TECHDOCS

Manual

750-363

FC EtherNet/IP; G4; ECO

Fieldbus Coupler EtherNet/IP, Generation 4, ECO

Version 1.0.1

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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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1 Notes about this Documentation

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.

1.1 Validity of this Documentation

This documentation is only applicable to the “FC EtherNet/IP; G4; ECO” (750-363).

The product “FC EtherNet/IP; G4; ECO” (750-363) shall only be installed and operated according to the instructions in this manual and the system description for the WAGO-I/O-SYSTEM 750.

NOTICE

Consider power layout of the WAGO-I/O-SYSTEM 750!
In addition to these operating instructions, you will also need the system description for the WAGO-I/O-SYSTEM 750, which can be downloaded at www.wago.com. There, you can obtain important information including information on electrical isolation, system power and supply specifications.

1.2 Copyright

1.3 Property rights

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1.4 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).

1.5 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 (.)

1.6 Font Conventions

Table 2: Font Conventions

Font Type	Indicates
italic	Names of paths and data files are marked in italic-type. e.g.: *C:\Program Files\WAGO Software*
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. 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 Qualifications

All sequences implemented on WAGO I/O SYSTEM 750 devices may only be carried out by electrical specialists with sufficient knowledge in automation. The specialists must be familiar with the current norms and guidelines for the devices and automated environments.

All changes to the coupler or controller should always be carried out by qualified personnel with sufficient skills in PLC programming.

2.1.3 Use of the 750 Series in Compliance with Underlying Provisions

Fieldbus couplers, controllers and I/O modules of the modular WAGO-I/O-SYSTEM 750 receive digital and analog signals from sensors and transmit them to actuators or higher-level control systems. Using controllers, the signals can also be (pre-) processed.

This product is designed for protection class IP20. There is protection against finger injury and solid impurities up to 12.5 mm diameter is assured; protection against water damage is not ensured.
The product represents an open-type device. It may only be installed in enclosures (tool-secured enclosures or operating rooms) which fulfil the listed requirements specified in the safety instructions in chapter “Safety Advice (Precautions)”.

The product is intended for installation in automation systems. It does not have its own integrated separator. A suitable separator must therefore be created on the plant side.

The operation of the product in residential areas without further measures is only permitted if the product complies with the emission limits (interference emissions) according to EN 61000-6-3.

Operating the product in home applications without further measures is only permitted if it meets the emission limits (emissions of interference) according to EN 61000-6-3.
You will find the relevant information in the section “Device Description” > “Standards and Guidelines” in the manual for the used fieldbus coupler/controller.

Appropriate housing (per 2014/34/EU) is required when operating the WAGO-I/O-SYSTEM 750 in hazardous environments. Please note that a prototype test certificate must be obtained that confirms the correct installation of the system in a housing or switch cabinet.

The implementation of safety functions such as EMERGENCY STOP or safety door monitoring must only be performed by the F I/O modules within the modular WAGO-I/O-SYSTEM 750. Only these safe F I/O modules ensure functional safety in accordance with the latest international standards. WAGO's interference-free output modules can be controlled by the safety function.

2.1.4 Technical Condition of Specified Devices

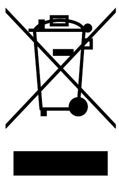
The devices to be supplied ex works are equipped with hardware and software configurations, which meet the individual application requirements. These modules contain no parts that can be serviced or repaired by the user. The following actions will result in the exclusion of liability on the part of WAGO Kontakttechnik GmbH & Co. KG:

- Repairs,
- Changes to the hardware or software that are not described in the operating instructions,
- Improper use of the components.

Further details are given in the contractual agreements. Please send your request for modified and new hardware or software configurations directly to WAGO Kontakttechnik GmbH & Co. KG.

2.1.4.1 Disposal

2.1.4.1.1 Electrical and Electronic Equipment



Electrical and electronic equipment may not be disposed of with household waste. This also applies to products without this symbol.

Electrical and electronic equipment contain materials and substances that can be harmful to the environment and health. Electrical and electronic equipment must be disposed of properly after use.
WEEE 2012/19/EU applies throughout Europe. Directives and laws may vary nationally.

Environmentally friendly disposal benefits health and protects the environment from harmful substances in electrical and electronic equipment.

- Observe national and local regulations for the disposal of electrical and electronic equipment.
- Clear any data stored on the electrical and electronic equipment.
- Remove any added battery or memory card in the electrical and electronic equipment.
- Have the electrical and electronic equipment sent to your local collection point.

Improper disposal of electrical and electronic equipment can be harmful to the environment and human health.

2.1.4.1.2 Packaging

Packaging contains materials that can be reused.
PPWD 94/62/EU and 2004/12/EU packaging guidelines apply throughout Europe. Directives and laws may vary nationally.

Environmentally friendly disposal of the packaging protects the environment and allows sustainable and efficient use of resources.

- Observe national and local regulations for the disposal of packaging.
- Dispose of packaging of all types that allows a high level of recovery, reuse and recycling.

Improper disposal of packaging can be harmful to the environment and wastes valuable resources.

2.2 Safety Advice (Precautions)

For installing and operating purposes of the relevant device to your system the following safety precautions shall be observed:

⚠ DANGER

Do not work on devices while energized!
All power sources to the device shall be switched off prior to performing any installation, repair or maintenance work.

⚠ DANGER

Install device in only one suitable enclosure!
The device is an open system. Install the device in a suitable enclosure. This enclosure must:

- Guarantee that the max. permissible degree of pollution is not exceeded.
- Offer adequate protection against contact.
- Prevent fire from spreading outside of the enclosure.
- Offer adequate protection against UV irradiation.
- Guarantee mechanical stability
- Restrict access to authorized personnel and may only be opened with tools

⚠ DANGER

Ensure disconnect and overcurrent protection!
The device is intended for installation in automation technology systems. Disconnect protection is not integrated. Connected systems must be protected by a fuse.
Provide suitable disconnect and overcurrent protection on the system side!

⚠ DANGER

Ensure a standard connection!
To minimize any hazardous situations resulting in personal injury or to avoid failures in your system, the data and power supply lines shall be installed according to standards, with careful attention given to ensuring the correct terminal assignment. Always adhere to the EMC directives applicable to your application.

NOTICE

Do not use in telecommunication circuits!
Only use devices equipped with ETHERNET or RJ-45 connectors in LANs. Never connect these devices with telecommunication networks.

NOTICE

Ensure proper contact with the DIN-rail!
Proper electrical contact between the DIN-rail and device is necessary to maintain the EMC characteristics and function of the device.

NOTICE

Replace defective or damaged devices!
Replace defective or damaged device/module (e.g., in the event of deformed contacts).

NOTICE

Protect the components against materials having seeping and insulating properties!
The components are not resistant to materials having seeping and insulating properties such as: aerosols, silicones and triglycerides (found in some hand creams). If you cannot exclude that such materials will appear in the component environment, then install the components in an enclosure being resistant to the above-mentioned materials. Clean tools and materials are imperative for handling devices/modules.

NOTICE

Clean only with permitted materials!
Clean housing and soiled contacts with propanol.

NOTICE

Do not use any contact spray!
Do not use any contact spray. The spray may impair contact area functionality in connection with contamination.

NOTICE

Do not reverse the polarity of connection lines!
Avoid reverse polarity of data and power supply lines, as this may damage the devices involved.

NOTICE

Avoid electrostatic discharge!
The devices are equipped with electronic components that may be destroyed by electrostatic discharge when touched. Please observe the safety precautions against electrostatic discharge per DIN EN 61340-5-1/-3. When handling the devices, please ensure that environmental factors (personnel, work space and packaging) are properly grounded.

2.3 Special Use Conditions for ETHERNET Devices

If not otherwise specified, ETHERNET devices are intended for use on local networks. Please note the following when using ETHERNET devices in your system:

- Do not connect control components and control networks directly to an open network such as the Internet or an office network. WAGO recommends putting control components and control networks behind a firewall.
- In the control components (e.g., for WAGO I/-CHECK and CODESYS) close all ports and services not required by your application to minimize the risk of cyber attacks and to enhance cyber security.
  Only open ports and services during commissioning and/or configuration.
- Limit physical and electronic access to all automation components to authorized personnel only.
- Change the default passwords before first use! This will reduce the risk of unauthorized access to your system.
- Regularly change the passwords used! This will reduce the risk of unauthorized access to your system.
- If remote access to control components and control networks is required, use a Virtual Private Network (VPN).
- Regularly perform threat analyses. You can check whether the measures taken meet your security requirements.
- Use “defense-in-depth” mechanisms in your system's security configuration to restrict the access to and control of individual products and networks.

3 System Description

The WAGO-I/O-SYSTEM 750 is a modular, fieldbus-independent input/output system (I/O system). The configuration described here consists of a fieldbus coupler/controller (1) and the modular I/O modules (2) for any signal shapes that form the fieldbus node together. The end module (3) completes the node and is required for correct operation of the fieldbus node.

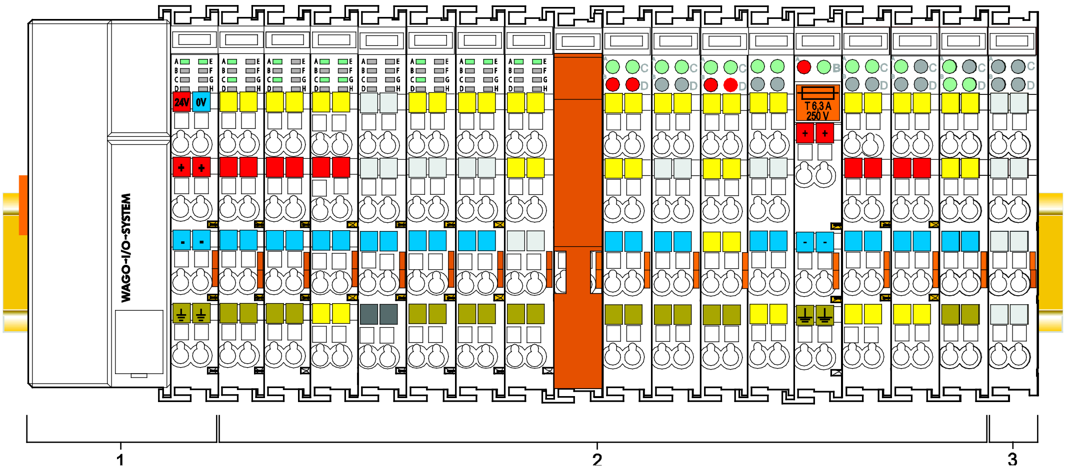


Figure 1: Fieldbus Node (Example)

Fieldbus couplers/controllers are available for different fieldbus systems.

The ECO coupler contains the fieldbus interface, electronics and a power supply for the system. The fieldbus interface forms the physical interface to the relevant fieldbus. The electronics process the data of the bus modules and make it available for the fieldbus communication.

I/O modules for diverse digital and analog I/O signals as well as special functions can be connected to the fieldbus coupler/controller. The communication between the fieldbus coupler/controller and the I/O modules is carried out via a local bus.

The components of the WAGO I/O SYSTEM 750 have clear termination points, light emitting diodes for status display, plug-in mini WSB tags and group marker cards for labeling.

The 1, 2 or 3 wire technology supplemented by a ground wire connection allows for direct sensor or actuator wiring.

3.1 Labeling

The front labeling includes:

- Device designation
- Name of the display elements, connections and control elements
- Serial number with hardware and firmware version

The side labeling includes:

- Manufacturer's identification
- Connector pin assignment
- Serial number
- Approval information

3.1.1 Labeling Symbols

Some general information and the respective product approvals are shown in the labeling as symbols.

Table 3: Labeling Symbols

Symbol	Meaning	Description
General Symbols		
Hansastr. 27 D-32423 Minden	Manufacturer's identification	Manufacturer name and address
	Data matrix code	One-to-one product identification by means of UII (Unique Item Identifier)
	General warning label	Read this manual carefully for safe use and proper handling
	ESD danger sign	Avoid electrostatic discharge! → See chapter "Safety Advice (Precautions)"
	WEEE label	Note on disposal →See chapter „Disposal“
Symbols of Approvals (Examples)		
	Conformity marking	Approval information → See chapter "Approvals"
	Korean Certificate	
	Ex approvals	
	Ship approvals	
	TÜV symbol	

3.1.2 Manufacturing Number

The serial number indicates the delivery status directly after production.

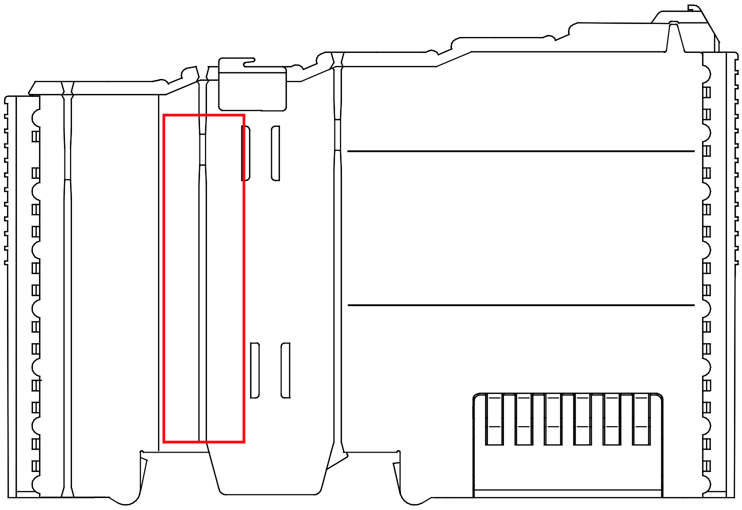


Figure 2: Marking Area for Serial Numbers

There are two serial numbers in two rows in the side marking. They are left of the release tab. The first 10 positions in the longer row of the serial numbers contain version and date identifications.

Example structure of the rows: 0114010101…

01	**14**	**01**	**01**	**01**	**(additional positions)**
WW	**YY**	**FW --**	**HW**	**FL**	**-**
Calendar week	Year	Firmware version	Hardware version	Firmware loader version	Internal information

The row order can vary depending on the production year, only the longer row is relevant. The back part of this and the shorter row contain internal administration information from the manufacturer.

In addition, the serial number is printed on the front on the cover cap of the service interface, so that it can also be read when installed.

3.1.3 Hardware Address (MAC-ID)

Each **FC EtherNet/IP; G4;** ECO has an internationally unambiguous physical address, referred to as the MAC-ID (Media Access Control Identity).

As part of the labeling on the right side of this component, the MAC ID is printed in the block diagram.
In addition, the MAC ID is located on the paper strip with two self-adhesive peel-off strips on its left side.
The MAC ID has a fixed length of 6 bytes (48 bits) which are presented hexadecimal. The first three bytes identify the manufacturer (e.g. 00:30 DE for WAGO). The second 3 bytes comprise the unique serial number of the hardware.

3.1.4 Update Matrix

For products that can be updated, the side inscription has a prepared matrix in which the current update data can be entered in columns.

The matrix has rows to enter the “FA” production or work order number and to enter the “PD” production date and “AZ” item number.

FA	XXXXXXXXXX	
PD	WWJJ	
AZ	FWHWFL	

Figure 3: Update Matrix from 2016

Table 4: Legend for Figure “Update Matrix from 2016”

	Description
FA	Production order number, 10-digit
PD	KW = calendar week YY = year
AZ	FW = firmware index HW = hardware index FL = firmware loader index

For factory updates to a head station, the current production or work order number is also printed on the cover cap of the service interface.

The original manufacturing information on the product housing remains unchanged.

3.2 Storage, Assembly and Transport

Whenever possible, the components are to be stored in their original packaging. Likewise, the original packaging provides optimal protection during transport.

When assembling or repacking the components, the contacts must not be soiled or damaged. The components must be stored and transported in appropriate containers/packaging. Thereby, the ESD information is to be regarded.

3.3 Assembly Guidelines/Standards

- DIN 60204 Electrical equipment of machines
- DIN EN 50178 Electronic equipment for use in power installations (replacement for VDE 0160)
- EN 60439 Low-voltage switchgear and controlgear assemblies

3.4 Power Supply

3.4.1 Overcurrent Protection

⚠ WARNING

Possible fire hazard due to insufficient overcurrent protection!
In the event of a fault, insufficient overcurrent protection can present a possible fire hazard. In the event of a fault, excessive current flow in the components can cause significant overheating. Therefore, you should always dimension the overcurrent protection according to the anticipated power usage.

The system and field voltage of the WAGO-I/O-SYSTEMs 750 is supplied on the head stations and bus supply modules.
For components that work with extra low voltage, only SELV/PELV voltage sources should be used.

A single voltage source supplying multiple components must be designed according to the component with the strictest electrical safety requirements.
For components which are only allowed to be supplied by SELV voltage sources, these requirements are listed in the technical data.

Most components in the WAGO-I/O-SYSTEM 750 have no internal overcurrent protection. Therefore, appropriate overcurrent production must always be implemented externally for the power supply to these components, e.g. via fuses. The maximum permissible current is listed in the technical data of the components used.

NOTICE

System supply only with appropriate fuse protection!
Without overcurrent protection, the electronics can be damaged.
For 24V system supply input voltage an external fuse, rated max. 2 A, slow acting, min. 30 VDC shall be used.

NOTICE

Field supply only with appropriate fuse protection!
Without overcurrent protection, the electronics can be damaged.
For 24V field supply input voltage an external fuse, rated max. 10 A, slow acting, min. 30 VDC shall be used.

3.4.2 Isolation

Within the fieldbus node, there are three electrically isolated potentials:

- Electrically isolated fieldbus interface via transformer
- Electronics of the fieldbus couplers/controllers and the I/O modules (local bus)
- All I/O modules have an electrical isolation between the electronics (local bus, logic) and the field electronics. Some digital and analog input modules have each channel electrically isolated, please see catalog.

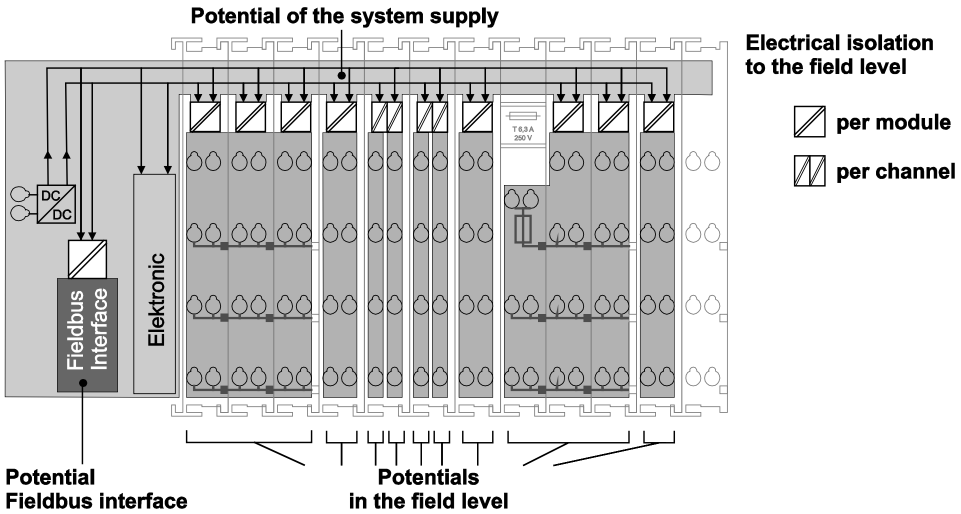


Figure 4: Isolation (Example)

3.4.3 System Supply

3.4.3.1 Connection

The WAGO-I/O-SYSTEM 750 requires a 24 V direct current system supply.
The power supply is provided via the fieldbus coupler/controller and, if necessary, in addition via internal system supply modules 750-613. The power supply is reverse voltage protected.

NOTICE

Do not use an incorrect voltage/frequency!
The use of an incorrect supply voltage or frequency can cause severe damage to the components.

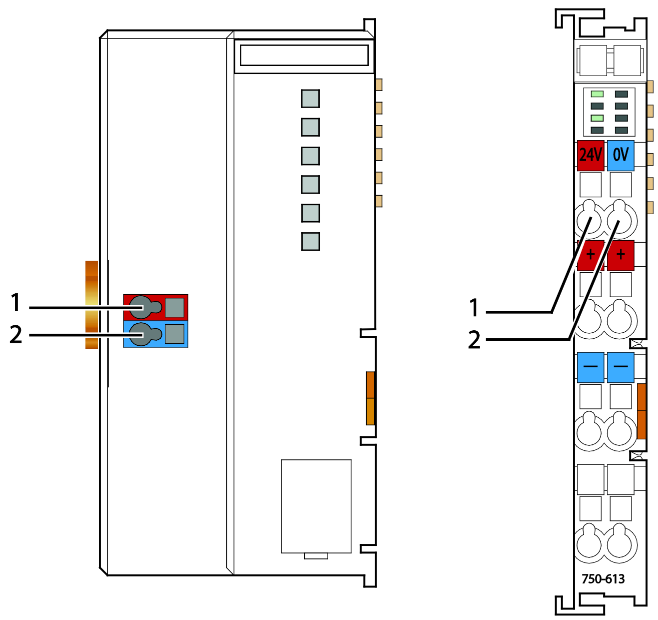


Figure 5: System Supply

Table 5: Legend for Figure “System Supply”

Pos.	Description
1	System supply 24 VDC (−15% / +20%)
2	System supply 0 V

The fed-in 24 VDC supplies all internal system components, e.g. fieldbus coupler/controller electronics, fieldbus interface and I/O modules via the local bus (5 VDC system voltage). The 5 VDC system voltage is galvanically connected to the 24 VDC supply voltage.

NOTICE

System supply only with appropriate fuse protection!
Without overcurrent protection, the electronics can be damaged.
For 24V system supply input voltage an external fuse, rated max. 2 A, slow acting, min. 30 VDC shall be used.

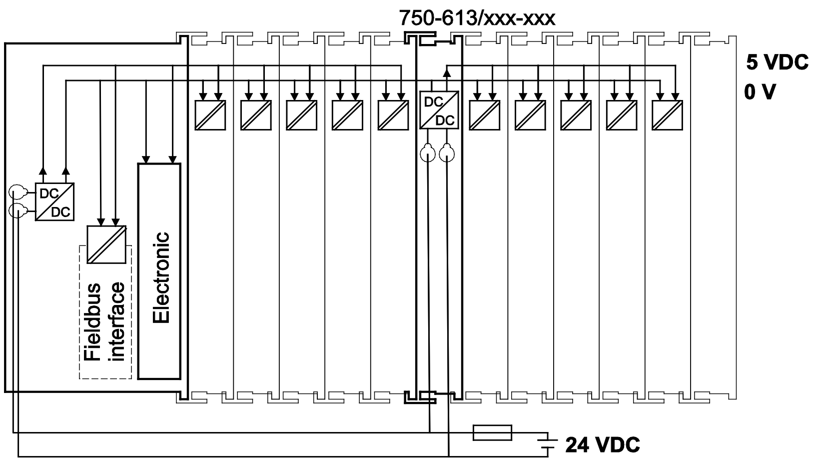


Figure 6: System Voltage (Example)

Note

Only reset the system simultaneously for all supply modules!
Reset the system by switching the system supply simultaneously at all supply modules (fieldbus coupler/controller and potential supply module with bus power supply) off and on again.

3.4.3.2 Dimensioning

Note

Recommendation
A stable power supply cannot always be assumed. Therefore, you should use regulated power supplies to ensure the quality of the supply voltage.

The supply capacity of the fieldbus coupler/controller or the internal system supply module can be taken from the technical data of the components.

Table 6: Alignment

Internal current consumption*)	Current consumption via system voltage (5 V for electronics of I/O modules and fieldbus coupler/controller).
Total current for I/O modules*)	Available current for the I/O modules. Provided by the bus power supply unit. See fieldbus coupler/controller and internal system supply module

*) See current catalog, manuals, Internet

Example:

Calculating the current consumption on an example coupler

Internal current consumption	300 mA at 5 V
Residual current for bus modules	700 mA at 5 V
Sum $I_{(5\ V)\ total}$	**1000 mA at 5 V**

The internal current consumption is indicated in the technical data for each bus terminal. In order to determine the total requirement, add together the values of all I/O modules in the node.

Note

Please note the aggregate current for I/O modules. It may be necessary to supply potential!
When the sum of the internal current consumption for the I/O modules exceeds their aggregate current, you must use a supply module with bus power supply. Install it before the position where the permissible aggregate current would be exceeded.

Example:

Calculating the total current on the example coupler

A node with an example coupler consists e. g. of the following I/O modules:
20 relay modules (750-517) and 10 digital input modules (750-405).

Internal current consumption	10 * 90 mA =	900 mA
	20 * 2 mA =	40 mA
Sum		**940 mA**

In this example, the example coupler can provide 700 mA for the I/O modules. This value is given in the associated data sheet ("Total current for I/O modules"). Consequently, an internal system supply module (750-613), e. g. in the middle of the node, should be added.

Note

Recommendation
Utilize the **smartDESIGNER** feature WAGO ProServe® software to configure fieldbus node assembly. You can test the configuration via the integrated plausibility check.

The maximum input current of the 24 V system supply is 500 mA. The exact electrical consumption ($I_{(V)}$) can be determined with the following formulas:

Fieldbus coupler or controller

$I_{(5\,V)\,total}$ = Sum of all the internal current consumption of the connected I/O modules + internal current consumption of the fieldbus coupler/controller

Internal system supply module

$I_{(5\,V)\,total}$ = Sum of all the internal current consumption of the connected I/O modules at internal system supply module

$$\text{Input current } I_{(24\,V)} = \frac{5\,V}{24\,V} \times \frac{I_{(5\,V)\,total}}{\eta}$$

η = Efficiency of the power supply at nominal load 24 V

Note

Activate all outputs when testing the current consumption!
If the electrical consumption of a power supply point for the 24 V system supply exceeds 500 mA, then the cause may be an improperly dimensioned node or a defect.
During the test, you must activate all outputs.

3.4.4 Field Supply

3.4.4.1 Connection

Sensors and actuators can be directly connected to the relevant channel of the I/O module in 1, 2, 3 or 4 conductor connection technology. The I/O module supplies power to the sensors and actuators. The input and output drivers of some I/O modules require the field side supply voltage.

The power supply modules provide field side power (24 VDC). In this case it is a passive power supply without protection equipment. Power supply modules are available for different potentials, e.g. 24 VDC, 230 VAC or others.

Power supply modules with or without fuse holder and diagnostic capability are available for the power supply of other field potentials (24 VDC, 0 … 230 VAC/DC, 120 VAC, 230 VAC). The power supply modules can also be used to set up various potential groups. The connections are connected in pairs to a power contact.

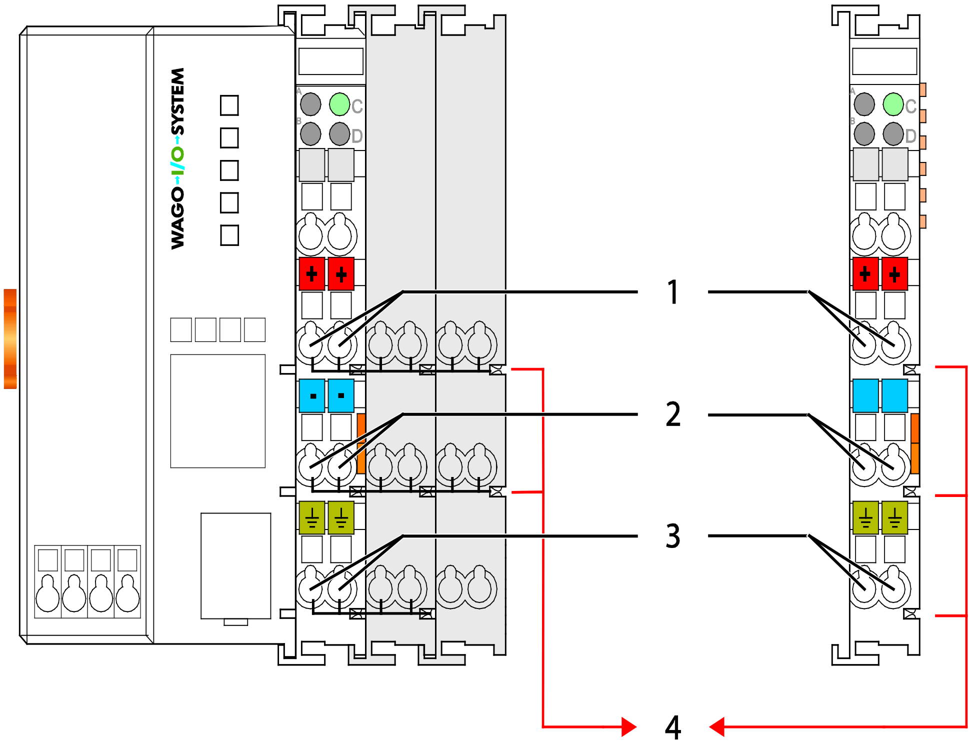


Figure 7: Field Supply (Sensor/Actuator)

Table 7: Legend for Figure "Field Supply (Sensor/Actuator) for ECO Fieldbus Coupler"

Field supply	
1	24 V (-15 % / +20 %)
2	0 V
3	Optional ground potential (functional earth)
Power jumper contacts	
4	Potential distribution to adjacent I/O modules

Note

In exceptional instances, I/O modules can be directly connected to the field supply!
The 24 V field supply can be connected also directly to a bus module, if the connection points are not needed for the peripheral device supply. In this case, the connection points need the connection to the power jumper contacts.

The field-side power supply is automatically derived from the power jumper contacts when snapping an I/O module.

The current load of the power contacts must not exceed 10 A on a continual basis.

By inserting an additional power supply module, the field supply via the power contacts is disrupted. From there a new power supply occurs which may also contain a new voltage potential.

Note

Re-establish the ground connection when the connection to the power jumper contacts is disrupted!
Some I/O modules have no or very few power contacts (depending on the I/O function). Due to this, the passing through of the relevant potential is disrupted. If you require a field supply via power jumper contacts for subsequent I/O modules, then you have to use a power supply module.
Note the data sheets of the I/O modules.

Note

Use a spacer module when setting up a node with different potentials!
In the case of a node setup with different potentials, e.g. the alteration from 24 VDC to 230 VAC, you should use a spacer module. The optical separation of the potentials acts as a warning to heed caution in the case of wiring and maintenance works. Thus, you can prevent the results of wiring errors.

3.4.4.2 Fusing via Power Supply Module

Internal fusing of the field supply is possible for various field voltages via an appropriate power supply module.

Table 8: Power Supply Modules

Order No.	Field Voltage
750-601	24 V DC, Supply/Fuse
750-609	230 V AC, Supply/Fuse
750-615	120 V AC, Supply/Fuse
750-617	24 V AC, Supply/Fuse
750-610	24 V DC, Supply/Fuse/Diagnosis
750-611	230 V AC, Supply/Fuse/Diagnosis
750-606	Supply Module 24 V DC, 1,0 A, Ex i
750-625/000-001	Supply Module 24 V DC, 1,0 A, Ex i (without diagnostics)

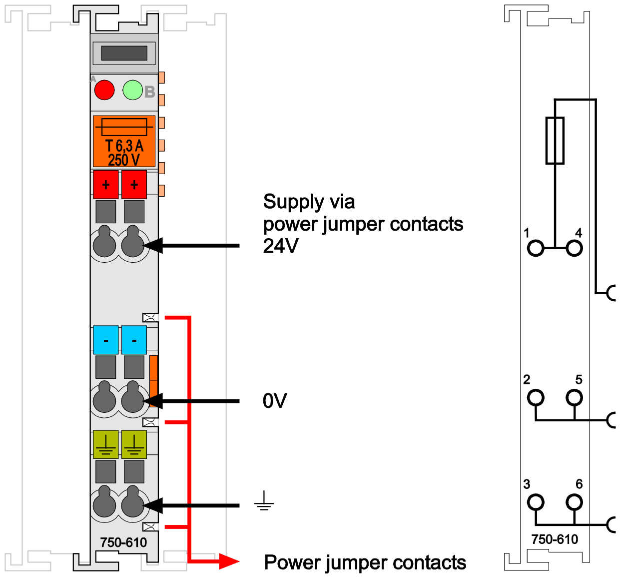


Figure 8: Supply Module with Fuse Carrier (Example 750-610)

NOTICE

Observe the maximum power dissipation and, if required, UL requirements!
In the case of power supply modules with fuse holders, you must only use fuses with a maximum dissipation of 1.6 W (IEC 127).
For UL approved systems only use UL approved fuses.

In order to insert or change a fuse, or to switch off the voltage in succeeding I/O modules, the fuse holder may be pulled out. In order to do this, use a screwdriver for example, to reach into one of the slits (one on both sides) and pull out the holder.

Figure 9: Removing the Fuse Carrier

Lifting the cover to the side opens the fuse carrier.

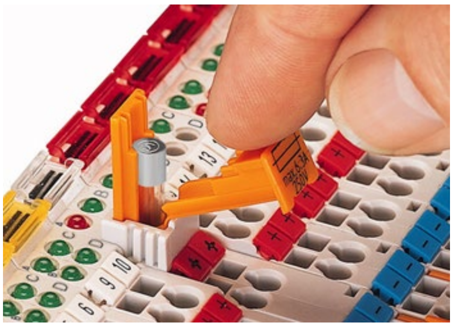


Figure 10: Opening the Fuse Carrier

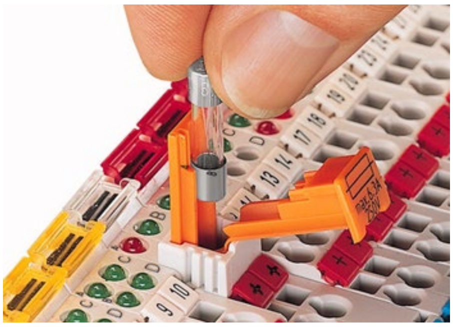


Figure 11: Changing the Fuse

After changing the fuse, the fuse carrier is pushed back into its original position.

3.4.4.3 Fusing external

NOTICE

Field supply only with appropriate fuse protection!
Without overcurrent protection, the electronics can be damaged.
For 24V field supply input voltage an external fuse, rated max. 10 A, slow acting, min. shall be used.
The 24V input voltage for the field supply is provided with an external fuse with max. 10 A slow acting, min. 30 VDC, to be secured.

For the external fusing, the fuse modules of the WAGO series 282, 2006, 281 and 2002 are suitable for this purpose.

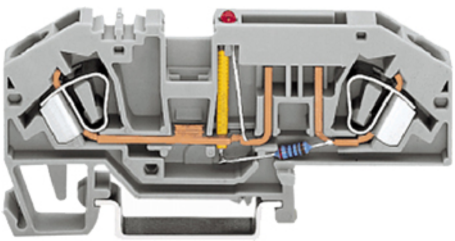


Figure 12: Fuse Modules for Automotive Fuses, Series 282

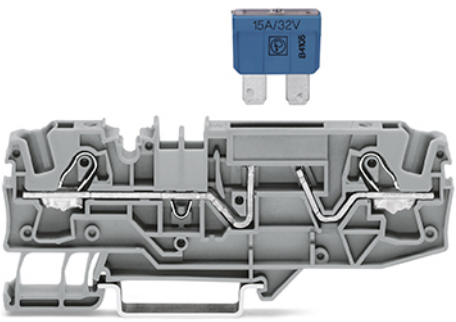


Figure 13: Fuse Modules for Automotive Fuses, Series 2006

Figure 14: Fuse Modules with Pivotable Fuse Carrier, Series 281

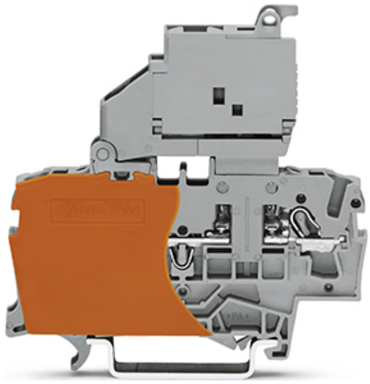


Figure 15: Fuse Modules with Pivotable Fuse Carrier, Series 2002

3.4.5 Supplementary Power Supply Regulations

The WAGO-I/O-SYSTEM 750 can also be used in shipbuilding or offshore and onshore areas of work (e. g. working platforms, loading plants). This is demonstrated by complying with the standards of influential classification companies such as Germanischer Lloyd and Lloyds Register.

Filter modules for 24 V supply are required for the certified operation of the system.

Table 9: Filter Modules for 24 V Supply

Order No.	Name	Description
750-626	Supply Filter	Filter module for system supply and field supply (24 V, 0 V), i. e. for fieldbus coupler/controller and bus power supply (750-613)
750-624	Supply Filter	Filter module for the 24 V field supply (750-602, 750-601, 750-610)

Therefore, the following power supply concept must be absolutely complied with.

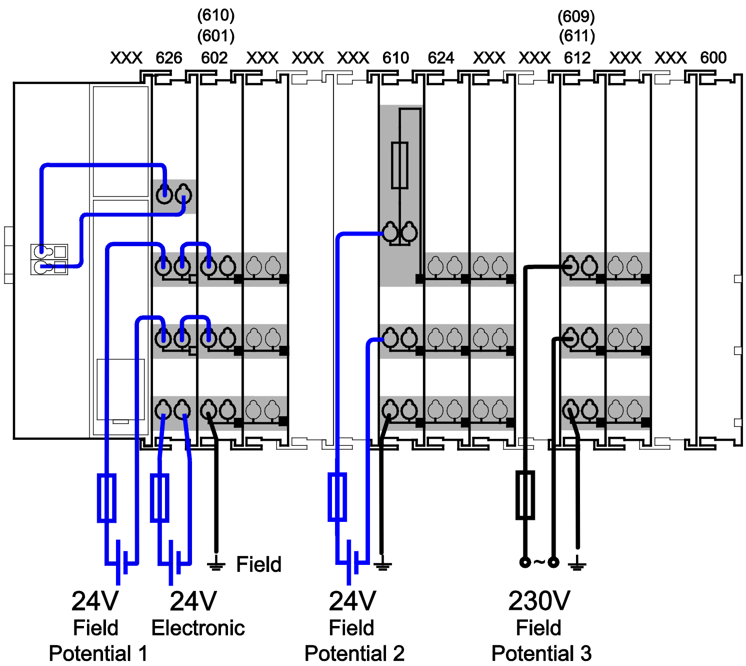


Figure 16: Power Supply Concept

Note

Use a supply module for equipotential bonding!
Use an additional 750-601/ 602/ 610 Supply Module behind the 750-626 Filter Module if you want to use the lower power jumper contact for equipotential bonding, e.g., between shielded connections and require an additional tap for this potential.

3.4.6 Supply Example

Note

The system supply and the field supply shall be separated!
You should separate the system supply and the field supply in order to ensure bus operation in the event of a short-circuit on the actuator side.

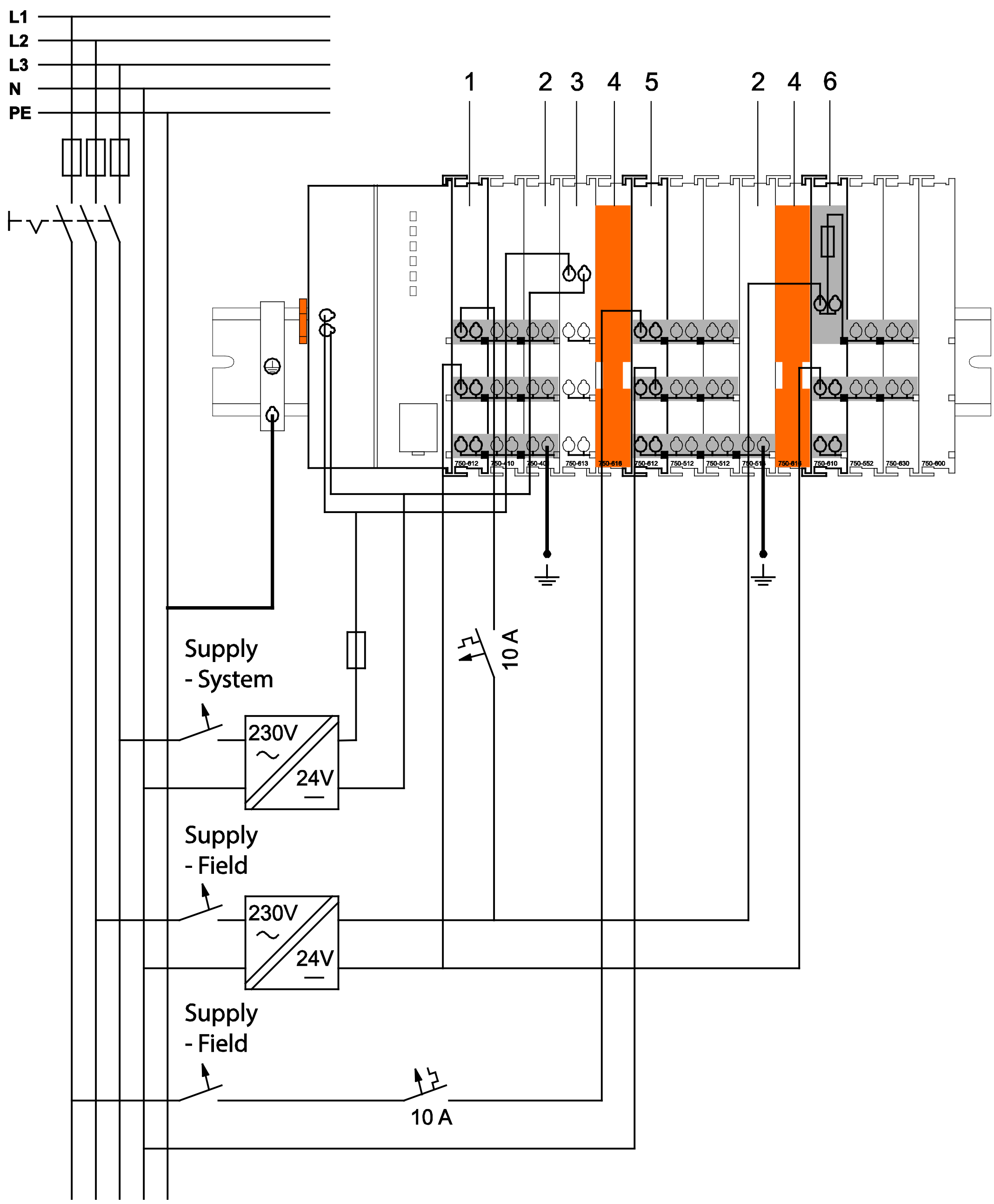


Figure 17: Supply Example

Table 10: Legend for Figure "Supply Example for Fieldbus Coupler/Controller"

Pos.	Description
1	Power Supply on fieldbus coupler/controller via external Supply Module
2	Power Supply with optional ground
3	Internal System Supply Module
4	Separation Module recommended
5	Supply Module passive
6	Supply Module with fuse carrier/diagnostics

3.4.7 Power Supply Unit

The WAGO-I/O-SYSTEM 750 requires a 24 VDC voltage (system supply).

Note

Recommendation
A stable power supply cannot always be assumed everywhere. Therefore, you should use regulated power supplies to ensure the quality of the supply voltage.

Note

Buffer for system power supply!
The system power supply must be buffered to bridge power outages. As the power demand depends on the respective node configuration, buffering is not implemented internally.
To achieve power outages of 1 ms to 10 ms according to IEC61131-2, determine the buffering appropriate for your node configuration and structure it as an external circuit.

The power demand must be determined individually depending on the entry point of the field supply. All loads through field devices and I/O modules must be taken into account. The field supply also impacts the I/O modules because the input and output drivers of some I/O modules require the voltage of the field supply.

Note

System and field supply must be isolated!
The system supply and field supply must be isolated to ensure bus operation in the event of short circuits on the actuator side.

Information

Power supply units are available in the eShop.
You can find suitable power supply units, e. g. from the EPSITRON series, in the eShop on www.wago.com.

3.5 Grounding

3.5.1 Grounding the DIN Rail

3.5.1.1 Framework Assembly

When setting up the framework, the carrier rail must be screwed together with the electrically conducting cabinet or housing frame. The framework or the housing must be grounded. The electrical connection is established via the screw. Thus, the carrier rail is grounded.

DANGER

Ensure sufficient grounding is provided!
You must take care to ensure the flawless electrical connection between the carrier rail and the frame or housing in order to guarantee sufficient grounding.

3.5.1.2 Insulated Assembly

Insulated assembly has been achieved when there is constructively no direct ohmic contact between the cabinet frame or machine parts and the carrier rail. Here, the earth ground must be set up via an electrical conductor in accordance with valid national safety regulations.

Note

Recommendation
The optimal setup is a metallic assembly plate with grounding connection which is electrically conductive linked to the carrier rail.

The separate grounding of the carrier rail can be easily set up with the aid of the WAGO ground wire terminals.

