Instances 1 through 255 (Analog Output Values 766 through 1020)

Table 170: "Analog output point extended 3" class: instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get/Set	V	Value	BYTE ARRAY	Object value	-
2	Get	V	Value length	BYTE	Value length in bytes	-
3	Get	V	Extended value length	WORD	Extended value range of values larger than 254 bytes	-

Overview of Services

Table 171: "Analog output point extended 3" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

14.1.6 IOM Input Point Class (83_{hex})

This class provides information about an individual I/O modules. This includes the breadth of process information for the input points of the I/O module in bytes. In addition, this class also provides access to the process information of the module. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 172: "IOM Input Point Class" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances: 65	-

Instance Attributes of Instances 1 through 65 (I/O module 1 through 65)

Table 173: „IOM Input Point Class“ class: Instance attributes

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get	V	Value	BYTE ARRAY	Object value	-
2	Get	V	Value Length	BYTE	Value length in bytes	-



Note

Reference of the instances

The instances comply with the respective position of the I/O modules connected to the fieldbus coupler. Instance 1 refers to the integrated digital inputs or outputs of the fieldbus coupler. Instance 2 refers to the first I/O module connected to the fieldbus coupler, instance 3 to the second I/O module, etc. If an I/O module has no input point, then instance attribute 2 (Value Length) has the value 0.

Overview of Services

Table 174: "IOM Input Point Class" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute

14.1.7 IOM Output Point Class (84_{hex})

This class provides information about an individual I/O modules. This includes the breadth of process information for the output points of the I/O module in bytes. In addition, this class also provides access to the process information of the module. The following tables provide an overview of the instances and attributes supported by WAGO:

Class Attributes

Table 175: “IOM Output Point Class” class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances: 65	-

Instance Attributes of Instances 1 through 65 (I/O module 1 through 65)

Table 176: „IOM Output Point Class“ class: Instance attribute

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get/Set	V	Value	BYTE ARRAY	Object value	-
2	Get	V	Value Length	BYTE	Value length in bytes	-

Note



Reference of the instances

The instances comply with the respective position of the I/O modules connected to the fieldbus coupler. Instance 1 refers to the integrated digital inputs or outputs of the fieldbus coupler. Instance 2 refers to the first I/O module connected to the fieldbus coupler, instance 3 to the second I/O module, etc. If an I/O module has no output point, then instance attribute 2 (Value Length) has the value 0.

Overview of Services

Table 177: “IOM Output Point Class” class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

14.1.8 Node Information Class (82_{hex})

This class provides information on an individual I/O module. Among the important information is the item number. Additional information about the I/O module can be found in instance attribute 2. This information can be obtained regardless of whether the I/O module is physical or virtual or if the process image is assigned to DeviceNet.

Class Attributes

Table 178: "Node information" class: class attributes

Attribute ID	Access	Name	Data Type	Description	Default Value
1	Get	Revision	UINT	Version of object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances: 65	-

Instance attributes of instances 1 through 255 (I/O modules 1 through 65)

Table 179: "Node information" class: instance attribute

Attribute ID	Access	NV	Name	Data Type	Description	Default Value
1	Get	V	Order number	SHORT_STRING	Item number	-
2	Get	V	Additional info	UDINT	*	-

* Bit 0: Additional module information

0 = Physical I/O module,

1 = Virtual I/O module

Bit 1: The process image is assigned to EtherNet/IP

0 = No,

1 = Yes

Overview of Services

Table 180: "Node information" class: services

Service Code	Service Available		Service Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Delivers content of respective attribute

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