TECHDOCS

WAGO I/O System 750/753

Safe 8 channel digital output; 24 VDC; 0.5 A; PROFIsafe

750-1665/000-004

Product manual
HW version 01 | FW version 01
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Table of Contents

1 Provisions

1.1 Scope of Applicability

This document applies to the following product:

750-1665/000-004 (8FDO 24V/0.5A PROFIsafe) Safe 8-channel digital output; 24 VDC; 0.5 A; PROFIsafe

Product Detail Page	**www.wago.com/750-1665/000-004**

Note

Note applicable documents!

The complete operating instructions for the product consists of several, applicable documents. The product must only be installed and operated in accordance with the complete operating instructions. Knowledge of all applicable documents is required for proper use. You can find all documents and information on the product detail page.

Applicable document

System Manual I/O System 750/753

- Provisions
- Safety
- Planning
- Transport and Storage
- Assembly and Disassembly
- Conductor Termination
- Decommissioning

Additional documents

- **Product Manual** from the specific manufacturer for the safe programmable logic controller (F PLC) used
- **Product Manual WAGO Safety Editor (SEDI)**

2 Safety

This section presents hazards that could occur if the product is used. Builders and operators must take all hazards into account when analyzing the risk of their installed systems. Measures to reduce the risk of hazards that are foreseeable from the manufacturer's point of view (i.e., without knowledge of the specific system built) are explained in the respective sections of this documentation (e.g., in "Planning").
Builders and operators must implement explained risk reduction measures and also take their own measures depending on the residual risk.

2.1 General Safety Regulations

- All activities and all configurations of functional safety devices, as a result of which the behavior of the functional safety is changed, may only be performed by persons who are competent in safety matters.

2.2 Indirect Safety

- Always check the safe state of your system before starting work.
- After every change to your system, all functional safety functions must be checked for effectiveness.
- Only use current firmware recommended by WAGO.

3 Overview

The safe F I/O module 750-1665/000-004 is intended for functional safety in the areas of industrial automation technology, building technology and process technology in order to protect humans and machines according to Machinery Directive 2006/42/EC.

The functional safety assessment was carried out by TÜV Rheinland.

The PROFIBUS or PROFINET fieldbus system is used for the connection to the safe PLC.

The product offers the following connection options:

- Eight safety-oriented digital outputs O1 … O8, high-side switching, nominal output current: 0.5 A each

The following loads can be operated at the product's outputs:

- Resistive loads
- Capacitive loads
- Inductive loads according to DC13 per EN 60947-5-1

The safety function of the product ensures that the loads are switched off safely.

Multicolor LEDs indicate the signal states of the inputs and outputs, as well as the status information and errors of the F I/O module.

The F I/O module's diagnostic signaling cannot be part of the safety function under any circumstances.

The product can be operated on the head stations of the WAGO I/O System 750/753 indicated in section **Compatibility [▸ 18]**.

4 Properties

4.1 View

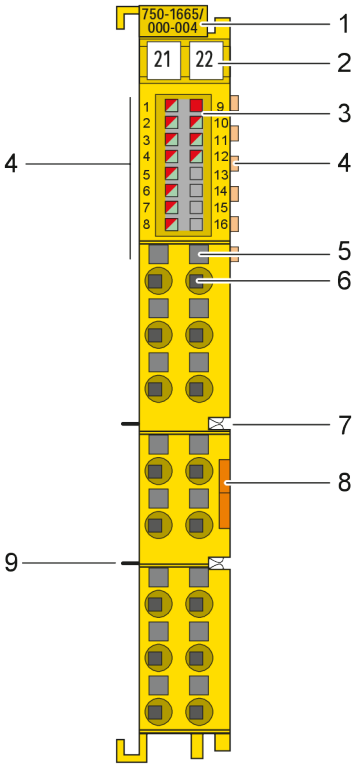


Figure 1: View

1	Item number	Scope of Applicability [▸ 5]
2	Slot for Mini-WSB (optional)	System Manual I/O System 750/753
3	Status LEDs	Indicators [▸ 9]
4	Data contacts	System Manual I/O System 750/753
5	Access to open the associated Push-in CAGE CLAMP® connection	System Manual I/O System 750/753
6	Push-in CAGE CLAMP® connection	Wiring Interface [▸ 10] and System Manual I/O System 750/753
7	Power jumper contacts (spring)	Power Jumper Contacts [▸ 12] and System Manual I/O System 750/753
8	Release tab	System Manual I/O System 750/753
9	Power jumper contacts (blade)	Power Jumper Contacts [▸ 12] and System Manual I/O System 750/753

4.2 Indicators

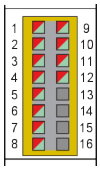


Figure 2: Indicators

Channel	Designation	LED	Function
1	Status, O1	1	Status/error indicator for digital output O1
2	Status, O2	2	Status/error indicator for digital output O2
3	Status, O3	3	Status/error indicator for digital output O3
4	Status, O4	4	Status/error indicator for digital output O4
5	Status, O5	5	Status/error indicator for digital output O5
6	Status, O6	6	Status/error indicator for digital output O6
7	Status, O7	7	Status/error indicator for digital output O7
8	Status, O8	8	Status/error indicator for digital output O8
–	Module error	9	Status/error indicator for F I/O module
–	Local bus communication	10	Status/error indicator for local bus communication
–	PROFIsafe status	11	Status/error indicator for PROFIsafe status
–	Parameterization	12	Status/error indicator for parameterization

The meanings of the indicated states are described in **Diagnostics via Indicators [▸ 29]**.