Table 11: WAGO Ground Wire Terminals

Order No.	Description
283-609	1-conductor ground (earth) terminal block make an automatic contact to the carrier rail; conductor cross section: 0.2 mm² … 16 mm² **Note**: Also order the end and intermediate plate (283-320).

3.5.2 Grounding Function

The grounding function increases the resistance against electro-magnetic interferences. Some components in the I/O system have a carrier rail contact that dissipates electro-magnetic interferences to the carrier rail.

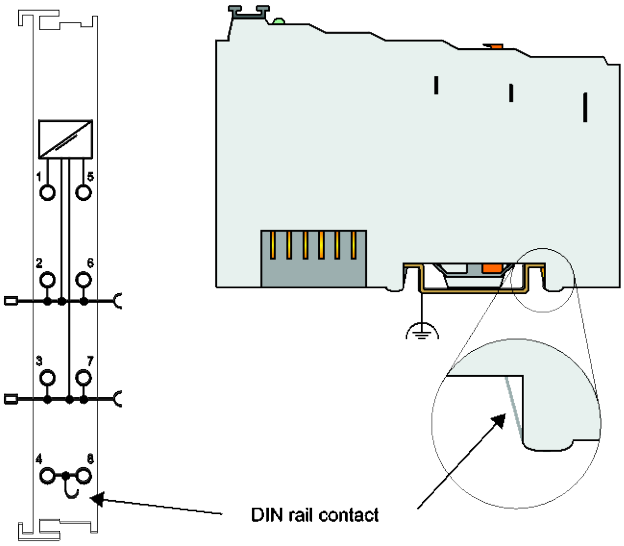


Figure 18: Carrier Rail Contact (Example)

DANGER

Ensure sufficient grounding is provided!
You must take care to ensure the direct electrical connection between the carrier rail contact and the carrier rail.
The carrier rail must be grounded.
For information on carrier rail properties, see section “Mounting” > … > “Carrier Rail Properties”.

The bottom CAGE CLAMP® connectors of the supply modules enable optional connection of a field-side functional ground. This potential is made available to the I/O module arranged on the right through the spring-loaded contact of the three power contacts. Some I/O modules are equipped with a knife-edge contact that taps this potential. This forms a potential group with regard to functional ground with the I/O module arranged on the left.

3.6 Shielding

3.6.1 General

Use of shielded cables reduces electromagnetic interference and thus increases signal quality. Measurement errors, data transmission errors and interference due to excessive voltage can be prevented.

Note

Connect the cable shield to the ground potential!
Integrated shielding is mandatory to meet the technical specifications in regards to measuring accuracy. Connect the cable shield and ground potential at the inlet to the cabinet or housing. This allows induced interference to dissipate and to be kept away from devices in the cabinet or housing.

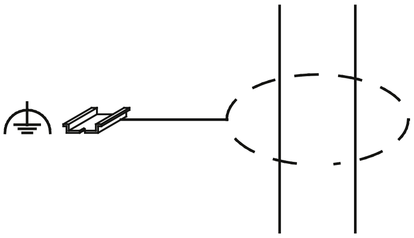


Figure 19: Cable Shield at Ground Potential

Note

Improve shielding performance by placing the shield over a large area!
Higher shielding performance is achieved via low-impedance connection between shield and ground. For this purpose, connect the shield over a large surface area, e.g., WAGO shield connecting system. This is especially recommended for large-scale systems where equalizing current or high impulse-type currents caused by atmospheric discharge may occur.

Note

Keep data and signal lines away from sources of interference!
Route data and signal lines separately from all high voltage cables and other sources of high electromagnetic emission (e.g., frequency converter or drives).

3.6.2 Fieldbus Cables

The shielding of fieldbus lines is described in the respective configuration guidelines and standards of the fieldbus system. Information on this can be provided by the corresponding fieldbus organization or specialist literature.

3.6.3 Shielded Signal Lines

Note

Use shielded signal lines!
Always use shielded signal lines for analog signals and I/O modules which are equipped with shield clamps. Only then you can ensure that the accuracy and interference immunity specified for the respective I/O module can be achieved even in the presence of interference acting on the signal cable.

On some WAGO devices you can directly clamp the shield. For all other devices use the WAGO shield connecting system.

3.6.4 WAGO Shield Connecting System

The series 790 WAGO shield connecting system consists of shield clamping saddles, busbars and various mounting carriers. These components can be used to achieve many different configurations.

Figure 20: Examples of the WAGO Shield Connecting System

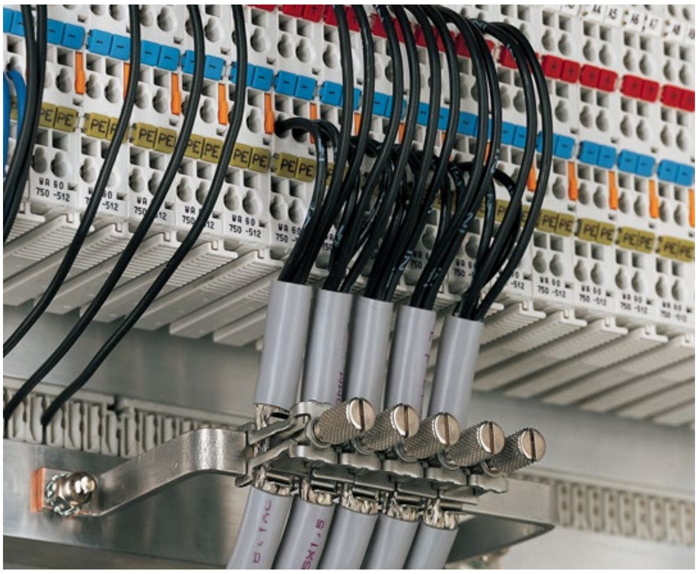


Figure 21: Application of the WAGO Shield Connecting System

4 Device Description

The FC EtherNet/IP; G4; ECO 750-363 is the head station of the fieldbus node assembly and connects the WAGO I/O-SYSTEM 750 to the EtherNet/IP fieldbus system.

The 750-363 can be used for applications in machine and plant construction as well as in the process industry and building technology.

The two Ethernet interfaces and the integrated switch make possible the wiring of the fieldbus in line topology. Thus additional infrastructure elements such as switches or hubs can be void. Both interfaces support Autonegotiation and Auto-MDI (X).

With the DIP switch the last byte of the IP address, as well as the assignment of the IP address (DHCP, BootP, firm setting) can be given.

In the head station, all input signals from the sensors are combined. After connecting the head station, the head station determines which I/O modules are on the node and creates a local process image from theirs data. Analog and specialty module data is sent via words and/or bytes; digital data is grouped bit-by-bit.

The local process image is divided into two data zones containing the data received and the data to be sent.

The data of the analog modules is mapped first into the process image. The modules are mapped in the order of their physical position after the head station.

The bits of the digital modules are combined into words and then mapped after the analog ones in the process image. If the number of digital I/Os is greater than 16 bits, the head station automatically begins a new word.

All sensor input signals are grouped in the coupler (slave) and transferred to the higher-order controller (master) via the fieldbus. Process data linking is performed in the higher-order controller. The higher-order controller puts out the resulting data to the actuators via the bus and the node.

The fieldbus connection consists of two ports (RJ-45). An ETHERNET switch integrated in the head station operates in the store and forward mode.
Both ports support:

- 10BASE-T / 100BASE-TX
- Full / Half duplex
- Autonegotiation
- Auto-MDI(X)

In order to send process data via ETHERNET, the head station supports a series of network protocols.

The EtherNet/IP protocol is implemented for exchanging process data.
For the management and diagnosis of the system, the HTTP and SNMP protocols are available.

For the data transfer via ETHERNET the FTP and SFTP are available.

For the automatic assignment of the IP address in the network, alternatively DHCP or BootP can be used.

An internal server is available for Web-based applications.

HTML pages stored in the head station allow access to information about the configuration, the status and the I/O data of the fieldbus node via Web browsers. It is also possible to store individual HTML pages using the implemented file system, store custom HTML pages.

4.1 View

The view below shows the different parts of the device:

- The fieldbus connection is within the lower range on the left side.
- Over the fieldbus connection is a power supply unit for the system supply.
- LEDs for bus communication, error messages and diagnostics are within the upper range on the right side.
- Down right the service interface is to be found.

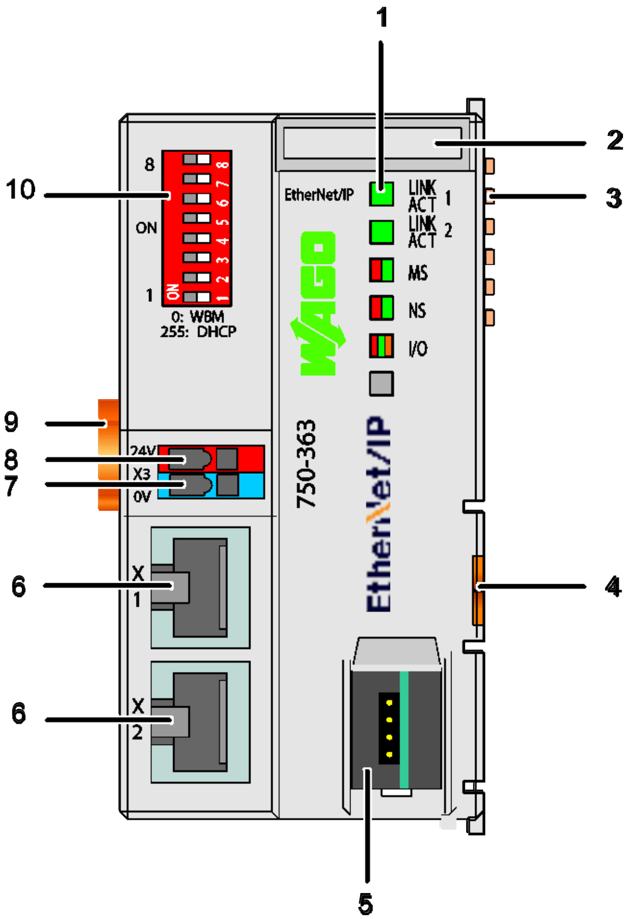


Figure 22: View FC EtherNet/IP; G4; 2ETH

Table 12: Legend for Figure “View”

Pos.	Desig-nation	Meaning	Details see Section
1	LINK ACT 1, 2, MS, NS, I/O	Status LEDs Fieldbus	„Device Description“ > „Display Elements“
2	---	Marking possibility on four miniature WSB markers	---
3	---	Data contacts	"Connect Devices" > "Data Contacts/Local Bus"
4	---	Unlocking lug	"Mounting" > "Inserting and Removing Devices"
5	---	Service interface (open flap)	"Device Description" > "Operating Elements"
6	X1, X2	Fieldbus connection 2 x RJ-45 as 2-Port ETHERNET Switch	„Device Description“ > „Connectors“
7	-	CAGE CLAMP® Connections System Supply 0 VDC	"System Description" >"Voltage Supply"
8	+	CAGE CLAMP® Connections System Supply 24 VDC	"System Description" >"Voltage Supply"
9	---	Locking Disc	„Mounting“ > „Plugging and Removal of the Device“
10	---	Address Selection Switch	"Device Description" > "Operating Elements"

4.2 Connectors

4.2.1 Device Supply

The device is powered via terminal blocks with CAGE CLAMP® connections.

The device supply generates the necessary voltage to power the electronics of the device and the internal electronics of the connected I/O modules.

The fieldbus interface is galvanically separated to the electrical potential of the device.

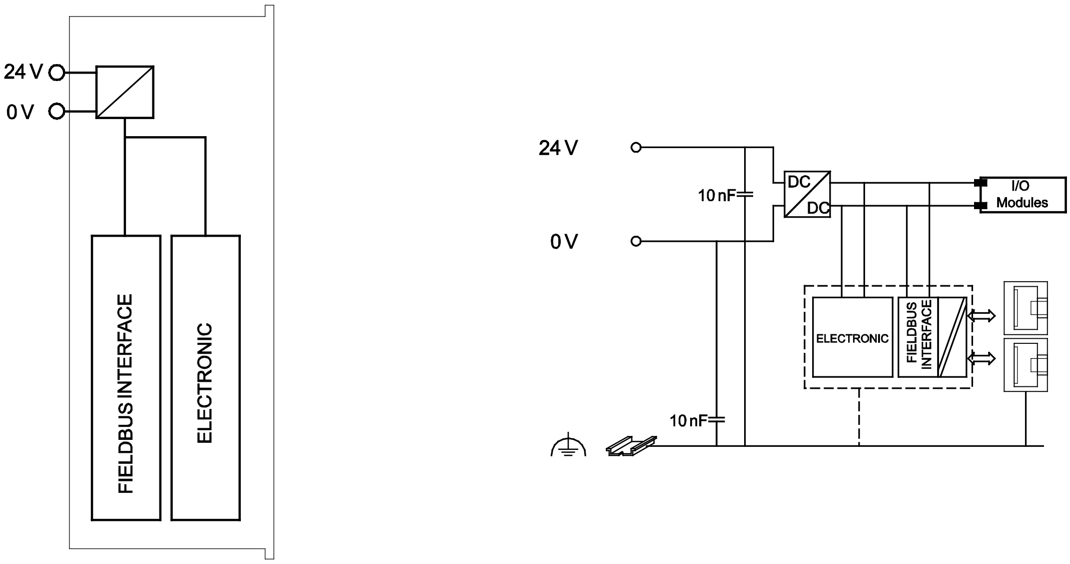


Figure 23: Device Supply

4.2.2 Fieldbus Connection

The connection to the fieldbus is made via two RJ-45 plugs, which are connected to the fieldbus controller via an integrated switch.
The integrated switch works in store-and-forward operation and for each port, supports the transmission speeds 10/100 Mbit as well as the transmission modes full and half-duplex and autonegotiation.
The wiring of these plugs corresponds to the specifications for 100BaseTX, which prescribes a category 5 twisted pair cable as the connecting cable. Cable types S/UTP (Screened Unshielded Twisted Pair) and STP (Shielded Twisted Pair) with a maximum segment length of 100 m (approximately 328.08 feet) can be used.
The socket is arranged physically lower, allowing the coupler to fit in an 80 mm high enclosure after plug connection.

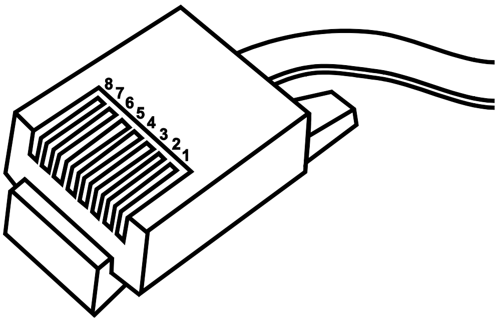


Figure 24: RJ-45 Connector

Table 13: RJ-45 Connector and RJ-45 Connector Configuration

Contact	Signal	
1	TD +	Transmit +
2	TD −	Transmit −
3	RD +	Receive +
4		free
5		free
6	RD −	Receive −
7		free
8		free

NOTICE

Do not use in telecommunication circuits!
Only use devices equipped with ETHERNET or RJ-45 connectors in LANs. Never connect these devices with telecommunication networks.

4.3 Display Elements

The operating condition of the fieldbus coupler or the node is displayed with the help of illuminated indicators in the form of light-emitting diodes (LEDs).
The LED information is routed to the top of the case by light guides. In some cases, the LEDs are multi-colored (red, green or orange).

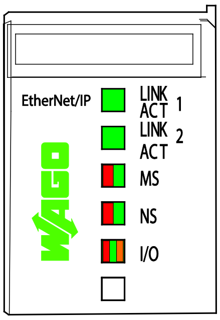


Figure 25: Display Elements

For the diagnostics of the different ranges fieldbus and node, the LED’s can be divided into groups:

Table 14: Display Elements Fieldbus Status

LED	Color	Meaning
LNK ACT 1	green	indicates a connection to the physical network at port 1
LNK ACT 2	green	indicates a connection to the physical network at port 2
MS	red/green	indicates the status of the node
NS	red/green	indicates the network status

Table 15: Display Elements Node Status

LED	Color	Meaning
I/O	red/green/ orange	Indicates the operation of the node and signals via a blink code faults encountered.

Information

More information about the LED Signaling
Read the detailed description for the evaluation of the displayed LED state in the section “Diagnostics” > … > “LED Signaling”.

4.4 Operating Elements

4.4.1 Service Interface

The service interface is located behind the flap.

It is used for the communication with the WAGO I/O-*CHECK* and WAGO Ethernet Settings.

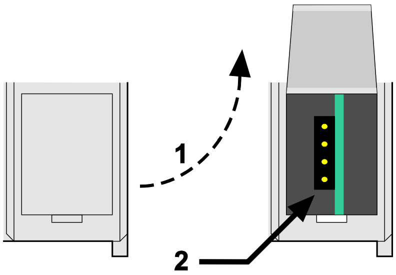


Figure 26: Service Interface (Closed and Opened Flap)

Table 16: Legend for Figure "Service Interface (Closed and Opened Flap)"

Number	Description
1	Open closed
2	View Service Interface

NOTICE

Device must be de-energized!
To prevent damage to the device, unplug and plug in the communication cable only when the device is de-energized!

The connection to the 4-pin header under the cover flap can be realized via the communication cables with the item numbers750-920 and 750-923 or via the WAGO radio adapter with the item number 750-921.

4.4.2 Address Selection Switch

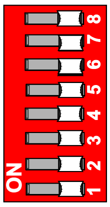


Figure 27: Address Selection Switch (for example setting “0“)

Using the address selection switch, the device can be assigned a fixed IP address.

The set value corresponds to the last digit of the IP address (host ID). The complete IP address consists of the base IP address stored in the device (factory setting: 192.168.1.0) and the host ID set on the address selection switch

The coding of the host ID is bit by bit and begins with address selection switch 1 for bit 0 (LSB) and ends with address selection switch 8 for bit 7 (MSB).

Example:

Basic IP address:	192.168.1.0
Address selection switch (1 … 8):	"11011001" = 155
IP address:	192.168.1.155

The detailed use of the address selection switch in conjunction with other options for IP address assignment is described in the chapter "Commissioning".

4.5 Technical Data

4.5.1 Device Data

Table 17: Technical Data - Device

Width	50 mm
High (from upper edge of DIN 35 rail)	65* mm (*from upper edge of DIN 35 rail)
Length	97 mm
Weight	105 g

4.5.2 System Data

Table 18: Technical Data - System

Number of fieldbus nodes per master	Limited by ETHERNET specification
Transmission medium	Twisted Pair CAT 5e (S/UTP or S/STP)
Fieldbus coupler connection	2 x RJ-45
Max. cable length	100 m
Max. network length	2000 m
Baud rate	10/100 Mbit/s
Transmission performance	Class D acc. to EN 50173
Protocols	EtherNet/IP, HTTP, HTTPS, BootP, DHCP, DNS, (S)FTP, SNTP, SNMP
Number of I/O modules - with bus extension	64 250
Configuration	via WAGO-I/O-CHECK, Web Based Management
Internal file system	1 GB

4.5.3 Supply

Table 4: Technical Data - Supply

Voltage Supply	24 V DC (-25% ... +30%)
Max. input current at 24 V DC.	280 mA
Power failure time acc. IEC 61131-2	Depending on external buffering
Efficiency of the power supply	90 %
Internal current consumption (5 V)	350 mA
Total current for I/O modules (5 V)	700 mA
Overvoltage category	II
Isolation	500 V system/supply

Note

Buffer for system power supply!
The system power supply must be buffered to bridge power outages. As the power demand depends on the respective node configuration, buffering is not implemented internally.
To achieve power outages of 1 ms to 10 ms according to IEC61131-2, determine the buffering appropriate for your node configuration and structure it as an external circuit.

4.5.4 Fieldbus EtherNet/IP

Table 5: Technical Data - Fieldbus EtherNet/IP

Input Process Image $_{max}$	1020 words
Output Process Image $_{max}$	1020 words
Number of „Encapsulation Sessions"	38
Number of „Explicite Messaging“-Connections (Class 3)	6
Number of „I/O Messaging“-Connections (Class 1)	3

4.5.5 Accessories

Table 19: Technical data – Accessories

Miniature WSB Quick marking system	248-501

4.5.6 Connection Type

Table 20: Technical Data – Field Wiring

Wire connection	CAGE CLAMP®
Cross section, solid wire	0.08 mm² … 2.5 mm² / AWG 28 … 14
Cross section, fine-stranded wire	0.25 mm² … 2.5 mm² / AWG 28 … 12
Stripped lengths	8 mm … 9 mm / 0.33 in

Table 21: Technical Data – Data Contacts

Data contacts	Slide contact, hard gold plated, self-cleaning

4.5.7 Climatic Environmental Conditions

Table 22: Technical Data – Climatic Environmental Conditions

Surrounding air temperature, operation	0 °C … 55 °C
Surrounding air temperature, storage	−25 °C … +85 °C
Operating altitude	0 … 2000 m
Relative humidity	Max. 5 % … 95 % without condensation
Pollution degree	2
Protection type	IP20
Resistance to harmful substances	Acc. to IEC 60068-2-42 and IEC 60068-2-43
Maximum pollutant concentration at relative humidity < 75 %	$SO_2 \leq 25$ ppm $H_2S \leq 10$ ppm
Special conditions	• Ensure that additional measures for components are taken, which are used in an environment involving: – dust, caustic vapors or gases – ionizing radiation • Ensure that the permissible temperature range of the connecting cable is correct dimensioned depending on the installation position and current intensity, because the clamping point temperature at 10 A can be up to 25 °C above the expected surrounding air temperature.

4.5.8 Mechanical Strength

Table 23: Technical Data – Mechanical Strength

Vibration resistance	Acc. to IEC 60068-2-6 Comment to the vibration resistance: a) Type of oscillation: sweep with a rate of change of 1 octave per minute 10 Hz ≤ f < 57 Hz, const. Amplitude 0,075 mm 57 Hz ≤ f < 150 Hz, const. Acceleration 1 g b) Period of oscillation: 10 sweep per axis in each of the 3 vertical axes
Shock resistance	Acc. to IEC 60068-2-27 Comment to the shock resistance: a) Type of impulse: half sinusoidal b) Intensity of impulse: 15 g peak value, 11 ms maintenance time c) Route of impulse: 3 impulses in each pos. And neg. direction of the 3 vertical axes of the test object, this means 18 impulses in all.
Free fall	Acc. IEC 60068-2-32 ≤ 1 m (module in original packing)

4.5.9 Software Compatibility

Table 24: Technical Data – Software Compatibility

Commissioning software	WAGO-I/O-CHECK 759-302 starting from version 3.18.1.2
Configuration software	WAGO Ethernet Settings 759-316 starting from version 6.9.9.16

4.6 Approvals

Information

More information about approvals.
Detailed references to the approvals are listed in the document "Overview Approvals **WAGO I/O SYSTEM 750**", which you can find via the internet under: www.wago.com → DOWNLOADS → Documentation → System Description.

The following approvals have been granted to 750-363 fieldbus coupler/controller:

Conformity Marking

Ordinary Locations UL61010-2-201

The following Ex approvals have been granted to 750-363 fieldbus coupler/controller:

Hazardous Locations UL 121201 for Use in Hazardous Locations
Cl I Div 2

TÜV 14 ATEX 148929 X

II 3 G Ex ec IIC T4 Gc

IECEx TUN 14.0035 X

Ex ec IIC T4 Gc

The following ship approvals have been granted to 750-363 fieldbus coupler/controller:

DNV GL
[Temperature: B, Humidity: B, Vibration: B, EMC: B, Enclosure: A]

4.7 Standards and Guidelines

750-363 meets the following requirements on emission and immunity of interference:

EMC CE-Immunity to interference	EN 61000-6-2
EMC CE-Emission of interference	EN 61000-6-3
EMC marine applications-Immunity to interference	acc. to DNV GL
EMC marine applications-Emission of interference	acc. to DNV GL

5 Mounting

5.1 Installation Position

Along with horizontal and vertical installation, all other installation positions are allowed.

Note

Use an end stop in the case of vertical mounting!
In the case of vertical assembly, an end stop has to be mounted as an additional safeguard against slipping.
WAGO order no. 249-116 End stop for DIN 35 rail, 6 mm wide
WAGO order no. 249-117 End stop for DIN 35 rail, 10 mm wide

5.2 Overall Configuration

The maximum total length of a fieldbus node without fieldbus coupler/controller is 780 mm including end module. The width of the end module is 12 mm. When assembled, the I/O modules have a maximum length of 768 mm.

Examples:

- 64 I/O modules with a 12 mm width can be connected to a fieldbus coupler/controller.
- 32 I/O modules with a 24 mm width can be connected to a fieldbus coupler/controller.

Exception:

The number of connected I/O modules also depends on the type of fieldbus coupler/controller is used. For example, the maximum number of stackable I/O modules on one PROFIBUS DP/V1 fieldbus coupler/controller is 63 with no passive I/O modules and end module.

NOTICE

Observe maximum total length of a fieldbus node!
The maximum total length of a fieldbus node without fieldbus coupler/controller and without using a 750-628 I/O Module (coupler module for internal data bus extension) may not exceed 780 mm.
Also note the limitations of individual fieldbus couplers/controllers.

Note

Increase the total length using a coupler module for internal data bus extension!

You can increase the total length of a fieldbus node by using a 750-628 I/O Module (coupler module for internal data bus extension). For such a configuration, attach a 750-627 I/O Module (end module for internal data bus extension) after the last I/O module of a module assembly. Use an RJ-45 patch cable to connect the I/O module to the coupler module for internal data bus extension of another module block.
This allows you to segment a fieldbus node into a maximum of 11 blocks with maximum of 10 I/O modules for internal data bus extension.
The maximum cable length between two blocks is five meters.
More information is available in the manuals for the 750-627 and 750-628 I/O Modules.

5.3 Mounting onto Carrier Rail

5.3.1 Carrier Rail Properties

All system components can be snapped directly onto a carrier rail in accordance with the European standard EN 60175 (DIN 35).

NOTICE

Do not use any third-party carrier rails without approval by WAGO!
WAGO Kontakttechnik GmbH & Co. KG supplies standardized carrier rails that are optimal for use with the I/O system. If other carrier rails are used, then a technical inspection and approval of the rail by WAGO Kontakttechnik GmbH & Co. KG should take place.

Carrier rails have different mechanical and electrical properties. For the optimal system setup on a carrier rail, certain guidelines must be observed:

- The material must be non-corrosive.
- Most components have a contact to the carrier rail to ground electro-magnetic disturbances. In order to avoid corrosion, this tin-plated carrier rail contact must not form a galvanic cell with the material of the carrier rail which generates a differential voltage above 0.5 V (saline solution of 0.3 % at 20°C).
- The carrier rail must optimally support the EMC measures integrated into the system and the shielding of the I/O module connections.
- A sufficiently stable carrier rail should be selected and, if necessary, several mounting points (every 20 cm) should be used in order to prevent bending and twisting (torsion).
- The geometry of the carrier rail must not be altered in order to secure the safe hold of the components. In particular, when shortening or mounting the carrier rail, it must not be crushed or bent.
- The base of the I/O components extends into the profile of the carrier rail. For carrier rails with a height of 7.5 mm, mounting points are to be riveted under the node in the carrier rail (slotted head captive screws or blind rivets).
- The metal springs on the bottom of the housing must have low-impedance contact with the DIN rail (wide contact surface is possible).

5.3.2 WAGO DIN Rails

WAGO carrier rails meet the electrical and mechanical requirements shown in the table below.

Table 25: WAGO DIN Rails

Item No.	Description
210-112	35 × 7.5; 1 mm; steel; bluish, tinned, chromed; slotted
210-113	35 × 7.5; 1 mm; steel; bluish, tinned, chromed; unslotted
210-197	35 × 15; 1.5 mm; steel; bluish, tinned, chromed; slotted
210-114	35 × 15; 1.5 mm; steel; bluish, tinned, chromed; unslotted
210-118	35 × 15; 2.3 mm; steel; bluish, tinned, chromed; unslotted
210-198	35 × 15; 2.3 mm; copper; unslotted
210-196	35 × 8.2; 1.6 mm; aluminum; unslotted

5.4 Spacing

The spacing between adjacent components, cable conduits, casing and frame sides must be maintained for the complete fieldbus node.

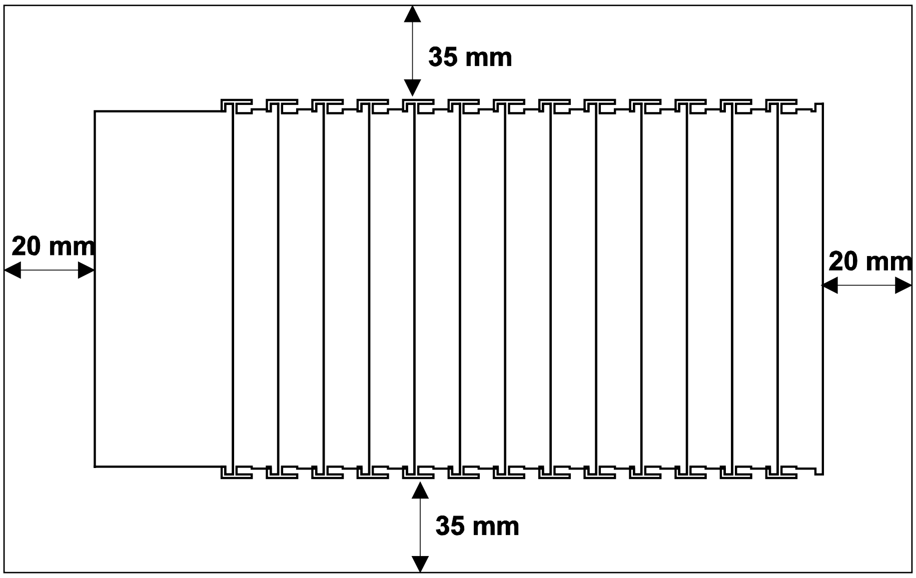


Figure 28: Spacing

The spacing creates room for heat transfer, installation or wiring. The spacing to cable conduits also prevents conducted electromagnetic interferences from influencing the operation.

5.5 Mounting Sequence

Fieldbus couplers, controllers and I/O modules of the WAGO I/O SYSTEM 750 are snapped directly on a carrier rail in accordance with the European standard EN 60175 (DIN 35).

The reliable positioning and connection is made using a tongue and groove system. Due to the automatic locking, the individual devices are securely seated on the rail after installation.

Starting with the fieldbus coupler or controller, the I/O modules are mounted adjacent to each other according to the project design. Errors in the design of the node in terms of the potential groups (connection via the power contacts) are recognized, as the I/O modules with power contacts (blade contacts) cannot be linked to I/O modules with fewer power contacts.

⚠ CAUTION

Risk of injury due to sharp-edged blade contacts!
The blade contacts are sharp-edged. Handle the I/O module carefully to prevent injury. Do not touch the blade contacts.

NOTICE

Insert I/O modules only from the proper direction!
All I/O modules feature grooves for power jumper contacts on the right side. For some I/O modules, the grooves are closed on the top. Therefore, I/O modules featuring a power jumper contact on the left side cannot be snapped from the top. This mechanical coding helps to avoid configuration errors, which may destroy the I/O modules. Therefore, insert I/O modules only from the right and from the top.

Note

Don't forget the bus end module!
Always plug a bus end module (750-600) onto the end of the fieldbus node! You must always use a bus end module at all fieldbus nodes with WAGO I/O SYSTEM 750 fieldbus couplers or controllers to guarantee proper data transfer.

5.6 Inserting and Removing Devices

DANGER

Do not work when devices are energized!
High voltage can cause electric shock or burns.
Switch off all power to the device prior to performing any installation, repair or maintenance work.

5.6.1 Inserting the Fieldbus Coupler/Controller

1. When replacing the fieldbus coupler/controller for an already available fieldbus coupler/controller, position the new fieldbus coupler/controller so that the tongue and groove joints to the subsequent I/O module are engaged.

2. Snap the fieldbus coupler/controller onto the carrier rail.

3. Use a screwdriver blade to turn the locking disc until the nose of the locking disc engages behind the carrier rail (see the following figure). This prevents the fieldbus coupler/controller from canting on the carrier rail.

With the fieldbus coupler/controller snapped in place, the electrical connections for the data contacts and power contacts (if any) to the possible subsequent I/O module are established.

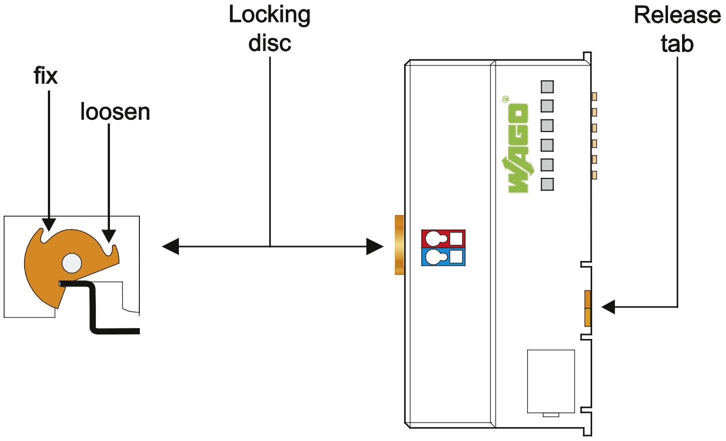


Figure 29: Release Tab

5.6.2 Removing the Fieldbus Coupler/Controller

1. Use a screwdriver blade to turn the locking disc until the nose of the locking disc no longer engages behind the carrier rail.

2. Remove the fieldbus coupler/controller from the assembly by pulling the release tab.

Electrical connections for data or power contacts to adjacent I/O modules are disconnected when removing the fieldbus coupler/controller.

5.6.3 Inserting the I/O Module

1. Position the I/O module so that the tongue and groove joints to the fieldbus coupler or controller or to the previous or possibly subsequent I/O module are
engaged.

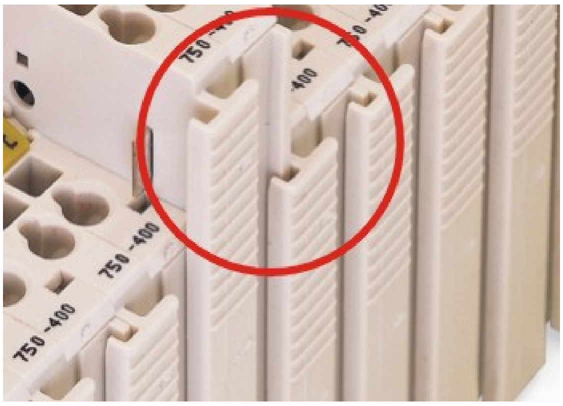


Figure 30: Insert I/O Module (Example)

2. Press the I/O module into the assembly until the I/O module snaps into the carrier rail.

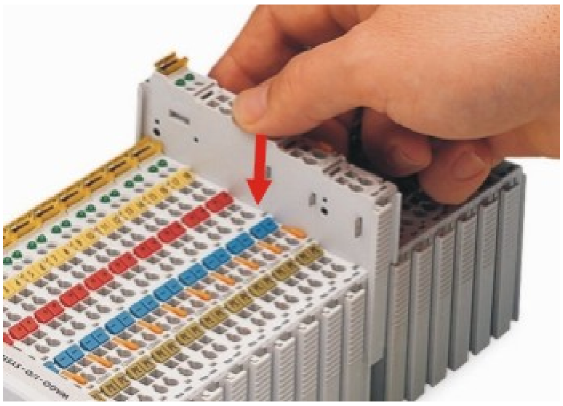


Figure 31: Snap the I/O Module into Place (Example)

With the I/O module snapped in place, the electrical connections for the data contacts and power jumper contacts (if any) to the fieldbus coupler or controller or to the previous or possibly subsequent I/O module are established.

5.6.4 Removing the I/O Module

1. Remove the I/O module from the assembly by pulling the release tab.

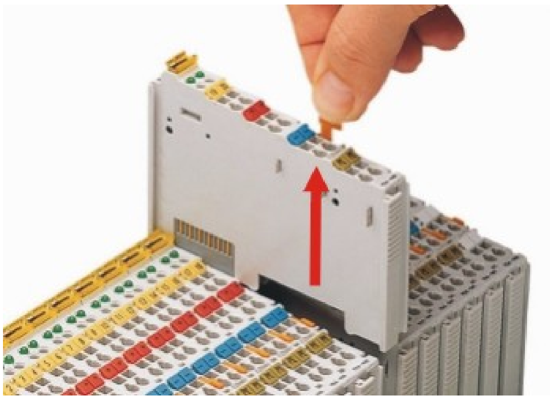


Figure 32: Removing the I/O Module (Example)

Electrical connections for data or power jumper contacts are disconnected when removing the I/O module.

6 Connect Devices

6.1 Data Contacts/Local Bus

Communication between the fieldbus coupler/controller and the I/O modules as well as the system supply of the I/O modules is carried out via the local bus. The contacting for the local bus consists of 6 data contacts, which are available as self-cleaning gold spring contacts.

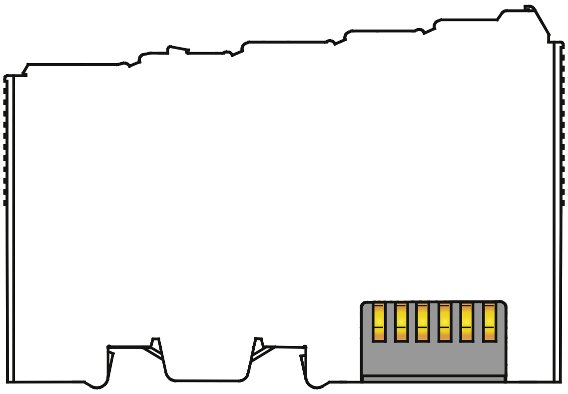


Figure 33: Data Contacts

NOTICE

Do not place the I/O modules on the gold spring contacts!
Do not place the I/O modules on the gold spring contacts in order to avoid soiling or scratching!

NOTICE

Ensure that the environment is well grounded!
The devices are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the devices, ensure that the environment (persons, workplace and packing) is well grounded. Avoid touching conductive components, e.g. data contacts.

6.2 Power Contacts/Field Supply

⚠ CAUTION

Risk of injury due to sharp-edged blade contacts!
The blade contacts are sharp-edged. Handle the I/O module carefully to prevent injury. Do not touch the blade contacts.

Self-cleaning power jumper contacts used to supply the field side are located on the right side of most of the fieldbus couplers/controllers and on some of the I/O modules. These contacts come as touch-proof spring contacts. As fitting counterparts the I/O modules have male contacts on the left side.

Power jumper contacts

Blade	0	0	3	2
Spring	0	3	3	2

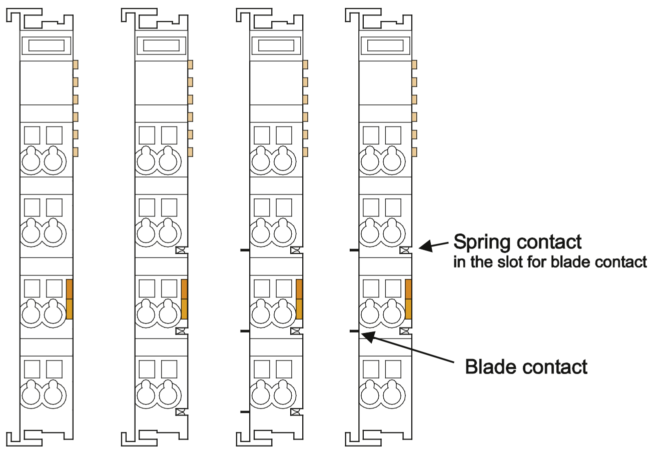


Figure 34: Example for the Arrangement of Power Contacts

Note

Field bus node configuration and test via smartDESIGNER
With the WAGO ProServe® Software smartDESIGNER, you can configure the structure of a fieldbus node. You can test the configuration via the integrated accuracy check.

6.3 Connecting a Conductor to the CAGE CLAMP®

The WAGO CAGE CLAMP® connection is appropriate for solid, stranded and finely stranded conductors.

Note

Only connect one conductor to each CAGE CLAMP®!
Only one conductor may be connected to each CAGE CLAMP®.
Do not connect more than one conductor at one single connection!

If more than one conductor must be routed to one connection, these must be connected in an up-circuit wiring assembly, for example using WAGO feed-through terminals.

1. For opening the CAGE CLAMP® insert the actuating tool into the opening above the connection.

2. Insert the conductor into the corresponding connection opening.

3. For closing the CAGE CLAMP® simply remove the tool. The conductor is now clamped firmly in place.

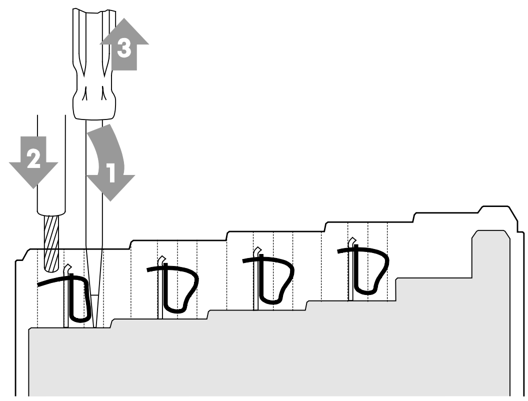


Figure 35: Connecting a Conductor to a CAGE CLAMP®

7 Function Description

7.1 Operating System

After master configuration and electrical installation of the fieldbus station, the system is operative.

The coupler begins running up after switching on the power supply or after a reset.

Upon initialization, the fieldbus coupler determines the I/O modules and configuration. The 'I/O' LED flashes red. After a trouble-free start-up, the coupler enters “Fieldbus start” mode and the 'I/O' LED lights up green.
In the event of a failure, the 'I/O' LED will blink continuously. Detailed error messages are indicated by blinking codes; an error is indicated cyclically by up to 3 blinking sequences.

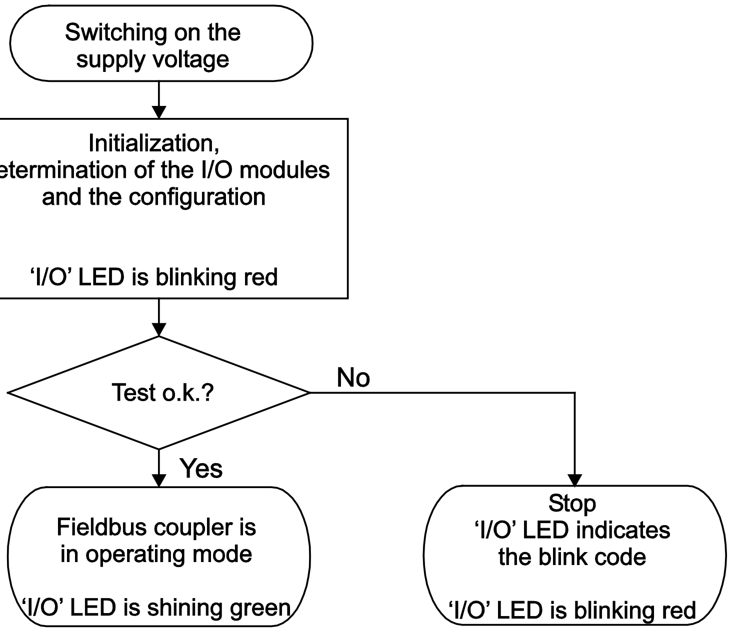


Figure 36: Operating System

Information

More information about the LED Signaling
Read the detailed description for the evaluation of the displayed LED state in the section “Diagnostics” > … > “LED Signaling”.

7.2 Process Data Architecture

7.2.1 Basic Structure

After switching on the supply voltage, the fieldbus coupler identifies all I/O modules connected with the node that send or receive data (data width/bit width > 0). In the maximum total extension the node can consist of a mixed arrangement of a maximum of 64 analog and digital I/O modules, connected on the fieldbus coupler.

The data of the digital I/O modules are bit-oriented; i.e., digital data are sent bit by bit. The data of the analog I/O modules are byte-oriented; i.e., analog data are sent byte by byte. The term “Analog I/O modules” represents the group of byte-oriented I/O modules, which send data byte by byte. This group includes, for example, counter modules and angle and distance measurement modules.

The fieldbus coupler stores the process data in the process images. The fieldbus coupler works with a process output data image (PIO) and a process input data image (PII).

The PIO is filled of the fieldbus master with the process output data. The PII is filled of the fieldbus coupler with the process input data.

Into the input and output process image the data of the I/O modules are stored in the sequence of its physical position after the fieldbus coupler in the individual process image.

First, all the byte-oriented I/O modules are stored in the process image, then the bit-oriented I/O modules. The bits of the digital I/O modules are grouped into bytes. If the amount of digital I/O information exceeds 8 bits, the fieldbus coupler automatically starts a new byte.

