WAGO I/O SYSTEM 750

Fieldbus Independent I/O Modules

Data Exchange Module 750-654

Manual

Version 1.0.2

WAGO®
INNOVATIVE CONNECTIONS

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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as errors can never be fully excluded, we would appreciate any information or ideas at any time.

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

CONTENT

1 Important Comments

To ensure fast installation and start-up of the units described in this manual, we strongly recommend that the following information and explanations are carefully read and abided by.

1.1 Legal Principles

1.1.1 Copyright

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1.1.2 Personnel Qualification

The use of the product detailed in this manual is exclusively geared to specialists having qualifications in PLC programming, electrical specialists or persons instructed by electrical specialists who are also familiar with the valid standards. WAGO Kontakttechnik GmbH & Co. KG declines all liability resulting from improper action and damage to WAGO products and third party products due to non-observance of the information contained in this manual.

1.1.3 Intended Use

For each individual application, the components supplied are to work with a dedicated hardware and software configuration. Modifications are only permitted within the framework of the possibilities documented in the manuals. All other changes to the hardware and/or software and the non-conforming use of the components entail the exclusion of liability on part of WAGO Kontakttechnik GmbH & Co. KG.

Please direct any requirements pertaining to a modified and/or new hardware or software configuration directly to WAGO Kontakttechnik GmbH & Co. KG.

1.2 Symbols

Danger
Always abide by this information to protect persons from injury.

Warning
Always abide by this information to prevent damage to the device.

Attention
Marginal conditions must always be observed to ensure smooth operation.

ESD (Electrostatic Discharge)
Warning of damage to the components by electrostatic discharge. Observe the precautionary measure for handling components at risk.

Note
Routines or advice for efficient use of the device and software optimization.

More information
References on additional literature, manuals, data sheets and internet pages.

1.3 Number Notation

Number Code	Example	Note
Decimal	100	normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	within inverted commas, nibble separated with dots

1.4 Safety Notes

Warning
Switch off the system prior to working on bus modules!

In the event of deformed contacts, the module in question is to be replaced, as its functionality can no longer be ensured on a long-term basis.

The components are not resistant against materials having seeping and insulating properties. Belonging to this group of materials is: e.g. aerosols, silicones, triglycerides (found in some hand creams).

If it cannot be ruled out that these materials appear in the component environment, then additional measures are to be taken:
- installation of the components into an appropriate enclosure
- handling of the components only with clean tools and materials.

Attention
Cleaning of soiled contacts may only be done with ethyl alcohol and leather cloths. Thereby, the ESD information is to be regarded.

Do not use any contact spray. The spray may impair the functioning of the contact area.

The WAGO-I/O-SYSTEM 750 and its components are an open system. It must only be assembled in housings, cabinets or in electrical operation rooms. Access must only be given via a key or tool to authorized qualified personnel.

The relevant valid and applicable standards and guidelines concerning the installation of switch boxes are to be observed.

ESD (Electrostatic Discharge)
The modules are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the modules, ensure that the environment (persons, workplace and packing) is well grounded. Avoid touching conductive components, e.g. gold contacts.

1.5 Scope

This manual describes the Special Module 750-654 Data Exchange Module of the modular WAGO-I/O-SYSTEM 750.

Handling, assembly and start-up are described in the manual of the Fieldbus Coupler. Therefore this documentation is valid only in the connection with the appropriate manual.