4.3 Wiring Interface

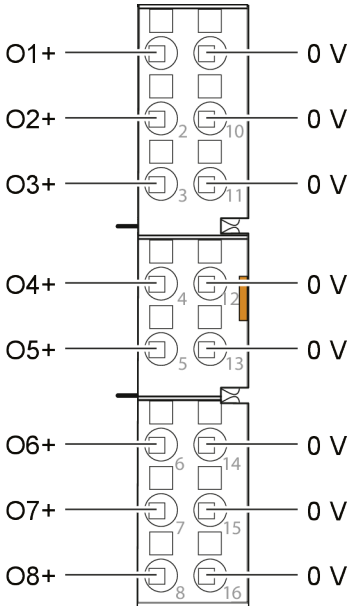


Figure 3: Wiring Interface

Channel	Connection	Designation	Function
Output channel 1	1	O1+	Digital output O1
	9	0 V	0 V
Output channel 2	2	O2+	Digital output O2
	10	0 V	0 V
Output channel 3	3	O3+	Digital output O3
	11	0 V	0 V
Output channel 4	4	O4+	Digital output O4
	12	0 V	0 V
Output channel 5	5	O5+	Digital output O5
	13	0 V	0 V
Output channel 6	6	O6+	Digital output O6
	14	0 V	0 V
Output channel 7	7	O7+	Digital output O7
	15	0 V	0 V
Output channel 8	8	O8+	Digital output O8
	16	0 V	0 V

4.4 Coding Switch

The F I/O module has a coding switch to set the PROFIsafe address. The coding switch is attached to the side of the F I/O module. When the F I/O module is plugged in, the coding switch is inaccessible.

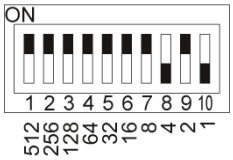


Figure 4: Coding switch PROFIsafe address (setting "1018")

You can find more information in the 🕮 **System Manual I/O System 750/753**.

4.5 Power Jumper Contacts

The potential for the field supply is fed in via the blade contacts and passed on via the spring contacts.

For additional information on the Power Jumper Contacts, please see
🕮 System Manual I/O System 750/753.

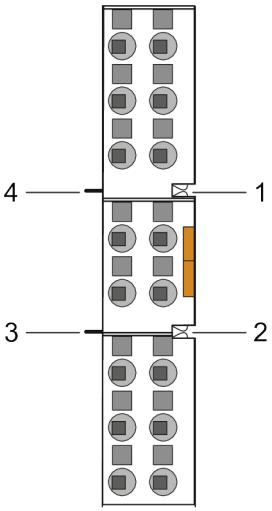


Figure 5: Power Jumper Contacts

No.	Type
1	Groove with spring contact
2	
3	Blade contact
4	

Arrangement in the Bus Node

For mechanical arrangement of the I/O module, the previous component must have at least 2 open grooves for accommodating the blade contacts.

For electrical compatibility requirements see Section Schematic Circuit Diagram [▸ 13].

4.6 Schematic Circuit Diagram

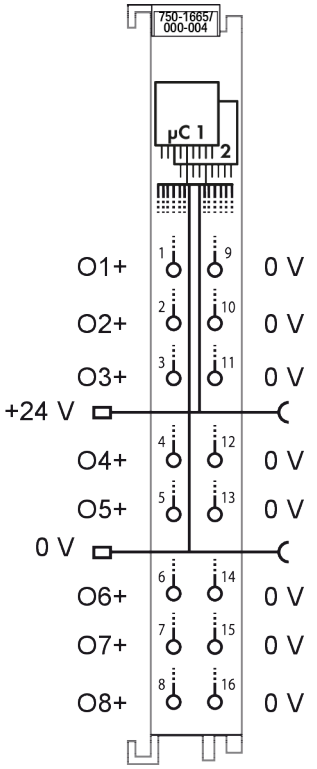


Figure 6: Schematic Circuit Diagram

Circuit Diagram, Output

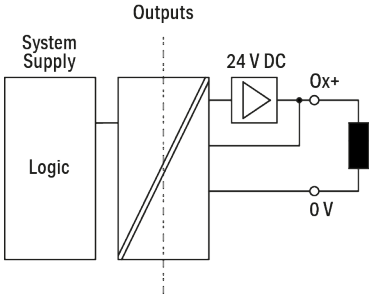


Figure 7: Circuit Diagram, Output

4.7 Safety Parameters

Table 1: Safety Parameters for Dual-Channel Safety Application – Duration of Use: 20 Years