NOTICE

Avoid equipment damages due to addressing errors!
To avoid equipment damages within the field range, you must consider that, depending on the specific position of an I/O module in the fieldbus node, the process data of all previous byte or bit-oriented modules must be taken into account to determine its location in the process data map.

Note

Consider the Process Data size for each module!
Observe the number of input and output bits or bytes for the individual I/O modules.

Note

Local bus extension with Coupler Module and End Module!
With the use of Bus Extension Coupler Module 750-628 and Bus Extension End Module 750-627, it is possible to operate up to 250 I/O modules on the device.

For some I/O modules and their different versions, the structure of the process data depends on the fieldbus.

Information

Additional information about the fieldbus specific process image
For the fieldbus-specific process image of any WAGO I/O Module, please refer to the section “Structure of the Process Data”.

7.2.2 Process Data EtherNet/IP

For some I/O modules (and their variations), the structure of the process data depends on the fieldbus.

With EtherNet/IP, the process image is built up word-by-word (with word alignment). The internal mapping method for data greater than one byte conforms to Intel formats.

Information

Additional Information:
For the respective fieldbus-specific structure of the process values of any I/O module within the 750 or 753 Series of the WAGO-I/O-SYSTEM, refer to Section "Structure of Process Data for EtherNet/IP".

An EtherNet/IP master can access the data via specific objects, whereby fixed instances are used as addresses.

Information

Additional Information:
For a detailed description of these fieldbus-specific data access methods, refer to the section "EtherNet/IP".

7.3 Data Exchange

With the fieldbus coupler/controller, data is exchanged via the EtherNet/IP.

In the EtherNet/IP network the master controller can be a PC or a PLC.

The head stations of the WAGO I/O-SYSTEM 750 are slaves.

The master requests communication. This request can be directed to certain head station by addressing. The head stations receive the request and, depending on the request type, send a reply to the master.

The **FC EtherNet/IP; G4;** ECO is essentially equipped with two interfaces for data exchange:

- the interface to the fieldbus (Master)
- the interface to the I/O modules.

Data exchange takes place between the fieldbus master and the I/O modules.

EtherNet/IP, as the fieldbus, uses an object model for data access.

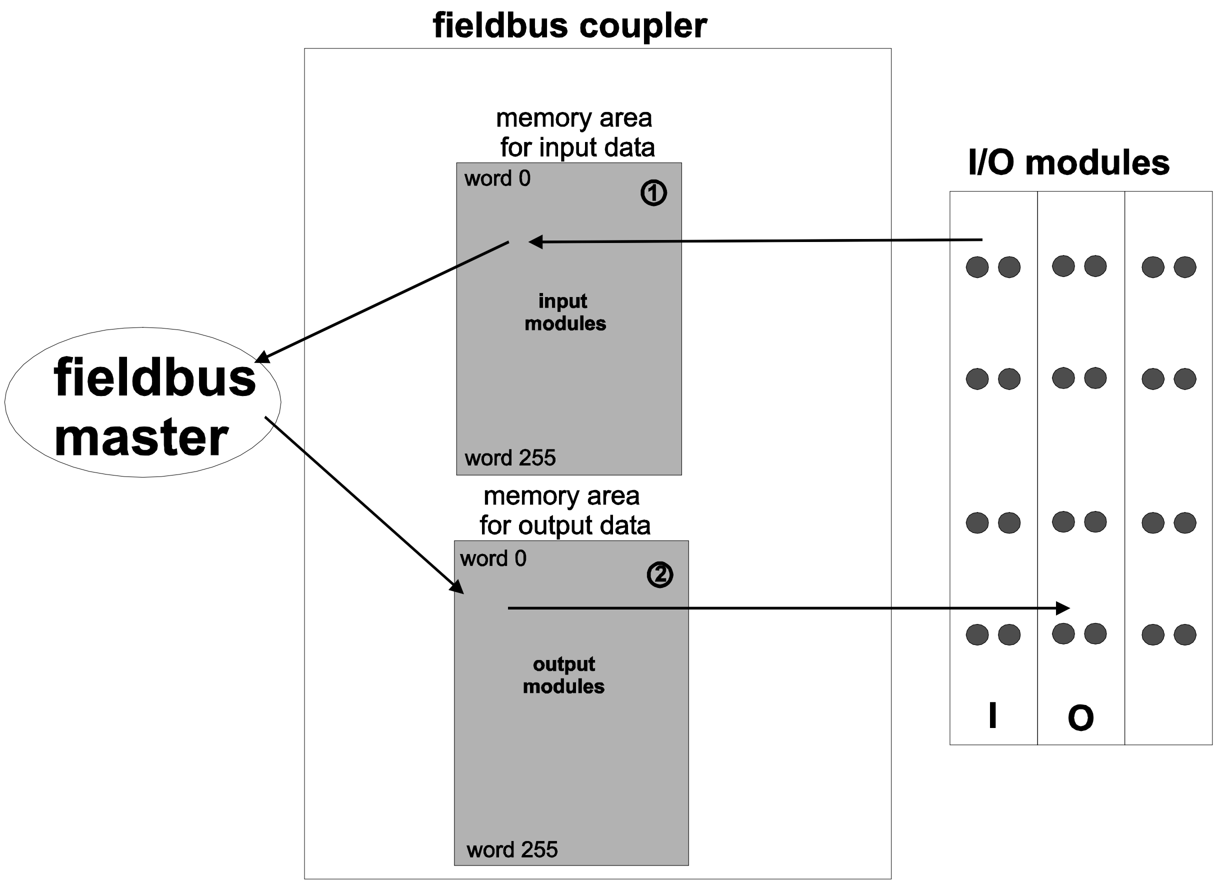


Figure 37: Memory Areas and Data Exchange

The fieldbus coupler process image contains the physical data for the bus modules.
These have a value of 0 ... 255 and word 512 ... 1275.

1 The input module data can be read by the CPU and by the fieldbus side.

2 Likewise, data can be written to the output modules from the CPU and the fieldbus side.

7.3.1 Addressing

Module inputs and outputs in a fieldbus coupler are addressed internally as soon as they are started. The order in which the connected modules are addressed depends on the type of module that is connected (input module, output module). The process image is formed from these addresses.
The physical arrangement of the I/O modules in the fieldbus node is arbitrary.

7.3.1.1 Addressing of I/O Modules

Addressing first references complex modules (modules that occupy several bytes) in accordance with their physical order downstream of the fieldbus coupler/controller; i.e., they occupy addresses starting from word 0.

Following these is the data for the remaining modules, compiled in bytes (modules that occupy less than one byte). In this process, byte by byte is filled with this data in the physical order. As soon a complete byte is occupied by the bit oriented modules, the process begins automatically with the next byte.

Note

Hardware changes can result in changes of the process image!
I f the hardware configuration is changed and/or expanded; this may result in a new process image structure. In this case, the process data addresses also change. If adding modules, the process data of all previous modules has to be taken into account.

Note

Observe process data quantity!
For the number of input and output bits or bytes of the individual IO modules please refer to the corresponding description of the IO modules.

Table 26: Data Width for I/O Modules

Data width > 1 byte (channel)	Data width = 1 bit (channel)
Analog input modules	Digital input modules
Analog output modules	Digital output modules
Input modules for thermocouples	Digital output modules with diagnostics (2 bits/channel)
Input modules for resistor sensors	Supply modules with fuse carrier/diagnostics
Pulse width output modules	Solid-state load relays
Interface modules	Relay output modules
Up/down counters	
I/O modules for angle and distance measurement	

7.3.2 Data Exchange between EtherNet/IP Master and I/O Modules

The data exchange between EtherNet/IP master and the I/O modules is objectoriented. Each node on the network is depicted as a collection of objects.

The “assembly” object specifies the structure of the objects for the data transmission. With the assembly object, data (e.g. I/O data) can be combined into blocks (mapped) and sent via a single message connection. Thanks to this mapping, less access to the network is necessary.

There is a distinction between input and output assemblies.

An input assembly reads in data from the application via the network or produces data on the network.

An output assembly writes data to the application or consumes data from the network.

The fieldbus coupler / controller provides a fixed number of assembly instances (static assembly).

After switching on the supply voltage, the I/O data from the input and output process image are assigned to the respective assembly instances. The assignment takes place in blocks of digital and analog input and output data.

Usually the data exchange takes place using I/O connections. When the connection is established, the assembly instances (and thus the I/O data) to be transferred in the connection are selected. Subsequently, the associated I/O data can be read and/or written by the master.

Information

Additional Information:
The assembly instances for the static assembly are described in the section "EtherNet/IP".

8 Commissioning

This section shows a step-by-step procedure for starting up exemplarily a WAGO fieldbus node.

Note

Good example!
This description is just an example and only serves to describe the procedure for a local start-up of a single fieldbus node with a PC under Windows.

In principle, only a few steps are required for start-up.

To enable communication from your PC to the fieldbus coupler/controller over network, both must be in the same network. This requires that you first determine the IP address of the PC and then assign a corresponding IP address to the fieldbus node. There are several options being available for IP address assignment.

The description of these single work steps can be found in the corresponding following chapters.

- **Connecting PC and fieldbus node**
- **Determing IP address of the PC**
- **Assigning IP address to the fieldbus node**
- **Applying IP address permanently (option “static”)**

Following the commissioning descriptions after which the fieldbus node is ready for communication, the following topics are described:

- **Preparing the Flash File System**
- **Synchronizing the System Time**
- **Restoring Factory Settings**

8.1 Connecting Client PC and Fieldbus Nodes

1. Mount the fieldbus node on the TS 35 carrier rail.
   Follow the mounting instructions found in the “Mounting” chapter.

2. Connect the 24 V power supply to the supply terminals.

3. Connect the PC's ETHERNET interface to the head station's ETHERNET interface (RJ-45) of your fieldbus node.

4. Turn the operating voltage on.

The head station is initialized. The head station determines the I/O module configuration of the fieldbus node and creates a process image.
During start-up, the I/O LED (red) flashes.
If the I/O LED lights up green after a brief period, the fieldbus node is operational.

If an error has occurred during initialization, it is red flashed with an error code by the I/O LED.
If the I/O LED flashes 6 times (indicating error code 6) and then 4 times (indicating error argument 4), this indicates that an IP address has not been assigned yet.

8.2 Determining the IP Address of the PC

To determine the IP address of the PC (with Microsoft Windows operating system) using the MS DOS prompt, proceed as follows:

1. Go via "Start"> "Search programs/files".

2. Enter the command "cmd" in the input field.

3. Choose at
   (Windows 7): "cmd.exe" and
   (Windows 10): "Command Prompt".

4. Press **[Enter]** key to confirm the entry.

   The MS DOS prompt window opens.

5. In the MS DOS prompt window enter the command “ipconfig”.

6. Press **[Enter]** key to confirm the entry.

The IP address, subnet mask and the default gateway with the corresponding parameters of the PC are displayed.

8.3 Assigning the IP Address to the Fieldbus Node

Note

The IP address must occur in the network only once!
For error-free network communication, note that the assigned IP address must occur only once in the network!
In the event of an error, the error message “IP address configuration error” (error code 6 – error argument 7) is indicated by 'I/O' LED at the next power-on.

- Use **address selection switch** (DIP switch) to assign IP address (manually).

- **Automatic assignment of addresses via DHCP**
(IP address via the fieldbus)
- **Assigning IP Address via** “**WAGO Ethernet Settings”**
(static IP address via the serial communication port or the ETHERNET interface)
- **Assigning IP Address via BootP**
(IP address via the fieldbus)

8.3.1 Assigning IP Address via Address Selection Switch

Use the address selection switch to set the host ID, which is the last byte of the IP address, with values between 1 and 254 binary coded.

The first three bytes of the IP address are specified by the fieldbus coupler/ controller. The fieldbus coupler/controller uses a static base IP address to assign the IP address via the address selector switch.
The basic IP address can be changed via the Web-based management or WAGO Ethernet settings (in the delivery state: **192.168.1.0**).

The subnet mask and default gateway values are taken from the static settings (as delivered: subnet mask = **255.255.255.0**, default gateway = **0.0.0.0**).

Example:

Base IP address:	192.168.1.0
Set DIP switch value:	**50** (binary coded: 00110010)
Resulting IP address:	192.168.1.**50**

Table 27: Address selection switch values (host ID)

Address selection switch	Description
1 … 254	Address selection switch is enabled. The host ID is set to a fixed value between 1 ... 254. The IP address consists of the static base address and the set host ID. The IP address set via the current device configuration (DHCP, BootP, static) is disabled.
0	Address selection switch is disabled. The IP address set via the current device configuration (DHCP, BootP, static) is used.
255	Address selection switch is disabled. The IP address is obtained from a DHCP server.

Information

More information about changing the static base address
You can also change the static base address currently saved in the fieldbus coupler/controller as required. Proceed as described for example in the section “Assigning IP Address via “WAGO Ethernet Settings””.

1. To configure the IP address via the address selection switch by setting the host ID (last position of the IP address) to a value that does not equal 0/255, first convert the host ID to the binary representation.
   For example, host ID “50” results in a binary code of “00110010”.

2. Set the bits in sequence using the 8 address switches. Start with address switch 1 to set bit 0 (LSB) and end with address switch 8 for bit 7 (MSB).

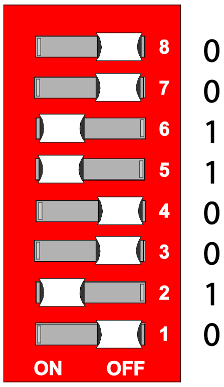


Figure 38: Address Selection Switch, for Example the Value Setting “50” ($2^1 + 2^4 + 2^5$)

3. Restart the fieldbus node after adjusting the address selection switch to apply the configuration changes.

8.3.2 Assigning IP Address via DHCP

Note

Set the address selection switch to 255 for assigning the IP address via DHCP!
Set the address selection switch to 255 to disable the DIP switch and to enable DHCP.
Restart the fieldbus node after adjusting the address selection switch to apply the configuration changes.

In delivery state of the head station, the dynamic assignment of the IP address is active by means of "Dynamic Host Configuration Protocol" (DHCP).

When the DHCP protocol is enabled the head station of fieldbus node expects the DHCP server to be permanently available. If there is no DHCP server available after a Power On reset, the network will remain inactive.

If DHCP is not active, it is necessary to enable DHCP, e. g. via "WAGO Ethernet Settings" or via the WBM (see chapters "Enable DHCP via "WAGO Ethernet Settings" (without existing IP address)" or "Enable DHCP via WBM (with existing IP address)").

Then the IP address assignment with DHCP takes place automatically via a DHCP server in the network.

If there is no DHCP server on your local PC, you can download a DHCP server free of charge from the Internet and install it on your PC.

Note

Total network failure when there are two DHCP servers in the network!
To prevent network failure, never connect a PC, on which a DHCP server is installed, to a global network. In larger networks, there is usually a DHCP server already that can cause collisions and subsequent network failure.

Note

Assign the DHCP server a fixed IP address and note common subnet!
Note that the DHCP server must have a fixed IP address and that the fieldbus node and DHCP server must be in the same subnet.

After the IP address was assigned by means of DHCP, it can be determined via the settings or outputs of the respective DHCP server, such as via the output of "Open DHCP", for example.

Note

Via DHCP assigned IP addresses are only temporarily valid!
Note that an IP address assigned via DHCP is limited in time. If the DHCP server is not available at the end of its useful life, the fieldbus node sets the IP address free and then the fieldbus node is no longer accessible!

In order to use the IP address permanently, change it to “static” (see chapter "Apply IP address permanently (option "static ")").

8.3.2.1 Enable DHCP via "WAGO Ethernet Settings" (without existing IP address)"

Note

Note Software Compatibility!
Refer to the version of the software specified in "Software Compatibility" in the Technical Data.

In the delivery state of the head station, the dynamic assignment of the IP address is active by means of "Dynamic Host Configuration Protocol" (DHCP).

However, if DHCP is not active and you do not have access to your fieldbus node via an IP address, you can enable DHCP via "WAGO Ethernet Settings" in the **Network** tab.

WAGO communication cables or WAGO radio-link adapters can be used for data communication via the serial service interface.

NOTICE

Do not connect Communication Cable when energized!
To prevent damage to the service interface, do not connect or disconnect 750-920 respectively 750-923 Communication Cable when energized! The fieldbus coupler/controller must be de-energized!

1. Using a WAGO Communication cable 750-920 respectively 750-923, connect your PC with the service interface of the head station of the fieldbus node.

2. Start “WAGO Ethernet Settings” program.

3. Click on **[Read]** to read in and identify the connected fieldbus node.

4. Select the **Network** tab.

5. Select the option "DHCP" in the field **Source**.

6. Click on the **[Write]** button to apply the settings in the fieldbus node.

   The fieldbus node then starts with the new IP address assigned via DHCP.

7. Then You can use the **[Read]** button to read out the currently assigned IP address.

8. In order to use the IP address permanently, select on "TCP/IP" WBM page the option “static" in the field **Source** and apply the settings for “IP address”, “Subnet mask” and “Gateway” from the currently used settings.

9. Click on the **[Write]** button to apply the settings.

8.3.2.2 Enable DHCP via WBM (with existing IP address)

In the delivery state of the head station, the dynamic assignment of the IP address is active by means of "Dynamic Host Configuration Protocol" (DHCP).

However, if DHCP is not active and you do already have access to your fieldbus node via an IP address, you can enable DHCP via WBM on "TCP/IP" WBM page.

1. Open the WBM (see chapter: "Configuring via the Web-Based Management System (WBM)" >> "Open WBM").
2. Change to the WBM page "TCP / IP".
3. Activate the “DHCP“ option to assign a new IP address via DHCP.
4. Confirm the change with the **[SUBMIT]** button.
5. Select the WBM page "Administration".
6. Click the **[SOFTWARE RESET]** button to apply the changed setting.

   Alternatively, you can restart the fieldbus node.

   The fieldbus node then starts with the new IP address assigned via DHCP. The connection to the browser is interrupted.
7. If you want to call the WBM again, you must use now the changed IP address.
8. In order to use the IP address permanently, select in the WBM on "TCP/IP" WBM page the option "IP configuration source: static" (see chapter "Apply IP address permanently (option "static ")").
9. In order to use the IP address permanently, select on "TCP/IP" WBM page the option “static" in the field **Source** and apply the settings for “IP address”, “Subnet mask” and “Gateway” from the currently used settings.
10. Confirm the change with the **[SUBMIT]** button.
11. Click the **[SOFTWARE RESET]** button to apply the changed setting.

8.3.3 Assigning IP Address via “WAGO Ethernet Settings”

Note

Note Software Compatibility!
Refer to the version of the software specified in "Software Compatibility" in the Technical Data.

This program is used to configure an IP address, to reset the fieldbus coupler/controller parameters to the factory settings and to restore the Flash File System in which the WBM pages of the fieldbus coupler/controller are stored.
"WAGO Ethernet Settings" can be used via the serial service interface or via the ETHERNET interface.

For initial commissioning, however, the way via the serial service interface is described here, because for access via the ETHERNET interface the currently assigned IP address must already be known.

WAGO communication cables or WAGO radio-link adapters can be used for data communication via the serial service interface.

NOTICE

Do not connect Communication Cable when energized!
To prevent damage to the service interface, do not connect or disconnect 750-920 respectively 750-923 Communication Cable when energized! The fieldbus coupler/controller must be de-energized!

Note

Set the address selection switch to 0 for an IP assignment via software!
Set the address selection switch to “0” to disable the DIP switch.
Restart the fieldbus node after adjusting the address selection switch to apply the configuration changes.

1. Using a WAGO Communication cable 750-920 respectively 750-923, connect your PC with the service interface of the head station of the fieldbus node.

2. Start “**WAGO Ethernet Settings”** program.

3. Click on **[Read]** to read in and identify the connected fieldbus node.

4. Select the **Network** tab.
5. To assign a permanent address, select the option "Static configuration" in the field **Source**.

6. Enter the required **IP Address** and, if applicable, the address of the subnet mask and gateway.

7. Click on the **[Write]** button to apply the settings in the fieldbus node.

8. You can now close "WAGO Ethernet Settings" or make other changes in the Web-based Management System as required. To open the Web-based Management System click on the button **[Start WBM]** on the right side.

8.3.4 Assigning the IP Address via BootP

A BootP server can be used to assign a fixed IP address.

Assigning the IP address using a BootP server depends on the respective BootP program. Handling is described in the respective manual for the program or in the respective integrated help texts.

Note

Set the address selection switch to 0 for an IP assignment via software!
Set the address selection switch to “0” to disable the DIP switch.
Restart the fieldbus node after adjusting the address selection switch to apply the configuration changes.

By default, DHCP is active in the delivery state of the head station.

Therefor it is necessary to enable BootP for IP address assignment via BootP, e. g. via "WAGO Ethernet Settings" or via the WBM (see analog the chapters "Activate DHCP via "WAGO Ethernet Settings" (without existing IP address)" or "Activate DHCP via WBM (with existing IP address)").

Then the IP address assignment with BootP takes place automatically via a BootP server in the network.

If there is no BootP server on your local PC, you can download a BootP server free of charge from the Internet and install it on your PC.

Information

Additional Information
Assigning IP addresses using a BootP server can be carried out in any Windows and Linux operating system. Any BootP server may be used.

Note

IP address assignment is not possible via the router!
The IP address is assigned via patch cable, switches or hubs. Addresses cannot be assigned via routers.

When the BootP protocol is enabled the head station of fieldbus node expects the BootP server to be permanently available. If there is no BootP server available after a Power On reset, the network will remain inactive.

In order to use the IP address permanently, change it to “static” (see chapter "Apply IP address permanently (option "static ")").

1. Based on the handling, which depends on the BootP program set, assign the required IP address for your fieldbus node.

2. Enable the query/response mechanism of the BootP protocol based on the handling, which depends on the BootP program set or e. g. in “WAGO Ethernet Settings“ (**Network** tab, **Source** “BootP”).

3. To apply the new IP address, use e.g. a hardware reset to restart your fieldbus node by interrupt the voltage supply for approx. 2 seconds.

4. Restart the fieldbus node.

   The fieldbus node then starts with the new IP address assigned via BootP.

5. In order to use the IP address permanently, select in the WBM on "TCP/IP" WBM page the option "IP configuration source: static" (see chapter "Apply IP address permanently (option "static ")").

8.3.4.1 Reasons for Failed IP Address Assignment

- The PC on whom the BootP server is running is not located in the network as the fieldbus coupler/controller; i.e., the IP addresses do not match.

  Example:
  Sub net mask: 255.255.255.0
  (default value for a fieldbus coupler/
  controller n)
  PC‘s IP: 192.168.**2**.100
  fieldbus coupler/controller‘s IP: 192.168.**1**.200
  Due to the sub net mask, the first 3 digits of the IP addresses must match.

- PC and/or head station is/are not linked to the ETHERNET

8.4 Apply IP address permanently (option “static“)

Note

For permanent address assignment, the IP stored in the EEPROM must be used!
To apply permanently the new IP address assigned via DHCP or BootP in the fieldbus coupler/controller, the assigned or desired settings for IP address, subnet mask and default gateway must be entered on the WBM “TCP/IP” page. In addition the option "IP configuration source: static" must be activated. Then, the IP address is stored in the EEPROM and used as static address.

You can enable the option “IP configuration source: static” in the Web-based Management System.

1. Open the WBM (see chapter: "Configuring in the Web-Based Management System (WBM)" >> "Open WBM").
2. Select the WBM page "TCP/IP".
3. Enter the assigned or desired settings for IP address, subnet mask and default gateway in the fields "IP address", "Subnet mask" and "Default gateway".
4. Enable the option “IP configuration source: "static".

   At the same time, the use of the DHCP/BootP server is diabled.

5. Confirm your changes with button **[SUBMIT]**.
6. Select the “Administration” WBM page.
7. Click on the button **[Software Reset]** at the bottom of the page in order for the settings to take effect**.**

   Alternatively restart the fieldbus node.

   Then the fieldbus node starts with the configurations and the assigned IP address, which were previously loaded into the EEPROM. The connection to the browser is interrupted.

8. Now you must use the new IP address, if you want to access again on the WBM of this fieldbus node via browser.

8.5 Testing the Function of the Fieldbus Node

1. To ensure that the IP address is correct and to test communication with the fieldbus node, first turn off the operating voltage of the fieldbus node.

2. Create a non-serial connection between your PC and the fieldbus node.

The head station is initialized. The head station determines the I/O module configuration of the fieldbus node and creates a process image.
During start-up, the I/O LED (red) flashes.
If the I/O LED lights up green after a brief period, the fieldbus node is operational.

If an error occurs during start-up indicated by the I/O LED flashing red, evaluate the error code and argument and resolve the error.

Information

More information about LED signaling
The exact description for evaluating the LED signal displayed is available in the section “Diagnostics” > … > “LED Signaling”.

8.6 Preparing the Flash File System

The flash file system must be prepared in order to use the WBM of the fieldbus coupler/controller of the fieldbus node to make all configurations.

The flash file system is already prepared when delivered.
However, if the flash file system has not been initialized on your fieldbus coupler/controller or it has been destroyed due to an error, you first must initialize it manually to access it.

NOTICE

Do not connect Communication Cable when energized!
To prevent damage to the service interface, do not connect or disconnect 750-920 respectively 750-923 Communication Cable when energized! The fieldbus coupler/controller must be de-energized!

Note

Resetting erases data!
Note that resetting erases all data and configurations.
Only use this function when the flash file system has not been initialized yet or has been destroyed due to an error.

1. Switch off the supply voltage of the fieldbus node.

2. Connect the communication cable 750-920 or 750-923 respectively the *Bluetooth*® Adapter 750-921 to the service interface of the head station of the fieldbus node and to your computer.

3. Switch on the supply voltage of the fieldbus node.

The head station is initialized. The head station determines the I/O module configuration of the fieldbus node and creates a process image.
During start-up, the I/O LED (red) flashes.
If the I/O LED lights up green after a brief period, the fieldbus node is operational.

If an error occurs during start-up indicated by the I/O LED flashing red, evaluate the error code and argument and resolve the error.

Information

More information about LED signaling
The exact description for evaluating the LED signal displayed is available in the section “Diagnostics” > … > “LED Signaling”.

4. Start the “**WAGO Ethernet Settings**” program.

5. In the top menu bar, select **[Reset File System]** to format the file system and to extract the WBM pages of the flash file system.

Formatting and extracting is complete when the status window displays "Resetting the file system successfully".

Note

Restart the Fieldbus node after resetting file system!
Make a restart of the fieldbus node, so that the WBM pages can be displayed after resetting file system.

8.7 Synchronizing the System Time

The head station's system time enables a date and time indication for files in the flash file system.

Note

System time will be reset when the fieldbus node is de-energized!
The head station 750-363 does not have a real-time clock. For this reason, the current system time will be reset when the fieldbus node is de-energized!
After switching on the operating voltage, the system time starts at 01/01/2000, 00:00:00 a.m.

At start-up, synchronize the system time with the computer's current time.

There are two options to synchronize the system time:

- Synchronize the system time using "**WAGO Ethernet Settings**"
- Synchronize the system time using the **Web Based Management System**

Synchronize the system time using "WAGO Ethernet Settings"

Note

Do not set time during a WAGO I/O-*CHECK* communication!
Note that setting the clock during a WAGO I/O-*CHECK* communication may cause communication errors. Therefore set the time only if WAGO I/O-*CHECK* is not yet started.

1. Switch off the supply voltage of the fieldbus node.
2. Connect the communication cable 750-920 or 750-923 respectively the *Bluetooth*® Adapter 750-921 to the service interface of the head station of the fieldbus node and to your computer.
3. Switch on the supply voltage of the fieldbus node.

The head station is initialized. The head station determines the I/O module configuration of the fieldbus node and creates a process image.
During start-up, the I/O LED (red) flashes.
If the I/O LED lights up green after a brief period, the fieldbus node is operational.

If an error occurs during start-up indicated by the I/O LED flashing red, evaluate the error code and argument and resolve the error.

Information

More information about LED signaling
The exact description for evaluating the LED signal displayed is available in the section “Diagnostics” > … > “LED Signaling”.

4. Start the “**WAGO Ethernet Settings”** program.

5. Select the **Date and Time** tab.

6. Click on the **[Apply]** button.

Synchronize the system time using the Web-based Management-System

1. Launch a Web browser (e.g., MS Internet Explorer or Mozilla) and enter in the address bar the IP address you have assigned to your fieldbus node.

2. Click **[Enter]** to confirm.
   The WBM start page is displayed.

3. Select “Clock” in the left navigation bar.

4. Enter your user name and password in the displayed query dialog box (default: user = "admin", password = "wago" or: user = "user", password = "user"). The WBM page "Clock" is displayed.

5. Set the current time and date values, as well as the time zone deviation in the input fields, and select the desired option for the display and Daylight Saving Time (DST).

6. Click on **[SUBMIT]** to apply the changes in your fieldbus node.

7. Restart the fieldbus node to apply the settings of the Web interface.

8.8 Restoring Factory Settings

To restore the factory settings, proceed as follows:

1. Switch off the supply voltage of the fieldbus node.

2. Connect the communication cable 750-920 or 750-923 respectively the *Bluetooth*® Adapter 750-921 to the service interface of the head station of the fieldbus node and to your computer.

3. Switch on the supply voltage of the fieldbus node.

4 Start the **WAGO-ETHERNET-Settings** program.

5. In the top menu bar, select **[Factory Settings]** and click **[Yes]** to confirm.

A restart of the fieldbus node is implemented automatically. The start takes place with the default settings.

9 Configuring via the Web-Based Management System (WBM)

An integrated Web server can be used for configuration and administration of the device. The HTML pages together, they are referred to as the Web-based Management System (WBM).

The WBM pages saved internally provide current information about the configuration and status of the device.
The configuration of the device can be changed via the special configuration pages. Authentication is required for this.
Also HTML pages created by yourself can be save via the implemented file system.

Note

After changes to the configuration, a restart may be necessary!
In order for changed configuration settings to take effect, it may be necessary for you to perform a system restart after your changes. This is then indicated in the description text on the respective WBM pages.

9.1 WBM User Groups

For authentication, 3 different password-protected user authorization groups are provided as standard:

Table 28: WBM User Groups

User Group	Default Password	Access Rights
admin	wago	Read/write access to all WBM pages as well as passwords modification and CODESYS application download, if this is enabled for CODESYS (WBM page "Administration"> "Security Settings"> "Enable CODESYS port authentication")
user	user	Read/write access to all WBM pages, but no write authorization on WBM-page "Administration"
guest	guest	Read only

9.2 Open WBM

1. To open the WBM, launch a Web browser.

2. Enter the IP address of the fieldbus coupler/controller in the address bar.

3. Click **[Enter]** to confirm.
   The start page of WBM loads.

4. Select the link to the desired WBM page in the left navigation bar.

   The first time a configuration page is called, a login dialog appears

5. Enter your user name and password in the query dialog (default: user = “admin”, password = “wago” or user = “user”, password = “user”).
   The corresponding WBM page is loaded.

6. Make the desired settings.

7. Click **[SUBMIT]** to confirm your changes or click **[UNDO]** to discard the changes.

   At the first confirmation via the **[SUBMIT]** button, a login dialog appears again. Proceed as described under point 5.

8. To apply the settings, you may have to reboot afterwards if this is indicated in the description text on the respective WBM page.
   You restart the system using WBM page “Administration”, button **[SOFTWARE RESET]**.

9.3 WBM Pages

You can access the available WBM pages via the links given in the navigation bar on the left side.
The configuration pages, listed below, are following described.

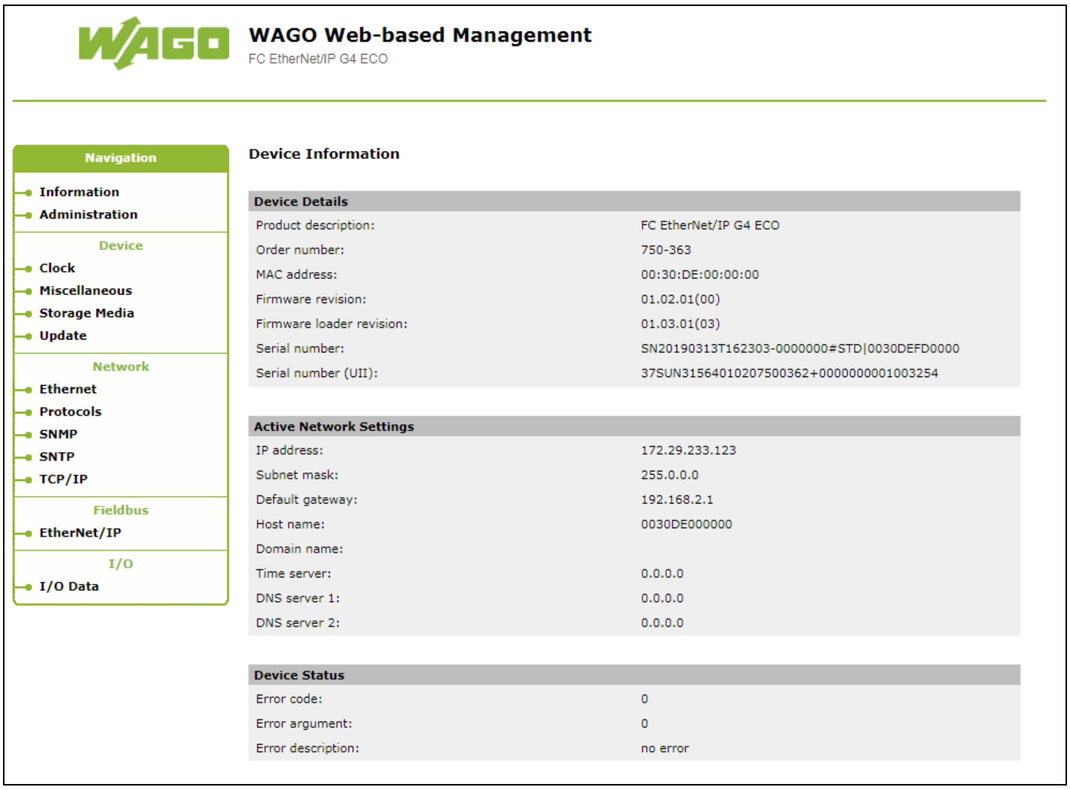


Figure 39: WBM page “Information” (example)

9.4 Information

The WBM page “Information” contains an overview of all important information about your fieldbus coupler.

Table 29: WBM Page “Information”

Device details			
Entry	**Default**	**Value (example)**	**Description**
Product description	Fieldbus Coupler EtherNet/IP, Generation 4, ECO		Produkt description
Order number	750-363		Order number
Mac address	0030DEXXXXXX	0030DE000006	Hardware MAC address
Firmware revision	kk.ff.bb(rr)	01.01.14(01)	Firmware revision number (kk = compatibility, ff = functionality, bb = bugfix, rr = revision)
Firmware loader revision	kk.ff.bb(rr)	01.03.01(03)	Firmware loader revision number (kk = compatibility, ff = functionality, bb = bugfix, rr = revision)
Serial number	___	„ “	Serial number of device (manufacturer-specific identification of device)
Serial number (UII)	___	„ “	„Unique Item Identifier“ (world wide unique identification of device)

Active Network Settings			
Entry	**Default**	**Value (example)**	**Description**
IP address	0.0.0.0	172.29.233.123	IP address, Type of IP address assignment
Subnet mask	255.255.255.0	255.0.0.0	Subnet mask
Default gateway	0.0.0.0	192.168.2.1	Gateway
Host name	0030DEXXXXXX	0030DE000000	Host name
Domain name	___	___	Domain name (not assigned here)
Time server	0.0.0.0	0.0.0.0	Address of Time server
DNS server 1	0.0.0.0	0.0.0.0	Address of first DNS server
DNS server 2	0.0.0.0	0.0.0.0	Address of second DNS server

Module Status			
Entry	**Default**	**Value (example)**	**Description**
Error Code	0	6	Error code
Error Argument	0	4	Error argument
Error Description	no error	IP address assignment error.	Error description

9.5 Administration

Use the “Administration” WBM page to set configuration options for basic administration purposes, such as boot behavior, authentication, and SSL certificate.

These configuration options are stored in non-volatile memory when the **[SUBMIT]** button is pressed. Changes to the configuration options take effect after the next power-on cycle or software reset.

Note

Changing the passwords requires administrator rights and software reset!
You can only change the passwords as an administrator with the user rights "admin" and the associated password.
Press the **[Software Reset]** button to restart the software for the setting changes to take effect.

Note

Note password restrictions!
The following restriction is applied for passwords:
- Max. 32 characters inclusive special characters.

Note

Renew access after software reset!
If you initiate a software reset on this page, then the fieldbus coupler/controller starts with the configurations previously loaded into the EEPROM and the connection to the browser is interrupted.
If you changed the IP address previously, you have to use the changed IP address to access the device from the browser.
You have not changed the IP address and performed other settings; you can restore the connection by refreshing the browser.

Table 30: WBM Page “Administration”

Security Settings			
Entry	**Default**	**Description**	
Enable web-server authentication	☑	☑	Enable password protection to access the Web interface
		☐	Disable password protection to access the Web interface

User Settings		
Entry	**Default**	**Description**
User	guest	Select user permissions according to the default user group (→ see Chapter "WBM User Groups").
Password	-	Enter desired password (max. 32 characters inclusive special characters).
Confirm Password	-	Enter desired password again to confirm.

*) The following default groups exist:

User: admin	Password: wago
User: user	Password: user
User: guest	Password: guest

SSL Certificates			
Entry	**Button**	**Status (Example)**	**Description**
Server certificate incl. private key	**[Durchsuchen …]**	D:\xyz.crt	Select the file with the server certificate and user key for secure Web server communication (HTTPS protocol). The server certificate must be in *pem, *.cer or *.crt format and contain the private key of the device.
	[UPLOAD]	NO FILE	Load the selected SSL certificate onto the device.
Root certificate (CA)	**[Durchsuchen …]**	D:\abc.pem	Select the file with the SSL root certificate. The root certificate must be in *pem, *.cer or *.crt format.
	[UPLOAD]	NO FILE	Load the selected SSL root certificate onto the device.
Upload and installation status	**-**	Ready	Download and install status indicator

Button	Description
[INSTALL]	Installs the SSL server and/or root certificate previously loaded on the device and replaces the existing SSL certificates.
[DOWNLOAD]	Downloads the SSL root certificate stored in the device to the local PC.
[SOFTWARE RESET]	Restart the software.

9.6 Clock

On the WBM "Clock" page, you make settings for the internal system time. Enter the current time and date here and select a time zone deviation, 12h or 24h display and automatic daylight saving time as required.

At start-up, the system time has to be synchronized with the computer's current time.

Note

System time will be reset when the controller is de-energized!
The head station 750-363 does not have a real-time clock. For this reason, the current system time will be reset when the controller is de-energized!
After switching on the operating voltage, the system time starts at 01/01/2000 00:00:00 a.m. and has to synchronize with the computer’s current time.

Note

Use a WAGO RTC module for time synchronization!!
You can use a WAGO 750-640 RTC Module for your node to utilize the actual encoded time (Real-time – RTC) in your higher-level control system.

Table 31: WBM Page „Clock“

Clock Settings			
Entry	**Default**	**Value (example)**	**Description**
Device local time (HH:MM:SS)	00:00:00	08:30:38	Set current time
Device local date (YYYY-MM-DD)	2000-01-01	2018-07-19	Set current date
Device time zone (+/- HH:MM)	0:00	+1:00	Set time zone offset from the Coordinated Universal Time (UTC)
Time display mode	◉ 24h		◉ Enable 24-hour display
			○ Disable 24-hour display
	○ 12h (AM/PM)		◉ Enable 12-hour display
			○ Disable 12-hour display
Automatic daylight saving time (DST)	◉ off	○	◉ Disable manual summer/winter time
			○ Enable manual summer/winter time
	○ EU	◉	◉ Enable automatic Daylight Saving Time (EU) (last Sunday in March, clocks are advanced from 02:00 AM to 03:00 AM / last Sunday in October, clocks are set back from 03:00 AM to 02:00 AM)
			○ Disable automatic Daylight Saving Time (EU)
	○ US	○	◉ Enable automatic Daylight Saving Time (US) (second Sunday in March, clocks are advanced from 02:00 AM to 03:00 AM / first Sunday in November, clocks are set back from 02:00 AM to 01:00 AM)
			○ Disable automatic Daylight Saving Time (US)
	○ AU	○	◉ Enable automatic Daylight Saving Time (AU) (first Sunday in October, clocks are advanced from 02:00 AM to 03:00 AM / first Sunday in April, clocks are set back from 03:00 AM to 02:00 AM)
			○ Disable automatic Daylight Saving Time (AU)
DST current status	not active	not active	Status display fort he current DST status

9.7 Miscellaneous

On the Miscellaneous WBM page, you can set configuration options for various features and compatibility options.

These configuration options are stored in non-volatile memory when the **[SUBMIT]** button is pressed. Changes to the configuration options take effect after the next power-on cycle or software reset.

Table 32: WBM Page “Miscellaneous”

Global Settings			
Entry	**Default**	**Description**	
Autoreset on fatal error	☐	☑	Enables an automatic software reset to be conducted when a system error occurs
		☐	Disables an automatic software reset to be conducted when a system error occurs
BootP request before static IP	☐	☑	Automatically set the static IP address enabled. For this configuration, the fieldbus coupler/ controller uses a statically configured IP address if the request via BootP fails. This process can take a few minutes. With the setting "DHCP" this function has no effect.
		☐	Automatically set the static IP address disabled. For this configuration, the IP address request via BootP is repeated in the event of error.
Non-adaptive local bus interval	☐	☑	Enables a fixed sampling interval of the local bus and statically sets the pause time to 14 ms. As a result, possibly the sampling interval of the local bus is extended and more computing power is available for the PLC application.
		☐	Enables the dynamic sampling interval of the local bus (default). The pause time between two local bus cycles is dynamically adjusted. This shortens the sampling interval of the local bus and less computing power is available for the PLC application.
Local bus extension installed	☐	☑	Indicates, that the bus extension (750-627/-628) is installed.
		☐	Indicates, that no bus extension is installed.

9.8 Storage Media

Information about the available storage devices and active drives which are currently mounted within the file system of the device is given on the “Storage Media” WBM page.
This page will be refreshed every 5 s.

This size information for the storage devices listed below are specified in units of 1 kB with 1 kB = 1024 Byte.

Table 33: WBM page "Storage Media"

Local Disks		
Entry	**Value (Example)**	**Description**
Drive Letter	A	Directory
Total Size [kB]	1050184 kB	Total size of the file system
Used Size [kB]	295560 kB	Used memory capacity
Free Size [kB]	754624 kB	Free memory capacity
File System	FAT	File system (File Allocation Table)

9.9 Update

Use the “Update“ WBM page to update the firmware of the device. To do this, the associated firmware image is first selected from the PC's local file system and downloaded to the device. Afterwards, the update will be executed and the device will be restarted automatically.
After the firmware update, the WBM pages will also be updated, self-created HTML pages or settings will be remained save.

Note

Stop fieldbus application and finish FTP connections before the update !
Please ensure, that the superordinate fieldbus application has been stopped and possibly existing FTP connections has been finished before starting the update process. When the software reset is beeing executed, the connection to the web-based management will be lost and the web-page has to be reloaded.

Table 34: WBM Page “Update“

Firmware Selection / Upload			
Entry	**Button**	**Value (example)**	**Description**
Firmware image	**[Durchsuchen…]**	firmware.bin	Use this button to select the firmware image file on your local file system (PC).
	[UPLOAD]	OK	This button loads the previously selected firmware image file from your local file system to the device.
Update Status	-	Verification of firmware image is done	Status display for the update.

Button	**Description**
[RESET]	Resetting the upload status (e.g. when selecting a wrong image file).
[UPDATE]	With this button you start the update process. The firmware image file previously loaded on the device is first checked and then installed. Afterwards an automatic restart of the device takes place.

9.10 Ethernet

Use the “Ethernet” WBM page to set the data transfer rate, the MAC address filter settings and bandwidth limit for each of the two switch ports for data transfer via Ethernet.