2 I/O Modules

2.1 Special Modules

2.1.1 750-654 [Data Exchange Module]

2.1.1.1 Variations

Item-No.	Designation	Description
750-654	Data Exchange Module	Baud rate: 62500 baud; Parity: none; data bits: 8, stop bits: 1
750-654/000-001	Data Exchange Module 125 kBaud	Baud rate: 125000 baud; Parity: none; data bits: 8, stop bits: 1

2.1.1.2 View

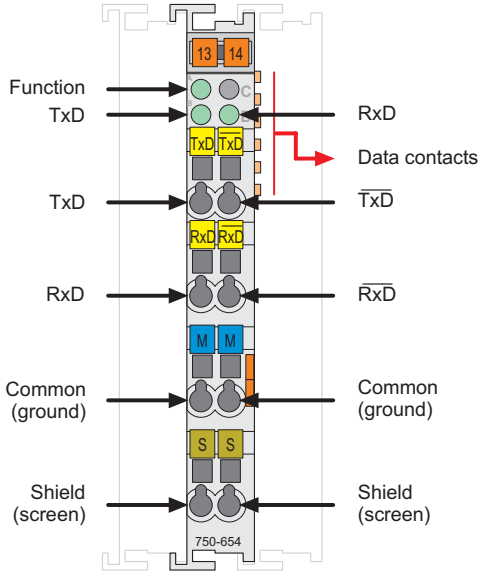

Fig. 2.1.1-1: Data Exchange Module 750-654 g065400e

2.1.1.3 Description

The data exchange module allows the exchange of data between different fieldbus systems via multiplexing of a serial connection.
Two modules are a communication pair that is connected by means of two twisted wire pairs. Each module is part of a fieldbus node.

The wiring to the communication partner is made by the connections TxD, /TxD, RxD, /RxD and ground.
The screen connection is connected directly to the mounting rail.

The data exchange is done in full duplex operation, independent of the fieldbus system used. The data of the output process image of the fieldbus coupler/-controller is transmitted to the communication partner. This module then transmits the data to the input process image of its fieldbus coupler/-controller and vice versa.

Depending on the fieldbus coupler/-controller used, the data exchange module allows for the exchange of 4 (5) bytes, one status byte and one control byte between the fieldbus systems via multiplexing of a serial connection. The delay which is caused by the multiplexor is ca. 5 ms with the module 750-654 and 2.5 ms with the module 750-654/000-001.

Three green LEDs signal readiness for operation and troublefree internal bus communication as well as the condition of the signal transmission.

The interface guarantees high fail-safe characteristic by differential transmission and electrically isolated signals.

Any configuration of the specialty modules is possible when designing the fieldbus node. Grouping of module types is not necessary.

Attention
This module has no power contacts. For field supply to downstream I/O modules, a supply module will be needed.

The data exchange module 750-654 and its variations can be used with all couplers/controllers of the WAGO-I/O-SYSTEM 750 (except for the economy types 750-320, -323, -324 and -327).

This description is valid for hardware and software version XXXX3A05.....
The version is specified in the manufacturing number, which is part of the lateral marking of the module.

2.1.1.4 Display Elements

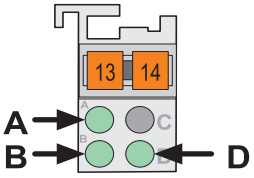

Fig. 2.1.1-2: Display Elements g065002x

LED	Channel	State	Function
A green	Function	off	No operational readiness or the internal data bus communication is interrupted
		on	Operational readiness and trouble-free internal data bus communication
B green	TxD	off	signal transfer TxD
		on	no signal transfer TxD
D green	RxD	off	signal transfer RxD
		on	no signal transfer RxD

[1] The pulses are so short that the off status cannot or only hardly be recognized with the eyes.