Maximum safety integrity level per IEC 61508		SIL 3
Maximum performance level per EN ISO 13849-1		Cat. 4/PL e
Duration of use		20 years
Probability of failure PFD$_{avg}$*, duration of use: 20 years (low demand mode) (IEC 61508)	For 1 dual-channel output (fieldbus to output)	2.72 × 10^{-5} (2.72 % of the total PFD of 10^{-3} at SIL3)
Probability of failure PFH*, duration of use: 20 years (high demand mode) (IEC 61508)	For 1 dual-channel output (fieldbus to output)	3.13 × 10^{-10} (0.31 % of the total PFH of 10^{-7} at SIL3)
Hardware fault tolerance HFT for dual-channel application (IEC 61508 / EN ISO 13849-1)		1 (1 error in the application does not yet lead to a failure of the safety equipment)
DC$_{avg}$ (diagnostic coverage level)		96 %
MTTF$_D$ (mean time to dangerous failure)		> 100 years

*PFD$_{avg}$: Probability of failure on demand
PFH: Probability of dangerous failure per hour

4.8 Safety Response Time

The safety response time of the digital outputs indicates the time between when a PROFIsafe telegram is received on the local bus and when a signal change occurs on the digital output. It is part of the overall response time of a safety application.

To determine the total safety response time of the safety function, the runtimes of the local bus, the fieldbus and the cycle time of the safe PLC must be taken into account when calculating the safety response time.

The safety response time of a digital output is 3.6 ms.

5 Functions

The product offers the following functions:

- Diagnostics via LED indicators and fieldbus protocol (per IEC 61784-1)
- Channel-granular passivation of the outputs
- Error detection through continuous readback of the outputs
- Active discharge for the digital outputs

The outputs of the F I/O module have a two-channel internal structure; in terms of the external wiring, they allow both single-channel and dual-channel operation.

The safety function of the product ensures that the loads are switched off safely.

5.1 Process Image

The F I/O module occupies six data bytes in the input process image and six data bytes in the output process image in the higher-level safe PLC. The secure PROFIsafe telegrams that are to be sent and received are stored in input bytes 0 ... 5 and in output bytes 0 ... 5.

The process image receives different data depending on whether the F I/O module is operated in PROFIsafe Mode V2.4 or PROFIsafe Mode V2.6.

The F parameters are used to set the respective PROFIsafe mode (V2.4 or V2.6); see **Overview of PROFIsafe F Parameters [▸ 40]**

5.1.1 Process Image, PROFIsafe Mode V2.4

Table 2: Process Image, PROFIsafe Mode V2.4

Input Data		Output data	
Byte 0	Output channel status byte	Byte 0	Output process value
Byte 1	WAGO status byte	Byte 1	WAGO control byte
Byte 2	PROFIsafe status byte	Byte 2	PROFIsafe control byte
Byte 3	PROFIsafe CRC	Byte 3	PROFIsafe CRC
Byte 4	PROFIsafe CRC	Byte 4	PROFIsafe CRC
Byte 5	PROFIsafe CRC	Byte 5	PROFIsafe CRC

5.1.2 Process Image, PROFIsafe Mode V2.6

Table 3: Process Image, PROFIsafe Mode V2.6

Input Data		Output data	
Byte 0	Output channel status byte	Byte 0	Output process value
Byte 1	PROFIsafe status byte	Byte 1	PROFIsafe control byte
Byte 2	PROFIsafe CRC	Byte 2	PROFIsafe CRC
Byte 3	PROFIsafe CRC	Byte 3	PROFIsafe CRC
Byte 4	PROFIsafe CRC	Byte 4	PROFIsafe CRC
Byte 5	PROFIsafe CRC	Byte 5	PROFIsafe CRC

The process image is structured according to RIOforFA. Therefore, the channel status byte contains the “RIOforFA Qualifier.”

5.1.3 Output Channel Status Byte

Table 4: Channel Status Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Status, O8	Status, O7	Status, O6	Status, O5	Status, O4	Status, O3	Status, O2	Status, O1

5.1.4 Status and Control Bytes

WAGO status byte

Table 5: WAGO status byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ChF_Ack_Req *	–	–	–	–	–	–	–

*) Use of "ChF_Ack_Reg" is described in Error Message Acknowledgment [▸ 31].

PROFIsafe status byte

Table 6: PROFIsafe status byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Res	Cons_nr_R	Toggle_d	FV_activated	WD_Timeout	CE_CRC	ChF_Ack_Req	iPar_OK

WAGO control byte

Table 7: WAGO control byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ChF_Ack *	–	–	–	–	–	–	–

*) Use of "ChF_Ack" is described in Error Message Acknowledgment [▸ 31].