Table 35: WBM Page „Ethernet“

PHY Settings			
Entry	**Default value**	**Description**	
Enable port	☑	☑	Enable Port X1/Port X2
		☐	Disable Port X1/Port X2
Enable auto-negotiation	⊙	⊙	Enable Autonegotiation for Port X1/Port X2. Automatically handling the best possible transmission mode and baud rate with the communication partner.
		○	Enable Autonegotiation for Port X1/Port X2.
10 MBit Half Duplex	○	Use a fixed transmission mode and baud rate for Port X1/Port X2.	
10 MBit Full Duplex	○		
100 MBit Half Duplex	○		
100 MBit Full Duplex	○		

C Address Filter Settings			
Entry	**Default value**	**Description**	
Enable filter	☐	☑	Activate MAC address filter. Depending on the operating mode of the MAC address filter (whitelist / blacklist), the subsequently entered MAC addresses are blocked or permitt.
		☐	Deactivate MAC address filter.
Filter mode	Whitelist ⊙	⊙	Chose Whitelist. Only the following registered MAC addresses have network access to the fieldbus coupler/controller, others are blocked
	Blacklist ○	⊙	Chose Blacklist. Only the following registered MAC addresses are blocked, others have network access to the fieldbus coupler/controller.
Allow WAGO devices	☐	☑	Activate MAC address filter. The WAGO devices with the MAC address 00:30:EN:XX:XX:XX always have network access to the fieldbus coupler/controller, independent of the other settings of the MAC address filter.
		☐	Deactivate MAC address filter. Only devices whose MAC address is entered in the list have network access to the fieldbus coupler / controller. The settings of the MAC address filter apply.
MAC address 1	00:00:00:00: 00:00	Filter for the first MAC address (hexadecimal).	
MAC address 2	00:00:00:00: 00:00	Filter for the second MAC address (hexadecimal).	
MAC address 3	00:00:00:00: 00:00	Filter for the third MAC address (hexadecimal).	
MAC address 4	00:00:00:00: 00:00	Filter for the fourth MAC address (hexadecimal).	
MAC address 5	00:00:00:00: 00:00	Filter for the fifth MAC address (hexadecimal).	

Switch Settings				
Entry	**Default value**			**Description**
Enable fast aging	☐			☑ Enable “Fast Aging” "Fast Aging" ensures that the cache for the MAC addresses is cleared faster in the switch. This may be required if a redundancy system (e.g., using a Jet-Ring network or comparable technology) needs to be set up.
				☐ Disable “Fast Aging”. The time to discard the cache entries is five minutes.
Enable port mirroring	☐			☑ Enable port mirroring Port Mirroring is used for network diagnostics. Packets are mirrored from one port (mirror port) to another (sniffer port).
				☐ Disable port mirroring
Ethernet MTU	1500			Maximum packet size of a protocol, which can be transferred without fragmentation ("Maximum Transmission Unit" - MTU).
	Port			
	1	**2**	**internal**	
Input data rate limit	No limit ▾			The input limit rate limits network traffic when receiving. The rate is indicated in megabits or kilobits per second. If the limit is exceeded, packets are lost.
Output data rate limit	No limit ▾			The output limit rate limits network traffic when sending. The rate is indicated in megabits or kilobits per second. If the limit is exceeded, packets are lost.
Enable broadcast storm protection	☐	☐		☑ Activate broadcast storm protection. The maximum number of incoming broadcast telegrams is limited and packets affected by the limitation are discarded.
				☐ Broadcast storm protection disabled.
Sniffer Port	○	⊙		Select the sniffer port the mirror port should be mirrored to.
Mirror Port	⊙	○	○	Select the mirror port which should be mirrored to the sniffer port.

Note

Set the MTU value for fragmentation only!
Only set the value for MTU, i.e., the maximum packet size between client and server, if you are using a tunnel protocol (e.g., 1452 for VPN) for ETHERNET communication and the packets must be fragmented.
Setting the value is independent of the transmission mode selected.

Note

Configure ETHERNET transmission mode correctly!
A fault configuration of the ETHERNET transmission mode may result in a lost connection, poor network performance or faulty performance of the fieldbus coupler/controller.

Note

All ETHERNET ports cannot be disabled!
Both ETHERNET ports can be switched off. If both ports are disabled and you press **[SUBMIT]**, the selection is not applied and the previous values are restored.

9.11 Protocols

Use the “Protocols” WBM page to enable or disable ports for the services available.

Note

Close any ports and services that you do not need!
Unauthorized persons may gain access to your automation system through open ports.
To reduce the risk of cyber attacks and, thus, enhance your cyber security, close all ports and services in the control components (e.g., Port 6626 for WAGO I/O-*CHECK*, Port 2455 for CODESYS 2 and Port 11740 for ***e!****COCKPIT*) not required by your application.
Only open ports and services during commissioning and/or configuration.

Table 36: WBM page „Protocols“

Protocol Settings		
Entry	**Default Value**	**Description**
FTP (Port 21)	☐	☑ Enable "File Transfer Protocol"
		☐ Disable "File Transfer Protocol"
SFTP (Port 22)	☑	☑ Enable "SSH File Transfer Protocol"
		☐ Disable "SSH File Transfer Protocol"
HTTP (Port __)	80	Port number setting for HTTP (1 … 65535)
	☑	☑ Disable "Hypertext Transfer Protocol"
		☐ Enable “Hypertext Transfer Protocol over SSL-encrypted connection”
HTTPS (Port 443)	☐	☑ Disable “Hypertext Transfer Protocol over SSL-encrypted connection”
		☐ Enable "File Transfer Protocol"
		Operate WebVisu via HTTPS! You can operate WebVisu via HTTPS protocol, provided HTTPS is activated and you use a WAGO-I/O-*PRO* version >= .42.
SNTP (Port 123)	☐	☑ Enable "Simple Network Time Protocol"
		☐ Disable "Simple Network Time Protocol"
SNMP (Port 161, 162)	☑	☑ Activating "Simple Network Management Protocol"
		☐ Deactivating "Simple Network Management Protocol"
EtherNet/IP (Port 44818 (TCP), Port (2222 (UDP))	☑	☑ Activating EtherNet/IP protocol
		☐ Deactivating EtherNet/IP protocol
Service protocol (Port 6626)	☑	☑ Activating WAGO services
		☐ Deactivating WAGO services

9.12 SNMP

On the HTML pages „SNMP“, you can perform the settings for the Simple Network Management Protocol (SNMP v1/v2c and v3).

SNMP is a standard for device management within a TCP/IP network. The Simple Network Management Protocol (SNMP) is responsible for transporting the control data that allows the exchange of management information, the status and statistic data between individual network components and a management system.

The fieldbus coupler supports SNMP in versions 1, 2c and 3.

The SNMP of the ETHERNET TCP/IP coupler includes the general MIB according to RFC1213 (MIB II).

SNMP is processed via port 161. The port number for SNMP traps (agent messages) is 162.

Note

Enable port 161 and 162 to use SNMP!
Enable ports 161 and 162 in the WBM in menu “port”, so that the fieldbus coupler can be reached via SNMP. The port numbers cannot be modified.

Note

Modify parameter via WBM or SNMP objects!
However, parameters that can be set on the WBM pages can also be changed directly by the appropriate SNMP objects.

Information

Additional Information:
Additional information for SNMP, the Management Information Base (MIB) and traps (event messages via SNMP) may be obtained from section “Fieldbus Communication” > … > “SNMP (Simple Network Management Protocol).”

Note that the settings for SNMPV1/V2c and SNMPV3 are separate from each other: The different SNMP versions can be activated or used in parallel or individually on a fieldbus coupler.

9.12.1 SNMP v1/v2c

The SNMP version 1/2c represents a community message exchange. The community name of the network community must thereby be specified.

Table 37: WBM Page “SNMP v1/v2”

SNMP Settings		
Entry	**Value (Default)**	**Description**
Description	FC EtherNet/IP; G4; ECO 750-363	Device description (sysDescription)
Physical location	LOCAL	Location of device (sysLocation)
Contact address	support@wago.com	E-mail contact address (sysContact)

SNMP v1/v2c Manager Settings		
Entry	**Default value**	**Description**
Enable protocol	☑	☑ Activating SNMP Version 1/2c
		☐ Deactivating SNMP-Version 1/2c
Local community name	public	used community name

SNMP v1/v2c Trap Receiver 1 Settings		
Entry	**Default value**	**Description**
Trap receiver	0.0.0.0	IP address of 1. used SNMP manager
Community name	public	1. Community name of the network community used
Trap version	v1 ◉	v1 ◉ v2 ○ Activating Traps Version 1
	v2 ○	v1 ○ v2 ◉ Activating Traps Version 2

SNMP v1/v2c Trap Receiver 2 Settings		
Entry	**Default value**	**Description**
Trap receiver	0.0.0.0	IP address of 2. used SNMP manager
Community name	public	2. Community name of the network community used
Trap version	v1 ◉	v1 ◉ v2 ○ Activating Traps Version 1
	v2 ○	v1 ○ v2 ◉ Activating Traps Version 2

9.12.2 SNMP V3

In SNMP version 3, exchanging messages is user-related. Each device, that knows the passwords set via WBM, may read or write values from the fieldbus coupler.

In SNMP v3, user data from SNMP messages can also be transmitted in encoded form. This is why SNMP v3 is often used in safety-related networks.

Via this WBM page "SNMP V3" two independent SNMPV3 users can be defined and activated (User 1 and User 2).

Table 38: WBM Page “SNMP V3”

SNMP v3 User 1 / 2 Settings		
Entry	**Value (Example)**	**Description**
Enable user	activate ☑	☑ Activating user 1 or 2
		☐ Deactivating user 1 or 2
Authentication type	None ○ MD5 ◉ SHA1 ○	None ◉ MD5 ○ SHA1 ○ No encryption of the authentication
		None ○ MD5 ◉ SHA1 ○ Encryption of the authentication with MD5
		None ○ MD5 ○ SHA1 ◉ Encryption of the authentication with SHA1
Authentication name	Security Name	Enter the name, if the “Authentication type” MD5 or SHA1 has been selected
Authentication key (min. 8 characters)	Authentification Key	Enter the password with at least 8 characters, if “Authentication type” MD5 or SHA1 has been selected
Privacy enable (DES)	☑	☑ Activate the DES encryption of the data
		☐ Deactivate the DES encryption of the data
Privacy key (min. 8 characters)	Privacy Key	Enter the password of at least 8 characters in the encryption with DES
Enable v3 notification/trap enable	☑	☑ Activate the notification traps of the SNMP version 3
		☐ Deactivate the notification traps of the SNMP version 3
Notification receiver (IP address)	192.168.1.10	IP address of the notification manager

9.13 SNTP

On the WBM page “SNTP”, you can perform the settings for the “Simple Network Time Protocol”.

The SNTP client supports configuration of static time servers. Two additional servers may be assigned by dynamic network configuration (e. g. DHCP or BootP). The selection of the active time server used to synchronize the current time is done automatically by the SNTP client. The SNTP client queries all time servers listed below and determines the most precise server to synchronize the device clock with. This takes into account whether the respective time server can be reached and how short the transmission distance between the time server and the SNTP client is.

Table 39: WBM Page “SNTP”

SNMP Settings		
Entry	**Value (Example)**	**Description**
Protocol status	enabled	Display the protocol status. „enabled“ SNTP protocol ist activated. „disabled“ SNTP protocol ist deactivated.
Active time server	de.pool.ntp.org	Hostname or IP address of the active time server, which is currently used to synchronize the time.

SNTP Client Settings		
Entry	**Value (Example)**	**Description**
Server update interval [s] (60 … 65535 s)	3600	Polling interval for sychronizing the device clock with the active time server.
First time server	de.pool.ntp.org	Host name or IP address of the first user-defined time server.
Second time server	0.0.0.0	Host name or IP address of the second user-defined time server.
Additional time servers	- -	List of up to 2 time servers dynamically allocated via BootP or DHCP.

9.14 TCP/IP

You can configure network addressing and network identification on the “TCP/IP” WBM page.

Note

Set the DIP switch to “0” and enable static IP configuration source!
Before you change parameters on this page, set the DIP switch to value “0” and enable the option “IP configuration source static”!
If these conditions are not met, the DIP switch settings are applied instead.

Tabelle 40: WBM-Seite „TCP/IP“

Network Settings (non-volatile)				
Eintrag	**Standardwert**	**Wert (Beispiel)**	**Beschreibung**	
IP configuration source	○ BootP	○	◉	Activate “Bootstrap Protocol“.
			○	Deactivate “Bootstrap Protocol“.
	◉ DHCP	◉	◉	Activate “Dynamic Host Configuration Protocol“.
			○	Deactivate “Dynamic Host Configuration Protocol“
	○ static	○	◉	Use IP address from EEPROM.
			○	Do not use IP address from EEPROM.
IP address conflict detection (ACD)	☑	☑	☑	Activate IP address conflict detection acc. to RFC5227.
			☐	Deactivate IP address conflict detection acc. to RFC5227 (an IP address conflict is detected once during initialization).
IP address	0.0.0.0	192.168.1.180	Enter IP address.	
Subnet mask	255.255.255.0	255.255.255.0	Enter subnet mask.	
Default gateway	0.0.0.0	0.0.0.0	Enter gateway.	
Host name	0030DEXXXXXX	0030DE000000	Enter host name.	
Domain name			Enter domain name.	
DNS server 1	0.0.0.0	0.0.0.0	Enter IP address of the first DNS server.	
DNS server 2	0.0.0.0	0.0.0.0	Enter optional IP address of the second DNS server.	
DIP switch base IP address	192.168.1	192.168.5	Network address for the configuration of the IP address with DIP switch.	
IP Fragment TTL [s] (max.255)	60	60	Life of a packet (Time to Live).	

9.15 EtherNet/IP

Use the EtherNet/IP WBM page to configure settings for the EtherNet/IP adapter functionality and download the Electronic Device Description (EDS) file.
In addition, information is displayed about the provided static assemblies and the mapping of the inserted I/O modules for the EtherNet/IP process image.

Table 41: WBM page “EtherNet/IP“

Static Assembly Instances		
Entry	**Button**	**Description**
Download EDS description file	**[DOWNLOAD]**	Download on the local PC the electronic device description file.

EtherNet/IP Settings			
Entry	**Default Value**	**Value (Exmaple)**	**Description**
I/O error reaction	○ Hold last output value	○	◉ In the event of a fieldbus error, the last output values are kept.
			○ In the case of a fieldbus error, one of the other error strategies is used.
	◉ Set outputs to zero	◉	◉ In the event of a fieldbus error, the outputs are set to 0.
			○ In the case of a fieldbus error, one of the other error strategies is used.
	○ Stop I/O processing	○	◉ In the event of a fieldbus error, the communication on the local bus is stopped.
			○ In the case of a fieldbus error, one of the other error strategies is used.
RUN/IDLE header configuration	☑ Originator to target	☐	☑ The RUN/IDLE header is inserted in the data direction to the target (device) for I/O connections.
			☐ The RUN / IDLE header is not inserted for I/O connections in the data direction to the target (device).
	☐ Target to originator	☐	☑ The RUN / IDLE header is inserted in the data direction to the originator (master / scanner for I/O connections).
			☐ The RUN / IDLE header is not inserted for I/O connections in the data direction to the originator (Master/Scanner usually).
Enable binary padding	☐	☑	☑ Assembly instances 101-109 are padded to an even byte count.
			☐ Assembly instances 101-109 are not padded to an even byte count.

Assembly-Information		
Entry	**Example**	**Description**
Instance	104	Number of the assembly instance provided by the device.
Description	„AI data, DI data, status and …“	Description of the content of the assembly instance.
Size [byte]	20	Byte length of the assembly instance.

I/O Mapping		
Entry	**Example**	**Description**
Slot	3	Slot number of the I/O module on the local bus.
Order Number	750-465	Order number of the I/O module.
Input Range [byte]	8 - 12	Address range of the I/O module within the input process data (e.g., Assembly instance 104).
Output Range [byte]	-	Address range of the I / O module within the output process data (e.g., Assembly instance 101).

9.16 I/O Config

Click the link “I/O config” to view the number of modules that are connected to your hardware.

The data in the second line are not relevant for the present fieldbus coupler, because no I/O configuration will be load onto devices which have no runtime system (PLC). Therefore you always find the value “0” for the number of modules in the I/O configuration.

Table 42: WBM page „I/O Data“

Configuration summary		
Entry	**Value (Example)**	**Description**
Number of modules on terminal bus	6	Number of I/O modules (hardware)
Number of modules in I/O configuration	0	Number of I/O modules in the I/O configuration (not relevant).

Button	**Description**
[SAVE CONFIG]	With this button, the current status of the I/O configuration on the local bus is read in, displayed and stored on the device.

I/O Mapping		
Entry	**Value (Example)**	**Description**
Position	1	Position of the I/O module in the hardware
Module	750-5xx M001Ch1 M001Ch2	Product number of the integrated I/O module M = module, 001 = position 1, Ch1 = channel 1 M = module, 002 = position 2, Ch2 = channel 2
Type	8DO	I/O module type, e.g. 8DO (8 Channel Digital Output Module)

Assigned Fieldbus	Fieldbus 1	Mapping via fieldbus 1

10 Diagnostics

10.1 LED Signaling

For on-site diagnostics, the fieldbus coupler has several LEDs that indicate the operational status of the fieldbus coupler or the entire node (see following figure).

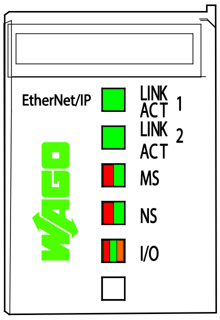


Figure 40: Display Elements

The diagnostics displays and their significance are explained in detail in the following section.

The LEDs are assigned in groups to the various diagnostics areas:

Table 43: LED Assignment for Diagnostics

Diagnostics area	LEDs
Fieldbus status	• LINK ACT Port 1 • LINK ACT Port 2 • MS • NS
Node status	• I/O

10.1.1 Evaluating Fieldbus Status

The health of the ETHERNET Fieldbus is signaled through the top LED group ('LINK ACT 1, 2', 'MS', und 'NS').

The two-colored LEDs 'MS' (module status) and 'NS' (network status) are solely used by the EtherNet/IP protocol. These two LEDs conform to the EtherNet/IP specifications.

Table 44: Fieldbus Diagnostics – Solution in Event of Error

LED Status	Meaning	Solution
LINK ACT 1, 2		
green	The fieldbus node is connected to the physical network.	-
green flashing	The fieldbus node sends and receives ETHERNET telegrams	-
off	The fieldbus node is not connected to the physical network.	1. Check the fieldbus cable.
MS		
green	Normal operation	-
green flashing	The system is not yet configures	-
red	The system indicates a not remediable error	1. Restart the device by turning the power supply off and on again. 2. If the error still exists, please contact the I/O support.
red/green flashing	Self test	-
off	No system supply voltage	1. Check the supply voltage.
NS		
green	At least one EtherNet/IP connection is developed (also connection to the Message rout applies)	-
green flashing	No EtherNet/IP connection.	-
red	The system indicates a double IP-address in the network	1. Use an IP address that is not used yet.
red flashing	At least one EtherNet/IP connection announced a Timeout, where the coupler functions as target.	1. Restart the device by turning the power supply off and on again. 2. Develop a new connection.
red/green flashing	Self test	-
off	No IP address is assigned to the system.	1. Assign to the system an IP address for example by BootP or DHCP.

10.1.2 Evaluating Node Status – I/O LED (Blink Code Table)

The communication status between fieldbus coupler/controller and the I/O modules is indicated by the I/O LED.

Table 45: Node Status Diagnostics – Solution in Event of Error

LED Status	Meaning	Solution
I/O		
green	The fieldbus node is operating correctly.	Normal operation.
orange flashing	Start of the firmware. 1 … 2 seconds of rapid flashing indicates start-up.	-
red	Fieldbus coupler/controller hardware defect	Replace the fieldbus coupler/controller.
red flashing	Flashing with approx. 10 Hz indicates the initialization of the local bus or a local bus error.	Note the following flashing sequence.
red cyclical flashing	Up to three successive flashing sequences indicate local bus errors. There are short intervals between the sequences.	Evaluate the flashing sequences based on the following blink code table. The blinking indicates an error message comprised of an error code and error argument.
off	No data cycle on the local bus.	The fieldbus coupler/controller supply is off.

Device boot-up occurs after turning on the power supply. The I/O LED flashes orange.

Then the local bus is initialized. This is indicated by flashing red at 10 Hz for 1 … 2 seconds.

After a trouble-free initialization, the I/O LED is green.

In the event of an error, the I/O LED continues to blink red. Blink codes indicate detailed error messages. An error is indicated cyclically by up to 3 flashing sequences.

After elimination of the error, restart the node by turning the power supply of the device off and on again.

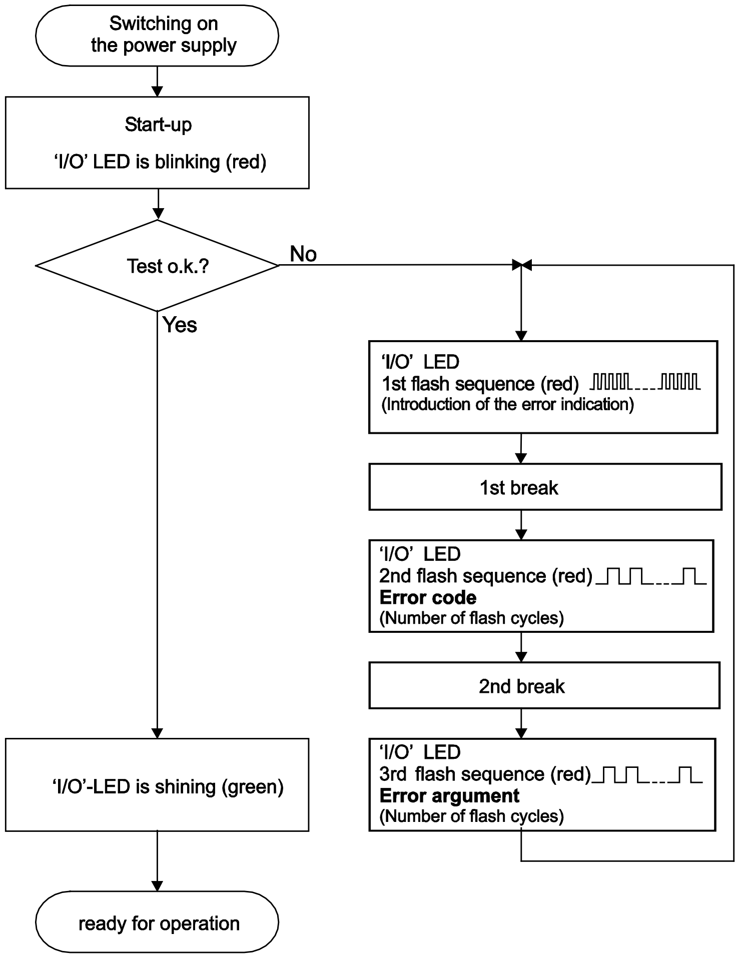


Figure 41: Node Status – I/O LED Signaling

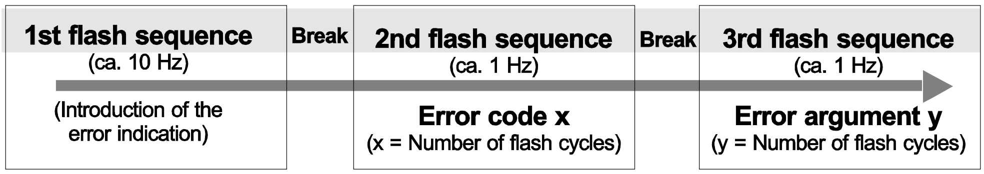


Figure 42: Error Message Coding

Example of a module error:

- The I/O LED starts the error display with the first flashing sequence (approx. 10 Hz).
- After the first break, the second flashing sequence starts (approx. 1 Hz): The I/O LED blinks four times.
  Error code 4 indicates "data error internal data bus".
- After the second break, the third flashing sequence starts (approx. 1 Hz): The I/O LED blinks twelve times.
  Error argument 12 means that the local bus is interrupted behind the twelfth I/O module.

The thirteenth I/O module is either defective or has been pulled out of the assembly.

Table 46: Blink code- table for the I/O LED signaling, error code 1

Error code 1: "Hardware and configuration error"		
Error Argument	**Error Description**	**Solution**
1	Overflow of the internal buffer memory for the attached I/O modules.	1. Turn off the power supply of the node. 2. Reduce the number of I/O modules. 3. Turn on again the power supply of the node. 4. If the error persists, replace the head station.
2	I/O module(s) with unknown data type	1. Determine the faulty I/O module. First turn off the power supply of the node. 2. Plug the end module into the middle of the node. 3. Turn on again the power supply of the node. 4. - LED continues to flash? - Turn off the power supply of the node and plug the end module into the middle of the first half of the node (toward the head station). - LED not flashing? - Turn off the power supply of the node and plug the end module into the middle of the second half of the node (away from the head station). 5. Turn on again the power supply of the node. 6. Repeat the procedure described in step 4 while halving the step size until the faulty I/O module is detected. 7. Replace the faulty I/O module. 8. Contact I/O support and inquire about a firmware update for the head station.
3	Invalid check sum in the parameter area of the head station.	1. Turn off the power supply of the node. 2. Replace the head station. 3. Turn on again the power supply of the node.
4	Fault when writing in the serial EEPROM.	1. Turn off the power supply of the node. 2. Replace the head station. 3. Turn on again the power supply of the node.
5	Fault when reading the serial EEPROM	1. Turn off the power supply of the node. 2. Replace the head station. 3. Turn on again the power supply of the node.
6	The I/O module configuration after AUTORESET differs from the configuration determined the last time the head station was powered up.	1. Restart the head station by turning the power supply off and on.
7	Invalid hardware-firmware combination.	1. Turn off the power supply of the node. 2. Replace the head station. 3. Turn on again the power supply of the node.
8	Timeout during serial EEPROM access.	1. Turn off the power supply of the node. 2. Replace the head station. 3. Turn on again the power supply of the node.

Table 46: Blink code- table for the I/O LED signaling, error code 1

Error code 1: "Hardware and configuration error"		
Error Argument	**Error Description**	**Solution**
9	Head station initialization error	1. Turn off the power supply of the node. 2. Replace the head station. 3. Turn on again the power supply of the node.
10 ... 13	not used	
14	Maximum number of gateway or mailbox modules exceeded	1. Turn off the power supply of the node. 2. Reduce the number of corresponding modules to a valid number. 3. Turn on again the power supply of the node.
15	Firmware loader was loaded from backup.	1. Execute the last firmware update again. 2. If the error persists, contact I/O support.
16	Firmware was loaded from backup.	1. Execute the last firmware update again. 2. If the error persists, contact I/O support.

Table 47: Blink Code Table for the I/O LED Signaling, Error Code 2

Error Code 2: „Process image exceeded“		
Error Argument	**Error Description**	**Solution**
1	Not used	-
2	Maximum process image size exceeded	1. Turn off the power supply of the node. 2. Reduce number of I/O modules. 3. Turn on again the power supply of the node.
3	Process image generation error	1. Turn off the power supply of the node. 2. Remove unsupported I/O modules. 3. Turn on again the power supply of the node.

Table 48: Blink Code Table for the I/O LED Signaling, Error Code 3

Error Code 3: „Protocoll error, local bus“		
Error Argument	**Error Description**	**Solution**
-	Local bus communication defective, incorrect module not identifiable	-- Are there power supply modules with the bus power supply (750-613) in the node? --- 1. Check that these I/O modules are supplied correctly with power. 2. Determine this by the state of the associated status LEDs. --- Are all I/O modules connected correctly or are there any 750-613 I/O modules in the node? --- 3. Determine the faulty I/O module. First turn off the power supply of the node. 4. Plug the end module into the middle of the node. 5. Turn on again the power supply of the node. 6. - LED continues to flash? - Turn off the power supply of the node and plug the end module into the middle of the first half of the node (toward the head station). - LED not flashing? - Turn off the power supply of the node and plug the end module into the middle of the second half of the node (away from the head station). 7. Turn on again the power supply of the node. 8. Repeat the procedure described in step 4 while halving the step size until the faulty I/O module is detected. 9. Replace the faulty I/O module. 10. If there is only one I/O module left on the head station and the LED is flashing, either this I/O module or the head station is defective. 11. Replace the faulty component.

Table 49: Blink Code Table for the I/O LED Signaling, Error Code 4

Error Code 4: „Physical error, local bus“		
Error Argument	**Error Description**	**Solution**
-	Local bus data transmission error or interruption of the local bus at the head station	1. Turn off the power supply of the node. 2. Plug in an I/O module with process data behind the head station. 3. Turn on again the power supply of the node. 4. Observe the error argument signaled. 5. --- Is no error argument indicated in the I/O LED?--- Replace the head station. --- Is an error argument indicated by the I/O LED? --- 6. Determine the faulty I/O module. First turn off the power supply of the node. 7. Plug the end module into the middle of the node. 8. Turn on again the power supply of the node. 9. - LED continues to flash? - Turn off the power supply of the node and plug the end module into the middle of the first half of the node (toward the head station). - LED not flashing? - Turn off the power supply of the node and plug the end module into the middle of the second half of the node (away from the head station). 10. Turn on again the power supply of the node. 11. Repeat the procedure described in step 4 while halving the step size until the faulty I/O module is detected. 12. Replace the faulty I/O module. 13. If there is only one I/O module left on the head station and the LED is flashing, either this I/O module or the head station is defective. 14. Replace the faulty component.
n*	Interruption of the local bus behind the nth I/O module with process data.	1. Turn off the power supply for the node. 2. Replace the (n+1) I/O module with process data or reduce the number of I/O modules until the (n+1) I/O module. 3. Turn the power supply on.

* The number of light pulses (n) indicates the position of the I/O module.
I/O modules without data are not counted (e.g., supply modules without diagnostics)

Table 50: Blink Code Table for the I/O LED Signaling, Error Code 5

Error Code 5: „Initialization error, local bus“		
Error Argument	**Error Description**	**Solution**
n*	Error in register communication during local bus initialization	1. Turn off the power supply for the node. 2. Replace the (n+1) I/O module with process data or reduce the number of I/O modules until the (n+1) I/O module. 3. Turn the power supply on.

* The number of light pulses (n) indicates the position of the I/O module.
I/O modules without data are not counted (e.g., supply modules without diagnostics)

Table 51: Blink Code Table for the I/O LED Signaling, Error Code 6

Error Code 6: " Configuration error, node configuration"		
Error Argument	**Error Description**	**Solution**
1	Invalid MAC ID	1. Turn off the power supply of the node. 2. Replace the head station. 3. Turn on again the power supply of the node.
2	Ethernet Hardware initialization error	1. Restart the head station by turning the power supply off and on again. 2. If the error still exists, replace the head station.
3	TCP/IP initialization error	1. Restart the head station by turning the power supply off and on again. 2. If the error still exists, replace the head station.
4	Network configuration error (no IP Address)	1. Check the settings of DHCP/BootP server or if a static IP address is used.
5	Application protocol initialization error	2. Restart the head station by turning the power supply off and on again. 3. If the error still exists, replace the head station.
6	Maximum process image size exceeded	1. Turn off the power supply of the node. 2. Reduce number of I/O modules. 3. Turn on again the power supply of the node.
7	Double IP address in network	1. Change configuration. Use another IP address, which is not yet present in network. 2. Restart the head station by turning the power supply off and on again.
8	Error when building the process image	1. Turn off the power supply of the node. 2. Reduce number of I/O modules. 3. Restart the head station by turning the power supply off and on again. 4. If the error still exists, replace the head station.
9	Error when mapping the I/O modules to a fieldbus	1. Check the file „io_config.xml“ on the head station.

Table 52: Blink Code Table for the I/O LED Signaling, Error Code 7

Error Code 7: „Not supported I/O module“		
Error Argument	**Error Description**	**Solution**
n	First not supported I/O module at position n	1. Turn off the power supply for the node. 2. Replace the (n+1) I/O module with process data or reduce the number of I/O modules until the (n+1) I/O module. 3. Turn the power supply on.

Table 53: Blink Code Table for the I/O LED Signaling, Error Code 8 … 11

Error Code 8 … 11: - not used -		
Error Argument	**Error Description**	**Solution**
-	Not used	-

Table 54: Blink code table for I/O LED signaling, error code 12

Error code 12 "System Error"		
Error Argument	**Error description**	**Solution**
1	General error of the operating system	1. Restart the fieldbus node by turning the power supply off and on again. 3. If the error still exists, please contact the I/O Support.
2	General error of the file system	1. Reset the file system using "WAGO Ethernet Settings", button **[Reset File System]** in the menu above**.** 2. Restart the fieldbus node by turning the power supply off and on again. 3. If the error still exists, please contact the I/O Support.
3	Insufficient system memory	1. Restart the fieldbus node by turning the power supply off and on again. 2. If the error still exists, please contact the I/O Support.

Table 55: Blink code table for I/O LED signaling, error code 13

Error code 13 – not used -		
Error Argument	**Error description**	**Solution**
-	**Not used**	**-**

10.2 Fault Behavior

10.2.1 Fieldbus Failure

For the fieldbus connections, the EtherNet/IP master (scanner) and the slave (adapter) use integrated timeout monitoring.
If there is a fieldbus failure, the established connections are no longer serviced and the connection partners detect a timeout condition.

A field bus failure is indicated when the “NS”-LED is blinking red.

Information

Further Information
For detailed information on the ‘NS‘ LED see Chapter "Diagnostics“ >> … >> „Evaluating Fieldbus Status“.

10.2.2 Local Bus Failure

I/O LED indicates a local bus failure.

When a local bus failure occurs, the head station generates an error message (error code and error argument) via the red-flashing I/O LED (see chapter "Diagnostics" => "Evaluating Node Status - I/O LED (Blink Code Table)").

If the local bus completely fails, output modules switch to defined states, e.g. "Off" or "0 V".

Example:

A fieldbus node consists of head station, five I/O modules with process data and the end module.
The output of one digital output module is activated.

If the end module is removed of the fieldbus node during operation, the local bus is interrupted. The output of the digital output module is automatically deactivated and the I/O LED flashes red and indicates with it error message 4/5.

The flashing code table provides for error code 4: "Physical error, local bus" with error argument 5: "Interruption of the local bus behind the nth I/O module with process data”.

If the end module is re-inserted into the fieldbus node, the local bus will restart after a few seconds. After the initialization blink code is completely, the I/O LED lights up again in a steady green and the transmission of the process data is resumed. Also the output of the digital output module is re-activated.

If the local bus error is caused by a defective module, it must be replaced, as described in the blink code table for error code 4 under "Solution".

11 Fieldbus Communication

Fieldbus communication between master application and a WAGO fieldbus coupler/controller based on the ETHERNET standard normally occurs via a fieldbus-specific application protocol.

Depending on the application, this can be e.g., MODBUS TCP/UDP, EtherNet/IP, BACnet/IP, KNXnet/IP, PROFINET, sercos or other.

In addition to the ETHERNET standard and the fieldbus-specific application protocol, there are also other communications protocols important for reliable communication and data transmission and other related protocols for configuring and diagnosing the system implemented in the WAGO fieldbus coupler/controller based on ETHERNET.

These protocols are explained in more detail in the other sections.

11.1 Implemented Protocols

11.1.1 Communication Protocols

11.1.1.1 IP (Internet Protocol)

The Internet protocol divides datagrams into segments and is responsible for their transmission from one network subscriber to another. The stations involved may be connected to the same network or to different physical networks which are linked together by routers.
Routers are able to select various paths (network transmission paths) through connected networks, and bypass congestion and individual network failures.
However, as individual paths may be selected which are shorter than other paths, datagrams may overtake each other, causing the sequence of the data packets to be incorrect.
Therefore, it is necessary to use a higher-level protocol, for example, TCP to guarantee correct transmission.

IP Packet

In addition to the data units to be transported, the IP data packets contain a range of address information and additional information in the packet header.

Table 56: IP Packet

IP Header	IP Data

The most important information in the IP header is the IP address of the transmitter and the receiver and the transport protocol used.

IP Addresses

To allow communication over the network each fieldbus node requires a 32 bit Internet address (IP address).

Note

IP Address must be unique!
For error free operation, the IP address must be unique within the network. The same IP address may not be assigned twice.

As shown below there are various address classes with net identification (net ID) and subscriber identification (subscriber ID) of varying lengths. The net ID defines the network in which the subscriber is located. The subscriber ID identifies a particular subscriber within this network.

Networks are divided into various network classes for addressing purposes:

- **Class A:** (Net ID: Byte 1, Host ID: Byte 2… Byte 4)

Table 57: Network Class A

e. g. 101 . 16 . 232 . 22

01100101	00010000	11101000	00010110
0 Net ID	Host ID		

The highest bit in Class A networks is always '0'. This means the highest byte can be in a range of '0 0000000' to '0 1111111'.
Therefore, the address range of a Class A network in the first byte is always between 0 and 127.

- **Class B:** (Net ID: Byte 1 … Byte 2, Host ID: Byte 3… Byte 4)

Table 58: Network Class B

e. g. 181 . 16 . 232 . 22

10110101	00010000	11101000	00010110
10 Net ID		Host ID	

The highest bits in Class B networks are always '10'. This means the highest byte can be in a range of '10 000000' to '10 111111'.
Therefore, the address range of Class B networks in the first byte is always between 128 and 191.

- **Class C:** (Net ID: Byte 1 … Byte 3, Host ID: Byte 4)

Table 59: Network Class C

e. g. 201 . 16 . 232 . 22

11000101	00010000	11101000	00010110
110 Net ID			Host ID

The highest bits in Class C networks are always '110'. This means the highest byte can be in a range of '110 00000' to '110 11111'.

Therefore, the address range of Class C networks in the first byte is always between 192 and 223.

- **Additional network classes (D, E):** are only used for special tasks.

Key Data

Table 60: Key Data Class A, B and C

Network Class	Address range of the subnetwork	Possible number of	
		Networks	Hosts per Network
Class A	0.XXX.XXX.XXX ... 127.XXX.XXX.XXX	128 (2^7)	Approx. 16 Million (2^{24})
Class B	128.000.XXX.XXX ... 191.255.XXX.XXX	Approx. 16 Thousand (2^{14})	Ca. 65 Thousand (2^{16})
Class C	192.000.000.XXX ... 223.255.255.XXX	Approx. 2 Million (2^{21})	254 (2^8)

Each WAGO ETHERNET fieldbus coupler or controller can be easily assigned an IP address via the implemented BootP protocol. For small internal networks we recommend selecting a network address from Class C.

Note

Do not set IP addresses to 0.0.0.0 or 255.255.255.255!
Never set all bits to equal 0 or 1 in one byte (byte = 0 or 255). These are reserved for special functions and may not be allocated. Therefore, the address 10.0.10.10 may not be used due to the 0 in the second byte.

If a network is to be directly connected to the Internet, only registered, internationally unique IP addresses allocated by a central registration service may be used. These are available from Inter*NIC* (International Network Information Center).

Note

Internet access only by the authorized network administrator!
Direct connection to the Internet should only be performed by an authorized network administrator and is therefore not described in this manual.

Subnets

To allow routing within large networks a convention was introduced in the specification RFC 950. Part of the Internet address, the subscriber ID is divided up again into a subnetwork number and the station number of the node. With the aid of the network number it is possible to branch into internal subnetworks within the partial network, but the entire network is physically connected together. The size and position of the subnetwork ID are not defined; however, the size is dependent upon the number of subnets to be addressed and the number of subscribers per subnet.

Table 61: Example: Class B Address with Field for Subnet IDs

1			8	16	24	32
1	0	...	Network ID	Subnet ID	Host ID	

Subnet Mask

A subnet mask was introduced to encode the subnets in the Internet. This involves a bit mask, which is used to mask out or select specific bits of the IP address. The mask defines the subscriber ID bits used for subnet coding, which denote the ID of the subscriber. The entire IP address range theoretically lies between 0.0.0.0 and 255.255.255.255. Each 0 and 255 from the IP address range are reserved for the subnet mask.

The standard masks depending upon the respective network class are as follows:

- **Class A Subnet mask:**

Table 62: Subnet Mask for Class A Network

255	.0	.0	.0

- **Class B Subnet mask:**

Table 63: Subnet Mask for Class B Network

255	.255	.0	.0

- **Class C Subnet mask:**

Table 64: Subnet Mask for Class C Network

255	.255	.255	.0

Depending on the subnet division the subnet masks may, however, contain other values beyond 0 and 255, such as 255.255.255.128 or 255.255.255.248.

Your network administrator allocates the subnet mask number to you.

Together with the IP address, this number determines which network your PC and your node belongs to.

The recipient node, which is located on a subnet, initially calculates the correct network number from its own IP address and subnet mask. Only then the node checks the node number and, if it corresponds, delivers the entire packet frame.

Table 65: Example for an IP Address from a Class B Network

IP address	172.16.233.200	'10101100 00010000 11101001 11001000'
Subnet mask	255.255.255.128	'11111111 11111111 11111111 10000000'
Net ID	172.16.0.0	'10101100 00010000 00000000 00000000'
Subnet ID	0.0.233.128	'00000000 00000000 11101001 10000000'
Host ID	0.0.0.72	'00000000 00000000 00000000 01001000'

Note

Specification of the network mask necessary!
Specify the network mask defined by the administrator in the same way as the IP address when installing the network protocol.

Gateway

The subnets of the Internet are normally connected via gateways. The function of these gateways is to forward packets to other networks or subnets.

This means that in addition to the IP address and network mask for each network card, it is necessary to specify the correct IP address of the standard gateway for a PC or fieldbus node connected to the Internet. You should also be able to obtain this IP address from your network administrator.

The IP function is limited to the local subnet if this address is not specified.

To communicate directly with each other, host and gateway must be on the same subnet, that means the network ID must be the same.

RAW IP

Raw IP manages without protocols such as PPP (point-to-point protocol). With RAW IP, the TCP/IP packets are directly exchanged without handshaking, thus enabling the connection to be established more quickly.

However, the connection must beforehand have been configured with a fixed IP address. The advantages of RAW IP are high data transfer rate and good stability.

IP Multicast

Multicast refers to a method of transmission from a point to a group, which is a point-to-multipoint transfer or multipoint connection. The advantage of multicast is that messages are simultaneously transferred to several users or closed user groups via one address.

IP multicasting at the Internet level is realized with the help of the Internet Group Message Protocol IGMP; neighboring routers use this protocol to inform each other on membership to the group.

For distribution of multicast packets in the sub-network, IP assumes that the datalink layer supports multicasting. In the case of Ethernet, you can provide a packet with a multicast address in order to send the packet to several recipients with a single send operation. Here, the common medium enables packets to be sent simultaneously to several recipients. The stations do not have to inform each other on who belongs to a specific multicast address – every station physically receives every packet. The resolution of IP address to Ethernet address is solved by the use of algorithms, IP multicast addresses are embedded in Ethernet multicast addresses.

11.1.1.2 TCP (Transmission Control Protocol)

As the layer above the Internet protocol, TCP (Transmission Control Protocol) guarantees the secure transport of data through the network.

TCP enables two subscribers to establish a connection for the duration of the data transmission. Communication takes place in full-duplex mode (i.e., transmission between two subscribers in both directions simultaneously).

TCP provides the transmitted message with a 16-bit checksum and each data packet with a sequence number.

The receiver checks that the packet has been correctly received on the basis of the checksum and then sets off the sequence number. The result is known as the acknowledgement number and is returned with the next self-sent packet as an acknowledgement.

This ensures that the lost TCP packets are detected and resent, if necessary, in the correct sequence.

TCP Data Packet

The packet header of a TCP data packet is comprised of at least 20 bytes and contains, among others, the application port number of the transmitter and the receiver, the sequence number and the acknowledgement number.

The resulting TCP packet is used in the data unit area of an IP packet to create a TCP/IP packet.

TCP Port Numbers

TCP can, in addition to the IP address (network and subscriber address), respond to a specific application (service) on the addressed subscriber. For this the applications located on a subscriber, such as a web server, FTP server and others are addressed via different port numbers. Well-known applications are assigned fixed ports to which each application can refer when a connection is built up
(Examples: Telnet Port number: 23, http Port number: 80).
A complete list of “standardized services” is contained in the RFC 1700 (1994) specifications.

11.1.1.3 UDP (User Datagram Protocol)

The UDP protocol, like the TCP protocol, is responsible for the transport of data. Unlike the TCP protocol, UDP is not connection-orientated; meaning that there are no control mechanisms for the data exchange between transmitter and receiver. The advantage of this protocol is the efficiency of the transmitted data and the resulting higher processing speed.

11.1.2 Configuration and Diagnostics Protocols

11.1.2.1 BootP (Bootstrap Protocol)

The “Bootstrap Protocol” (BootP) can be used to assign an IP address and other parameters to the head station of the fieldbus node in a TCP/IP network.

The BootP protocol can be enabled in the WBM on "TCP/IP" WBM page (the option "DHCP" is enabled by default).

The protocol communication consists of a client request from the head station and a response from the BootP server. If no BootP server is available, in the default configuration the head station will periodically send client requests at irregular intervals until a server responds.

The protocol sends a broadcast request on port 67 (BootP server) containing the hardware address (MAC ID) of the head station. The BootP server receives the message. It contains a database in which MAC ID and IP addresses are assigned to one another. If the MAC address is found, a broadcast response is transmitted via the network. The head station “listens” at the specified Port 68 for the response of the BootP server. Incoming packets contain information such as the IP address and the MAC address of the head station. A head station recognizes by the MAC address whether the message is intended for it and, if it matches, transfers the sent IP address to its network interface.