2.1.1.5 Schematic Diagram

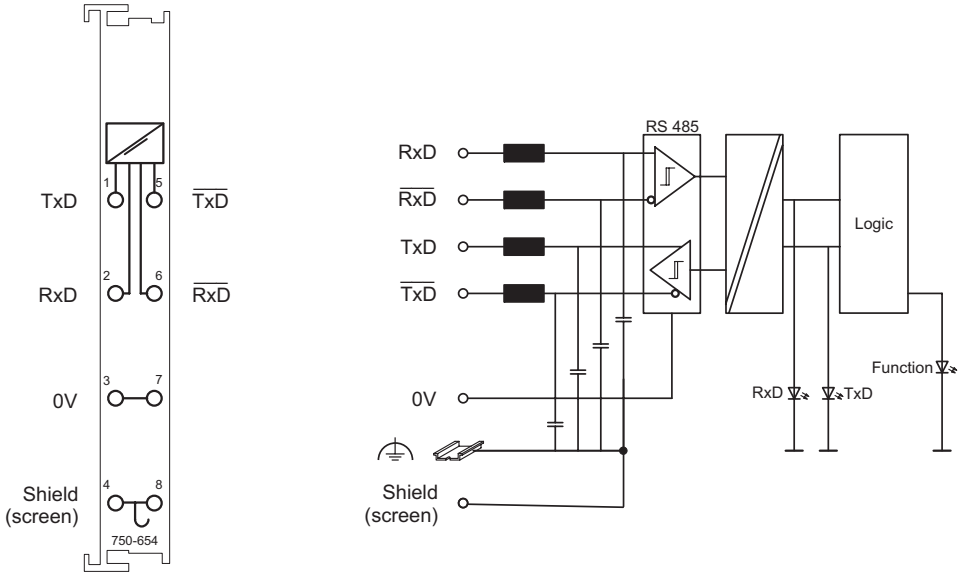

Fig. 2.1.1-3: Data Exchange Module 750-654 g065401e

2.1.1.6 Technical Data

Module Specific Data		
Transmission channel	1 TxD / 1 RxD, full duplex	
Baud rate	62500 baud (8 N 1) (750-654) 125000 baud (8 N 1) (750-654/000-001)	
Bit transfer	over 2 x twisted pair with differential signals	
Line impedance	120 Ω	
Transmission length $_{max.}$	100 m twisted pair	
Current consumption (internal)	65 mA	
Voltage supply	via system voltage DC /DC	
Isolation	500 V (System/Supply)	
Bit width	1 x 40 bits data 1 x 8 bits control/status	
Dimensions (mm) W x H x L	12 x 64* x 100 * from upper edge of 35 DIN rail	
Weight	ca. 55 g	
Standards and Regulations (cf. Chapter 2.2 of the Coupler/Controller Manual)		
EMC-Immunity to interference (CE)	acc. to EN 50082-2 (96)	
EMC-Emission of interference (CE)	acc. to EN 50081-1 (93)	
Approvals (cf. Chapter 2.2 of the Coupler/Controller Manual)		
	$_{C}UL_{US}$ (UL508)	
	ABS (American Bureau of Shipping)	
	DNV (Det Norske Veritas)	Cl. B
	GL (Germanischer Lloyd) (applied for)	Cat. A, B, C, D
	KR (Korean Register of Shipping)	
	NKK (Nippon Kaiji Kyokai)	
	Conformity Marking	

More Information
Detailed references to the approvals are listed in the document "Overview Approvals WAGO-I/O-SYSTEM 750", which you can find on the CD ROM ELECTRONICC Tools and Docs (Item-No.: 0888-0412)
or in the internet under:
www.wago.com → Documentation → WAGO-I/O-SYSTEM 750 → System Description

2.1.1.7 Functional description

The integrated watchdog function switches all outputs to zero if there is no valid information for more than 200 ms via the multiplex connection.

The 128 bytes input buffer provides for high rates of data transmission. When using slower speeds, you can collect the received data with lower priority without loosing data.

The 16 byte output buffer provides for faster transmission of larger data strings.

The data exchange module is connected peer-to-peer. For the wiring of the serial multiplex connection the RxD and TxD cables are crossed. The following illustrations show the peer-to-peer connection and the internal structure of the data exchange module.