PROFIsafe control byte

Table 8: PROFIsafe control byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Loopcheck	ChF_Ack	Toggle_h	activate_FV	Use_TO2	Cons_nr_R	OA_Req	iPar_EN

5.2 Output Process Value

Table 9: Output Process Value

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
O8	O7	O6	O5	O4	O3	O2	O1

5.3 Operational Functions

5.3.1 Error Detection

Internal and external errors are detected and diagnosed in the F I/O module through continuous self-testing. The F I/O module also generates warnings against potential errors. An overview of all detectable and diagnosed errors and warnings is given in **Diagnostic Messages [▸ 25]**.

Strong EMC events can cause both internal and external errors. This can lead to a safety-related shutdown of the F I/O module. The user cannot acknowledge a safety-related shutdown.

To check whether the cause of a safety-related shutdown was a temporary EMC event, you can switch the entire fieldbus node off and then back on in an attempt to activate the F I/O module again.

If safety-related shutdown occurs multiple times, the F I/O module must be replaced. In this case, return the defective F I/O module to WAGO GmbH & Co. KG for fault analysis.

Dark Test

The F I/O module uses test pulses to diagnose the outputs. The test pulses are adapted to the connected load and last at least 1 ms and at most 50 ms.

The diagnostic test interval of the dark test is approx. 1 minute.

5.4 Diagnostic Function

After detecting internal or external errors, the F I/O module outputs diagnostic messages to the controller via the fieldbus. The diagnostic messages can be used to identify errors that have occurred and to take corresponding measures for error correction.

The F I/O module offers diagnostic options via the indicators and diagnostic services of the PROFINET or PROFIBUS fieldbus systems.

You can find an evaluation of the possible indicators, diagnostic messages and error codes in **Diagnostics [▸ 25]**.

6 Planning

6.1 Compatibility

The I/O module can be operated on the following head stations of the WAGO I/O System 750/753 from the specified version:

Table 10: Compatibility List

Bus System	Fieldbus Coupler/Controller	Item number	Firmware
PROFIBUS®	Fieldbus coupler	750-333	25
PROFINET®	Fieldbus coupler	750-375	11
		750-377	11

The following filter modules can be used with the I/O module:

Table 11: Filter Module Compatibility List

Item number
750-624
750-626
750-626/020-000
750-626/020-002

6.2 Derating

At the maximum output current, the power loss is higher than is typically assumed for the I/O modules of the WAGO I/O Systems 750/753.

To avoid thermal overload, observe the information on the maximum total output current.

With an expected ambient temperature of up to 40 °C, no restrictions are necessary.

At an expected ambient temperature of up to 55 °C, the total output current is reduced. Only the horizontal mounting positions ("horizontal left," "horizontal right" or "horizontal top" – see 🕮 **System Manual I/O System 750/753**) are permitted. Distance modules must be planned for other adjacent I/O modules (no distance module is required between two I/O modules **750-1665/000-004**).

A list of suitable distance modules can be found in the **Distance Modules [▸ 36]** table.

6.3 Requirements for Wiring and Accessories

An operating tool with a 2.5 mm blade (e.g., item no. **210-719**) is required for opening the Push-in CAGE CLAMP® connections.

Protected Cable Installation per IEC 60204-1 or EN ISO 13849-2

If a cross circuit arises between a positive potential (e.g., +24 V) and Ox+, the controlled actuator can no longer be switched off. To avoid cross circuits between a positive potential (e.g., +24 V) and Ox+, lay the cables for connecting the actuators in a way that protects against cross-circuits.

Short circuits between conductors can be excluded by protected installation per EN ISO 13849-2 (Safety-related parts of control systems) with the following alternative measures:
- Permanently installed cables are protected against external damage (e.g., through armored conduits or cable ducts).
- The conductors are routed in different sheathed cables.
- Conductors are routed within an electrical installation space, both the cables and the installation space meeting the requirements of IEC 60204-1.

6.4 Using Safety Functions

The F I/O module's diagnostic signaling is not safety-related must not be part of the safety function under any circumstances.

6.5 Aids and Examples

6.5.1 Aids

The WAGO-I/O-CHECK software and the description of the software are available from **https://downloadcenter.wago.com/wago/software**.

The WAGO Safety Editor parameterization tool (SEDI for short), including a description, is available from the website: **www.wago.com**.

The safe PLC engineering tool is available from the manufacturer of the safe PLC.

The GSD files can be found on the following websites:
- for **PROFIBUS**
- for **PROFINET**

WAGO Support provides application, circuit and programming examples for the PLC:

Tel.: +49 (0) 571/8 87 – 4 45 55

Fax: +49 (0) 571/8 87 – 84 45 55

6.5.2 Connection Examples

This section describes possible applications in which the functions of the F I/O module are used to implement a safety function.