In contrast to DHCP, the head station keeps the IP address with BootP, as long as it is not switched off. This means that the head station can only receive a new IP address after the next power on reset (or a software reset).

Note

IP addresses can be assigned via BootP under Windows and Linux!
You can use BootP to assign an IP address under the Windows and Linux operating systems.

Information

More information about IP address assigning with BootP
The process for assigning addresses using BootP is described in detail in the section “Commissioning”.

The head station supports the following options in addition to the default “IP address” option:

Table 66: BootP Options

Option	Meaning
[OPT1] Subnet mask	32-bit address mask that displays which bits of the IP address identify the network and which identify the network stations.
[OPT2] Time zone	Time difference between the local time and the UTC (Universal Time Coordinated).
[OPT3] Gateway	IP address of the router that permits access to other networks.
[OPT6] DNS server	IP address of the name servers that converts a name into an IP address. Up to 2 DNS servers can be configured.
[OPT12] Host name	The name of the host is the unique name of a computer in a network. The host name can contain up to 32 characters.
[OPT15] Domain name	The name of the domain is the unique name of a network. The domain name can contain up to 32 characters.
[OPT42] NTP server	IP address of the Network Time Server. This address is only accepted if the protocol "SNTP" is enabled via the WBM.

The WBM page "Miscellaneous" can also be used to select the "BootP Request before static IP" option. To do this, static network parameters must be stored in the EEPROM on the "TCP/IP" WBM page. After the restart, 5 BootP requests are sent. If there is no response to any of these requests, the head station configures itself with the IP parameters stored in the EEPROM.

If the head station does not receive a valid IP address, the I/O LED indicates an error code (see chapter "Diagnostics").

11.1.2.2 DHCP (Dynamic Host Configuration Protocol)

The Dynamic Host Configuration Protocol (DHCP) allows you to assign an IP address and other parameters to the head station of a fieldbus node in a TCP/IP network.
The DHCP protocol can be activated in the WBM on the "TCP/IP" WBM page (this option is already enabled by default).

DHCP is an advancement of BootP. The difference between BootP and DHCP is that both use different mapping methods and the configuration is limited in time with DHCP.
The DHCP client must re-request the configuration at the end of the server-supplied time ("lease time"). Normally, the DHCP server returns the same configuration, but it can be changed at any time.

If there is no response from a server on a DHCP request, the request is repeated continuously: first after 4 seconds, another after 8 seconds, the third after 16 seconds. After that follow more and more requests at longer intervals. If requests remain without an answer, the network configuration is discarded after the lease time has expired and a flash code is displayed via the I/O LED. Then the head station no longer has a valid IP address (IP 0.0.0.0).

There are three different operating modes for a DHCP server:

- **Manual assignment**
  In this mode, the IP addresses are permanently assigned on the DHCP server to specific MAC addresses. The addresses are assigned to the MAC address for an indefinite period.
  Manual assignments are used primarily to ensure that the DHCP client can be reached under a fixed IP address.

- **Automatic assignment**
  For automatic assignment, a range of IP addresses is assigned on the DHCP server.
  If the address was assigned from this range once to a DHCP client, then it belongs to the client for an indefinite period as the assigned IP address is also bound to the MAC address.

- **Dynamic assignment**
  This process is similar to automatic assignment, but the DHCP server has a statement in its configuration file that specifies how long a certain IP address may be “leased” to a client before the client must log into the server again and request an “extension”.
  If the client does not log in, the address is released and can be reassigned to another (or the same) client. The time defined by the administrator is called Lease Time.
  Some DHCP servers also assign IP addresses based on the MAC address, i.e., a client receives the same IP address as before after longer network absence and elapse of the Lease Time (unless the IP address has been assigned otherwise in the mean time).

DHCP is used to dynamically configure the network parameters.
The head station supports the following options in addition to the default “IP address” option:

Table 67: Meaning of DHCP Options

Option	Meaning
[OPT1] Subnet mask	32-bit address mask that displays which bits of the IP address identify the network and which identify the network stations.
[OPT2] Time zone	Time difference between the local time and the UTC (Universal Time Coordinated).
[OPT3] Gateway	IP address of the router that permits access to other networks.
[OPT6] DNS server	IP address of the name servers that converts a name into an IP address. Up to 2 DNS servers can be configured.
[OPT15] Domain name *)	The name of the domain is the unique name of a network. The domain name can contain up to 32 characters.
[OPT42] NTP server	IP address of the Network Time Server. This address is only accepted if the protocol "SNTP" is activated via the WBM.
[OPT51] Lease time	The maximum duration in seconds (i.e., how long the fieldbus coupler/controller maintains the assigned IP address) can be defined here. The maximum lease time for the fieldbus controller is 48 days. This is due to the internal timer resolution. The minimum lease time is 16 minutes.
[OPT58] Renewing time	The renewing time indicates when the fieldbus coupler/controller must renew the lease time. The renewing time should be approximately half of the lease time.
[OPT59] Rebinding time	The rebinding time indicates after what amount of time the fieldbus coupler/controller must have received its new address. The rebinding time should be approximately 7/8 of the lease time.

*) In contrast to BootP, the DHCP client does not support assignment of the host name.

11.1.2.3 HTTP (Hypertext Transfer Protocol)

HTTP is a protocol used by WWW (World Wide Web) servers for the forwarding of hypermedia, texts, images, audiodata, etc.

Today, HTTP forms the basis of the Internet and is also based on requests and responses in the same way as the BootP protocol.

The HTTP server implemented in the (programmable) fieldbus coupler or controller is used for viewing the HTML pages saved in the coupler/controller. The HTML pages provide information about the coupler/controller (state, configuration), the network and the process image.

On some HTML pages, (programmable) fieldbus coupler or controller settings can also be defined and altered via the web-based management system (e.g. whether IP configuration of the coupler/controller is to be performed via the DHCP protocol, the BootP protocol or from the data stored in the EEPROM).

The HTTP server uses port number 80.

11.1.2.4 DNS (Domain Name Systems)

The DNS client enables conversion of logical Internet names such as www.wago.com into the appropriate decimal IP address represented with separator stops, via a DNS server. Reverse conversion is also possible.

The addresses of the DNS server are configured via DHCP, BootP or web-based management. Up to 2 DNS servers can be specified. The host identification can be achieved with two functions; an internal host table is not supported.

11.1.2.5 SNTP-Client (Simple Network Time Protocol)

The SNTP client is used for synchronization of the time of day between a time server (NTP and SNTP server Version 3 and 4 are supported) and the internal system time in the (programmable) fieldbus coupler or controller. The protocol is executed via a UDP port. Only unicast addressing is supported.

Configuration of the SNTP client

The configuration of the SNTP client is performed via the web-based management system. The following parameters must be set:

Table 68: Meaning of the SNTP Parameters

Parameter	Meaning
WBM page “TCP/IP” → “(S)NTP Server”	The address assignment can be made over an IP address.
WBM page “TCP/IP” → „SNTP Update Time (sec, max. 65535) ”	The update time indicates the interval in seconds, in which the synchronization with the time server is to take place.
WBM page “Clock” → “Timezone (+/- hour:minute)”	To operate the ETHERNET couplers/controllers with SNTP in various countries, you must specify a time zone. The time zone relative to GMT (Greenwich Mean time). A range of -12 to +14 hours is acceptable.
WBM page “Port”→ “SNTP”	It indicates whether the SNTP Client is to be activated or deactivated.

11.1.2.6 FTP-Server (File Transfer Protocol)

The file transfer protocol (FTP) enables files to be exchanged between different network stations regardless of operating system.

In the case of the ETHERNET coupler/controller, FTP is used to store and read the HTML pages created by the user, the IEC61131 program and the IEC61131 source code in the (programmable) fieldbus coupler or controller.

A total memory of 1 GB is available for the internal file system.

Note

Cycles for flash limited to 1 million!
Up to 1 million write cycles per sector are allowed when writing the flash for the file system. The file system supports “Wear-Leveling”, so that the same sectors are not always written to.

Information

More Information about the implemented Protocols
You can find a list of the exact available implemented protocols in the section “Technical Data” to the fieldbus coupler and/or controller.

11.1.2.7 SNMP (Simple Network Management Protocol)

The Simple Network Management Protocol (SNMP) is responsible for transporting the control data that allows the exchange of management information as well as status and statistic data between individual network components and a management system.

An SNMP management workstation polls the SNMP agents to obtain information on the relevant devices.

SNMP is supported in versions 1/2c and some fieldbus couplers/controllers in version 3.

This represents a community message exchange in SNMP versions 1 and 2c. The community name of the network community must thereby be specified.

In SNMP version 3, exchanging messages is user-related. Each device, that knows the passwords set via WBM, may read or write values from the controller. In SNMPv3, user data from SNMP messages can also be transmitted in encoded form. This way, both requested values and values to be written cannot be easily decoded by others via ETHERNET. This is why SNMPv3 is often used in safety-related networks.

The device data, that can be accessed or modified by an SNMP agent, is called SNMP object. The sets of SNMP objects are stored in a logical database called Management Information Base (MIB); this is why these objects are typically known as “MIB objects”.

The SNMP of the ETHERNET controller includes both the general MIB acc. to RFC1213 (MIB II) and a special WAGO MIB.

SNMP is processed via port 161. The port number for SNMP traps (agent messages) is 161. Both ports must be enabled to use SNMP.

11.1.2.7.1 MIB II Description

MIB II acc. to RFC1213 is divided into the following groups:

Table 69: MIB II groups

Group	Identifier
System Group	1.3.6.1.2.1.1
Interface Group	1.3.6.1.2.1.2
IP Group	1.3.6.1.2.1.4
IpRoute Table Group	1.3.6.1.2.1.4.21
ICMP Group	1.3.6.1.2.1.5
TCP Group	1.3.6.1.2.1.6
UDP Group	1.3.6.1.2.1.7
SNMP Group	1.3.6.1.2.1.11

11.1.2.7.2 Traps

Standard Traps

For specific events, the SNMP agent will independently send one of the following messages without polling the manager.

Note

Enable event messages (traps) in the WBM!
Initially enable the event messages in the WBM in menu “SNMP” under “Trap Enable”. Traps in version 1, 2c and 3 may be activated separately.

The following messages are triggered automatically as traps (SNMPv1) by the fieldbus coupler/controller:

Table 70: Standard Traps

TrapType/TrapNumber/OID of the provided value	Name	Event
TrapType = 0	ColdStart	Restart the coupler/controller
TrapType = 1	WarmStart	Reset via mode selector switch (only for controller)
TrapType = 3	EthernetUp	Network connection detected
TrapType = 4	AuthenticationFailure	Unauthorized (abortive) MIB access
TrapType = 6/ ab Trap-Nummer 25 benutzerspezifisch	enterpriseSpecific	Enterprise-specific messages and function poll in the PFC program starting with enterprise trap number 25

11.1.3 Application Protocols

If fieldbus specific application protocols are implemented, then the appropriate fieldbus specific communication is possible with the respective coupler/controller. Thus the user is able to have a simple access from the respective fieldbus on the fieldbus node.

The fieldbus specific application protocols implemented in the fieldbus coupler/controller are listed in the following chapters and some special details are described.

11.2 EtherNet/IP (Ethernet/Industrial Protocol)

11.2.1 General

EtherNet/IP stands for Ethernet Industrial Protocol and defines an open industry standard that extends the classic Ethernet with an industrial protocol. This standard was jointly developed by ControlNet International (CI) and the Open DeviceNet Vendor Association (ODVA) with the help of the Industrial Ethernet Association (IEA).

This communication system enables devices to exchange time-critical application data in an industrial environment. The spectrum of devices ranges from simple I/O devices (e.g., sensors) through to complex controllers (e.g., robots).

EtherNet/IP is based on the TCP/IP protocol family and consequently uses the bottom 4 layers of the OSI layer model in unaltered form so that all standard Ethernet communication modules such as PC interface cards, cables, connectors, hubs and switches can also be used with EtherNet/IP.
Positioned above the transport layer is the encapsulation protocol, which enables use of the Control & Information Protocol (CIP) on TCP/IP and UDP/IP.

CIP, as a major network independent standard, is already used with ControlNet and DeviceNet. Therefore, converting from one of these protocols to EtherNet/IP is easy to do. Data exchange takes place with the help of an object model.

In this way, ControlNet, DeviceNet and EtherNet/IP have the same application protocol and can therefore jointly use device profiles and object libraries. These objects enable plug-and-play interoperability between complex devices of different manufacturers.

11.2.2 Protocol overview in the OSI model

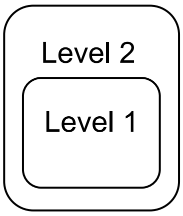
In order to clarify the interrelationships between DeviceNet, ControlNet and EtherNet/IP, the following diagram presents the associated ISO/OSI reference model.

Table 71: ISO/OSI reference model

<table>
<tr><td>7
Application Layer</td><td colspan="3">Object Library
(Communications, Applications, Time Synchronization)</td><td>Safety Object Library</td><td rowspan="3">Comon Industrial Protocol (CIP)</td></tr>
<tr><td>6
Presentation Layer</td><td colspan="3">Data Management Services
Explicit and I/O Messages</td><td>Safety Services and Messages</td></tr>
<tr><td>5
Session Layer</td><td colspan="4">Connection Management, Routing</td></tr>
<tr><td>4
Transport Layer</td><td>TCP/UDP</td><td rowspan="2">CompoNet
Network and Transport</td><td rowspan="2">ControlNet
Network and Transport</td><td rowspan="2">DeviceNet
Network and Transport</td><td rowspan="4">Network Adaptations of CIP</td></tr>
<tr><td>3
Network Layer</td><td>Internet Protocol</td></tr>
<tr><td>2
Data Link Layer</td><td>Ethernet
CSMA/CD</td><td>CompoNet
Time Slot</td><td>ControlNet
CTDMA</td><td>CAN
CSMA/NBA</td></tr>
<tr><td>1
Physical Layer</td><td>Ethernet</td><td>CompoNet</td><td>ControlNet</td><td>DeviceNet</td></tr>
</table>

11.2.3 Characteristics of the EtherNet/IP Protocol Software

The EtherNet/IP product classes are divided into 4 levels with each level containing a particular functionality. Each higher level in turn possesses at least the functionality of a lower level. The fieldbus coupler supports levels 1 and 2 of the EtherNet/IP product classes, which immediately build on each other.



Level 2: Level 1 + I/O Messages Server

Level 1: Explicit Messages Server

- Unconnected Message Manager (UCMM) client and server
- 38 "Encapsulation Protocol Sessions"
- 6 Class 3 Connections ("Explicit Message")
- 3 Class 1 Connections ("Implicit Message")

11.2.4 EDS File

The “Electronic Data Sheets” file (EDS file for short) contains the characteristics of the fieldbus coupler/controller and information regarding its communication capabilities. The EDS file required for EtherNet/IP operation is imported and installed by the corresponding configuration software.

Note

Downloading the EDS file!
You can download the EDS file in the download area of the WAGO web site: http://www.wago.com.

Information

Information about installing the EDS file
When installing the EDS file, refer to the information provided in the documentation of the configuration software, which you are using.

11.2.5 Object Model

11.2.5.1 General

For network communication, EtherNet/IP utilizes an object model in which all functions and data of a device 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 class describes 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 as regards form and behavior, but can comprise differing attribute values.

Instance:
An instance describes a specific and physical occurrence of an object. The terms "object," "instance" and "object instance" all refer to a specific instance. Different instances of a class have the same services, the same behavior and the same variables (attributes). However, you can have different variable values.
For example, Finland is an instance of the "Land" object class.

Variable:
The variables (attributes) describe an externally visible characteristic or the function of an object. Typical attributes include configuration or status information.
For example, the ASCII name of an object or the repetition frequency of a periodic object is output.

Service:
A service is a function supported by an object and/or an object class. CIP defines a group of common services that are applied to the attributes. These services execute specified actions.
Example: Reading variables.

Behavior:
The behavior specifies 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.

11.2.5.2 Class Overview

CIP classes are included in the CIP specification of ODVA. They describe the properties (Volume 1, “Common Industrial Protocol”) of Ethernet and CAN independent of their physical interface. The physical interface is described in a separate specification. For EtherNet/IP, this is Volume 2 (“EtherNet/IP Adaptation of CIP”), which describes the adaption of EtherNet /IP to CIP.

For this purpose, WAGO uses classes 01_{hex}, 02_{hex}, 04_{hex}, 05_{hex}, 06_{hex} and $F4_{hex}$, which are described in Volume 1 (“Common Industrial Protocol”).
Classes $F5_{hex}$ and $F6_{hex}$ are supported from Volume 2 (“EtherNet/IP Adaptation of CIP”).

WAGO-specific classes listed in the overview table below are also available.

All CIP Common classes listed and the WAGO-specific classes listed below that are described in detail in the following individual sections after a brief explanation of the table headings in the object descriptions.

Table 72: CIP common class

Class	Name
01 hex	Identity
02 hex	Message Router
04 hex	Assembly
06 hex	Connection Manager
F5 hex	TCP/IP Interface Object
F6 hex	Ethernet Link Object

Table 73: WAGO specific classes

Class	Name
64 hex	Coupler/Controller Configuration Object
65 hex	Discrete Input Point
66 hex	Discrete Output Point
67 hex	Analog Input Point
68 hex	Analog Output Point
69 hex	Discrete Input Point Extended 1
6A hex	Discrete Output Point Extended 1
6B hex	Analog Input Point Extended 1
6C hex	Analog Output Point Extended 1
6D hex	Discrete Input Point Extended 2
6E hex	Discrete Output Point Extended 2
6F hex	Analog Input Point Extended 2
70 hex	Analog Output Point Extended 2
71 hex	Discrete Input Point Extended 3
72 hex	Discrete Output Point Extended 3
73 hex	Analog Input Point Extended 3
74 hex	Analog Output Point Extended 3

80 hex	Module Configuration
81 hex	Module Configuration Extended 1

11.2.5.3 Explanation of the Table Headings in the Object Descriptions

Table 74: Explanation of the table headings in the object descriptions

Table heading	Description
Attribute ID	Integer value which is assigned to the corresponded attribute
Access	**Set:** The attribute can be accessed by means of Set_Attribute services. **Note** **Response also possible with Get_Attribute service!** All the set attributes can also be accessed by means of Get_Attribute services. **Get:** The attribute can be accessed by means of Get_Attribute services. **Get_Attribute_All:** Delivers content of all attributes. **Set_Attribute_Single:** Modifies an attribute value. **Reset:** Performs a restart. 0: Restart 1: Restart and restoration of factory settings
NV	**NV (non volatile):** The attribute is permanently stored in the controller.
	V (volatile): The attribute is not permanently stored in the controller. **Note** **Without specifying, the attribute is not saved!** If this column is missing, all attributes have the type V (volatile).
Name	Designation of the attribute
Data type	Designation of the CIP data type of the attribute
Description	Short description for the Attribute
Default value	Factory settings

11.2.5.4 Identity (01 hex)

The “Identity” class provides general information about the fieldbus coupler/controller that clearly identifies it.

Instance 0 (Class Attributes)

Table 75: Identity (01 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum instance	1 (0x0001)
3	Get	Max ID number of class attributes	UINT	Maximum number of class attributes	0 (0x0000)

Instance 1

Table 76: Identity (01 hex) – Instance 1

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 the product	12 (0x000C)
3	Get	Product Code	UINT	Designation of the coupler/ controller	**750-363** (in hex)
4	Get	Revision	STRUCT of:	Revision of the identity objects	Depending on the firmware
		Major Revision	UINT		
		Minor Revision	UINT		
5	Get	Status	WORD	Current status of the device	Bit 0 Assignment to a master Bit 1 = 0 reserved Bit 2 (configured) = 0 Configuration is unchanged = 1 Configuration is different to the manufacturers parameters Bit 3 = 0 reserved Bit 4-7 Extended Device Status =0010 at least one faulted I/O connection =0011 no I/O connection established Bit 8-11 not used Bit 12-15 =0 reserved
6	Get	Serial Number	UINT	Serial number	Manuafcturer specific Serial number incl. the last 4 digits of MAC ID: "NNNNNNNNNN - DEXXXXXX"
7	Get	Product Name	SHORT_ STRING	Product name	WAGO **750-363** EtherNet/IP

Common Services

Table 77: Identity (01 hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
01 hex	Yes	Yes	Get_Attribute_All	Supplies contents of all attributes
05 hex	No	Yes	Reset	Implements the reset service Service parameter 0: Emulates a Power On reset 1: Emulates a Power On reset and re-establishes factory settings
0E hex	No	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.5 Message Router (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.

Instance 0 (Class Attributes)

Table 78: Message router (02 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Number of Attributes	UINT	Number of attributes	0 (0x0000)
3	Get	Number of Services	UINT	Number of services	0 (0x0000)

Instance 1

Table 79: Message router (02 hex) – Instance 1

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	ObjectList	STRUCT of:	-	
		Number	UINT	Number of implemented classes	40 (0x0028)
		Classes	UINT	Implemented classes	06 00 02 00 03 03 04 03 04 00 00 03 02 03 F5 00 F6 00 01 00 64 00 65 00 69 00 6D 00 71 00 66 00 6A 00 6B 00 72 00 67 00 6B 00 6F 00 73 00 68 00 6C 00 70 00 74 00 A3 00 A4 00 A5 00 A8 00 A9 00 AC 00 AD 00 A0 00 A1 00 A6 00 A7 00 AA 00 AB 00 80 00 81 00
2	Get	NumberAvailable	UINT	Maximum number of connections	9 (0x0009)

Common Services

Table 80: Message router (02 hex) – Common service

Service code	Service available		Service-Name	Description
	Class	Instance		
01 hex	Yes	No	Get_Attribute_All	Supplies contents of all attributes
0E hex	No	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.6 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 static assembly instances with their contents and arrangements.

Static Assembly Instances – Overview

Table 81: Static assembly instances – Overview

Instance	Description
Instance 101 (65 hex)	for analog and digital output data
Instance 102 (66 hex)	for digital output data
Instance 103 (67 hex)	for analog output data
Instance 104 (68 hex)	for analog and digital input data and status
Instance 105 (69 hex)	for digital input data and status
Instance 106 (6A hex)	for analog input data and status
Instance 107 (6B hex)	for analog and digital input data
Instance 108 (6C hex)	for digital input data
Instance 109 (6D hex)	for analog input data

Instance 0 (Class Attributes)

Table 82: Assembly (04 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	2 (0x0002)
2	Get	Max Instance	UINT	Maximum number of Instances	199 (0x00C7)
3	Get	Number of Instances	UINT	Number of Instances	12 (0x000C)

Instance 101 (65_{hex})

This assembly instance contains analog and digital output data.

Table 83: Static assembly instances – Instance 101 (65_{hex})

Attribute ID	Access	Name	Data type	Description	Default value
3	Get/Set	Data	ARRAY of octed	Reference on the process image: analog and digital output data	-
4	Get	Size	UINT	Number of bytes in Attribute 3	-

Instance 102 (66_{hex})

This assembly instance contains digital output data only.

Table 84: Static assembly instances – Instance 102 (66_{hex})

Attribute ID	Access	Name	Data type	Description	Default value
3	Get/Set	Data	ARRAY of octed	Reference on the process image: only digital output data	-
4	Get	Size	UINT	Number of bytes in Attribute 3	-

Instance 103 (67_{hex})

This assembly instance contains analog output data only.

Table 85: Static assembly instances – Instance 103 (67_{hex})

Attribute ID	Access	Name	Data type	Description	Default value
3	Get/Set	Data	ARRAY of octed	Reference of the process image: only analog output data	-
4	Get	Size	UINT	Number of bytes in Attribute 3	-

Instance 104 (68_{hex})

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

Table 86: Static assembly instances – Instance 104 (68_{hex})

Attribute ID	Acces s	Name	Data type	Description	Default value
3	Get	Data	ARRAY of octed	Reference of the process image: analog and digital input data + Status	-
4	Get	Size	UINT	Number of bytes in Attribute 3	-

Instance 105 (69_{hex})

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

Table 87: Static assembly instances – Instance 105 (69_{hex})

Attribute ID	Access	Name	Data type	Description	Default value
3	Get	Data	ARRAY of octed	Reference of the process image: only digital input data + Status	-
4	Get	Size	UINT	Number of bytes in Attribute 3	-

Instance 106 ($6A_{hex}$)

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

Table 88: Static assembly instances – Instance 106 ($6A_{hex}$)

Attribute ID	Access	Name	Data type	Description	Default value
3	Get	Data	ARRAY of octed	Reference of the process image: only analog input data + Status	-
4	Get	Size	UINT	Number of bytes in Attribute 3	-

Instance 107 ($6B_{hex}$)

This assembly instance contains analog and digital input data.

Table 89: Static assembly instances – Instance 107 ($6B_{hex}$)

Attribute ID	Access	Name	Data type	Description	Default value
3	Get	Data	ARRAY of octed	Reference of the process image: analog and digital input data	-
4	Get	Size	UINT	Number of bytes in Attribute 3	-

Instance 108 ($6C_{hex}$)

This assembly instance contains digital input data.

Table 90: Static assembly instances – Instance 108 ($6C_{hex}$)

Attribute ID	Access	Name	Data type	Description	Default value
3	Get	Data	ARRAY of octed	Reference of the process image: only digital input data	-
4	Get	Size	UINT	Number of bytes in Attribute 3	-

Instance 109 (6D$_{hex}$)

This assembly instance contains analog input data.

Table 91: Static assembly instances – Instance 109 (6C $_{hex}$)

Attribute ID	Acces s	Name	Data type	Description	Default value
3	Get	Data	ARRAY of octed	Reference of the process image: only analog input data	-
4	Get	Size	UINT	Number of bytes in Attribute 3	-

Instance 1 (01 hex) "Configuration"

This Instance can optionally be used in the "Configuration Path" of a connection if the associated connection originator (for example the master) requires the specification of a "Configuration Path". The data length of this Instance is always zero.

Instance 198 (C6 $_{hex}$) “Input Only”

This instance is used to establish a connection when no outputs are to be addressed or when inputs, which are already being used in an exclusive owner connection, are to be interrogated. The data length of this instance is always zero.
This instance can only be used in the “consumed path” (seen from the slave device).

Instance 199 (C7 $_{hex}$) “Listen only”

This instance is used to establish a connection based on an existing exclusive owner connection. The new connection also has the same transmission parameters as the exclusive owner connection. When the exclusive owner connection is cleared, this connection, too, is automatically cleared. The data length of this instance is always zero.

This instance can only be used in the “consumed path” (from the point of view of the slave device).

Common Service

Table 92: Static assembly instances – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E $_{hex}$	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 $_{hex}$	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.7 Connection Manager (06_{hex})

The “Connection Manager Object” provides the internal resources that are required for the input and output data and explicit messages. In addition, the administration of this resource is an assignment of the “Connection Manager Object”.
For each connection (input and output data or explicit), another instance of the connection class is created. The connection parameters are extracted from the “Forward Open” service, which is responsible for establishing a connection.

The following services are supported for the first instance:

- Forward_Open
- Unconnected_Send
- Forward_Close

No class and instance attributes are visible.

11.2.5.8 TCP/IP Interface ($F5_{hex}$)

The “TCP/IP Interface Object” provides for the configuration of the TCP/IP network interface of a fieldbus coupler/controller. Examples of configurable objects include the IP address, the network mask and the gateway address of the fieldbus coupler/controller.

The underlying physical communications interface that is connected with the TCP/IP interface object can be any interface supported by the TCP/IP protocol. Examples of components that can be connected to a TCP/IP interface object include the following: an Ethernet interface 802.3, an ATM (Asynchronous Transfer Mode) interface or a serial interface for protocols such as PPP (Point-to-Point Protocol).
The TCP/IP interface object provides an attribute, which is identified by the link-specific object for the connected physical communications interface. The link-specific object should typically provide link-specific counters as well as any link-specific configuration attributes.

Each device must support exactly one instance of the TCP/IP interface object for each TCP/IP-compatible communications interface. A request for access to the first instance of the TCP/IP interface object must always refer to the instance connected with the interface, which is used to submit the request.

Instance 0 (Class Attributes)

Table 93: TCP/IP interface ($F5_{hex}$) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	4 (0x0004)
2	Get	Max Instance	UINT	Maximum number of instances	1 (0x0001)
3	Get	Number of Instances	UINT	Number of instances	1 (0x0001)

Instance 1

Table 94: TCP/IP interface ($F5_{hex}$) – Instance 1

Attribute ID	Access	NV	Name	Data type	Description	Default value
1	Get	V	Status	DWORD	Interface state	-
2	Get	V	Configuration Capability	DWORD	Interface flags for possible kinds of configuration	0x00000017
3	Set	NV	Configuration Control	DWORD	Specifies, how the device gets is TCP/IP configuration after the first Power On	0x00000011
4	Get	V	Physical Link Object	STRUCT of		
			Path size	UINT	Number of 16 Bit words in the following path	0x0002
			Path	Padded EPATH	Logical path, which points to the physical Link object	0x20 0xF6 0x24 0x03 (equates to the Ethernet Link Object)
5	Set	NV	Interface Configuration	STRUCT of	-	
			IP Address	UDINT	IP address	0
			Network Mask	UDINT	Net work mask	0
			Gateway Address	UDINT	IP address of default gateway	0
			Name Server	UDINT	IP address of the primary name of the server	0
			Name Server 2	UDINT	IP address of the secondary name of the server	0
			Domain Name	STRING	Default domain name	“”
6	Set	NV	Host Name	STRING	Device name	“”
10	Set	NV	SelectAcd	BOOL	Enable (1) or disable (0) the automatic IP address conflict detection via ACD	1 (0x01)
11	Set	NV	LastConflictDetected	STRUCT of:	Last detected IP address conflict	
			AcdActivity	USINT	Status of activity of ACD	0 (0x00)
			RemoteMAC	ARRAY of 6 USINT	MAC ID oft he conflicting device	0x00, … 0x00
			ArpPdu	ARRAY of 28 USINT	Copy of the ARP PDU that caused the conflict	0x00, …, 0x00
13	Set	NV	Encapsulation Inactivity Timeout	UINT	Timeout in seconds for encapsulation sessions	120 (0x0078)

Common Services

Table 95: TCP/IP interface ($F5_{hex}$) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
01 hex	Yes	Yes	Get_Attribute_All	Supplies contents of all attributes
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.9 Ethernet Link (F6 hex)

The “Ethernet Link Object” contains link-specific counter and status information for an Ethernet 802.3 communications interface. Each device must support exactly one instance of the Ethernet Link Object for each Ethernet IEEE 802.3 communications interface on the module. An Ethernet link object instance for an internal interface can also be used for the devices, e.g. an internal port with an integrated switch.

Instance 0 (Class Attributes)

Table 96: Ethernet link ($F5_{hex}$) – Class

Attribute ID	Acces s	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	4 (0x0004)
2	Get	Max Instance	UDINT	Maximum number of instances	3 (0x0003)
3	Get	Number of Instances	UDINT	Number of instances	3 (0x0003)

Instance 1

Table 97: Ethernet link (F6 hex) – Instance 1

Attribute ID	Access	NV	Name	Data type	Description	Default value
1	Get	NV	Interface Speed	UDINT	Transfer rate	100 (0x00000064)
2	Get	NV	Interface Flags	DWORD	Interface configuration and status information Bit 0: Link status Bit 1: Half/full duplex Bit 2…4: Detection status Bit 5: Manual settings require reset Bit 6: Local hardware error Bit 7…31: Reserved	Value is dependent upon Ethernet connection.
3	Get	NV	Physical Address	ARRAY of 6 UINTs	MAC layer address	MAC ID of the device
6	Set	NV	Interface Control	STRUCT of:	Configuration of the physical interface	-
			Control Bits	WORD	Interface configuration bits Bit 0: Automatic detection Bit 1: Default duplex mode Bit 2…15: Reserved	0x0001
			Forced Interface Speed	UINT	Preset interface speed	0 (0x0000) – Auto negotiate
7	Get	NV	Interface Type	USINT	Interface type Value 0: Unknown Value 1: Internal interface; e.g., in the case of an integrated switch Value 2: Twisted pair (e.g. 100Base-TX). Value 3: fiber glass (e.g. 100Base-FX). Value 4…256: Reserved	2 (0x02) – Twisted Pair
8	Get	NV	Interface State	USINT	Interface status Value 0: Unknown Value 1: Interface active and ready to send/receive. Value 2: Interface deactivated. Value 3: Interface is testing Wert 4…256: Reserved	-

Table 97: Ethernet link (F6 hex) – Instance 1

Attribute ID	Access	NV	Name	Data type	Description	Default value
9	Get/ Set	NV	Admin State	USINT	Admin status: Value 0: Reserved Value 1: Interface active Value 2: Interface deactivated. Is this the only CIP interface, a request for deactivation will be receipted with error code 0x09 Value 3…256: Reserved	1 (0x01)
10	Get	NV	Interface Label	SHORT_ STRING	Name of the interface	“Port 1”
11	Get	NV	Interface Capability	STRUCT of:	Properties of the Ethernet interface	
			Capability Bits	DWORD	Supported functionsof the interface Bit 0: Manual Setting requires Reset Bit 1: Auto-Negotiate Bit 2: Auto-MDIX Bit 3: Manual Speed/Duplex	0x0000000F
			Speed/Duplex Options	STRUCT of:	List of supported Speed/Duplex combinations	
				USINT	Number of the Speed/Duplex combinations	4 (0x04)
				ARRAY of STRUCT of:	Supported Speed/Duplex combinations	10 Mbit/s HD, 10 Mbit/s FD, 100 Mbit/s HD, 100 Mbit/s FD (0x0A 0x00 0x00, 0x0A 0x00 0x01, 0x64 0x00 0x00, 0x64 0x00 0x01)
				UINT	Interface Speed	
				USINT	Interface Duplex Mode	

Instance 2 – Port 2

Table 98: Ethernet link (F6 hex) – Instance 2

Attribute ID	Access	NV	Name	Data type	Description	Default value
1	Get	NV	Interface Speed	UDINT	Transfer rate	100 (0x00000064)
2	Get	NV	Interface Flags	DWORD	Interface configuration and status information Bit 0: Link status Bit 1: Half/full duplex Bit 2…4: Detection status Bit 5: Manual settings require reset Bit 6: Local hardware error Bit 7…31: Reserved	Value is dependent upon Ethernet connection.
3	Get	NV	Physical Address	ARRAY of 6 UINTs	MAC layer address	MAC ID of the device
6	Set	NV	Interface Control	STRUCT of:	Configuration of the physical interface	-
			Control Bits	WORD	Interface configuration bits Bit 0: Automatic detection Bit 1: Default duplex mode Bit 2…15: Reserved	0x0001
			Forced Interface Speed	UINT	Preset interface speed	(0x0000) Auto negotiate
7	Get	NV	Interface Type	USINT	Interface type Value 0: Unknown Value 1: Internal interface; e.g., in the case of an integrated switch Value 2: Twisted pair (e.g. 100Base-TX). Value 3: fiber glass (e.g. 100Base-FX). Value 4…256: Reserved	2 (0x02) – Twisted Pair
8	Get	NV	Interface State	USINT	Interface status Value 0: Unknown Value 1: Interface active and ready to send/receive. Value 2: Interface deactivated. Value 3: Interface is testing Wert 4…256: Reserved	-

Table 98: Ethernet link (F6 hex) – Instance 2

Attribute ID	Access	NV	Name	Data type	Description	Default value
9	Get/ Set	NV	Admin State	USINT	Admin status: Value 0: Reserved Value 1: Interface active Value 2: Interface deactivated. Is this the only CIP interface, a request for deactivation will be receipted with error code 0x09 Value 3…256: Reserved	1 (0x01)
10	Get	NV	Interface Label	SHORT_ STRING	Name of the interface	“Port 2”
11	Get	NV	Interface Capability	STRUCT of:	Properties of the Ethernet interface	
			Capability Bits	DWORD	Supported functionsof the interface Bit 0: Manual Setting requires Reset Bit 1: Auto-Negotiate Bit 2: Auto-MDIX Bit 3: Manual Speed/Duplex	0x0000000F
			Speed/Duplex Options	STRUCT of:	List of supported Speed/Duplex combinations	
				USINT	Number of the Speed/Duplex combinations	4 (0x04)
				ARRAY of STRUCT of:	Supported Speed/Duplex combinations	10 Mbit/s HD, 10 Mbit/s FD, 100 Mbit/s HD, 100 Mbit/s FD (0x0A 0x00 0x00, 0x0A 0x00 0x01, 0x64 0x00 0x00, 0x64 0x00 0x01)
				UINT	Interface Speed	
				USINT	Interface Duplex Mode	

Instance 3 – Internal Port 3

Table 99: Ethernet link (F6 hex) – Instance 3

Attribute ID	Access	NV	Name	Data type	Description	Default value
1	Get	NV	Interface Speed	UDINT	Transfer rate	100 (0x00000064)
2	Get	NV	Interface Flags	DWORD	Interface configuration and status information	3 (0x03) – Link active (Bit 0), Full duplex (Bit 1)
3	Get	NV	Physical Address	ARRAY of 6 UINTs	MAC layer address	MAC ID of the device
6	Set	NV	Interface Control	STRUCT of:	Configuration of the physical interface	-
			Control Bits	WORD	Interface configuration bits	3 (0x03) – Link active (Bit 0), Full duplex (Bit 1)
			Forced Interface Speed	UINT	Baud rate	100 (0x64)
7	Get	NV	Interface Type	UINT	Interface type	1 (0x01) – internal Port
8	Get	NV	Interface State	UINT	Interface status	1 (0x01) – active
9	Get	NV	Admin State	UINT	Admin status	1 (0x01) – active
10	Get	NV	Interface Label	SHORT_ STRING	Name of the interface	“Internal Port 3”
11	Get	NV	Interface Capability	STRUCT of:	Properties of the Ethernet interface	
			Capability Bits	DWORD	Supported functionsof the interface Bit 0: Manual Setting requires Reset Bit 1: Auto-Negotiate Bit 2: Auto-MDIX Bit 3: Manual Speed/Duplex	0x00000001
			Speed/Duplex Options	STRUCT of:	List of supported Speed/Duplex combinations	
				USINT	Number of the Speed/Duplex combinations	1 (0x01)
				ARRAY of STRUCT of:	Supported Speed/Duplex combinations	100 Mbit/s FD (0x64 0x00 0x01)
				UINT	Interface Speed	
				USINT	Interface Duplex Mode	

Common Services

Table 100: Ethernet link (F6 hex) – Common service

Service code	Service available		Service-Name	Description
	Class	Instance		
01 hex	Yes	Yes	Get_Attribute_All	Supplies contents of all attributes
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

Note

Changes with service "Set_Attribute_Single" not directly effective!
Attributes (particularly the attributes 6 and 9) which were changed over the service "Set_Attribute_Single", become only effective after the next Power-On-Reset of the controller.

11.2.5.10 Coupler/Controller Configuration (64 hex)

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

Instance 0 (Class Attributes)

Table 101: Coupler/Controller configuration (64 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Maximum number of instances	1 (0x0001)
3	Get	Number of Instances	UINT	Number of Instances	1 (0x0001)

Instance 1

Table 102: Coupler/Controller configuration (64 hex) – Instance 1

Attribute ID	Access	NV	Name	Data type	Description	Default value
5	Get	V	ProcessState	USINT	State of coupler/controller, error mask: Bit 0: Local bus error Bit 3: Module diagnostics (0x08) Bit 7: Fieldbus error (0x80)	0
6	Get	V	DNS_i_ Trmnldia	UINT	Module diagnostics: Bit 0..7: Module number Bit 8..14: Module channel Bit 15: 0/1 Error, repair/arisen	0
7	Get	V	CnfLen. AnalogOut	UINT	Number of I/O bits for the analog output	-
8	Get	V	CnfLen. AnalogInp	UINT	Number of I/O bits for the analog input	-
9	Get	V	CnfLen. DigitalOut	UINT	Number of I/O bits for the digital output	-
10	Get	V	CnfLen. DigitalInp	UINT	Number of I/O bits for the digital input	-
11	Set	NV	Bk_Fault_ Reaction	USINT	Fieldbus error reaction 0: stop local I/O cycles 1: set all output to 0 2: no error reaction 3: no error reaction 4: PFC task takes over control of the outputs (apply to controllers)	1
12..26	Reserved for compatibility to DeviceNet					
40..43	Reserved for compatibility to DeviceNet					
45	Get	V	Bk_Led_Err _Code	UINT	I/O LED error code	0
46	Get	V	Bk_Led_Err _Arg	UINT	I/O LED error argument	0
47	Get	V	Bk_Cfg_Diag_ Value	UINT	I/O-Module diagnostics (Module specific diagnostic state) **Note:** This attribute has to be read out before attribute 6 (DNS_i_Trmnldia), because during the reading of attribute 6 the diagnostic byte contains the data of the next diagnostic	0

120 (0x78)	Set	NV	Bk_Header CfgOT	UINT	Indicates whether the RUN/IDLE header is used originator → target direction 0: is used 1: is not used	0x0000
121(0x79)	Set	NV	Bk_Header CfgTO	UINT	Indicates whether the RUN/IDLE header is used originator → target direction 0: is used 1: is not used	0x0001

Common Service

Table 103: Coupler/Controller configuration (64 hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.11 Discrete Input Point (65 hex)

This class allows the reading of data of a particular digital input point.

Instance 0 (Class-Attributes)

Table 104: Discrete input point (65 hex) – Class

Attribute ID	Acces s	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Digital output value 1 up to 255)

Table 105: Discrete input point (65 hex) – Instance 1...255

Attribute ID	Acces s	Name	Data type	Description	Default value
1	Get	DipObj_Value	BYTE	Digital output (only Bit 0 is valid)	-

Common Services

Table 106: Discrete input point (65 hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.12 Discrete Input Point Extended 1 (69 hex)

The extension of the “Discrete Input Point” class enables the reading of data from a fieldbus node that contains over 255 digital input points (DIPs). The instance scope of the “Discrete Input Point Extended 1” class covers DIPs from 256 to 510 in the fieldbus node.

Instance 0 (Class Attributes)

Table 107: Discrete Input Point Extended 1(69 hex,) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Digital input value 256 up to 510)

Table 108: Discrete output point (66 hex) – Instance 256...510

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	DipObj_Value	BYTE	Digital input (only Bit 0 is valid)	-

Common Services

Table 109: Discrete Input Point Extended 1 (69 hex) – Common service

Service code	Service available		Service-name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.13 Discrete Input Point Extended 2 (6D hex)

The extension of the “Discrete Input Point” class enables the reading of data from a fieldbus node that contains over 510 digital input points (DIPs). The instance scope of the “Discrete Input Point Extended 2” class covers DIPs from 511 to 765 in the fieldbus node.

Instance 0 (Class Attributes)

Table 110: Discrete Input Point Extended 2 (6D hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Digital input value 511 up to 765)

Table 111: Analog input point (67 hex) – Instance 1

Attribute ID	Acces s	Name	Data type	Description	Default value
1	Get	DipObj_Value	ARRAY of BYTE	Digital input (only Bit 0 is valid)	-

Common Services

Table 112: Analog input point (67 hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.14 Discrete Input Point Extended 3 (71 hex)

The extension of the “Discrete Input Point” class enables the reading of data from a fieldbus node that contains over 765 digital input points (DIPs). The instance scope of the “Discrete Input Point Extended 3” class covers DIPs from 766 to 1020 in the fieldbus node.

Instance 0 (Class-Attributes)

Table 113: Discrete Input Point Extended 3 (71 hex) – Class

Attribute ID	Acces s	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Digital input value 766 up to 1020)

Table 114: Discrete Input Point Extended 3 (71 hex) – Instance 766...1020

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	DipObj_Value	BYTE	Digital input (only Bit 0 is valid)	-

Common Services

Table 115: Discrete Input Point Extended 3 (71 hex) – Common service

Service code	Service available		Service-Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.15 Discrete Output Point (66 hex)

This class enables data exchange for a particular digital output point.

Instance 0 (Class Attributes)

Table 116: Discrete Output Point (66 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Digital output value 1 up to 255)

Table 117: Discrete Output Point (66 hex) – Instance 1...255

Attribute ID	Access	Name	Data type	Description	Default value
1	Set	DopObj_Value	BYTE	Digital Output (only Bit 0 valid)	-

Common Services

Table 118: Discrete Output Point (66 hex) – Common service

Service code	Service available		Service-Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.16 Discrete Output Point Extended 1 (6A hex)

The extension of the “Discrete Output Point” class enables the exchange of data from a fieldbus node that contains over 255 digital output points (DOPs). The instance scope of the “Discrete Output Point Extended 1” class covers DOPs from 256 to 510 in the fieldbus node.