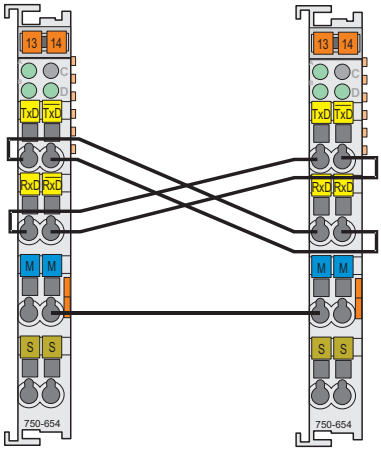

Fig. 2.1.1-4: Point-to-Point connection g065402d

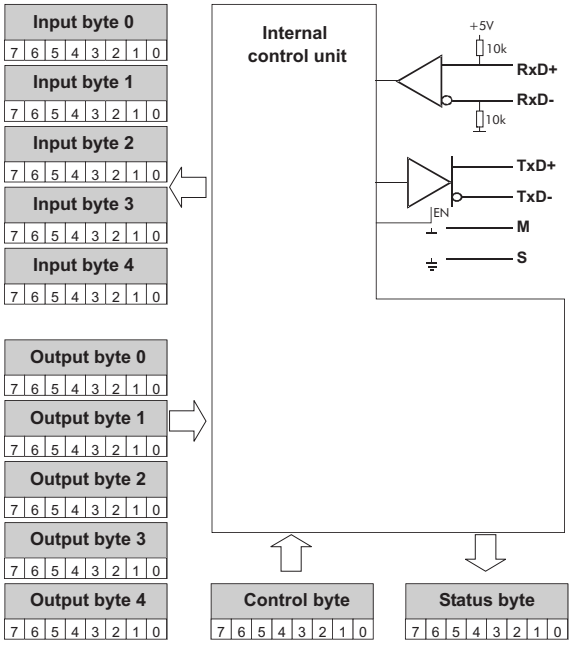

Fig. 2.1.1-5: Internal Structure g065403e

2.1.1.8 Process Image

Using the module 750-654, a 6 byte input and output process image can be transferred to the fieldbus coupler / controller via one logical channel. The data sent and received are stored in up to 5 output and input bytes (D0 ... D4). One control byte (C) and one status byte (S) are used to control the data flow.

Attention
The representation of the process data of some I/O modules or their variations in the process image depends on the fieldbus coupler/-controller used. Please take this information as well as the particular design of the respective control/status bytes from the section "Fieldbus Specific Design of the Process Data" included in the description concerning the process image of the corresponding coupler/controller.

Input data		Output data	
S	Status byte	C	Control byte
D0	Input byte 0	D0	Output byte 0
D1	Input byte 1	D1	Output byte 1
D2	Input byte 2	D2	Output byte 2
D3	Input byte 3	D3	Output byte 3
D4	Input byte 4	D4	Output byte 4

Control byte							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	X	X	X	X	X	X	X

X not used

0 Constant value must always be 0

Status byte							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	X	X	RCVT1	RCVT2	CHK	OVR	PAR

PAR Parity error or wrong data in a frame.

OVR Buffer overflow

CHK Checksum error.

RCVT2 The receiver is in timeout.

RCVT1 Constant value always should be 0. Module is in timeout. All output bits are set to 0 (watchdog).The receiver is in timeout. Checksum error. Buffer overflowParity error or wrong data in a frame.

X not used

0 Constant value must always be 0

2.1.1.9 Data Transfer

The status byte is used as diagnostic byte for the data communication and indicates the status of data communication with the partner module.

Control of the multiplex connection:
In the process image of the transmitting coupler/controller, one bit is set to "1" for the whole time. As long as this bit is "1" in the receiving coupler/controller, further input bits can be evaluated. If the bit is "0" the multiplex connection has been disrupted. The further bits are also 0 because of the watchdog.

Control of the multiplex connection with acknowledge:
If the transmitting coupler/controller gets an acknowledgement from the receiving coupler/controller, the received bit must be transferred by the application software as an output bit to the process image. The transmission is successful as long as the bit is "1".

Handshake:
If a serial data exchange should be made with the data exchange module, the handshake can be made via "Toggle Bits". Therefore an input bit and an output bit are reserved. As soon as this input bit is different from this output bit, a request from the opposite module is made. As soon as the request is executed the output bit is negative (toggled).

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