Use of the connection examples described is not by itself sufficient to implement the safety function in accordance with the necessary risk reduction (SIL/Cat./PL) determined from the risk assessment. In connection with safe devices, sensors and actuators, additional measures may be necessary to guarantee the safety function. These include wiring the digital outputs accordingly and measures to exclude unforeseeable errors, for example, For more detailed information, see the user documentation for the safe devices used.

The following loads can be operated at the product's outputs:
- Resistive loads
- Capacitive loads
- Inductive loads according to DC13 per EN 60947-5-1

Note

A diode recovery circuit is always required for miniature safety relays.

When using small safety relays, an external diode recovery circuit must always be used to prevent increased wear on the relay contacts. This can also be the indicator of the miniature safety relay, e.g., item number 788-304.

Connection examples for digital outputs are examined in more detail below.

6.5.2.1 Connection of Loads to Ox+ against 0 V, Single-Channel

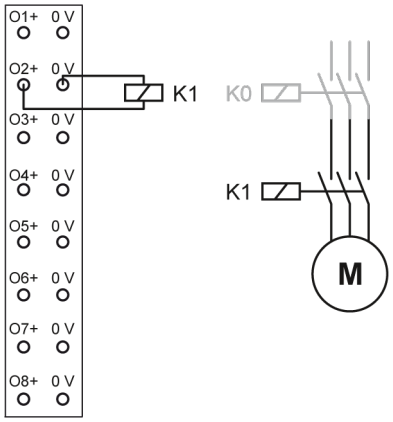


Figure 8: Connection of Loads to Ox+ against 0 V, Single-Channel

You can perform single-channel switching of a load (e.g., a relay) with a digital output Ox. To do so, connect a load between digital output Ox+ and the ground connection of the 0 V field supply voltage.

Note the following requirements as well:

- You must connect the normally open contact (K1, see figure) of the relay in series with the load that is to be switched.
- With single-channel use for SIL2/Cat. 2/PL d, shutdown must be ensured by the standard control in the event of an error. This can be achieved by integrating a second shutdown option (e.g., a main contactor K0) into the safety application.

You can connect a contactor to a digital output and perform single-channel switching of a motor via the normally open contacts of the contactor. The connection can be made at each of the four digital outputs.

With this wiring, you can achieve SIL2/Cat.2/PL d.

6.5.2.2 Connection of Loads to Ox+ against 0 V, Dual-Channel

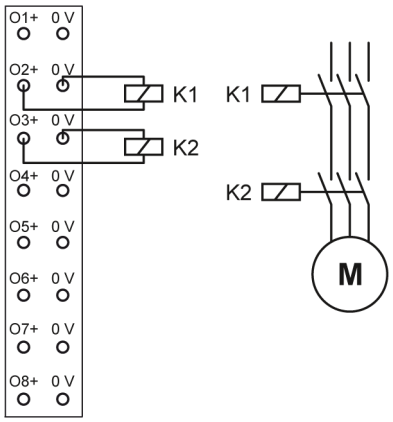


Figure 9: Connection of Loads to Two Ox+ Outputs against 0 V, Dual-Channel

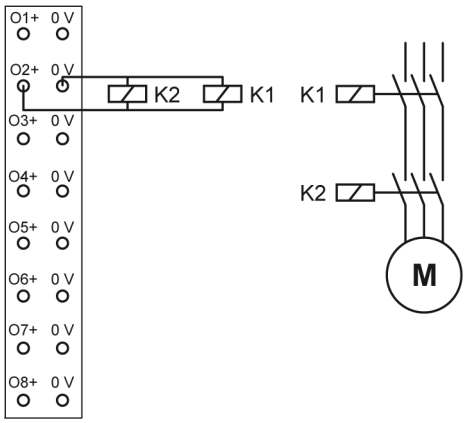


Figure 10: Connection of Two Loads Connected in Parallel to One Ox Output against 0 V, Dual-Channel

You can perform dual-channel switching of two loads (e.g., two relays) with one or two digital outputs Ox. To do this, connect the load in question between a digital output Ox+ and the corresponding ground connection of the 0 V field supply voltage. Use of two high-side switches (Ox+) is also permitted.

Note the following requirements as well:

- You must connect the normally open contacts (K1 and K2, see figure) of both relays in series to the load that is to be switched.
- At least two relays are required for single fault safety.

With this wiring, you can achieve SIL 3/Cat. 4/PL e.

6.5.2.3 Connection of a SIL3/Cat. 4-Capable Load to a Digital Output, Dual-Channel

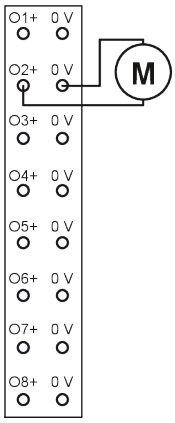


Figure 11: Connection of a SIL3/Cat. 4-Capable Load to a Digital Output, Dual-Channel

You can switch a SIL3/Cat.4-capable load with a digital output Ox. To do so, connect the load between digital output Ox+ and the ground connection of the 0 V field supply voltage.