Instance 0 (Class Attributes)

Table 119: Discrete Output Point Extended 1 (6A hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Digital output value 256 up to 510)

Table 120: Discrete Output Point Extended 1 (6A hex) – Instance 256...510

Attribute ID	Access	Name	Data type	Description	Default value
1	Set	DopObj_Value	BYTE	Digital Output (only Bit 0 valid)	-

Common Services

Table 121: Discrete Output Point Extended 1 (6A hex) – Common service

Service code	Service available		Service-Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.17 Discrete Output Point Extended 2 (6E hex)

The extension of the “Discrete Output Point” class enables the exchange of data from a fieldbus node that contains over 510 digital output points (DOPs). This instance cope of the “Discrete Output Point Extended 1” class covers the DOPs from 511 to 765 in the fieldbus node.

Instance 0 (Class Attributes)

Table 122: Discrete Output Point Extended 2 (6E hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Digital output value 511 up to 765)

Table 123: Discrete Output Point Extended 2 (6E hex) – Instance 511...765

Attribute ID	Access	Name	Data type	Description	Default value
1	Set	DopObj_Value	BYTE	Digital Output (only Bit 0 valid)	-

Common Services

Table 124: Discrete Output Point Extended 2 (6E hex) – Common service

Service code	Service available		Service-Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.18 Discrete Output Point Extended 3 (72 hex)

The extension of the “Discrete Output Point” class enables the exchange of data from a fieldbus node that contains over 765 digital output points (DOPs). The instance scope of the “Discrete Output Point Extended 2” class covers DOPs from 766 to 1020 in the fieldbus node.

Instance 0 (Class Attributes)

Table 125: Discrete Output Point Extended 3 (72 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Digital Output value 766 up to 1020)

Table 126: Discrete Output Point Extended 3 (72 hex) – Instance 766...1020

Attribute ID	Access	Name	Data type	Description	Default value
1	Set	DopObj_Value	BYTE	Digital Output (only Bit 0 valid)	-

Common Services

Table 127: Discrete Output Point Extended 2 (6E hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.19 Analog Input Point (67 hex)

This class enables the reading of data of a particular analog input point (AIP). An analog input point is part of an analog input module.

Instance 0 (Class Attributes)

Table 128: Analog Input Point (67 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Analog input 1 up to 255)

Table 129: Analog Input Point (67 hex) – Instance 1 ... 255

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	AipObj_Value	ARRAY of BYTE	Analog Input	-
2	Get	AipObj_Value_Length	USINT	Length of the output data AopObj_Value (in byte)	-

Common Services

Table 130: Analog Input Point (67 hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.20 Analog Input Point Extended 1 (6B hex)

The extension of the “Analog Input Point” class enables the reading of data from a fieldbus node that contains over 255 analog outputs (AIPs). The instance scope of the “Analog Input Point Extended 1” class covers AIPs from 256 to 510 in the fieldbus node.

Instance 0 (Class Attributes)

Table 131: Analog Input Point Extended 1 (6B hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Analog Input value 256 up to 510)

Table 132: Analog Input Point Extended 1 (6B hex) – Instance 256 ... 510

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	AipObj_Value	ARRAY of BYTE	Analog Input	-
2	Get	AipObj_Value_Length	USINT	Length of the output data AopObj_Value (in byte)	-

Common Services

Table 133: Analog Input Point Extended 1 (6B hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.21 Analog Input Point Extended 2 (6F hex)

The extension of the “Analog Input Point” class enables the reading of data from a fieldbus node that contains over 510 analog outputs (AIPs). The instance scope of the “Analog Input Point Extended 2” class covers AIPs from 511 to 765 in the fieldbus node.

Instance 0 (Class Attributes)

Table 134: Analog Input Point Extended 2 (6F hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Analog Input 511 up to 765)

Table 135: Analog Input Point Extended 2 (6F hex) – Instance 511 ... 765

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	AipObj_Value	ARRAY of BYTE	Analog Input	-
2	Get	AipObj_Value_Length	USINT	Length of the output data AopObj_Value (in byte)	-

Common Services

Table 136: Analog Input Point Extended 2 (6F hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.22 Analog Input Point Extended 3 (73 hex)

The extension of the “Analog Input Point” class enables the reading of data from a fieldbus node that contains over 765 analog outputs (AIPs). The instance scope of the “Analog Input Point Extended 3” class covers AIPs from 766 to 1020 in the fieldbus node.

Instance 0 (Class Attributes)

Table 137: Analog Input Point Extended 3 (73 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Analog input value 766 up to 1020)

Table 138: Analog Input Point Extended 3 (73 hex) – Instance 766 ... 1020

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	AipObj_Value	ARRAY of BYTE	Analog Input	-
2	Get	AipObj_Value_Length	USINT	Length of the output data AopObj_Value (in byte)	-

Common Services

Table 139: Analog Input Point Extended 3 (73 hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.23 Analog Output Point (68 hex)

This class enables the reading of data of a particular analog output point (AOP). An analog output point is part of an analog output module.

Instance 0 (Class Attributes)

Table 140: Analog Output Point (68 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Analog output value 1 up to 255)

Table 141: Analog Output Point (68 hex) – Instance 1...255

Attribute ID	Access	Name	Data type	Description	Default value
1	Set	AopObj_Value	ARRAY of BYTE	Analog Output	-
2	Get	AopObj_Value_ Length	USINT	Length of the output data AopObj_Value (in byte)	-

Common Services

Table 142: Analog Output Point (68 hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.24 Analog Output Point Extended 1 (6C hex)

The extension of the “Analog Output Point” class enables the exchange of data from a fieldbus node that contains over 255 analog output points (AOPs). The instance scope of the “Discrete Output Point Extended 1” class covers AOPs from 256 to 510 in the fieldbus node.

Instance 0 (Class Attributes)

Table 143: Analog Output Point Extended 1 (6C hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Analog output value 256 up to 510)

Table 144: Analog Output Point Extended 1 (6C hex) – Instance 256...510

Attribute ID	Access	Name	Data type	Description	Default value
1	Set	AopObj_Value	ARRAY of BYTE	Analog Output	-
2	Get	AopObj_Value_ Length	USINT	Length of the output data AopObj_Value (in byte)	-

Common Services

Table 145: Analog Output Point Extended 1 (6C hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.25 Analog Output Point Extended 2 (70 hex)

The extension of the “Analog Output Point” class enables the exchange of data from a fieldbus node that contains over 510 analog output points (AOPs). The instance scope of the “Discrete Output Point Extended 2” class covers AOPs from 511 to 765 in the fieldbus node.

Instance 0 (Class Attributes)

Table 146: Analog Output Point Extended 2 (70 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Analog output value 511 up to 765)

Table 147: Analog Output Point Extended 2 (70 hex) – Instance 511...765

Attribute ID	Access	Name	Data type	Description	Default value
1	Set	AopObj_Value	ARRAY of BYTE	Analog Output	-
2	Get	AopObj_Value_ Length	USINT	Length of the output data AopObj_Value (in byte)	-

Common Services

Table 148: Analog Output Point Extended 2 (70 hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.26 Analog Output Point Extended 3 (74 hex)

The extension of the “Analog Output Point” class enables the exchange of data from a fieldbus node that contains over 765 analog output points (AOPs). The instance scope of the “Discrete Output Point Extended 3” class covers AOPs from 766 to 1020 in the fieldbus node.

Instance 0 (Class Attributes)

Table 149: Analog Output Point Extended 3 (74 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 ... 255 (Analog output value 766 up to 1020)

Table 150: Analog Output Point Extended 3 (74 hex) – Instance 766...1020

Attribute ID	Access	Name	Data type	Description	Default value
1	Set	AopObj_Value	ARRAY of BYTE	Analog Output	-
2	Get	AopObj_Value_ Length	USINT	Length of the output data AopObj_Value (in byte)	-

Common Services

Table 151: Analog Output Point Extended 3 (74 hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute
10 hex	No	Yes	Set_Attribute_Single	Modifies an attribute value

11.2.5.27 Module Configuration (80 hex)

Instance 0 (Class Attributes)

Table 152: Module Configuration (80 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 … 255 (I/O module 0 up to 254)

Table 153: Module Configuration (80 hex) – Instance 1...255

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	ModulDescription	WORD	Description of connected modules (module 0 = coupler/controller) Bit 0: Module has inputs Bit 1: Module has outputs Bit 8-14: Data width internally in bit 15: 0/1 Analog/digital module For analog modules, bits 0-14 identify the module type, e.g., 401 for module 750-401	-

Common Services

Table 154: Module Configuration (80 hex) – Common service

Service code	Service available		Service name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

11.2.5.28 Module Configuration Extended (81 hex)

The same as “Module Configuration (80 hex)” but with a description of module 255.

Instance 0 (Class Attributes)

Table 155: Module Configuration Extended (81 hex) – Class

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	Revision	UINT	Revision of this object	1 (0x0001)
2	Get	Max Instance	UINT	Max. number of instances	-
3	Get	Number of Instances	UINT	Number of Instances	-

Instance 1 (I/O module 255)

Table 156: Module Configuration Extended (81 hex) – Instance 256

Attribute ID	Access	Name	Data type	Description	Default value
1	Get	ModulDescription	WORD	Description of connected modules (module 0 = coupler/controller) Bit 0: Module has inputs Bit 1: Module has outputs Bit 8-14: Data width internally in Bit 15: 0/1 Analog/digital module For analog modules, bits 0-14 identify the module type, e.g., 401 for module 750-401	-

Common Services

Table 157: Module Configuration Extended (81 hex) – Common service

Service code	Service available		Service-Name	Description
	Class	Instance		
0E hex	Yes	Yes	Get_Attribute_Single	Supplies contents of the appropriate attribute

12 I/O Modules

12.1 Overview

For modular applications with the WAGO I/O SYSTEM 750, different types of I/O modules are available

- Digital Input Modules
- Digital Output Modules
- Analog Input Modules
- Analog Output Modules
- Communication Modules, Supply and Segment Modules
- Function and Technology Modules

For detailed information on the I/O modules and the module variations, refer to the manuals for the I/O modules.

You will find these manuals on the WAGO web pages under www.wago.com.

Information

More Information about the WAGO I/O SYSTEM
Current information on the modular WAGO I/O SYSTEM is available in the Internet under: www.wago.com.

12.2 Process Data Architecture for EtherNet/IP

With some I/O modules, the structure of the process data is fieldbus specific.

In the case of a fieldbus controller with EtherNet/IP, the process image uses a word structure (with word alignment). The internal mapping method for data greater than one byte conforms to the Intel format.

The following section describes the process image for various WAGO-I/O-SYSTEM 750 and 753 I/O modules when using a fieldbus coupler with EtherNet/IP.

NOTICE

Equipment damage due to incorrect address!
Depending on the specific position of an I/O module in the fieldbus node, the process data of all previous byte or bit-oriented modules must be taken into account to determine its location in the process data map.

12.2.1 Digital Input Modules

Digital input modules supply one bit of data per channel to specify the signal state for the corresponding channel. These bits are mapped into the Input Process Image.

Some digital I/O modules have an additional diagnostic bit per channel in the input process image. The diagnostic bit detects faults (e.g., wire breakage, overloads and/or short circuits). For some I/O modules, the data bits also have be evaluated with the set diagnostic bit.

When analog input modules are also present in the node, the digital data is always appended after the analog data in the Input Process Image, grouped into bytes.

1 sub index is assigned for each 8 bit.

Each input channel seizes one Instance in the Discrete Input Point Object (Class 0x65).

12.2.1.1 1 Channel Digital Input Module with Diagnostics

750-435

Table 158: 1 Channel Digital Input Module with Diagnostics

Input Process Image							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
						Diagnostic bit S 1	Data bit DI 1

The input modules seize 2 Instances in Class (0x65).

12.2.1.2 2 Channel Digital Input Modules

750-400, -401, -405, -406, -407, -410, -411, -412, -427, -438, (and all variations),
753-400, -401, -405, -406, -410, -411, -412, -427, -429

Table 159: 2 Channel Digital Input Modules

Input Process Image							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
						Data bit DI 2 Channel 2	Data bit DI 1 Channel 1

The input modules seize 2 Instances in Class (0x65).

12.2.1.3 2 Channel Digital Input Module with Diagnostics

750-419, -421, -424, -425,
753-421, -424, -425

Table 160: 2 Channel Digital Input Module with Diagnostics

Input Process Image							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
				Diagnostic bit S 2 Channel 2	Diagnostic bit S 1 Channel 1	Data bit DI 2 Channel 2	Data bit DI 1 Channel 1

The input modules seize 4 Instances in Class (0x65).

12.2.1.4 2 Channel Digital Input Module with Diagnostics and Output Process Data

750-418,
753-418

The digital input module supplies a diagnostic and acknowledge bit for each input channel. If a fault condition occurs, the diagnostic bit is set. After the fault condition is cleared, an acknowledge bit must be set to re-activate the input. The diagnostic data and input data bit is mapped in the Input Process Image, while the acknowledge bit is in the Output Process Image.

Table 161: 2 Channel Digital Input Module with Diagnostics and Output Process Data

Input Process Image							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
				Diagnostic bit S 2 Channel 2	Diagnostic bit S 1 Channel 1	Data bit DI 2 Channel 2	Data bit DI 1 Channel 1

The input modules seize 4 Instances in Class (0x65).

Output Process Image							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
				Acknowledge-ment bit Q 2 Channel 2	Acknowledge-ment bit Q 1 Channel 1	0	0

And the input modules seize 4 Instances in Class (0x66).

12.2.1.5 4 Channel Digital Input Modules

750-402, -403, -408, -409, -414, -415, -422, -423, -428, -432, -433, -1420, -1421, -1422, -1423
753-402, -403, -408, -409, -415, -422, -423, -428, -432, -433, -440

Table 162: 4 Channel Digital Input Modules

Input Process Image							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
				Data bit DI 4 Channel 4	Data bit DI 3 Channel 3	Data bit DI 2 Channel 2	Data bit DI 1 Channel 1

The input modules seize 4 Instances in Class (0x65).

12.2.1.6 8 Channel Digital Input Modules

750-430, -431, -436, -437, -1415, -1416, -1417, -1418,
753-430, -431, -434, -436, -437

Table 163: 8 Channel Digital Input Modules

Input Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Data bit DI 8 Channel 8	Data bit DI 7 Channel 7	Data bit DI 6 Channel 6	Data bit DI 5 Channel 5	Data bit DI 4 Channel 4	Data bit DI 3 Channel 3	Data bit DI 2 Channel 2	Data bit DI 1 Channel 1

The input modules seize 8 Instances in Class (0x65).

12.2.1.7 8 Channel Digital Input Modules NAMUR Diagnostics and Output Process Data

750-439

The digital input module NAMUR provides via one logical channel 2 byte for the input and output process image.

The signal state of inputs DI1 … DI8 is transmitted to the fieldbus coupler/controller via input data byte D0.
The fault conditions are transmitted via input data byte D1.

The channels 1 … 8 are switched on or off via the output data byte D1. The output data byte D0 is reserved and always has the value “0“.

Table 164: 8 Channel Digital Input Module NAMUR with Diagnostics and Output Process Data

Input Process Image							
Input Byte D0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Signal status DI 8 Channel 8	Signal status DI 7 Channel 7	Signal status DI 6 Channel 6	Signal status DI 5 Channel 5	Signal status DI 4 Channel 4	Signal status DI 3 Channel 3	Signal status DI 2 Channel 2	Signal status DI 1 Channel 1
Input Byte D1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Wire break /short circuit Data bit DI 8 Channel 8	Wire break /short circuit Data bit DI 7 Channel 7	Wire break /short circuit Data bit DI 6 Channel 6	Wire break /short circuit Data bit DI 5 Channel 5	Wire break /short circuit Data bit DI 4 Channel 4	Wire break /short circuit Data bit DI 3 Channel 3	Wire break /short circuit Data bit DI 2 Channel 2	Wire break /short circuit Data bit DI 1 Channel 1

The input modules seize 16 Instances in Class (0x65).

Output Process Image							
Output Byte D0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	0	0	0
Output Byte D1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DIAG Off 8 Channel 8 *)	DIAG Off 7 Channel 7 *)	DIAG Off 6 Channel 6 *)	DIAG Off 5 Channel 5 *)	DIAG Off 4 Channel 4 *)	DIAG Off 3 Channel 3 *)	DIAG Off 2 Channel 2 *)	DIAG Off 1 Channel 1 *)
*) 0: Channel ON 1: Channel OFF							

The input modules seize 16 Instances in Class (0x66).

12.2.1.8 8 Channel Digital Input Module PTC with Diagnostics and Output Process Data

750-1425

The digital input module PTC provides via one logical channel 2 byte for the input and output process image.

The signal state of PTC inputs DI1 … DI8 is transmitted to the fieldbus coupler/controller via input data byte D0.
The fault conditions are transmitted via input data byte D1.

The channels 1 … 8 are switched on or off via the output data byte D1. The output data byte D0 is reserved and always has the value “0“.

Table 165: 8 Channel Digital Input Module PTC with Diagnostics and Output Process Data

Input Process Image							
Input Byte D0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Signal status DI 8 Channel 8	Signal status DI 7 Channel 7	Signal status DI 6 Channel 6	Signal status DI 5 Channel 5	Signal status DI 4 Channel 4	Signal status DI 3 Channel 3	Signal status DI 2 Channel 2	Signal status DI 1 Channel 1
Input Byte D1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Wire break /short circuit Data bit DI 8 Channel 8	Wire break /short circuit Data bit DI 7 Channel 7	Wire break /short circuit Data bit DI 6 Channel 6	Wire break /short circuit Data bit DI 5 Channel 5	Wire break /short circuit Data bit DI 4 Channel 4	Wire break /short circuit Data bit DI 3 Channel 3	Wire break /short circuit Data bit DI 2 Channel 2	Wire break /short circuit Data bit DI 1 Channel 1

The input modules seize 16 Instances in Class (0x65).

Output Process Image							
Output Byte D0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	0	0	0
Output Byte D1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DI Off 8 Channel 8 *)	DI Off 7 Channel 7 *)	DI Off 6 Channel 6 *)	DI Off 5 Channel 5 *)	DI Off 4 Channel 4 *)	DI Off 3 Channel 3 *)	DI Off 2 Channel 2 *)	DI Off 1 Channel 1 *)
*) 0: Channel ON 1: Channel OFF							

The input modules seize 16 Instances in Class (0x66).

12.2.1.9 16 Channel Digital Input Modules

750-1400, -1402, -1405, -1406, -1407

Table 166: 16 Channel Digital Input Modules

Input Process Image							
Input Byte D0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Data bit DI 8 Channel 8	Data bit DI 7 Channel 7	Data bit DI 6 Channel 6	Data bit DI 5 Channel 5	Data bit DI 4 Channel 4	Data bit DI 3 Channel 3	Data bit DI 2 Channel 2	Data bit DI 1 Channel 1
Input Byte D1							
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Data bit DI 16 Channel 16	Data bit DI 15 Channel 15	Data bit DI 14 Channel 4	Data bit DI 13 Channel 13	Data bit DI 12 Channel 12	Data bit DI 11 Channel 11	Data bit DI 10 Channel 10	Data bit DI 9 Channel 9

The input modules seize 16 Instances in Class (0x65).

12.2.2 Digital Output Modules

Digital output modules use one bit of data per channel to control the output of the corresponding channel. These bits are mapped into the Output Process Image.

Some digital modules have an additional diagnostic bit per channel in the Input Process Image. The diagnostic bit is used for detecting faults that occur (e.g., wire breaks and/or short circuits). With some I/O modules, with set diagnostic bit, additionally the data bits must be evaluated.

When analog output modules are also present in the node, the digital image data is always appended after the analog data in the Output Process Image, grouped into bytes.

For each 8 bits a subindex is occupied.

Each output channel occupies one instance in the Discrete Output Point Object (Class 0x 66).

12.2.2.1 1 Channel Digital Output Module with Input Process Data

750-523

The digital output modules deliver 1 bit via a process value Bit in the output process image, which is illustrated in the input process image. This status image shows "manual mode".

Table 167: 1 Channel Digital Output Module with Input Process Data

Input Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
						not used	Status bit “Manual Operation“

Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
						not used	controls DO 1 Channel 1

And the output modules seize 2 Instances in Class (0x66).

12.2.2.2 2 Channel Digital Output Modules

750-501, -502, -509, -512, -513, -514, -517, -535, -538, (and all variations),
753-501, -502, -509, -512, -513, -514, -517

Table 168: 2 Channel Digital Output Modules

Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
						controls DO 2 Channel 2	controls DO 1 Channel 1

The output modules seize 2 Instances in Class (0x66).

12.2.2.3 2 Channel Digital Input Modules with Diagnostics and Input Process Data

750-507 (-508), -522,
753-507

The digital output modules have a diagnostic bit for each output channel. When an output fault condition occurs (i.e., overload, short circuit, or broken wire), a diagnostic bit is set. The diagnostic data is mapped into the Input Process Image, while the output control bits are in the Output Process Image.

Table 169: 2 Channel Digital Input Modules with Diagnostics and Input Process Data

Input Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
						Diagnostic bit S 2 Channel 2	Diagnostic bit S 1 Channel 1

Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
						controls DO 2 Channel 2	controls DO 1 Channel 1

And the output modules seize 2 Instances in Class (0x66).

750-506,
753-506

The digital output module has 2-bits of diagnostic information for each output channel. The 2-bit diagnostic information can then be decoded to determine the exact fault condition of the module (i.e., overload, a short circuit, or a broken wire). The 4-bits of diagnostic data are mapped into the Input Process Image, while the output control bits are in the Output Process Image.

Table 170: 2 Channel Digital Input Modules with Diagnostics and Input Process Data 75x-506

Input Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
				Diagnostic bit S 3 Channel 2	Diagnostic bit S 2 Channel 2	Diagnostic bit S 1 Channel 1	Diagnostic bit S 0 Channel 1

Diagnostic bits S1/S0, S3/S2: = ‘00’ standard mode
Diagnostic bits S1/S0, S3/S2: = ‘01’ no connected load/short circuit against +24 V
Diagnostic bits S1/S0, S3/S2: = ‘10’ Short circuit to ground/overload

The output modules seize 4 Instances in Class (0x65).

Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
				not used	not used	controls DO 2 Channel 2	controls DO 1 Channel 1

And the output modules seize 4 Instances in Class (0x66).

12.2.2.4 4 Channel Digital Output Modules

750-504, -515, -516, -519, -531,
753-504, -516, -531, -540

Table 171: 4 Channel Digital Output Modules

Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
				controls DO 4 Channel 4	controls DO 3 Channel 3	controls DO 2 Channel 2	controls DO 1 Channel 1

The output modules seize 4 Instances in Class (0x66).

12.2.2.5 4 Channel Digital Output Modules with Diagnostics and Input Process Data

750-532, -539

The digital output modules have a diagnostic bit for each output channel. When an output fault condition occurs (i.e., overload, short circuit, or broken wire), a diagnostic bit is set. The diagnostic data is mapped into the Input Process Image, while the output control bits are in the Output Process Image.

Table 172: 4 Channel Digital Output Modules with Diagnostics and Input Process Data

Input Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
				Diagnostic bit S 4 Channel 4	Diagnostic bit S 3 Channel 3	Diagnostic bit S 2 Channel 2	Diagnostic bit S 1 Channel 1

Diagnostic bit S = ‘0’ no Error
Diagnostic bit S = ‘1’ overload, short circuit, or broken wire

The output modules seize 4 Instances in Class (0x65).

Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
				controls DO 4 Channel 4	controls DO 3 Channel 3	controls DO 2 Channel 2	controls DO 1 Channel 1

And the output modules seize 4 Instances in Class (0x66).

12.2.2.6 8 Channel Digital Output Module

750-530, -536, -1515, -1516
753-530, -534, -536

Table 173: 8 Channel Digital Output Module

Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
controls DO 8 Channel 8	controls DO 7 Channel 7	controls DO 6 Channel 6	controls DO 5 Channel 5	controls DO 4 Channel 4	controls DO 3 Channel 3	controls DO 2 Channel 2	controls DO 1 Channel 1

The output modules seize 8 Instances in Class (0x66).

12.2.2.7 8 Channel Digital Output Modules with Diagnostics and Input Process Data

750-537
753-537

The digital output modules have a diagnostic bit for each output channel. When an output fault condition occurs (i.e., overload, short circuit, or broken wire), a diagnostic bit is set. The diagnostic data is mapped into the Input Process Image, while the output control bits are in the Output Process Image.

Table 174: 8 Channel Digital Output Modules with Diagnostics and Input Process Data

Input Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Diagnostic bit S 8 Channel 8	Diagnostic bit S 7 Channel 7	Diagnostic bit S 6 Channel 6	Diagnostic bit S 5 Channel 5	Diagnostic bit S 4 Channel 4	Diagnostic bit S 3 Channel 3	Diagnostic bit S 2 Channel 2	Diagnostic bit S 1 Channel 1

Diagnostic bit S = ‘0’ no Error
Diagnostic bit S = ‘1’ overload, short circuit, or broken wire

The output modules seize 8 Instances in Class (0x65).

Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
controls DO 8 Channel 8	controls DO 7 Channel 7	controls DO 6 Channel 6	controls DO 5 Channel 5	controls DO 4 Channel 4	controls DO 3 Channel 3	controls DO 2 Channel 2	controls DO 1 Channel 1

And the output modules seize 8 Instances in Class (0x66).

12.2.2.8 16 Channel Digital Output Modules

750-1500, -1501, -1504, -1505

Table 175: 16 Channel Digital Output Modules

Output Process Image							
Output Byte D0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
controls DO 8 Channel 8	controls DO 7 Channel 7	controls DO 6 Channel 6	controls DO 5 Channel 5	controls DO 4 Channel 4	controls DO 3 Channel 3	controls DO 2 Channel 2	controls DO 1 Channel 1
Output Byte D1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
controls DO 16 Channel 16	controls DO 15 Channel 15	controls DO 14 Channel 14	controls DO 13 Channel 13	controls DO 12 Channel 12	controls DO 11 Channel 11	controls DO 10 Channel 10	controls DO 9 Channel 9

The output modules seize 16 Instances in Class (0x66).

12.2.2.9 8 Channel Digital Input/Output Modules

750-1502, -1506

Table 176: 8 Channel Digital Input/Output Modules

Input Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Data bit DI 8 Channel 8	Data bit DI 7 Channel 7	Data bit DI 6 Channel 6	Data bit DI 5 Channel 5	Data bit DI 4 Channel 4	Data bit DI 3 Channel 3	Data bit DI 2 Channel 2	Data bit DI 1 Channel 1

The input/output modules seize 8 Instances in Class (0x65).

Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
controls DO 8 Channel 8	controls DO 7 Channel 7	controls DO 6 Channel 6	controls DO 5 Channel 5	controls DO 4 Channel 4	controls DO 3 Channel 3	controls DO 2 Channel 2	controls DO 1 Channel 1

The input/output modules seize 8 Instances in Class (0x66).

12.2.3 Analog Input Modules

The hardware of an analog input module has 16 bits of measured analog data per channel and 8 bits of control/status.

However, the coupler/controller with EtherNet/IP does not have access to the 8 control/status bits.

Therefore, the coupler/controller with MODBUS/TCP can only access the 16 bits of analog data per channel, which are grouped as words and mapped in Intel format in the Input Process Image.

When digital input modules are also present in the node, the analog input data is always mapped into the Input Process Image in front of the digital data.

Each input channel seizes one Instance in the Analog Input Point Object (Class 0x67).

Note

Information for the control/status byte development
Please refer to the corresponding description of the I/O modules for the structure of the control/status bytes. You can find a manual with the relevant I/O module description on the WAGO home page: at: http://www.wago.com .

12.2.3.1 1 Channel Analog Input Modules

750-491, (and all variations)

Table 177: 1 Channel Analog Input Modules

Input Process Image			
Instance	**Byte Destination**		**Description**
	High Byte	**Low Byte**	
n	D1	D0	Measured Value U_D
n+1	D3	D2	Measured Value U_{ref}

The input modules represent 2x2 bytes and seize 2 Instances in Class (0x67).

12.2.3.2 2 Channel Analog Input Modules

750-452, -454, -456, -461, -462, -464 (2-Channel Operation) -465, -466, -467, -469, -470, -472, -473, -474, -475, 476, -477, -478, -479, -480, -481, -483, -485, -487, -492, (and all variations),
753-452, -454, -456, -461, -465, -466, -467, -469, -472, -474, -475, -476, -477, -478, -479, -483, -492, (and all variations)

Table 178: 2 Channel Analog Input Modules

Input Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	D1	D0	Measured Value Channel 1
n+1	D3	D2	Measured Value Channel 2

The input modules represent 2x2 bytes and seize 2 Instances in Class (0x67).

12.2.3.3 2 Channel Analog Input Modules HART

750-482, -484, (and all variations),
753-482

The HART I/O module provides two different process images depending on the set operating mode.

For the pure analog values 4 mA ... 20 mA, the HART I/O module transmits 16 bit measured values per channel as an analog input module, which are mapped by word.

In operating mode "6 Byte Mailbox", the HART I/O module provides the fieldbus coupler / controller with a 12-byte input and output process image via a logical channel. For the control/status byte and the dummy byte, an acyclic channel (mailbox) for the process value communication is embedded in the process image, which occupies 6 bytes of data. This is followed by the measured values for channels 1 and 2.

HART commands are executed via the WAGO-IEC function blocks of the "WagoLibHart_0x.lib" library. The data is tunneled to the application via the mailbox and decoded by means of the library, so that the evaluation and processing takes place directly at the application level.

The operating mode is set using the WAGO-I / O-*CHECK* commissioning tool.

Table 179: 2-Channel Analog Input Modules HART

Input Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	D1	D0	Measured Value Channel 1
n+1	D3	D2	Measured Value Channel 2

The input modules represent 2x2 bytes and seize 2 Instances in Class (0x67).

Table 180:: 2 Channel Analog Input Modules HART + 6 bytes Mailbox

Input Process Image				
Instance	**Byte Destination**		**Description**	
	High Byte	**Low Byte**		
n	Internal Use	S0	Internal used	Status byte
	MBX_RES	MBX_RES	Response data from mailbox	
	MBX_RES	MBX_RES		
	MBX_RES	MBX_RES		
	D1	D0	Measured Value Channel 1	
	D3	D2	Measured Value Channel 2	

The input modules represent 1x12 bytes and seize 1 Instance in Class (0x67).

Output Process Image			
Instance	**Byte Destination**		**Description**
	High Byte	**Low Byte**	
n	-	C0	Control byte
	MBX_REQ	MBX_REQ	Request data from mailbox
	MBX_REQ	MBX_REQ	
	MBX_REQ	MBX_REQ	
	-	-	Not used
	-	-	

The input modules represent 1x12 bytes and seize 1 Instance in Class (0x68).

12.2.3.4 4 Channel Analog Input Modules

750-450, -453, -455, -457, -459, -460, -463, -464 (4-Channel Operation), -468, -471, -468, (and all variations),
753-453, -455, -457, -459

Table 181: 4 Channel Analog Input Modules

Input Process Image			
Instance	**Byte Destination**		**Description**
	High Byte	**Low Byte**	
n	D1	D0	Measured Value Channel 1
n+1	D3	D2	Measured Value Channel 2
n+2	D5	D4	Measured Value Channel 3
n+3	D7	D6	Measured Value Channel 4

The input modules represent 4x2 bytes and seize 4 Instances in Class (0x67).

12.2.3.5 8 Channel Analog Input Modules

750-451, 750-458, 750-496, 750-497

Table 182: 8 Channel Analog Input Modules

Input Process Image			
Instance	Byte Destination		Description
	High Byte	High Byte	
n	D1	D0	Measured Value Channel 1
n+1	D3	D2	Measured Value Channel 2
n+2	D5	D4	Measured Value Channel 3
n+3	D7	D6	Measured Value Channel 4
n+4	D9	D8	Measured Value Channel 5
n+5	D11	D10	Measured Value Channel 6
n+6	D13	D12	Measured Value Channel 7
n+7	D15	D14	Measured Value Channel 8

The input modules represent 8x2 bytes and seize 8 Instances in Class (0x67)

12.2.3.6 3-Phase Power Measurement Module

750-493

The above Analog Input Modules have a total of 9 bytes of user data in both the Input and Output Process Image (6 bytes of data and 3 bytes of control/status). The following tables illustrate the Input and Output Process Image, which has a total of 6 words mapped into each image.
Word alignment is applied.

Table 183: 3-Phase Power Measurement Module

Input Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	-	S0	Status byte 0
	D1	D0	Input data word 1
n+1	-	S1	Status byte 1
	D3	D2	Input data word 2
n+2	-	S2	Status byte 2
	D5	D4	Input data word 3

The input modules represent 3x4 bytes and seize 3 Instances in Class (0x67).

Output Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	-	C0	Control byte 0
	D1	D0	Output data word 1
n+1	-	C1	Control byte 1
	D3	D2	Output data word 2
n+2	-	C2	Control byte 2
	D5	D4	Output data word 3

The input modules represent 3x4 bytes and seize 3 Instances in Class (0x68).

750-494, -495, (and all variations)

The 3-Phase Power Measurement Modules 750-494, -495, (and all variations) have a total of 24 bytes of user data in both the Input and Output Process Image (16 bytes of data and 8 bytes of control/status).

Table 184: 3-Phase Power Measurement Modules 750-494, -495, (and all variations)

Input Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	S1	S0	Status word
	S3	S2	Extended status word 1
n+1	S5	S4	Extended status word 2
	S7	S6	Extended status word 3
n+2	D1	D0	Process value 1
	D3	D2	
n+3	D5	D4	Process value 2
	D7	D6	
n+4	D9	D8	Process value 3
	D11	D10	
n+5	D13	D12	Process value 4
	D15	D14	

The input modules represent 6x4 bytes and seize 6 Instances in Class (0x67).

Output Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	S1	S0	Control word
	S3	S2	Extended control word 1
n+1	S5	S4	Extended control word 2
	S7	S6	Extended control word 3
n+2	-	-	-
	-	-	
n+3	-	-	-
	-	-	
n+4	-	-	-
	-	-	
n+5	-	-	-
	-	-	

The input modules represent 6x4 bytes and seize 6 Instances in Class (0x68).

12.2.3.7 8 Channel Analog Input Modules

750-451

Table 185: 8 Channel Analog Input Modules for RTD's

Input Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	D1	D0	Measured Value Channel 1
n+1	D3	D2	Measured Value Channel 2
n+2	D5	D4	Measured Value Channel 3
n+3	D7	D6	Measured Value Channel 4
n+4	D9	D8	Measured Value Channel 5
n+5	D11	D10	Measured Value Channel 6
n+6	D13	D12	Measured Value Channel 7
n+7	D15	D14	Measured Value Channel 8

The input modules represent 8x2 bytes and seize 8 Instances in Class (0x67).

12.2.4 Analog Output Modules

The hardware of an analog output module has 16 bits of measured analog data per channel and 8 bits of control/status. However, the coupler/controller with EtherNet/IP does not have access to the 8 control/status bits. Therefore, the coupler/controller with EtherNet/IP can only access the 16 bits of analog data per channel, which are grouped as words and mapped in Intel format in the Output Process Image.

When digital output modules are also present in the node, the analog output data is always mapped into the Output Process Image in front of the digital data.

Each output channel seizes one Instance in the Analog Output Point Object (Class 0x68).

Information

Information to the structure of the Control/Status byte
For detailed information about the structure of a particular module's control/status byte, please refer to that module's manual. Manuals for each module can be found on the Internet under: http://www.wago.com.

12.2.4.1 2 Channel Analog Output Modules

750-550, -552, -554, -556, -560, -562, -563, -585, -586, (and all variations),
753-550, -552, -554, -556

Table 186: 2 Channel Analog Output Modules

Output Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	D1	D0	Output Value Channel 1
n+1	D3	D2	Output Value Channel 2

The output modules represent 2x2 bytes and seize 2 Instances in Class (0x68).

12.2.4.2 4 Channel Analog Output Modules

750-553, -555, -557, -559,
753-553, -555, -557, -559

Table 187: 4 Channel Analog Output Modules

Output Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	D1	D0	Output Value Channel 1
n+1	D3	D2	Output Value Channel 2
n+2	D5	D4	Output Value Channel 3
n+3	D7	D6	Output Value Channel 4

The output modules represent 4x2 bytes and seize 4 Instances in Class (0x68).

12.2.4.3 8 Channel Analog Output Modules

750-597

Table 188: 8 Channel Analog Output Modules

Output Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	D1	D0	Output Value Channel 1
n+1	D3	D2	Output Value Channel 2
n+2	D5	D4	Output Value Channel 3
n+3	D7	D6	Output Value Channel 4
n+4	D9	D8	Output Value Channel 5
n+5	D11	D10	Output Value Channel 6
n+6	D13	D12	Output Value Channel 7
n+7	D15	D14	Output Value Channel 8

The output modules represent 8x2 bytes and seize 8 Instances in Class (0x68).

12.2.5 Specialty Modules

WAGO has a host of Specialty I/O modules that perform various functions. With individual modules beside the data bytes also the control/status byte is mapped in the process image. The control/status byte is required for the bidirectional data exchange of the module with the higher-ranking control system. The control byte is transmitted from the control system to the module and the status byte from the module to the control system.

This allows, for example, setting of a counter with the control byte or displaying of overshooting or undershooting of the range with the status byte.

The control/status byte always lies in the low byte for the fieldbus coupler/controller with EtherNet/IP.

Information

Information about the structure of the Control/Status byte
For detailed information about the structure of a particular module's control/status byte, please refer to that module's manual. Manuals for each module can be found on the Internet under: http://www.wago.com.

The Specialty Modules represent as analog modules.
For this, the process input data of the Specialty Modules seize one Instance per channel in the Analog Input Point Object (Class 0x67) and the process output data seize one Instance seize one Instance in the Analog Input Point Object (Class 0x67) per channel in the Analog Output Point Object (Class 0x68).

12.2.5.1 Counter Modules

750-404, (and all variations except of /000-005),
753-404, (and variation /000-003)

The above Counter Modules have a total of 5 bytes of user data in both the Input and Output Process Image (4 bytes of counter data and 1 byte of control/status). The counter value is supplied as 32 bits. The following tables illustrate the Input and Output Process Image, which has a total of 3 words mapped into each image. Word alignment is applied.

Table 189: Counter Modules 750-404, (and all variations except of /000-005), 753-404, -404/000-003

Input Process Image			
Instance	**Byte Destination**		**Description**
	High Byte	**Low Byte**	
n	-	S	Status byte
	D1	D0	Counter value
	D3	D2	

The specialty modules represent 1x6 bytes input data and seize 1 Instance in Class (0x67).

Output Process Image			
Instance	**Byte Destination**		**Description**
	High Byte	**Low Byte**	
n	-	C	Control byte
	D1	D0	Counter setting value
	D3	D2	

And the specialty modules represent 1x6 bytes output data and seize 1 Instance in Class (0x68).

750-404/000-005
753-404/000-005

The above Counter Modules have a total of 5 bytes of user data in both the Input and Output Process Image (4 bytes of counter data and 1 byte of control/ status). The two counter values are supplied as 16 bits. The following tables illustrate the Input and Output Process Image, which has a total of 3 words mapped into each image. Word alignment is applied.

Table 190: Counter Modules 750-404/000-005, 753-404/000-005

Input Process Image			
Instance	**Byte Destination**		**Description**
	High Byte	**Low Byte**	
n	-	S	Status byte
	D1	D0	Counter Value of Counter 1
	D3	D2	Counter Value of Counter 2

The specialty modules represent 2x3 bytes input data and seize 2 Instances in Class (0x67).

Output Process Image			
Instance	**Byte Destination**		**Description**
	High Byte	**Low Byte**	
n	-	C	Control byte
	D1	D0	Counter Setting Value of Counter 1
	D3	D2	Counter Setting Value of Counter 2

And the specialty modules represent 1x6 bytes output data and seize 1 Instance in Class (0x68).

750-633

The above Counter Module has a total of 5 bytes of user data in both the Input and Output Process Image (4 bytes of counter data and 1 byte of control/ status). The following tables illustrate the Input and Output Process Image, which has a total of 3 words mapped into each image. Word alignment is applied.
The meaning of the output data depends on the set operating mode:

1 Up counter with enable input
2 Up/down counter with U/D input
3 Frequency counter
4 Gate time counter

Table 191: Counter Modules 750-633

Input Process Image			
Instance	**Byte Designation**		**Description**
	High Byte	**Low Byte**	
n	-	S	Status byte
	D1	D0	Counter Value
	D3	D2	

The specialty modules represent 1x6 bytes input data and seize 1 Instance in Class (0x67).

Output Process Image			
Instance	Byte Designation		Description
	High Byte	Low Byte	
n	-	C	Control byte
	D1	D0	Counter Setting Value [1,2] watchdog time [3] reserved [4]
	D3	D2	Counter Setting Value [1,2] reserved [3] reserved [4]

[1,2] Up counter with enable input, Up /down counter with U / D input
[3] Frequency counter
[4] Gate time counter

The specialty modules represent 1x6 bytes input data and seize 1 Instance in Class (0x68).

750-638,
753-638

The above Counter Modules have a total of 6 bytes of user data in both the Input and Output Process Image (4 bytes of counter data and 2 bytes of control/status). The two counter values are supplied as 16 bits. The following tables illustrate the Input and Output Process Image, which has a total of 4 words mapped into each image. Word alignment is applied.

Table 192: Counter Modules 750-638, 753-638

Input Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	-	S0	Status byte of Counter 1
	D1	D0	Counter Value of Counter 1
n+1	-	S1	Status byte of Counter 2
	D3	D2	Counter Value of Counter 2

The specialty modules represent 2x3 bytes input data and seize 2 Instances in Class (0x67).

Output Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	-	C0	Control byte of Counter 1
	D1	D0	Counter Setting Value of Counter 1
n+1	-	C1	Control byte of Counter 2
	D3	D2	Counter Setting Value of Counter 2

And the specialty modules represent 2x3 bytes output data and seize 2 Instances in Class (0x68).

12.2.5.2 Pulse Width Modules

750-511, (and all variations /xxx-xxx)
753-511

The above Pulse Width modules have a total of 6 bytes of user data in both the Input and Output Process Image (4 bytes of channel data and 2 bytes of control/ status). The two channel values are supplied as 16 bits. Each channel has its own control/status byte. The following table illustrates the Input and Output Process Image, which has a total of 4 words mapped into each image. Word alignment is applied.

Table 193: Pulse Width Modules 750-511, /xxx-xxx, 753-511

Input and Output Process			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	-	C0/S0	Control/Status byte of Channel 1
	D1	D0	Data Value of Channel 1
n+1			Control/Status byte of Channel 2
	D3	D2	Data Value of Channel 2

The specialty modules represent 2x3 bytes input and output data and seize 2 Instances in Class (0x67) and 2 Instances in Class (0x68).

12.2.5.3 Serial Interface Modules with alternative Data Format

750-650, (and the variations /000-002, -004, -006, -009, -010, -011, -012, -013),
750-651, (and the variations /000-001, /000-002, -003),
750-653, (and the variations /000-002, -007),
753-650, -653

Note

The process image of the / 003-000-variants depends on the parameterized operating mode!
With the freely parametrizable variations /003 000 of the serial interface modules, the desired operation mode can be set. Dependent on it, the process image of these modules is then the same, as from the appropriate variation.

The above Serial Interface Modules with alternative data format have a total of 4 bytes of user data in both the Input and Output Process Image (3 bytes of serial data and 1 byte of control/status). The following table illustrates the Input and Output Process Image, which have a total of 2 words mapped into each image. Word alignment is applied.

Table 194: Serial Interface Modules with Alternative Data Format

Input and Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	D0	C/S	Data byte	Control/status byte
n+1	D2	D1	Data bytes	

The specialty modules represent 2x2 bytes input and output data and seize 2 Instances in Class (0x67) and 2 Instances in Class (0x68).

12.2.5.4 Serial Interface Modules with Standard Data Format

750-650/000-001, -014, -015, -016
750-651/000-001
750-653/000-001, -006

The above Serial Interface Modules with Standard Data Format have a total of 6 bytes of user data in both the Input and Output Process Image (5 bytes of serial data and 1 byte of control/status). The following table illustrates the Input and Output Process Image, which have a total of 3 words mapped into each image. Word alignment is applied.

Table 195: Serial Interface Modules with Standard Data Format

Input and Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	D0	C/S	Data byte	Control/status byte
	D2	D1	Data bytes	
	D4	D3		

The specialty modules represent 1x6 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.5 Serial Interface Modules

750-652,
753-652

The size of the process image for the Serial Interface Module can be adjusted to 12, 24 or 48 bytes.
It consists of two status bytes (input) or control bytes (output) and the process data with a size of 6 to 46 bytes.

Thus, each Serial Interface Module uses between 8 and 48 bytes in the process image. The sizes of the input and output process images are always the same.

The process image sizes are set with the startup tool WAGO-I/O-*CHECK*.

Table 196: Serial Interface Modules 750-652, 753-652

Input and Output Process Image					
Process image size	Instance	Byte Designation		Description	
		High Byte	Low Byte		
8 bytes	n	C1/S1	C0/S0	Control/Status byte C1/S1	Control/Status byte C0/S0
		D1	D0	Prozess data (6-46 bytes)	
		D3	D2		
		D5	D4		
24 bytes*		D7	D6		
		D21	D20		
48 bytes		D23	D22		
		D45	D44		

*) Factory setting

The specialty modules represent 1x24 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.6 Data Exchange Module

750-654, (and the variation /000-001)

The Data Exchange modules have a total of 4 bytes of user data in both the Input and Output Process Image. The following tables illustrate the Input and Output Process Image, which has a total of 2 words mapped into each image.
Word alignment is applied.

Table 197: Data Exchange Module

Input and Output Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	D1	D0	Data bytes
n+1	D3	D2	

The specialty modules represent 2x2 bytes input and output data and seize 2 Instances in Class (0x67) and 2 Instances in Class (0x68).

12.2.5.7 SSI Transmitter Interface Modules

750-630, (and all variations /000-001, -002, -006, -008, -009, -011, -012, -013)

Note

The process image of the / 003-000-variants depends on the parameterized operating mode!
The operating mode of the configurable /003-000 I/O module versions can be set. Based on the operating mode, the process image of these I/O modules is then the same as that of the respective version.

The above SSI Transmitter Interface modules have a total of 4 bytes of user data in the Input Process Image, which has 2 words mapped into the image.
Word alignment is applied.

Table 198: SSI Transmitter Interface Modules

Input Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	D1	D0	Data bytes
n+1	D3	D2	

The specialty modules represent 2x2 bytes input data and seize 2 Instances in Class (0x67).

750-630/000-004, -005, -007

In the input process image, SSI transmitter interface modules with status occupy 5 usable bytes, 4 data bytes, and 1 additional status byte. A total of 3 words are assigned in the process image via word alignment.

Table 199: SSI Transmitter Interface I/O Modules with an Alternative Data Format

Input Process Image				
Instance	Byte Destination		Description	
	High Byte	High Byte		
n	-	S	not used	Status byte
	D1	D0	Data bytes	
	D3	D2		

The specialty modules represent 1x6 bytes and seize 1 Instance in Class (0x67).

12.2.5.8 Incremental Encoder Interface Modules

750-631/000-004, -010, -011

The above Incremental Encoder Interface modules have 5 bytes of input data and 3 bytes of output data. The following tables illustrate the Input and Output Process Image, which have 4 words into each image. Word alignment is applied.

Table 200: Incremental Encoder Interface Modules 750-631/000-004, -010, -011

Input Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	-	S	not used	Status byte
	D1	D0	Counter word	
	-	-	not used	
	D4	D3	Latch word	

The specialty modules represent 1x6 bytes input data and seize 1 Instance in Class (0x67).

Output Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	-	C	Control byte of counter 1
	D1	D0	Counter setting value of counter 1
	-	-	not used
	-	-	not used

And the specialty modules represent 1x6 bytes output data and seize 1 Instance in Class (0x68).

750-634

The above Incremental Encoder Interface module has 5 bytes of input data (6 bytes in cycle duration measurement mode) and 3 bytes of output data. The following tables illustrate the Input and Output Process Image, which has 4 words mapped into each image. Word alignment is applied.

Table 201: Incremental Encoder Interface Modules 750-634

Input Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	-	S	not used	Status byte
	D1	D0	Counter word	
	-	(D2) *)	not used	(Periodic time)
	D4	D3	Latch word	

*) If cycle duration measurement mode is enabled in the control byte, the cycle duration is given as a 24-bit value that is stored in D2 together with D3/D4.

The specialty modules represent 1x8 bytes input data and seize 1 Instance in Class (0x67).

Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	-	C	not used	Control byte
	D1	D0	Counter setting word	
	-	-	not used	
	-	-		

And the specialty modules represent 1x8 bytes output data and seize 1 Instance in Class (0x68).

750-637, (and all variations)

The above Incremental Encoder Interface Module has a total of 6 bytes of user data in both the Input and Output Process Image (4 bytes of encoder data and 2 bytes of control/status). The following table illustrates the Input and Output Process Image, which have 4 words mapped into each image. Word alignment is applied.

Table 202: Incremental Encoder Interface Modules 750-637, (and all variations)

Input and Output Process Image			
Instance	Byte Destination		Description
	High Byte	Low Byte	
n	-	C0/S0	Control/Status byte of Channel 1
	D1	D0	Data Value of Channel 1
n+1	-	C1/S1	Control/Status byte of Channel 2
	D3	D2	Data Value of Channel 2

The specialty modules represent 2x3 bytes input and output data and seize 2 Instances in Class (0x67) and 2 Instances in Class (0x68).

Digital Pulse Interface module

750-635,
753-635

The above Digital Pulse Interface module has a total of 4 bytes of user data in both the Input and Output Process Image (3 bytes of module data and 1 byte of control/status). The following table illustrates the Input and Output Process Image, which have 2 words mapped into each image. Word alignment is applied.

Table 203: Incremental Encoder Interface Modules 750-635, 750-635

Input and Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	D0	C0/S0	Data byte	Control/status byte
	D2	D1	Data bytes	

The specialty modules represent 1x4 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.9 DC-Drive Controller

750-636, -636/000-700, -636/000-800

The DC-Drive Controller maps 6 bytes into both the input and output process image. The data sent and received are stored in up to 4 input and output bytes (D0 ... D3). Two control bytes (C0, C1) and two status bytes (S0/S1) are used to control the I/O module and the drive.

In addition to the position data in the input process image (D0 … D3), it is possible to display extended status information (S2 … S5). Then the three control bytes (C1 … C3) and status bytes (S1 … S3) are used to control the data flow.

Bit 3 of control byte C1 (C1.3) is used to switch between the process data and the extended status bytes in the input process image (Extended Info_ON). Bit 3 of status byte S1 (S1.3) is used to acknowledge the switching process.

Table 204: DC-Drive Controller 750-636, -636/000-700, -636/000-800

Input Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	S1	S0	Status byte S1	Status byte S0
	D1*) / S3**)	D0*) / S2**)	Actual position*) / Extended status byte S3**)	Actual position (LSB) / Extended status byte S2**)
	D3*) / S5**)	D2*) / S4**)	Actual position (MSB) / Extended status byte S3**)	Actual position*) / Extended status byte S4**)

*) ExtendedInfo_ON = ‘0’.
**) ExtendedInfo_ON = ‘1’.

Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	C1	C0	Control byte C1	Control byte C0
	D1	D0	Setpoint position	Setpoint position (LSB)
	D3	D2	Setpoint position (MSB)	Setpoint position

The specialty modules represent 1x6 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.10 Stepper Controller

750-670, -671, -672

The Steppercontroller RS422 / 24 V / 20 mA 750-670 provides the fieldbus coupler 12 bytes input and output process image via 1 logical channel. The data to be sent and received are stored in up to 7 output bytes (D0 … D6) and 7 input bytes (D0 … D6), depending on the operating mode.

Output byte D0 and input byte D0 are reserved and have no function assigned.

One I/O module control and status byte (C0, S0) and 3 application control and status bytes (C1 ... C3, S1 ... S3) provide the control of the data flow.

Switching between the two process images is conducted through bit 5 in the control byte (C0 (C0.5). Activation of the mailbox is acknowledged by bit 5 of the status byte S0 (S0.5).

Table 205: Stepper Controller 750-670, -671, -672

Input Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	reserved	S0	reserved	Status byte S0
	D1	D0	Process data*) / Mailbox**)	
	D3	D2		
	D5	D4		
	S3	D6	Status byte S3	Process data*) / reserved**)
	S1	S2	Status byte S1	Status byte S2

*) Cyclic process image (Mailbox disabled)
**) Mailbox process image (Mailbox activated)

Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	reserved	C0	reserved	Control byte C0
	D1	D0	Process data*) / Mailbox**)	
	D3	D2		
	D5	D4		
	C3	D6	Control byte C3	Process data*) / reserved**)
	C1	C2	Control byte C1	Control byte C2

*) Cyclic process image (Mailbox disabled)
**) Mailbox process image (Mailbox activated)

The specialty modules represent 1x12 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.11 RTC Module

750-640

The RTC Module has a total of 6 bytes of user data in both the Input and Output Process Image (4 bytes of module data and 1 byte of control/status and 1 byte ID for command). The following table illustrates the Input and Output Process Image, which have 3 words mapped into each image. Word alignment is applied.

Table 206: RTC Module 750-640

Input and Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	ID	C/S	Command byte	Control/status byte
	D1	D0	Data bytes	
	D3	D2		

The specialty modules represent 1x6 bytes input data and seize 1 Instance in Class (0x67).and seize 1 Instance in Class (0x68).

12.2.5.12 DALI/DSI Master Module

750-641

The DALI/DSI Master module has a total of 6 bytes of user data in both the Input and Output Process Image (5 bytes of module data and 1 byte of control/status). The following tables illustrate the Input and Output Process Image, which have 3 words mapped into each image. Word alignment is applied.

Table 207: DALI/DSI Master module 750-641

Input Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	D0	S	DALI Response	Status byte
	D2	D1	Message 3	DALI Address
	D4	D3	Message 1	Message 2

The specialty modules represent 1x6 bytes input data and seize 1 Instance in Class (0x67).

Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	D0	C	DALI command, DSI dimming value	Control byte
	D2	D1	Parameter 2	DALI Address
	D4	D3	Command extension	Parameter 1

And the specialty modules represent 1x6 bytes output data and seize 1 Instance in Class (0x68).

12.2.5.13 DALI Multi-Master Module

753-647

The DALI Multi-Master module occupies a total of 24 bytes in the input and output range of the process image.

The DALI Multi-Master module can be operated in "Easy" mode (default) and "Full" mode. "Easy" mode is used to transmit simply binary signals for lighting control. Configuration or programming via DALI master module is unnecessary in "Easy" mode.

Changes to individual bits of the process image are converted directly into DALI commands for a pre-configured DALI network. 22 bytes of the 24-byte process image can be used directly for switching of electronic ballasts (ECG), groups or scenes in "Easy" mode. Switching commands are transmitted via DALI and group addresses, where each DALI and each group address is represented by a 2-bit pair.

In full mode, the 24 bytes of the process image are used to tunnel a protocol using a mailbox interface. The process image consists of 1 byte for control / status and 23 bytes for the acyclic data.

The structure of the process data is described in detail in the following tables.

Table 208: DALI Multi-Master Module 753-647 in the "Easy" Mode

Input Process Image			
Instance	**Byte Designation**		**Note**
	High Byte	**Low Byte**	
n	-	S	res. Status, activate broadcast Bit 0: 1-/2-button mode Bit 2: Broadcast status ON/OFF Bit 1,3-7: -
	DA4…DA7	DA0…DA3	Bit pair for DALI address DA0: Bit 1: Bit set = ON Bit not set = OFF Bit 2: Bit set = Error Bit not set = No error Bit pairs DA1 … DA63 similar to DA0.
	DA12…DA15	DA8…DA11	
	DA20…DA23	DA16…DA19	
	DA28…DA31	DA24…DA27	
	DA36…DA39	DA32…DA35	
	DA44…DA47	DA40…DA43	
	DA52…DA55	DA48…DA51	
	DA60…DA63	DA56…DA59	
	GA4…GA7	GA0…GA3	Bit pair for DALI group address GA0: Bit 1: Bit set = ON Bit not set = OFF Bit 2: Bit set = Error Bit not set = No error Bit pairs GA1 … GA15 similar to GA0.
	GA12…GA15	GA8…GA11	
	-	-	Not used

DA = DALI address
GA = Group address

The specialty modules represent 1x24 bytes input data and seize 1 Instance in Class (0x67).

Output Process Image			
Instance	**Byte Designation**		**Note**
	High Byte	**Low Byte**	

n	-	S	res.	Bit 0: Broadcast ON Bit 1: Broadcast OFF Bit 2: (1 button operation): - short: Broadcast ON/OFF - long: Broadcast dimming brighter/darker Bit 2: (2 buttons operation): - short: Broadcast ON/OFF - long: Broadcast dimming brighter Bit 3: (1 button operation): Broadcast ON/OFF Bit 3: (2 buttons operation): - short: Broadcast ON/OFF - long: Broadcast dimming darker Bit 4: Watchdog toggling (starting from FW06 of the DALI Multi-Master) Bit 5…7: reserved
	DA4…DA7	DA0…DA3		Bit pair for DALI address: Bit 1 (1 button operation): - short: DA switch ON/OFF - long: dimming brighter/darker Bit 1 (2 buttons operation): - short: DA switch ON - long: dimming brighter Bit 2 (1 button operation): DA switch ON/OFF Bit 2 (2 buttons operation): - short: DA switch OFF - long: dimming darker
	DA12…DA15	DA8…DA11		
	DA20…DA23	DA16…DA19		
	DA28…DA31	DA24…DA27		
	DA36…DA39	DA32…DA35		
	DA44…DA47	DA40…DA43		
	DA52…DA55	DA48…DA51		
	DA60…DA63	DA56…DA59		
	GA4…GA7	GA0…GA3		Bit pair for DALI group address: Bit 1 (1 button operation): - short: GA switch ON/OFF - long: dimming brighter/darker Bit 1 (2 buttons operation): - short: GA switch ON - long: dimming brighter Bit 2 (1 button operation): GA switch ON/OFF Bit 2 (2 buttons operation): - short: GA switch OFF - long: dimming darker
	GA12…GA15	GA8…GA11		
	Bit 8…15	Bit 0…7		Switch scene 0…15

DA = DALI address
GA = Group address

The specialty modules represent 1x24 bytes output data and seize 1 Instance in Class (0x68).

Table 209: DALI Multi-Master Module 753-647 in the "Full" Mode

Input and Output Process Image				
Instance	Byte Designation		Note	
	High Byte	Low Byte		
n	MBX_C/S	C0/S0	Mailbox control/status byte	control/status byte
	MBX1	MBX0	Mailbox	
	MBX3	MBX2		
	MBX5	MBX4		
	MBX7	MBX6		
	MBX9	MBX8		
	MBX11	MBX10		
	MBX13	MBX12		
	MBX15	MBX14		
	MBX17	MBX16		
	MBX19	MBX18		
	MBX21	MBX20		

The specialty modules in “Full” mode represent 1x24 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.14 LON® FTT Module

753-648

The process image of the LON® FTT module consists of a control/status byte and 23 bytes of bidirectional communication data that is processed by the WAGO-I/O-*PRO* function block "LON_01.lib". This function block is essential for the function of the LON® FTT module and provides a user interface on the control side.

Table 210: LON® FTT Module 753-648

Input and Output Process Image				
Instance	Byte Designation		Note	
	High Byte	Low Byte		
n	MBX_C/S	C0/S0	Mailbox control/status byte	control/status byte
	MBX1	MBX0	Mailbox	
	MBX3	MBX2		
	MBX5	MBX4		
	MBX7	MBX6		
	MBX9	MBX8		
	MBX11	MBX10		
	MBX13	MBX12		
	MBX15	MBX14		
	MBX17	MBX16		
	MBX19	MBX18		
	MBX21	MBX20		

The specialty modules mode represent 1x24 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.15 EnOcean Radio Receiver

750-642

The EnOcean radio receiver has a total of 4 bytes of user data in both the Input and Output Process Image (3 bytes of module data and 1 byte of control/status). The following tables illustrate the Input and Output Process Image, which have 2 words mapped into each image. Word alignment is applied.

Table 211: EnOcean Radio Receiver 750-642

Input Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	D0	S	Data byte	Status byte
n+1	D2	D1	Data bytes	

Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	-	C	not used	Control byte
n+1	-	-	not used	

The specialty modules represent 2x2 bytes input and output data and seize 2 Instances in Class (0x67) and 2 Instances in Class (0x68).

12.2.5.16 MP Bus Master Module

750-643

The MP Bus Master Module has a total of 8 bytes of user data in both the Input and Output Process Image (6 bytes of module data and 2 bytes of control/status). The following table illustrates the Input and Output Process Image, which have 4 words mapped into each image. Word alignment is applied.

Table 212: MP Bus Master Module 750-643

Input and Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	C1/S1	C0/S0	extended Control/ Status byte	Control/status byte
	D1	D0	Data bytes	
	D3	D2		
	D5	D4		

The specialty modules represent 1x8 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.17 *Bluetooth®* RF-Transceiver

750-644

The size of the process image for the *Bluetooth®* module can be adjusted to 12, 24 or 48 bytes.
It consists of a control byte (input) or status byte (output); an empty byte; an overlayable mailbox with a size of 6, 12 or 18 bytes (mode 2); and the *Bluetooth®* process data with a size of 4 to 46 bytes.
Thus, each *Bluetooth®* module uses between 12 and 48 bytes in the process image. The sizes of the input and output process images are always the same.

The first byte contains the control/status byte; the second contains an empty byte.

Process data attach to this directly when the mailbox is hidden. When the mailbox is visible, the first 6, 12 or 18 bytes of process data are overlaid by the mailbox data, depending on their size. Bytes in the area behind the optionally visible mailbox contain basic process data. The internal structure of the *Bluetooth®* process data can be found in the documentation for the *Bluetooth®* 750-644 RF Transceiver.

The mailbox and the process image sizes are set with the startup tool WAGO-I/O-*CHECK*.

Table 213: Bluetooth® RF-Transceiver 750-644

<table>
<tr><th colspan="5">Input and Output Process Image</th></tr>
<tr><th rowspan="2">Instance</th><th colspan="2">Byte Destination</th><th rowspan="2" colspan="2">Description</th></tr>
<tr><th>High Byte</th><th>Low Byte</th></tr>
<tr><td rowspan="6">n</td><td>-</td><td>C0/S0</td><td>not used</td><td>Control/status byte</td></tr>
<tr><td>D1</td><td>D0</td><td rowspan="5" colspan="2">Mailbox (0, 3, 6 or 9 words) and Process data (2-23 words)</td></tr>
<tr><td>D3</td><td>D2</td></tr>
<tr><td>D5</td><td>D4</td></tr>
<tr><td>...</td><td>...</td></tr>
<tr><td>D45</td><td>D44</td></tr>
</table>

The 750-644 constitutes a special module, whose process data (12, 24 or 48 bytes) occupy on instances in classes 0x67 and 0x68.

12.2.5.18 Vibration Velocity/Bearing Condition Monitoring VIB I/O

750-645

The Vibration Velocity/Bearing Condition Monitoring VIB I/O has a total of 12 bytes of user data in both the Input and Output Process Image (8 bytes of module data and 4 bytes of control/status). The following table illustrates the Input and Output Process Image, which have 8 words mapped into each image. Word alignment is applied.

Table 214: Vibration Velocity/Bearing Condition Monitoring VIB I/O 750-645

Input and Output Process Image				
Instance	Byte Destination		Description	
	High Byte	Low Byte		
n	-	C0/S0	not used	Control/status byte (log. Channel 1, Sensor input 1)
	D1	D0	Data bytes (log. Channel 1, Sensor input 1)	
n+1	-	C1/S1	not used	Control/status byte (log. Channel 2, Sensor input 2)
	D3	D2	Data bytes (log. Channel 2, Sensor input 2)	
n+2	-	C2/S2	not used	Control/status byte (log. Channel 3, Sensor input 1)
	D5	D4	Data bytes (log. Channel 3, Sensor input 3)	
n+3	-	C3/S3	not used	Control/status byte (log. Channel 4, Sensor input 2)
	D7	D6	Data bytes (log. Channel 4, Sensor input 2)	

The specialty modules represent 4x3 bytes input and output data and seize 4 Instances in Class (0x67) and 4 Instances in Class (0x68).

12.2.5.19 Proportional Valve Module

750-632, -632/000-100

The size of the process image of the proportional valve modules depends on the set operating mode. The operating mode with one valve occupies has a total of 6 data bytes in both the Input and Output Process Image, and the operating mode with two valves occupies has a total of 12 data bytes in both the Input and Output Process Image. The following tables illustrate the Input and Output Process Images, which have 3 words mapped into each image for operating mode with one valve and 6 words for operating mode with two valves. Word alignment is applied.

Table 215: Proportional valve module operating mode with one valve 750-632, 753-632/000-100

<table>
<tr><th colspan="5">Input Process Image</th></tr>
<tr><th rowspan="2">Instance</th><th colspan="2">Byte Designation</th><th colspan="2" rowspan="2">Description</th></tr>
<tr><th>High Byte</th><th>Low Byte</th></tr>
<tr><td>n</td><td>MBX_ST</td><td>S0</td><td>Mailbox Status byte</td><td>Status byte S0</td></tr>
<tr><td>n+1</td><td>V1</td><td>MBX_DATA</td><td>Status byte V1</td><td>Mailbox</td></tr>
<tr><td>n+2</td><td>V1_ACTUAL_H</td><td>V1_ACTUAL_L</td><td colspan="2">Process data</td></tr>
</table>

The specialty modules represent 3x2 bytes input data and seize 3 Instances in Class (0x67).

<table>
<tr><th colspan="5">Output Process Image</th></tr>
<tr><th rowspan="2">Instance</th><th colspan="2">Byte Designation</th><th colspan="2" rowspan="2">Description</th></tr>
<tr><th>High Byte</th><th>Low Byte</th></tr>
<tr><td>n</td><td>MBX_CTRL</td><td>C0</td><td>Mailbox control byte</td><td>Control byte C0</td></tr>
<tr><td>n+1</td><td>V1</td><td>MBX_DATA</td><td>Control byte V1</td><td>Mailbox</td></tr>
<tr><td>n+2</td><td>V1_
SETPOINTVALUE_H</td><td>V1_SETPOINTVALUE_L</td><td colspan="2">Process data</td></tr>
</table>

The specialty modules represent 3x2 bytes output data and seize 3 Instances in Class (0x68).

Table 216: Proportional valve module operating mode with two valves 750-632, 753-632/000-100

<table>
<tr><th colspan="5">Input Process Image</th></tr>
<tr><th rowspan="2">Instance</th><th colspan="2">Byte Designation</th><th colspan="2" rowspan="2">Description</th></tr>
<tr><th>High Byte</th><th>Low Byte</th></tr>
<tr><td rowspan="3">n</td><td>MBX_ST</td><td>S0</td><td>Mailbox Status byte</td><td>Status byte S0</td></tr>
<tr><td>MBX_DATA2</td><td>MBX_DATA1</td><td colspan="2" rowspan="2">Mailbox</td></tr>
<tr><td>MBX_DATA4</td><td>MBX_DATA3</td></tr>
<tr><td rowspan="3">n+1</td><td>V2</td><td>V1</td><td>Status byte V2</td><td>Status byte V1</td></tr>
<tr><td>V1_ACTUAL_H</td><td>V1_ACTUAL_L</td><td colspan="2" rowspan="2">Process data</td></tr>
<tr><td>V2_ACTUAL_H</td><td>V2_ACTUAL_L</td></tr>
</table>

The specialty modules represent 2x6 bytes input data and seize 2 Instances in Class (0x67).

Output Process Image				
Instance	Byte Designation		Description	
	High Byte	Low Byte		
n	MBX_CTRL	C0	Mailbox control byte	Control byte C0
	MBX_DATA2	MBX_DATA1	Mailbox	
	MBX_DATA4	MBX_DATA3		
n+1	V2	V1	Control byte V2	Control byte V1
	V1_ SETPOINTVALUE_H	V1_SETPOINTVALUE_L	Process data	
	V2_ SETPOINTVALUE_H	V2_SETPOINTVALUE_L		

The specialty modules represent 2x6 bytes output data and seize 2 Instances in Class (0x68).

12.2.5.20 M-Bus Master Module

753-649

The M-Bus master 753-649 has a cyclic 24 byte process image for the local bus in both the Input and Output Process Image.
In addition to the control/status byte and the empty byte, an acyclic channel that occupies 22 bytes of data is embedded in the process image for the process communication.
For data access, the WAGO-IEC function blocks are available of the library „MBUS_649_01.lib“.
The input and output data exchange is event-driven.

Table 217: M-BUS Master Module 753-649

Input and Output Process Image				
Instance	Byte Designation		Description	
	High Byte	Low Byte		
n	-	C0/S0	Not used	Control/Status byte
	MBX0	MBX_C/S	Mailbox	Mailbox Control/Status byte
	MBX2	MBX1	Mailbox	
	MBX4	MBX3		
	MBX6	MBX5		
	MBX8	MBX7		
	MBX10	MBX9		
	MBX12	MBX11		
	MBX14	MBX13		
	MBX16	MBX15		
	MBX18	MBX17		
	MBX20	MBX19		

The specialty modules represent 1x24 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.21 IO-Link Master

750-657

The process image size of the IO-Link master can be adjusted to the devices (switches, IO-Link compatible devices, etc.) attached to the IO-Link ports. Process image sizes of 4, 6, 8, 10, 12, 16, 20 or 24 bytes can be set.
As process data is exchanged, the process image has a fixed structure of a control/status byte, Mailbox bytes and SIO byte regardless of the current configuration.
The mailbox starts in the process image with an offset of 1 (after the control / status byte) and occupies at least 2 bytes (FC0, MB0). The mailbox size can be set to a maximum of x bytes (x = total PA size - 1 SIO byte - 1 control / status byte) to configure the IO-Link master.
Depending on the set mailbox size, another data storage area is available behind the SIO byte in which cyclical process data can be transferred from IO-Link devices.
The mailbox and the process image sizes are set with the startup tool WAGO-I/O-*CHECK*.

Table 218: IO-Link Master 750-657

Input and Output Process Image					
Process image size	**Instance**	**Byte Designation**		**Descrition**	
		High Byte	**Low Byte**		
4 bytes	n	FC0	C0/S0	Acyclic channel	Control/ Status byte
		SIO	MB0	SIO byte	Mailbox byte
6 bytes		D1	D0	Mailbox (0 … 20 bytes)/ Process data (0 … 20 bytes)	
8 bytes		D3	D2		
10 bytes		D5	D4		
12 bytes		D7	D6		
16 bytes		D9	D8		
		D11	D10		
20 bytes		D13	D12		
		D15	D14		
24 bytes*		D17	D16		
		D19	D18		

*) Factory Setting

The specialty modules represent 1x24 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.22 CAN Gateway

750-658

The process image size of the CAN Gateway can be set in the specified sizes of 8, 12, 16, 20, 24, 32, 40 or 48 bytes.
The CAN Gateway has an acyclic communication channel (Mailbox) in the process image.
This is used to transmit configuration, parameterization and diagnostic data. The length of the first acyclic channel can be set between 2 and a maximum of x bytes (x = total PA size - 3). This is followed by the CAN user data area, where CAN telegrams are transmitted via the "Mailbox 2.0" communication mechanism in the operating modes "Sniffer Mode" and "Transparent Mode". In the operating mode "Mapped Mode", in this area transmitted and received CAN telegrams can be mapped to the process image without using any protocoll.

The operating mode and also the mailbox and the process image sizes are set with the startup tool WAGO-I/O-*CHECK*.

Table 219: CAN Gateway 750-658

Input and Output Process Image					
Process image size	**Instance**	**Byte Designation**		**Descrition**	
		High Byte	**Low Byte**		
8 bytes		C/D_MBX	C0/S0	Config/Diag Mailbox	Control/ Status byte
		C/D_MBX / CAN_X	C/D_MBX	Config/Diag Mailbox (1 … 44 bytes)/ CAN user data Mailbox (5 … 45 bytes) **) bzw. Toggle-Byte +CAN-Nutzdaten (4-44 Byte) ***)	
		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
12 bytes		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
16 bytes		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
20 bytes		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
24 bytes *		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
32 bytes		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
40 bytes		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
48 bytes		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
		C/D_MBX / CAN_X	C/D_MBX / CAN_X		
		CAN_X	CAN_X		

*) Factory Setting
**) Operating mode „Sniffer Mode“ and operating mode „Transparent Mode“
***) Operating mode „Mapped Mode“

The specialty modules represent 1x48 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.23 Servo Stepper Controller

750-673

The stepper servo provides the fieldbus coupler / controller with a 12-byte input and output process image via 1 logical channel.
The data to be sent and received is stored in up to 7 output bytes (D0 ... D6) and 7 input bytes (D0 ... D6) depending on the operating mode. The output byte D0 and the input byte D0 are reserved and without function.
A local bus control and status byte (C0, S0) as well as 3 control and status bytes for the application (C1 ... C3, S1 ... S3) are used to control the data flow.
The changeover between both process images takes place via bit 5 in control byte C0 (C0.5). Bit 5 of the status byte S0 (S0.5) acknowledges the activation of the mailbox.

Table 220: Servo Stepper Controller 750-673

<table>
<tr><th colspan="5">Input and Output Process Image</th></tr>
<tr><th rowspan="2">Instance</th><th colspan="2">Byte Designation</th><th colspan="2" rowspan="2">Description</th></tr>
<tr><th>High Byte</th><th>Low Byte</th></tr>
<tr><td rowspan="6">n</td><td>reserved</td><td>C0/S0</td><td>reserved</td><td>Control/status byte C0/S0</td></tr>
<tr><td>D1</td><td>D0</td><td colspan="2" rowspan="3">Process data*) / Mailbox**)</td></tr>
<tr><td>D3</td><td>D2</td></tr>
<tr><td>D5</td><td>D4</td></tr>
<tr><td>C3/S3</td><td>D6</td><td>Control/status byte C3/S3</td><td>Process data*) / reserved**)</td></tr>
<tr><td>C1/S1</td><td>C2/S2</td><td>Control/status byte C1/S1</td><td>Control/status byte C2/S2</td></tr>
</table>

*) Cyclic process image (Mailbox deactivated)
**) Mailbox process image (Mailbox activated)

The specialty modules represent 1x12 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.24 SMI Master Module

753-1630, -1631

The 753-1630 I/O module has a cyclic 12 byte process image for the local bus in both the Input and Output Process Image.
Process data communication with the SMI master module is conducted in fieldbus coupler mode via a cyclic process image and in Full mode via the Mailbox 2.0 protocol.
Byte 0 of the process image contains the control/status byte and byte 1 the extended control/status byte. Depending on the control/status byte, bytes 2 to 11 contain data from Mailbox 2.0 or the cyclic process image.
The changeover between Mailbox 2.0 and the cyclic process image takes place via bit 5 in control byte C0 (C0.5). Bit 5 of the status byte S0 (S0.5) acknowledges the activation of the mailbox.

Tabelle 221:SMI Master Module 753-1630, -1631 in Fieldbus Coupler Mode

Input Process Image				
Instance	**Byte Designation**		**Description**	
	High Byte	**Low Byte**		
n	S1	S0	Extended status byte	Status byte
	-	-	Not used	
	-	-		
	D5	D4	Reflection of the group mask bit 0…15	
	D7	D6	Response to the command	
	D9	D8	Shutter actual position	Slat actual position

The specialty modules represent 1x12 bytes input data and seize 1 Instance in Class (0x67).

Output Process Image				
Instance	**Byte Designation**		**Description**	
	High Byte	**Low Byte**		
n	C1	C0	Extended control byte	Control byte
	D1	D0	2-button operation upwards Bit 0: Address 8 … … Bit 7: Address 15	2-button operation upwards Bit 0: Address 0 … … Bit 7: Address 7
	D3	D2	2-button operation downwards Bit 0: Address 8 … … Bit 7: Address 15	2-button operation downwards Bit 0: Address 0 … … Bit 7: Address 7
	D5	D4	Group mask bit 0...15	
	D7	D6	Commands	
	D9	D8	Shutter target position	Slat target position

The specialty modules represent 1x24 bytes output data and seize 1 Instance in Class (0x68).

Table 222: SMI Master Module 753-1630, -1631 in „Full Mode“

Input and Output Process Image			
Instance	**Byte Designation**		**Description**
	High Byte	**Low Byte**	

	S1/C1	S0/C0	Extended Control/Status byte	Control/Status byte
n	MBX0	MBX_C/S	Mailbox	Mailbox Control/Status byte
	MBX2	MBX1	Mailbox	
	MBX4	MBX3		
	MBX6	MBX5		
	MBX8	MBX7		
	MBX10	MBX9		
	MBX12	MBX11		
	MBX14	MBX13		
	MBX16	MBX15		
	MBX18	MBX17		
	MBX20	MBX19		

The specialty modules represent 1x24 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.5.25 AS-interface Master Module

750-655,
753-655

The length of the process image of the AS-interface master module can be set to fixed sizes of 12, 20, 24, 32, 40 or 48 bytes.
It consists of a control or status byte, a mailbox with a size of 0, 6, 10, 12 or 18 bytes and the AS-interface process data, which can range from 0 to 46 bytes.

The AS-interface master module has a total of 6 to maximally 24 words data in both the Input and Output Process Image. Word alignment is applied.

The first Input and output word, which is assigned to an AS-interface master module, contains the status / control byte and one empty byte.
Subsequently the mailbox data are mapped, when the mailbox is permanently superimposed (Mode 1).

In the operating mode with suppressible mailbox (Mode 2), the mailbox and the cyclical process data are mapped next.
The following words contain the remaining process dat.

The mailbox and the process image sizes are set with the startup tool WAGO-I/O-*CHECK*.

Table 223: AS-interface Master Module 750-655, 753-655

Input and Output Process Image					
Process image size	Instance	Byte Designation		Description	
		High Byte	Low Byte		
12 bytes	n	-	C0/S0	Not used	Control-/ Status byte
		D1	D0	Mailbox (0, 6, 10, 12 or 18 bytes)/ Process data (0-46 bytes)	
		D9	D8		
20 bytes		D11	D10		
		D17	D16		
24 bytes *		D19	D18		
		D21	D20		
32 bytes		D23	D22		
		D29	D28		
40 bytes		D31	D30		
		D37	D36		
48 bytes		D39	D38		
		D45	D44		

*) Factory Setting

The specialty modules represent 1x 12 … 48 bytes input and output data and seize 1 Instance in Class (0x67) and 1 Instance in Class (0x68).

12.2.6 System Modules

12.2.6.1 System Modules with Diagnostics

750-606

The modules provide 2 bits of diagnostics in the Input Process Image for monitoring of the internal power supply.

Table 224: System Modules with Diagnostics 750-606

Input Process Image							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
						Diagnostics bit S_out	Diagnostics bit S_in

The system modules seize 2 Instances in Class (0x65).

750-610, -611

The modules provide 2 bits of diagnostics in the Input Process Image for monitoring of the internal power supply.

Table 225: System Modules with Diagnostics 750-610, -611

Input Process Image							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
						Diagnostic bit S 2 Fuse	Diagnostic bit S 1 Fuse

The system modules seize 2 Instances in Class (0x65).

12.2.6.2 Filter Module

750-624/020-002, -626/020-002

The Filter Module 750-624/020-002 and 750-626/020-002 equipped with surge suppression for the field side power supply have a total of 8 bits in both the Input and Output Process Image.

Table 226: Filter Modules 750-624/020-002, 750-626/020-002

Input Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0V_MA	0V_PA	24V_MA	24V_PA	not used	PWR_DIAG	not used	VAL

The Filter Modules seize 8 Instances in class (0x65).

Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
not used	not used	not used	not used	not used	not used	not used	GFT

The Filter Modules seize 8 Instances in class (0x66).

12.2.6.3 Binary Space Module

750-622

The Binary Space Modules behave alternatively like 2 channel digital input modules or output modules and seize depending upon the selected settings 1, 2, 3 or 4 bits per channel. According to this, 2, 4, 6 or 8 bits are occupied then either in the process input or the process output image.

Table 227: Binary Space Module 750-622 (with behavior like 2 channel digital input)

Input and Output Process Image							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
(Data bit DI 8)	(Data bit DI 7)	(Data bit DI 6)	(Data bit DI 5)	(Data bit DI 4)	(Data bit DI 3)	Data bit DI 2	Data bit DI 1

The Binary Space Modules seize 2, 4, 6 or 8 Instances in class (0x65) or in Class (0x66).

13 Use in Hazardous Environments

The **WAGO I/O SYSTEM 750** (electrical equipment) is designed for use in Zone 2 hazardous areas and shall be used in accordance with the marking and installation regulations.

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 I/O module has the required approval or is subject to the range of application of the ATEX directive.

13.1 Marking Configuration Examples

13.1.1 Marking for Europe According to ATEX and IECEx

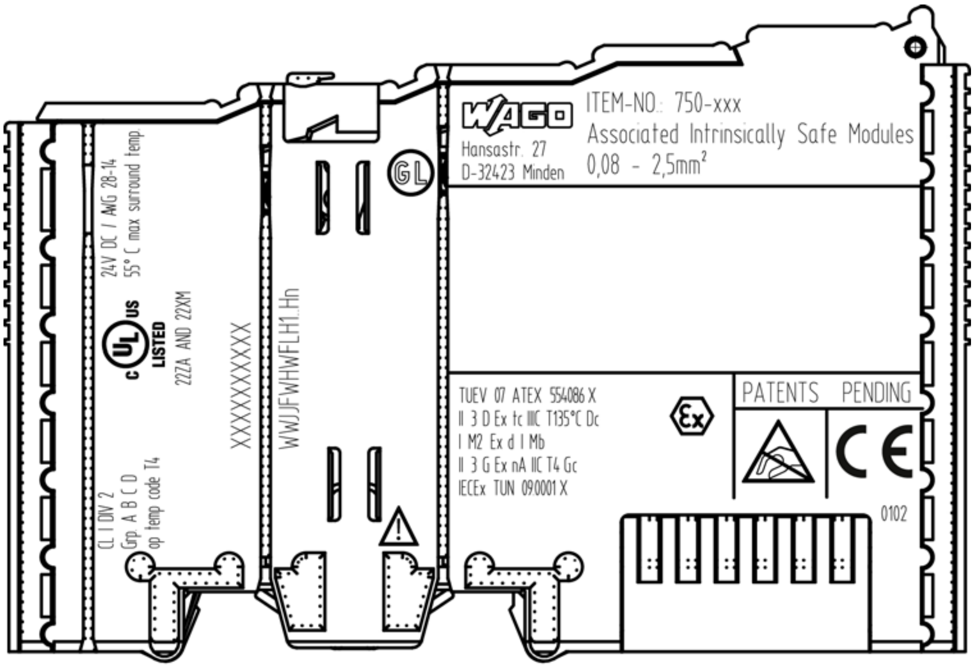


Figure 43: Marking Example According to ATEX and IECEx

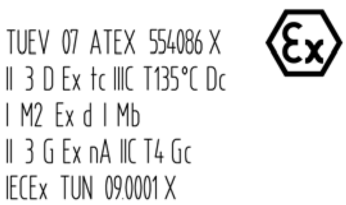


Figure 44: Text Detail – Marking Example According to ATEX and IECEx

Table 228: Description of Marking Example According to ATEX and IECEx

Marking	Description
TUEV 07 ATEX 554086 X IECEx TUN 09.0001 X	Approving authority resp. certificate numbers
Dust	
II	Equipment group: All except mining
3 D	Category 3 (Zone 22)
Ex	Explosion protection mark
tc	Type of protection: Protection by enclosure
IIIC	Explosion group of dust
T135°C	Max. surface temperature of the enclosure (without a dust layer)
Dc	Equipment protection level (EPL)
Mining	
I	Equipment group: Mining
M2	Category: High level of protection
Ex	Explosion protection mark
d	Type of protection: Flameproof enclosure
I	Explosion group for electrical equipment for mines susceptible to firedamp
Mb	Equipment protection level (EPL)
Gases	
II	Equipment group: All except mining
3 G	Category 3 (Zone 2)
Ex	Explosion protection mark
nA	Type of protection: Non-sparking equipment
IIC	Explosion group of gas and vapours
T4	Temperature class: Max. surface temperature 135 °C
Gc	Equipment protection level (EPL)

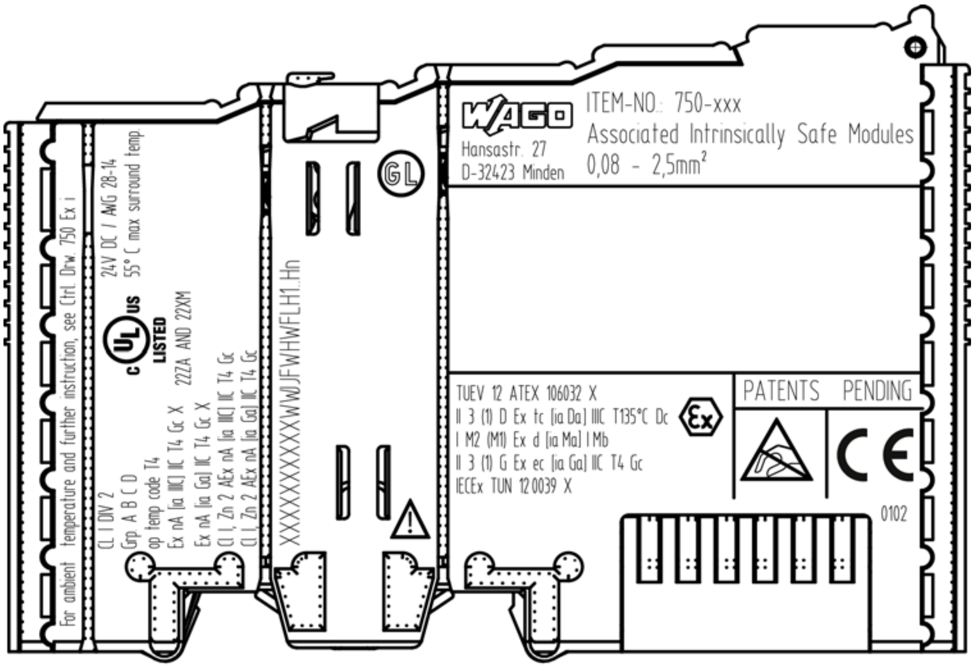


Figure 45: Marking Example for Approved Ex i I/O Module According to ATEX and IECEx

TUEV 12 ATEX 106032 X
II 3 (1) D Ex tc [ia Da] IIIC T135°C Dc
I M2 (M1) Ex d [ia Ma] I Mb
II 3 (1) G Ex ec [ia Ga] IIC T4 Gc
IECEx TUN 12.0039 X

Figure 46: Text Detail – Marking Example for Approved Ex i I/O Module According to ATEX and IECEx

Table 229: Description of Marking Example for Approved Ex i I/O Module According to ATEX and IECEx

Marking	Description
TUEV 12 ATEX 106032 X IECEx TUN 12 0039 X	Approving authority resp. certificate numbers
Dust	
II	Equipment group: All except mining
3 (1) D	Category 3 (Zone 22) equipment containing a safety device for a category 1 (Zone 20) equipment
Ex	Explosion protection mark
tc	Type of protection: Protection by enclosure
[ia Da]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 20
IIIC	Explosion group of dust
T135°C	Max. surface temperature of the enclosure (without a dust layer)
Dc	Equipment protection level (EPL)
Mining	
I	Equipment Group: Mining
M2 (M1)	Category: High level of protection with electrical circuits which present a very high level of protection
Ex	Explosion protection mark
d	Type of protection: Flameproof enclosure
[ia Ma]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety electrical circuits
I	Explosion group for electrical equipment for mines susceptible to firedamp
Mb	Equipment protection level (EPL)
Gases	
II	Equipment group: All except mining
3 (1) G	Category 3 (Zone 2) equipment containing a safety device for a category 1 (Zone 0) equipment
Ex	Explosion protection mark
ec	Equipment protection by increased safety “e”
[ia Ga]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 0
IIC	Explosion group of gas and vapours
T4	Temperature class: Max. surface temperature 135 °C
Gc	Equipment protection level (EPL)

13.1.2 Marking for the United States of America (NEC) and Canada (CEC)

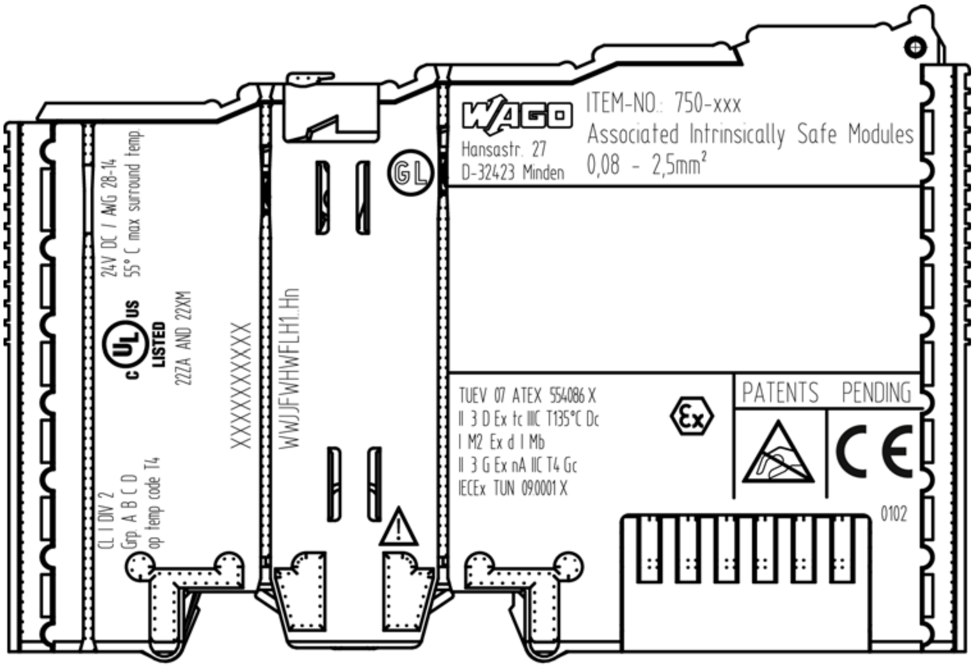


Figure 47: Marking Example According to NEC

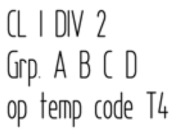


Figure 48: Text Detail – Marking Example According to NEC 500

Table 230: Description of Marking Example According to NEC 500

Marking	Description
CL I	Explosion protection (gas group)
DIV 2	Area of application
Grp. A B C D	Explosion group (gas group)
op temp code T4	Temperature class

Cl I, Zn 2 AEx nA [ia Ga] IIC T4 Gc

Figure 49: Text Detail – Marking Example for Approved Ex i I/O Module According to NEC 505

Table 231: Description of Marking Example for Approved Ex i I/O Module According to NEC 505

Marking	Description
Cl I,	Explosion protection group
Zn 2	Area of application
AEx	Explosion protection mark
nA	Type of protection
[ia Ga]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 20
IIC	Group
T4	Temperature class
Gc	Equipment protection level (EPL)

Cl I, Zn 2 AEx nA [ia IIIC] IIC T4 Gc

Figure 50: Text Detail – Marking Example for Approved Ex i I/O Module According to NEC 506

Table 232: Description of Marking Example for Approved Ex i I/O Modules According to NEC 506

Marking	Description
Cl I,	Explosion protection group
Zn 2	Area of application
AEx	Explosion protection mark
nA	Type of protection
[ia IIIC]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 20
IIC	Group
T4	Temperature class
Gc	Equipment protection level (EPL)

Ex nA [ia IIIC] IIC T4 Gc X
Ex nA [ia Ga] IIC T4 Gc X

Figure 51: Text Detail – Marking Example for Approved Ex i I/O Modules According to CEC 18 attachment J

Table 233: Description of Marking Example for Approved Ex i I/O Modules According to CEC 18 attachment J

Marking	Description
Dust	
Ex	Explosion protection mark
nA	Type of protection
[ia IIIC]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 20
IIC	Group
T4	Temperature class
Gc	Equipment protection level (EPL)
X	Symbol used to denote specific conditions of use
Gases	
Ex	Explosion protection mark
nA	Type of protection
[ia Ga]	Type of protection and equipment protection level (EPL): Associated apparatus with intrinsic safety circuits for use in Zone 0
IIC	Group
T4	Temperature class
Gc	Equipment protection level (EPL)
X	Symbol used to denote specific conditions of use

13.2 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.