With this wiring, you can achieve SIL3/Cat.4/PL e.

6.5.2.4 Connection of Digital Outputs to Digital Inputs

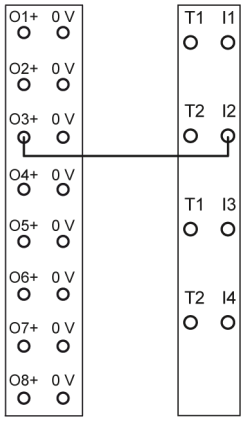


Figure 12: Connection of a Digital Output to a Digital Input

You can connect digital outputs Ox+ to digital inputs according to IEC 61131-2.

Please note that the digital outputs use test pulses to check their switching capability.

With this wiring, you can achieve SIL2/Cat.2/PL d.

6.5.2.5 Switching Inductive Loads

You can operate inductive loads on the digital outputs of the F I/O module using the internal recovery circuit. Depending on the inductance of the load and the value of the load current, it may be permissible to exceed the switching frequency specified in **Technical Data, Approvals, Guidelines and Standards [▸ 36]**.

The figure below shows the maximum permissible inductance of the load without an external diode recovery circuit as a function of the load current and the switching frequency.

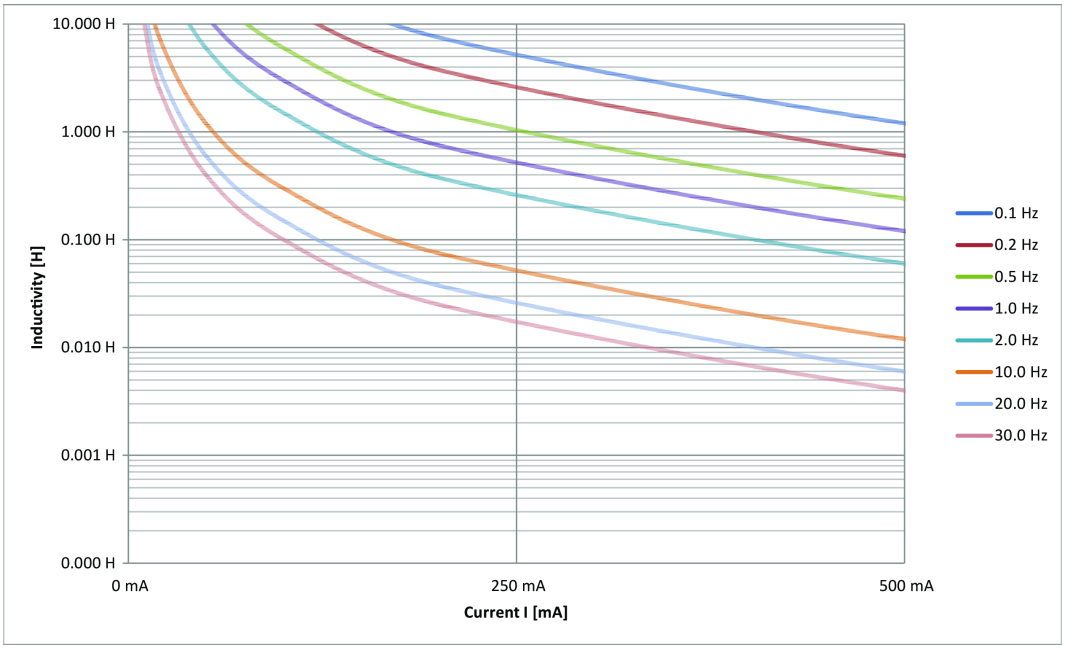


Figure 13: Switching Frequency as a Function of Inductance and Load Current

6.5.2.5.1 Selecting a Diode Recovery Circuit

When an inductive load is switched off, the magnetic energy stored in the inductive load must be dissipated. A diode recovery circuit converts this magnetic energy into heat. Either the diode recovery circuit integrated into the F I/O module or a suitable external diode recovery circuit in heat can be used for this purpose.

As the magnetic energy dissipates, negative voltage arises on the inductor. The negative voltage limitation of the diode recovery circuit integrated into the F I/O module differs depending on the connection variant and the value of the field voltage.

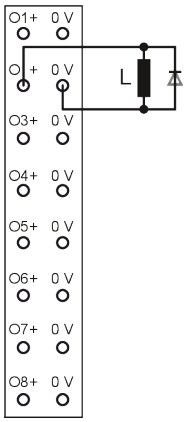


Figure 14: Connection Variant with External Diode Recovery Circuit

You can connect an inductive load between digital output Ox+ and the ground connection of the 0 V field supply voltage. When selecting the external diode recovery circuit, make sure that the negative voltage is limited to a value less than U_L; otherwise, the F I/O module converts the magnetic energy into heat. The following table shows the corresponding voltage values:

Table 12: Maximum Negative Voltage of the Diode Recovery Circuit

Field Voltage	U_L (Output Ox)
+18.0 V	–26 V
+ 24.0 V	–20 V
+ 31.2 V	–13 V

6.5.2.6 Switching Capacitive and Electronic Loads

You can use the F I/O module to switch electronic loads (e.g., electronically controlled door locking devices). In addition, you can switch capacitive loads according to the technical data.

7 Diagnostics

7.1 Diagnostic Messages

All the diagnostic messages that the F I/O module provides are listed below in alphabetical order. The structure of the diagnostic messages is described in the manuals for the fieldbus couplers.

Table 13: Diagnostic Messages

Message	Description	
Different F_Dest_Add	Diagnostic type	Module diagnostic
	Coding	0x0040
	LED display	Module error: red PROFIsafe status red
	Description/remedy	The PROFIsafe address assigned as part of the F parameterization differs from the one set on the F I/O module. Check the DIP switch setting or the PROFIsafe address setting using the safety editor (SEDI) or the engineering tool of the safe controller.
	Classification	Error
Incorrect F_CRC_Length	Diagnostic type	Module diagnostic
	Coding	0x0045
	LED display	Module error: red PROFIsafe status red
	Description/remedy	The F_CRC length setting in the parameterization is not possible in the current operating mode. Observe the dependency between F_Par_Version and F_CRC_Length and select a valid combination.
	Classification	Error
Incorrect F_Par_Version	Diagnostic type	Module diagnostic
	Coding	0x0046
	LED display	Module error: red PROFIsafe status red
	Description/remedy	The version setting for the F parameter set is incorrect. Observe the dependency between F_Par_Version and F_CRC_Length and select a valid combination.
	Classification	Error
Firmware update required	Diagnostic type	Module diagnostic
	Coding	0x0231
	LED display	Module error: red, flashing at 2 Hz
	Description/remedy	The firmware image check has resulted in an inconsistent state. Update the device firmware. **ATTENTION:** Updating the device firmware is only permitted if the diagnostic message is output due to a previously canceled firmware update. If the F I/O module was working without errors until the diagnostic message was output, it is defective and must be replaced.
	Classification	Error
Internal channel error	Diagnostic type	Channel diagnostics
	Coding	0x0280
	LED display	Channel status: red

Message	Description	
	Description/remedy	The internal hardware test of the F I/O module failed. If the error occurs repeatedly after restart, immediately replace the F I/O module and send it to WAGO for fault analysis.
	Classification	Error
Short circuit to V_{CC}	Diagnostic type	Channel diagnostics
	Coding	0x021B
	LED display	Channel status: red
	Description/remedy	The "+" connection of the output is short circuited with the +24 V potential of the field supply. Check the output's wiring. The output may be defective.
	Classification	Error
Unsupported F_Block_ID	Diagnostic type	Module diagnostic
	Coding	0x004C
	LED display	Module error: red PROFIsafe status red
	Description/remedy	The F I/O module does not support the F parameter block specified by the F_Block_ID. Use an F parameter block supported by the F I/O module.
	Classification	Error
Unsupported F_SIL	Diagnostic type	Module diagnostic
	Coding	0x0044
	LED display	Module error: red PROFIsafe status red
	Description/remedy	The F I/O module cannot be operated at the safety integrity level (SIL) specified by the parameterization. Correct the F parameterization.
	Classification	Error
PROFIsafe CRC2 error	Diagnostic type	Module diagnostic
	Coding	0x004D
	LED display	Module error: red PROFIsafe status: red, flashing at 1 Hz
	Description/remedy	A CRC2 error occurred during safe communication. Check the communication connection and acknowledge the error message.
	Classification	Error
Cross circuit	Diagnostic type	Channel diagnostics
	Coding	0x0284
	LED display	Channel status: red
	Description/remedy	Cross circuit between two or more outputs. Check the wiring of the outputs.
	Classification	Error
Acknowledgment required	Diagnostic type	Module diagnostic
	Coding	0x004F
	LED display	PROFIsafe status: green, flashing at 0.5 Hz
	Description/remedy	Acknowledgement required in order to reactivate the channel(s) after error correction. This diagnostic is only output in PROFIsafe V2.6 mode.
	Classification	Error
Safety shutdown, internal	Diagnostic type	Module diagnostic
	Coding	0x0219