13.2.1 Special Notes including Explosion Protection

The following warning notices are to be posted in the immediately proximity of the WAGO I/O SYSTEM 750 (hereinafter “product”):

WARNING – DO NOT REMOVE OR REPLACE FUSED WHILE ENERGIZED!

WARNING – DO NOT DISCONNECT WHILE ENERGIZED!

WARNING – ONLY DISCONNECT IN A NON-HAZARDOUS AREA!

Before using the components, check whether the intended application is permitted in accordance with the respective printing. Pay attention to any changes to the printing when replacing components.

The product is an open system. As such, the product must only be installed in appropriate enclosures or electrical operation rooms to which the following applies:

- Can only be opened using a tool or key
- Inside pollution degree 1 or 2
- In operation, internal air temperature within the range of 0 °C ≤ Ta ≤ +55 °C or −20 °C ≤ Ta ≤ +60 °C for components with extension number …/025-xxx or −40 °C ≤ Ta ≤ +70 °C for components with extension number …/040-xxx
- Minimum degree of protection: min. IP54 (acc. to EN/IEC 60529)
- For use in Zone 2 (Gc), compliance with the applicable requirements of the standards EN/IEC/ABNT NBR IEC 60079-0, -7, -11, -15
- For use in Zone 22 (Dc), compliance with the applicable requirements of the standards EN/IEC/ABNT NBR IEC 60079-0, -7, -11, -15 and -31
- For use in mining (Mb), minimum degree of protection IP64 (acc. EN/IEC 60529) and adequate protection acc. EN/IEC/ABNT NBR IEC 60079-0 and -1
- Depending on zoning and device category, correct installation and compliance with requirements must be assessed and certified by a “Notified Body” (ExNB) if necessary!

Explosive atmosphere occurring simultaneously with assembly, installation or repair work must be ruled out. Among other things, these include the following activities

- Insertion and removal of components
- Connecting or disconnecting from fieldbus, antenna, D-Sub, ETHERNET or USB connections, DVI ports, memory cards, configuration and programming interfaces in general and service interface in particular:
  - Operating DIP switches, coding switches or potentiometers
  - Replacing fuses

Wiring (connecting or disconnecting) of non-intrinsically safe circuits is only permitted in the following cases

- The circuit is disconnected from the power supply.
- The area is known to be non-hazardous.

Outside the device, suitable measures must be taken so that the rated voltage is not exceeded by more than 40 % due to transient faults (e.g., when powering the field supply).

Product components intended for intrinsically safe applications may only be powered by 750-606 or 750-625/000-001 bus supply modules.

Only field devices whose power supply corresponds to overvoltage category I or II may be connected to these components.

13.2.2 Special Notes Regarding ANSI/ISA Ex

For ANSI/ISA Ex acc. to UL File E198726, the following additional requirements apply:

- Use in Class I, Division 2, Group A, B, C, D or non-hazardous areas only
- ETHERNET connections are used exclusively for connecting to computer networks (LANs) and may not be connected to telephone networks or telecommunication cables
- **WARNING** – The radio receiver module 750-642 may only be used to connect to external antenna 758-910!
- **WARNING** – Product components with fuses must not be fitted into circuits subject to overloads!
  These include, e.g., motor circuits.
- **WARNING** – When installing I/O module 750-538, "Control Drawing No. 750538" in the manual must be strictly observed!

Information

Additional Information
Proof of certification is available on request.
Also take note of the information given on the operating and assembly instructions.
The manual, containing these special conditions for safe use, must be readily available to the user.

14 Appendix

14.1 MIB II Groups

14.1.1 System Group

The system group contains general information about the coupler/controller.

Table 234: MIB II – System Group

Identifier	Entry	Access	Description
1.3.6.1.2.1.1.1	sysDescr	R	This entry contains the device identification. The object has a fixed code (e.g., "WAGO 750-841")
1.3.6.1.2.1.1.2	sysObjectID	R	This entry contains the manufacturer's authorization identification.
1.3.6.1.2.1.1.3	sysUpTime	R	This entry contains the time (in hundredths of a second) since the management unit has been last reset.
1.3.6.1.2.1.1.4	sysContakt	R/W	This entry contains the identification and contact information for the system contact person.
1.3.6.1.2.1.1.5	sysName	R/W	This entry contains the administration-assigned device name.
1.3.6.1.2.1.1.6	sysLocation	R/W	This entry contains the node’s physical location.
1.3.6.1.2.1.1.7	sysServices	R	This entry designates the quantity of services that this coupler/controller contains.

14.1.2 Interface Group

The interface group contains information and statistics about the device interface.

A device interface describes the Ethernet interface of a coupler/controller and provides status information on the physical Ethernet ports as well as on the internal loopback interface.

Table 235: MIB II – Interface Group

Identifier	Entry	Access	Description
1.3.6.1.2.1.2.1	ifNumber	R	Number of network interfaces in this system
1.3.6.1.2.1.2.2	ifTable	-	List of network interfaces
1.3.6.1.2.1.2.2.1	ifEntry	-	Network interface entry
1.3.6.1.2.1.2.2.1.1	ifIndex	R	This entry contains a unique value for each interface
1.3.6.1.2.1.2.2.1.2	ifDescr	R	This entry contains the name of the manufacturer, the product name, and the version of the hardware interface: e.g., "WAGO Kontakttechnik GmbH 750-841: Rev 1.0"
1.3.6.1.2.1.2.2.1.3	ifType	R	This entry describes the type of interface. ETHERNET CSMA/CD = 6 Software Loopback = 24
1.3.6.1.2.1.2.2.1.4	ifMtu	R	This entry specifies the largest transfer unit; i.e., the maximum telegram length that can be transferred via this interface.
1.3.6.1.2.1.2.2.1.5	ifSpeed	R	This entry indicates the interface speed in bits per second.
1.3.6.1.2.1.2.2.1.6	ifPhysAddress	R	This entry indicates the physical address of the interface. For example, for Ethernet, this entry contains a MAC ID.
1.3.6.1.2.1.2.2.1.7	ifAdmin-Status	R/W	This entry specifies the desired state of the interfaces. Possible values are: up(1): Ready for operation for transmission and reception down(2): Interface is switched off testing(3): Interface is in test mode
1.3.6.1.2.1.2.2.1.8.	ifOperStatus	R	This entry indicates the current operational state of the interface.
1.3.6.1.2.1.2.2.1.9.	ifLastChange	R	This entry indicates the value of the sysUpTime when the state was last changed.
1.3.6.1.2.1.2.2.1.10	ifInOctets	R	This entry gives the total number of bytes received via interface.
1.3.6.1.2.1.2.2.1.11	ifInUcastPkts	R	This entry indicates the number of received unicast packets delivered to a higher layer.
1.3.6.1.2.1.2.2.1.12	ifInNUcastPkts	R	This entry indicates the number of received broad and multicast packets delivered to a higher layer.
1.3.6.1.2.1.2.2.1.13	ifInDiscards	R	This entry indicates the number of packets that were discarded even though no errors had been detected.
1.3.6.1.2.1.2.2.1.14	ifInErrors	R	This entry indicates the number of received packets that contained errors preventing them from being deliverable to a higher layer.

Table 235: MIB II – Interface Group

Identifier	Entry	Access	Description
1.3.6.1.2.1.2.2.1.15	IfInUnknown-Protos	R	This entry indicates the number of received packets sent to an unknown or unsupported port number.
1.3.6.1.2.1.2.2.1.16	ifOutOctets	R	This entry gives the total number of bytes sent via interface.
1.3.6.1.2.1.2.2.1.17	ifOutUcastPkts	R	This entry contains the number of outgoing unicast packets delivered to a higher layer.
1.3.6.1.2.1.2.2.1.18	ifOutNUcastPkts	R	This entry indicates the number of outgoing broad and multicast packets delivered to a higher layer.
1.3.6.1.2.1.2.2.1.19	ifOutDiscards	R	This entry indicates the number of packets that were discarded even though no errors had been detected.
1.3.6.1.2.1.2.2.1.20	ifOutErrors	R	This entry indicates the number of packets that could not be transmitted because of errors.

14.1.3 IP Group

The IP group contains information about IP communication.

Table 236: MIB II – IP Group

Identifier	Entry	Access	Description
1.3.6.1.2.1.4.1	ipForwarding	R/W	1: Host is a router; 2: Host is not a router
1.3.6.1.2.1.4.2	ipDefaultTTL	R/W	Default value for the Time-To-Live field of each IP frame.
1.3.6.1.2.1.4.3	ipInReceives	R	Number of received IP frames, including those received in error.
1.3.6.1.2.1.4.4	ipInHdrErrors	R	Number of received IP frames with header errors.
.3.6.1.2.1.4.5	ipInAddrErrors	R	Number of received IP frames with a misdirected IP address.
1.3.6.1.2.1.4.6	ipForwDatagrams	R	Number of received IP frames passed on (routed)
1.3.6.1.2.1.4.7	ipUnknownProtos	R	Number of received IP frames with an unknown protocol type.
1.3.6.1.2.1.4.8	ipInDiscards	R	Number of received IP frames rejected although no disturbance was present.
1.3.6.1.2.1.4.9	ipInDelivers	R	Number of received IP frames passed on a higher protocol layer.
1.3.6.1.2.1.4.10	ipOutRequests	R	Number of sent IP frames
1.3.6.1.2.1.4.11	ipOutDiscards	R	Number of rejected IP Frames that should have been sent.
1.3.6.1.2.1.4.12	ipOutNoRoutes	R	Number of sent IP frames rejected because of incorrect routing information.
1.3.6.1.2.1.4.13	ipReasmTimeout	R	Minimum time duration until an IP frame is re-assembled.
1.3.6.1.2.1.4.14	ipReasmReqds	R	Minimum number of the IP fragments for building up and passing on.
1.3.6.1.2.1.4.15	ipReasmOKs	R	Number of IP frames re-assembled successfully.
1.3.6.1.2.1.4.16	ipReasmFails	R	Number of IP frames not re-assembled successfully.
1.3.6.1.2.1.4.17	ipFragOKs	R	Number of IP frames fragmented and passed on.
1.3.6.1.2.1.4.18	ipFragFails	R	Number of IP frames that should have been fragmented but could not be, because their don't fragment bit was set in the header.
1.3.6.1.2.1.4.19	ipFragCreates	R	Number of generated IP fragment frames
1.3.6.1.2.1.4.20	ipAddrTable	-	Table of all local IP addresses of the coupler/controller.
1.3.6.1.2.1.4.20.1	ipAddrEntry	-	Address information for an entry
1.3.6.1.2.1.4.20.1.1	ipAdEntAddr	R	The IP address corresponding to the entry's address information
1.3.6.1.2.1.4.20.1.2	ipAdEntIfIndex	R	Index of the interface
1.3.6.1.2.1.4.20.1.3	ipAdEntNetMask	R	The entry's associated subnet mask
1.3.6.1.2.1.4.20.1.4	ipAdEntBcastAddr	R	Value of the last significant bit in the IP broadcast address
1.3.6.1.2.1.4.20.1.5	IpAdEntReasm-MaxSize	R	The size of the longest IP telegram that can be defragmented (reassembled) again.
1.3.6.1.2.1.4.23	ipRoutingDiscards	R	Number of deleted routing entries

14.1.4 IpRoute Table Group

The IP route table contains information about the routing table in the coupler/controller.

Table 237: MIB II – IpRoute Table Group

Identifier	Entry	Access	Description
1.3.6.1.2.1.4.21	ipRouteTable	-	IP routing table
1.3.6.1.2.1.4.21.1	ipRouteEntry	-	A routing entry for a particular destination
1.3.6.1.2.1.4.21.1.1	ipRouteDest	R/W	This entry indicates the destination address of the routing entry
1.3.6.1.2.1.4.21.1.2	ipRouteIfIndex	R/W	This entry indicates the index of the interface, which is the next route destination
1.3.6.1.2.1.4.21.1.3	ipRouteMetric1	R/W	The primary route to the target system
1.3.6.1.2.1.4.21.1.4	ipRouteMetric2	R/W	An alternative route to the target system
1.3.6.1.2.1.4.21.1.5	ipRouteMetric3	R/W	An alternative route to the target system
1.3.6.1.2.1.4.21.1.6	ipRouteMetric4	R/W	An alternative route to the target system
.3.6.1.2.1.4.21.1.7	ipRouteNextHop	R/W	The IP address of the next route section
1.3.6.1.2.1.4.21.1.8	ipRouteType	R/W	The route type
1.3.6.1.2.1.4.21.1.9	ipRouteProto	R	Routing mechanism via which the route is developed
1.3.6.1.2.1.4.21.1.10	ipRouteAge	R/W	Number of seconds since then the route was last renewed/examined
1.3.6.1.2.1.4.21.1.11	ipRouteMask	R/W	This entry contents the subnet mask for this entry
1.3.6.1.2.1.4.21.1.12	ipRouteMetric5	R/W	An alternative route to the target system
1.3.6.1.2.1.4.21.1.13	ipRouteInfo	R/W	A reference to a special MIB

14.1.5 ICMP Group

Table 238: MIB II – ICMP Group

Identifier	Entry	Access	Description
1.3.6.1.2.1.5.1	icmpInMsgs	R	Number of received ICMP messages
1.3.6.1.2.1.5.2	icmpInErrors	R	Number of received ICMP errors containing ICMP-specific errors
1.3.6.1.2.1.5.3	icmpInDestUnreachs	R	Number of received ICMP destination unreachable messages
1.3.6.1.2.1.5.4	icmpInTimeExcds	R	Number of received ICMP time exceeded messages
1.3.6.1.2.1.5.5	icmpInParmProbs	R	Number of received ICMP parameter problem messages
1.3.6.1.2.1.5.6	icmpInSrcQuenchs	R	Number of received ICMP source quench messages
1.3.6.1.2.1.5.7	icmpInRedirects	R	Number of received ICMP redirect messages
1.3.6.1.2.1.5.8	icmpInEchos	R	Number of received ICMP echo request messages (Ping)
1.3.6.1.2.1.5.9	icmpInEchoReps	R	Number of received ICMP echo reply messages (Ping)
1.3.6.1.2.1.5.10	icmpInTimestamps	R	Number of received ICMP timestamp request messages
1.3.6.1.2.1.5.11	icmpInTimestampReps	R	Number of received ICMP timestamp reply messages
1.3.6.1.2.1.5.12	icmpInAddrMasks	R	Number of received ICMP address mask request messages
1.3.6.1.2.1.5.13	icmpInAddrMaskReps	R	Number of received ICMP address mask reply messages
1.3.6.1.2.1.5.14	icmpOutMsgs	R	Number of sent ICMP messages
1.3.6.1.2.1.5.15	icmpOutErrors	R	Number of sent ICMP messages that could not be sent due to errors
1.3.6.1.2.1.5.16	icmpOutDestUnreachs	R	Number of sent ICMP destination unreachable messages
1.3.6.1.2.1.5.17	icmpOutTimeExcds	R	Number of sent ICMP time exceeded messages
1.3.6.1.2.1.5.18	icmpOutParmProbs	R	Number of sent ICMP parameter problem messages
1.3.6.1.2.1.5.19	icmpOutSrcQuenchs	R	Number of sent ICMP source quench messages
1.3.6.1.2.1.5.20	icmpOutRedirects	R	Number of sent ICMP redirection messages
1.3.6.1.2.1.5.21	icmpOutEchos	R	Number of sent ICMP echo request messages
1.3.6.1.2.1.5.22	icmpOutEchoReps	R	Number of sent ICMP echo reply messages
1.3.6.1.2.1.5.23	icmpOutTimestamps	R	Number of sent ICMP timestamp request messages
1.3.6.1.2.1.5.24	icmpOutTimestampReps	R	Number of sent ICMP timestamp reply messages
1.3.6.1.2.1.5.25	icmpOutAddrMasks	R	Number of sent ICMP address mask request messages
1.3.6.1.2.1.5.26	icmpOutAddrMaskReps	R	Number of sent ICMP address mask reply messages

14.1.6 TCP Group

Table 239: MIB II – TCP Group

Identifier	Entry	Access	Description
1.3.6.1.2.1.6.1	tcpRtoAlgorithm	R	Retransmission time: 1 = other, 2 = constant, 3 = RSRE, 4 = VANJ
1.3.6.1.2.1.6.2	tcpRtoMin	R	Minimum value for the retransmission timer
1.3.6.1.2.1.6.3	tcpRtoMax	R	Maximum value for the retransmission timer
1.3.6.1.2.1.6.4	tcpMaxConn	R	Number of maximum TCP connections that can exist simultaneously
1.3.6.1.2.1.6.5	tcpActiveOpens	R	Number of existing active TCP connections
1.3.6.1.2.1.6.6	tcpPassiveOpens	R	Number of existing passive TCP connections
1.3.6.1.2.1.6.7	tcpAttemptFails	R	Number of failed connection attempts
1.3.6.1.2.1.6.8	tcpEstabResets	R	Number of connection resets
1.3.6.1.2.1.6.9	tcpCurrEstab	R	The number of TCP connections for which the current state is either Established or Close-Wait
1.3.6.1.2.1.6.10	tcpInSegs	R	Number of received TCP frames including the error frames
1.3.6.1.2.1.6.11	tcpOutSegs	R	Number of correctly sent TCP frames with data
1.3.6.1.2.1.6.12	tcpRetransSegs	R	Number of sent TCP frames retransmitted because of errors
1.3.6.1.2.1.6.13	tcpConnTable	-	For each existing connection, a table entry is created
1.3.6.1.2.1.6.13.1	tcpConnEntry	-	Table entry for connection
1.3.6.1.2.1.6.13.1.1	tcpConnState	R	This entry indicates the status of the TCP connection
1.3.6.1.2.1.6.13.1.2	tcpConnLocalAddress	R	The entry contains the IP address for the connection. For a server, this entry is constant 0.0.0.0
1.3.6.1.2.1.6.13.1.3	tcpConnLocalPort	R	The entry indicates the port number of the TCP connection.
1.3.6.1.2.1.6.13.1.4	tcpConnRemAddress	R	The entry contains the remote IP address of the TCP connection.
1.3.6.1.2.1.6.13.1.5	tcpConnRemPort	R	The entry contains the remote port of the TCP connection.
1.3.6.1.2.1.6.14	tcpInErrs	R	Number of received incorrect TCP frames
1.3.6.1.2.1.6.15	tcpOutRsts	R	Number of sent TCP frames with set RST flag

14.1.7 UDP Group

Table 240: MIB II – UDP Group

Identifier	Entry	Access	Description
1.3.6.1.2.1.7.1	udpInDatagrams	R	Number of received UDP frames that could be passed on to the appropriate applications
1.3.6.1.2.1.7.2	udpNoPorts	R	Number of received UDP frames that could not be passed on to the appropriate applications (port unreachable)
1.3.6.1.2.1.7.3	udpInErrors	R	Number of received UDP frames that could not be passed on to the appropriate applications for other reasons.
1.3.6.1.2.1.7.4	udpOutDatagrams	R	Number of sent UDP frames
1.3.6.1.2.1.7.5	udpTable	-	A table entry is created for each application that received UDP frames
1.3.6.1.2.1.7.5.1	udpEntry	-	Table entry for an application that received an UDP frame
1.3.6.1.2.1.7.5.1.1	udpLocalAddress	R	IP address of the local UDP server
1.3.6.1.2.1.7.5.1.2	udpLocalPort	R	Port number of the local UDP server

14.1.8 SNMP Group

Table 241: MIB II – SNMP Group

Identifier	Entry	Access	Description
1.3.6.1.2.1.11.1	snmpInPkts	R	Number of received SNMP frames
1.3.6.1.2.1.11.2	snmpOutPkts	R	Number of sent SNMP frames
1.3.6.1.2.1.11.3	snmpInBadVersions	R	Number of received SNMP frames with an invalid version number
1.3.6.1.2.1.11.4	snmpInBadCommunity-Names	R	Number of received SNMP frames with an invalid community
1.3.6.1.2.1.11.5	snmpInBadCommunity Uses	R	Number of received SNMP frames whose community did not have sufficient authorization for the actions that it tried to execute
1.3.6.1.2.1.11.6	snmpInASNParseErrs	R	Number of received SNMP frames with an incorrect structure
1.3.6.1.2.1.11.8	snmpInTooBigs	R	Number of received SNMP frames that acknowledged the result too Big
1.3.6.1.2.1.11.9	snmpInNoSuchNames	R	Number of received SNMP frames that acknowledged the result noSuchName
1.3.6.1.2.1.11.10	snmpInBadValues	R	Number of received SNMP frames that acknowledged the result bad value
1.3.6.1.2.1.11.11	snmpInReadOnlys	R	Number of received SNMP frames that acknowledged the result readOnly
1.3.6.1.2.1.11.12	snmpInGenErrs	R	Number of received SNMP frames that acknowledged the result genError
1.3.6.1.2.1.11.13	snmpInTotalReqVars	R	Number of received SNMP frames with valid GET or GET-NEXT requests
1.3.6.1.2.1.11.14	snmpInTotalSetVars	R	Number of received SNMP frames with valid SET requests
1.3.6.1.2.1.11.15	snmpInGetRequests	R	Number of GET requests received and processed
1.3.6.1.2.1.11.16	snmpInGetNexts	R	Number of GET-NEXT requests received and processed
1.3.6.1.2.1.11.17	snmpInSetRequests	R	Number of SET requests received and processed
1.3.6.1.2.1.11.18	snmpInGetResponses	R	Number of received GET responses
1.3.6.1.2.1.11.19	snmpInTraps	R	Number of received traps
1.3.6.1.2.1.11.20	snmpOutTooBigs	R	Number of sent SNMP frames that contained the result too Big
1.3.6.1.2.1.11.21	snmpOutNoSuchNames	R	Number of sent SNMP frames that contained the result noSuchName
1.3.6.1.2.1.11.22	snmpOutBadValues	R	Number of sent SNMP frames that contained the result bad value
1.3.6.1.2.1.11.24	SnmpOutGenErrs	R	Number of sent SNMP frames that contained the result genErrs
1.3.6.1.2.1.11.25	snmpOutGetRequests	R	Number of GET requests sent
1.3.6.1.2.1.11.26	SnmpOutGetNexts	R	Number of GET NEXT requests sent
1.3.6.1.2.1.11.27	snmpOutSetRequests	R	Number of SET requests sent
1.3.6.1.2.1.11.28	snmpOutGetResponses	R	Number of GET responses sent
1.3.6.1.2.1.11.29	snmpOutTraps	R	Number of traps sent
1.3.6.1.2.1.11.30	snmpEnableAuthenTraps	R/W	Authentification failure traps(1 = on, 2 = off)

14.2 WAGO MIB Groups

14.2.1 Company Group

The company group contains general information about the company WAGO Kontakttechnik GmbH & Co. KG.

Table 242: WAGO MIB – Company Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.1.1	wagoName	R	Company's registered name Default value: "WAGO Kontakttechnik GmbH & Co. KG"
1.3.6.1.4.1.13576.1.2	wagoDescrition	R	Description of company Default value: "WAGO Kontakttechnik GmbH & Co. KG, Hansastr. 27, D-32423 Minden"
1.3.6.1.4.1.13576.1.3	wagoURL	R	URL for company web site Default value: "www.wago.com"

14.2.2 Product Group

The product group contains information about the product.

Table 243: WAGO MIB – Product Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.1	wioArticleName	R	Name of article Default value: "750-xxx/000-000"
1.3.6.1.4.1.13576.10.1.2	wioArticleDescription	R	Description of article Default value: "WAGO Ethernet (10/100MBit) FBC"
1.3.6.1.4.1.13576.10.1.3	wioSerialNumber	R	Serial number of article Default value: "SNxxxxxxxx-Txxxxxx-mac|0030DExxxxxx"
1.3.6.1.4.1.13576.10.1.4	wioMacAddress	R	MAC address of article Default value: "0030DExxxxxx"
1.3.6.1.4.1.13576.10.1.5	wioURLDatasheet	R	URL to datasheet of article Default value: "http://www.wago.com/ wagoweb/documentation/navigate/nm 0dc__e.htm#ethernet"
1.3.6.1.4.1.13576.10.1.6	wioURLManual	R	URL to manual of article Default value: "http://www.wago.com/ wagoweb/documentation/navigate/nm 0dc__e.htm#ethernet"
1.3.6.1.4.1.13576.10.1.7	wioDeviceClass	R	Device class 10 = controller 20 = coupler 30 = switch 40 = display 50 = sensor 60 = actuator
1.3.6.1.4.1.13576.10.1.8	wioDeviceGroup	R	Device group 10 = Serie 750 20 = Serie 758 30 = Serie 767 40 = Serie 762 PERSPECTO

14.2.3 Versions Group

The version group contains information about the used hardware/software versions.

Table 244: WAGO MIB – Versions Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.10.1	wioFirmwareIndex	R	Index of firmware version
1.3.6.1.4.1.13576.10.1.10.2	wioHardwareIndex	R	Index of hardware version
1.3.6.1.4.1.13576.10.1.10.3	wioFwlIndex	R	Index of software version from firmware loader
1.3.6.1.4.1.13576.10.1.10.4	wioFirmwareVersion	R	Complete firmware string

14.2.4 Real-Time Clock Group

The real-time clock group contains information about the system's real-time clock.

Table 245: WAGO MIB – Real Time Clock Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.11.1	wioRtcDateTime	R/W	Date/time of coupler in UTC as string. For writing date/time use the following string time 11:22:33 date 13-1-2007 Default value: "time xx:xx:xx date xx-xx-xxxx (UTC)"
1.3.6.1.4.1.13576.10.1.11.2	wioRtcTime	R/W	Date/time of coupler in UTC as integer in seconds from 1970-01-01 Default value: “0”
1.3.6.1.4.1.13576.10.1.11.3	wioTimezone	R/W	"Actual time zone of article in hours (-12 - +12) Default value: “0”
1.3.6.1.4.1.13576.10.1.11.4	wioRtcHourMode	R	Hour mode 0 = 12h mode 1 = 24h mode Default value: “0”
1.3.6.1.4.1.13576.10.1.11.5	wioRtcBatteryStatus	R	RTC battery status: 0 = ok 1 = battery empty Default value: “1”
1.3.6.1.4.1.13576.10.1.11.6	wioRtcDayLightSaving	R/W	Time offset of 1 hour: 0 = not offset 1 = offset 1 hour (DayLightSaving) Default value: “0”

14.2.5 Ethernet Group

The Ethernet group contains the settings for Ethernet.

Table 246: WAGO MIB – Ethernet Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.12.1	wioEthernetMode	R/W	IP configuration of Ethernet connection: 0 = fix Ip address 1 = dynamic IP address over Bootp 2 = dynamic IP address over DHCP Default value: “1”
1.3.6.1.4.1.13576.10.1.12.2	wioIp	R/W	Actual IP address of coupler
1.3.6.1.4.1.13576.10.1.12.3	wioSubnetMask	R/W	Actual subnet mask of coupler
1.3.6.1.4.1.13576.10.1.12.4	wioGateway	R/W	Actual gateway IP of coupler
1.3.6.1.4.1.13576.10.1.12.5	wioHostname	R/W	Actual host name of coupler
1.3.6.1.4.1.13576.10.1.12.6	wioDomainName	R/W	Actual domain name of coupler
1.3.6.1.4.1.13576.10.1.12.7	wioDnsServer1	R/W	IP address of first DNS server
1.3.6.1.4.1.13576.10.1.12.8	wioDnsServer2	R/W	IP address of second DNS server

14.2.6 Actual Error Group

The actual error group contains information about the last system status/error status.

Table 247: WAGO MIB – Actual Error Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.20.1	wioErrorGroup	R	Error group of last error
1.3.6.1.4.1.13576.10.1.20.2	wioErrorCode	R	Error code of last error
1.3.6.1.4.1.13576.10.1.20.3	wioErrorArgument	R	Error argument of last error
1.3.6.1.4.1.13576.10.1.20.4	wioErrorDescription	R	Error description string

14.2.7 Http Group

The Http group contains information and settings for the Web server.

Table 248: WAGO MIB – Http Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.40.1.1	wioHttpEnable	R/W	Enable/disable the port of the webserver: 0 = port of webserver disable 1 = port of webserver enable Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.1.2	wioHttpAuthen-ticationEnable	R/W	Enable/disable the authentication on the websides: 0 = authentication disabled 1 = authentication enable Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.1.3	wioHttpPort	R/W	Port of the http web server Default value: { 80 }

14.2.8 Ftp Group

The Ftp group contains information and settings for the Ftp server.

Table 249: WAGO MIB – Ftp Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.40.2.1	wioFtpEnable	R/W	Enable/disable the port of the ftp server 0 = port of ftp server disable 1 = port of ftp server enable Default value: { 1 }

14.2.9 Sntp Group

The Sntp group contains information and settings for the Sntp server.

Table 250: WAGO MIB – Sntp Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.40.3.1	wioSntpEnable	R/W	Enable/disable the port of the SNTP server 0 = port of SNTP server disable 1 = port of SNTP server enable Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.3.2	wioSntpServer-Address	R/W	IP address of SNTP server Default value: { 0 }
1.3.6.1.4.1.13576.10.1.40.3.3	wioSntpClient-Intervall	R/W	Interval to pool SNTP manager Default value: { 0 }
1.3.6.1.4.1.13576.10.1.40.3.4	wioSntpClient-Timeout	R/W	Timeout to corrupt SNTP answer Default value: { 2000 }
1.3.6.1.4.1.13576.10.1.40.3.5	wioSntpClient-DayLightSaving	R/W	Time offset of 1 hour: 0 = not offset 1 = offset 1 hour (DayLightSaving) Default value: { 0 }

14.2.10 Snmp Group

The Snmp group contains information and settings for the SNMP agent.

Table 251: WAGO MIB – Snmp Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.40.4.1	wioSnmpEnable	R/W	Enable/disable the port of the SNMP server 0 = port of SNMP server disable 1 = port of SNMP server enable Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.4.2.1	wioSnmp1-ProtocolEnable	R/W	Enable/disable first SNMPv1/v2c agent Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.4.2.2	wioSnmp1-ManagerIp	R/W	IP address of first SNMP server Default value: { 'C0A80101'h }
1.3.6.1.4.1.13576.10.1.40.4.2.3	wioSnmp1-Community	R/W	Community identification string for SNMPv1/v2c Default value: { "public" }
1.3.6.1.4.1.13576.10.1.40.4.2.4	wioSnmp1Trap-V1enable	R/W	Enable/disable SNMPv1 traps to first SNMP server Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.4.2.5	wioSnmp1Trap-V2enable	R/W	Enable/disable SNMPv2c traps to first SNMP server Default value: { 0 }

Table 251: WAGO MIB – Snmp Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.40.4.2.6	wioSnmp2-ProtocolEnable	R/W	Enable/disable first SNMPv1/v2c agent Default value: { 0 }
1.3.6.1.4.1.13576.10.1.40.4.2.7	wioSnmp2-ManagerIp	R/W	IP address of second SNMP server Default value: { '00000000'h }
1.3.6.1.4.1.13576.10.1.40.4.2.8	wioSnmp2-Community	R/W	Community identification string for SNMPv1/v2c Default value: { "public" }
1.3.6.1.4.1.13576.10.1.40.4.2.9	wioSnmp2Trap-V1enable	R/W	Enable/disable SNMPv1 traps to first SNMP server Default value: { 0 }
1.3.6.1.4.1.13576.10.1.40.4.2.10	wioSnmp2Trap-V2enable	R/W	Enable/disable SNMPv2c traps to first SNMP server Default value: { 0 }
1.3.6.1.4.1.13576.10.1.40.4.3.1	wioSnmp1User-Enable	R/W	Enable/disable first SNMPv3 user Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.4.3.2	wioSnmp1-Authentication-Typ	R/W	Athentication typ for first SNMPv3 user: 0 = no Authentication 1 = MD5 Authentication 2 = SHA1 Authentication Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.4.3.3	wioSnmp1-Authentication-Name	R/W	Authentication name for first SNMPv3 user Default value: { "SecurityName" }
1.3.6.1.4.1.13576.10.1.40.4.3.4	wioSnmp1-Authentication-Key	R/W	Authentication key for first SNMPv3 user Default value: {"AuthenticationKey "}
1.3.6.1.4.1.13576.10.1.40.4.3.5	wioSnmp1-PrivacyEnable	R/W	Disable/enable data encryption for first SNMPv3 user:: 0 = no Encryption 1 = DES Encryption Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.4.3.6	wioSnmp1-PrivacyKey	R/W	Privacy key for SNMPv3 for first SNMPv3 user Default value: { "PrivacyKey" }
1.3.6.1.4.1.13576.10.1.40.4.3.7	wioSnmp1-Notification-Enable	R/W	Enable/disable notification (SNMPv3 traps) with SNMPv3 user Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.4.3.8	wioSnmp1-Notification-ReceiverIP	R/W	Receiver IP address for notification (SNMPv3 traps) with SNMPv3 user Default value: { 'C0A80101'h }
1.3.6.1.4.1.13576.10.1.40.4.3.9	wioSnmp2User-Enable	R/W	Enable/disable second SNMPv3 user Default value: { 0 }
1.3.6.1.4.1.13576.10.1.40.4.3.10	wioSnmp2-Authentication-Typ	R/W	Authentication typ for second SNMPv3 user: 0 = no authentication 1 = MD5 authentication 2 = SHA1 authentication Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.4.3.11	wioSnmp2-Authentication-Name	R/W	Authentication name for second SNMPv3 user Default value: { "SecurityName" }
1.3.6.1.4.1.13576.10.1.40.4.3.12	wioSnmp2-Authentication-Key	R/W	Authentication key for second SNMPv3 user Default value: {"AuthenticationKey"}

Table 251: WAGO MIB – Snmp Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.40.4.3.13	wioSnmp2-PrivacyEnable	R/W	Privacy key for SNMPv3 for second SNMPv3 user Default value: { 1 }
1.3.6.1.4.1.13576.10.1.40.4.3.14	wioSnmp2-PrivacyKey	R/W	Privacy key for SNMPv3 for second SNMPv3 user Default value: { "PrivacyKey" }
1.3.6.1.4.1.13576.10.1.40.4.3.15	wioSnmp2-Notification-Enable	R/W	Enable/disable notification (SNMPv3 traps) with SNMPv3 user Default value: { 0 }
1.3.6.1.4.1.13576.10.1.40.4.3.16	wioSnmp2-Notification-ReceiverIP	R/W	Receiver IP address for notification (SNMPv3 traps) with SNMPv3 user Default value: { '00000000'h }

14.2.11 Snmp Trap String Group

The Snmp trap string group contains strings that are attached to the manufacturer-specific traps.

Table 252: WAGO MIB – Snmp Trap String Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.40.4.4.1	wioTrapKbus-Error	R/W	String for 1st SNMP trap Default value: { "Kbus Error" }
1.3.6.1.4.1.13576.10.1.40.4.4.2	wioTrapPlcStart	R/W	String for 2nd SNMP trap Default value: { "Plc Start" }
1.3.6.1.4.1.13576.10.1.40.4.4.3	wioTrapPlcStop	R/W	String for 3rd SNMP trap Default value: { "Plc Stop" }
1.3.6.1.4.1.13576.10.1.40.4.4.4	wioTrapPlc-Reset	R/W	String for 4th SNMP trap Default value: { "Plc Reset" }
1.3.6.1.4.1.13576.10.1.40.4.4.5	wioTrapPlcSoft-wareWatchdog	R/W	String for 5th SNMP trap Default value: { "Plc Software Watchdog" }
1.3.6.1.4.1.13576.10.1.40.4.4.6	wioTrapPlc-DivideByZero	R/W	String for 6th SNMP trap Default value: {"Plc Divide By Zero"}
1.3.6.1.4.1.13576.10.1.40.4.4.7	wioTrapPlc-OnlineChange	R/W	String for 7th SNMP trap Default value: {"Plc Online Change"}
1.3.6.1.4.1.13576.10.1.40.4.4.8	wioTrapPlc-Download	R/W	String for 8th SNMP trap Default value: { "Plc Download Programm" }
1.3.6.1.4.1.13576.10.1.40.4.4.9	wioTrapPlc-Login	R/W	String for 9th SNMP trap Default value: { "Plc Login" }
1.3.6.1.4.1.13576.10.1.40.4.4.10	wioTrapPlc-Logout	R/W	String for 10th SNMP trap Default value: {"Plc Logout"}

14.2.12 Snmp User Trap String Group

The Snmp user trap string group contains strings that can be attached to user-specific traps. These strings can be changed via SNMP or Wago_SNMP.lib in CODESYS.

Table 253: WAGO MIB – Snmp User Trap String Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.40.4.5.1	wioUserTrapMsg1	R/W	String for 1st SNMP trap
1.3.6.1.4.1.13576.10.1.40.4.5.2	wioUserTrapMsg2	R/W	String for 2nd SNMP trap
1.3.6.1.4.1.13576.10.1.40.4.5.3	wioUserTrapMsg3	R/W	String for 3rd SNMP trap
1.3.6.1.4.1.13576.10.1.40.4.5.4	wioUserTrapMsg4	R/W	String for 4th SNMP trap
1.3.6.1.4.1.13576.10.1.40.4.5.5	wioUserTrapMsg5	R/W	String for 5th SNMP trap
1.3.6.1.4.1.13576.10.1.40.4.5.6	wioUserTrapMsg6	R/W	String for 6th SNMP trap
1.3.6.1.4.1.13576.10.1.40.4.5.7	wioUserTrapMsg7	R/W	String for 7th SNMP trap
1.3.6.1.4.1.13576.10.1.40.4.5.8	wioUserTrapMsg8	R/W	String for 8th SNMP trap
1.3.6.1.4.1.13576.10.1.40.4.5.9	wioUserTrapMsg9	R/W	String for 9th SNMP trap
1.3.6.1.4.1.13576.10.1.40.4.5.10	wioUserTrapMsg10	R/W	String for 10th SNMP trap

14.2.13 Plc Connection Group

Activate or deactivate the connection to CODESYS with the Plc connection group.

Table 254: WAGO MIB – Plc Connection Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.40.5.1	wioCODESYSEnabl e	R/W	Enable/disable the port of the CODESYS server 0 = port of CODESYS server disable 1 = port of CODESYS server enable Default value: { 1 }

14.2.14 Ethernet IP Group

The EtherNet/IP group contains information and settings for the EtherNet/IP.

Table 255: WAGO MIB – Ethernet IP Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.40.7.1	wioEthernetIpEnable	R/W	Enable/disable the port of the Ethernet IP server 0 = port of EtherNet/IP server disable 1 = port of EtherNet/IP server enable Default value: { 0 }
1.3.6.1.4.1.13576.10.1.40.7.2	wioEthernetIpVariables-InputCount	R/W	
1.3.6.1.4.1.13576.10.1.40.7.3	wioEthernetIpVariables-OutputCount	R/W	
1.3.6.1.4.1.13576.10.1.40.7.4	wioEthernetIpVariables-PlcInputCount	R/W	
1.3.6.1.4.1.13576.10.1.40.7.5	wioEthernetIpVariables-PlcInputOffset	R/W	
1.3.6.1.4.1.13576.10.1.40.7.6	wioEthernetIpVariables-PlcOutputCount	R/W	
1.3.6.1.4.1.13576.10.1.40.7.7	wioEthernetIpVariables-PlcOutputOffset	R/W	
1.3.6.1.4.1.13576.10.1.40.7.8	wioEthernetIpRunIdle-HeaderOrginatorToTarget	R/W	
1.3.6.1.4.1.13576.10.1.40.7.9	wioEthernetIpRunIdle-HeaderTargetToOrginator	R/W	

14.2.15 Process Image Group

The process image group contains a list of information about the terminals connected to the fielbus coupler.

Table 256: WAGO MIB – Process Image Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.50.1	wioModulCount	R	Count of modules
1.3.6.1.4.1.13576.10.1.50.2	wioAnalogOutLength	R	Length of analog output process datas
1.3.6.1.4.1.13576.10.1.50.3	wioAnalogInLength	R	Length of analog input process datas
1.3.6.1.4.1.13576.10.1.50.4	wioDigitalOutLength	R	Length of digital output process datas
1.3.6.1.4.1.13576.10.1.50.5	wioDigitalInLength	R	Length of digital input process datas
1.3.6.1.4.1.13576.10.1.50.6	wioDigitalOutOffset	R	Offset of digital output process datas
1.3.6.1.4.1.13576.10.1.50.7	wioDigitalInOffset	R	Offset of digital input process datas
1.3.6.1.4.1.13576.10.1.50.8	wioModuleTable	-	
1.3.6.1.4.1.13576.10.1.50.8.1	wioModuleEntry	-	
1.3.6.1.4.1.13576.10.1.50.8.1.1	wioModuleNumber	R	Number of module slot
1.3.6.1.4.1.13576.10.1.50.8.1.2	wioModuleName	R	Name of module

Table 256: WAGO MIB – Process Image Group

Identifier	Entry	Access	Description
1.3.6.1.4.1.13576.10.1.50.8.1.3	wioModuleType	R	Type of module
1.3.6.1.4.1.13576.10.1.50.8.1.4	wioModuleCount	R	Count of module
1.3.6.1.4.1.13576.10.1.50.8.1.5	wioModule-AlternativeFormat	R	Module in alternative format
1.3.6.1.4.1.13576.10.1.50.8.1.6	wioModuleAnalog-OutLength	R	Length of analog output data of module (Bit)
1.3.6.1.4.1.13576.10.1.50.8.1.7	wioModuleAnalog-InLength	R	Length of analog input data of module (Bit)
1.3.6.1.4.1.13576.10.1.50.8.1.8	wioModuleDigital-OutLength	R	Length of digital output data of module (Bit)
1.3.6.1.4.1.13576.10.1.50.8.1.9	wioModuleDigital-InLength	R	Length of digital input data of module (Bit)

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