Message	Description	
	LED display	Module error: red, flashing at 2 Hz
	Description/remedy	The F I/O module has entered the safe state and switched the outputs off. If the error occurs repeatedly after restart, immediately replace the F I/O module and send it to WAGO for fault analysis.
	Classification	Error
Overload	Diagnostic type	Channel diagnostics
	Coding	0x0204
	LED display	Channel status: red
	Description/remedy	The maximum permissible load current at the output of the F I/O module has been exceeded.
	Classification	Error
Overvoltage, field supply	Diagnostic type	Module diagnostic
	Coding	0x0230
	LED display	Module error: red
	Description/remedy	The 24 V field supply of the F I/O module is above the specified tolerance. Fix the power supply responsible.
	Classification	Error
Overrange F_WD_Time	Diagnostic type	Module diagnostic
	Coding	0x004E
	LED display	Module error: red PROFIsafe status: red, flashing at 1 Hz
	Description/description/remedy	The time between two data packets from the safe PLC was greater than the F_WD_Time setting. Check the **F_WD_Time** parameter and increase the value if necessary.
	Classification	Error
Overtemperature error	Diagnostic type	Module diagnostic
	Coding	0x0205
	LED display	Module error: red
	Description/remedy	The permissible internal housing temperature was exceeded, which results in module-wide passivation of the F I/O module. Make sure the ambient temperature is within the specified range.
	Classification	Error
Overtemperature warning	Diagnostic type	Module diagnostic
	Coding	0x0232
	LED display	No indicator
	Description/remedy	Exceeding a defined internal housing temperature that does not yet result in module-wide passivation of the F I/O module. Make sure the ambient temperature is within the specified range.
	Classification	Warning
Invalid F_CRC1	Diagnostic type	Module diagnostic
	Coding	0x0047
	LED display	Module error: red PROFIsafe status red
	Description/remedy	The F_CRC1 formed from the F parameter set is invalid. Create a consistent F parameter set.
	Classification	Error
Invalid F_Dest_Add	Diagnostic type	Module diagnostic
	Coding	0x0041

Message	Description	
	LED display	Module error: red PROFIsafe status red
	Description/remedy	The PROFIsafe address of the F I/O module must lie within the range from 1 … 65534. Correct the F parameterization.
	Classification	Error
Invalid F parameters	Diagnostic type	Module diagnostic
	Coding	0x0048
	LED display	Module error: red PROFIsafe status red
	Description/remedy	The combination of F parameters is invalid. Correct the F parameterization.
	Classification	Error
Invalid F_Source_Add	Diagnostic type	Module diagnostic
	Coding	0x0042
	LED display	Module error: red PROFIsafe status red
	Description/remedy	The PROFIsafe address of the safe controller must be within the range 1 … 65534. Correct the F parameterization.
	Classification	Error
Invalid F_WD_Time	Diagnostic type	Module diagnostic
	Coding	0x0043
	LED display	Module error: red PROFIsafe status red
	Description/remedy	The monitoring time for safe data exchange must be set to a value greater than “0 ms.” Correct the F parameterization.
	Classification	Error
Invalid iParameters	Diagnostic type	Module diagnostic
	Coding	0x0200
	LED display	Module error: red Parameterization red, flashing at 1 Hz
	Description/remedy	The PROFIsafe address or the checksum in the engineering tool of the safe controller is set to an invalid value. Check these values.
	Classification	Error
Undervoltage, field supply	Diagnostic type	Module diagnostic
	Coding	0x0202
	LED display	Module error: red
	Description/remedy	The 24 V field supply of the F I/O module is below the specified tolerance. Fix the power supply responsible.
	Classification	Error

7.2 Diagnostics via Indicators

The I/O module's indicators provide information about possible states and error cases. The tables below contain the interpretations of the signals.

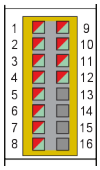


Figure 15: Indicators

LED	Designation	LED State	Explanation
1	Status, O1	Off	Output O1: output voltage for logical 0 (false)
		Green	Output O1: output voltage for logical 1 (true)
		Red	Output O1: error
2	Status, O2	Off	Output O2: output voltage for logical 0 (false)
		Green	Output O2: output voltage for logical 1 (true)
		Red	Output O2: Error
3	Status, O3	Off	Output O3: output voltage for logical 0 (false)
		Green	Output O3: output voltage for logical 1 (true)
		Red	Output O3: error
4	Status, O4	Off	Output O4: output voltage for logical 0 (false)
		Green	Output O4: output voltage for logical 1 (true)
		Red	Output O4: error
5	Status, O5	Off	Output O5: output voltage for logical 0 (false)
		Green	Output O5: output voltage for logical 1 (true)
		Red	Output O5: error
6	Status, O6	Off	Output O6: output voltage for logical 0 (false)
		Green	Output O6: output voltage for logical 1 (true)
		Red	Output O6: error
7	Status, O7	Off	Output O7: output voltage for logical 0 (false)
		Green	Output O7: output voltage for logical 1 (true)
		Red	Output O7: error
8	Status, O8	Off	Output O8: output voltage for logical 0 (false)
		Green	Output O8: output voltage for logical 1 (true)
		Red	Output O8: error
9	Module error	Off	No error
		Red	Module error (see **Diagnostic Messages [▸ 25]**)
		Red, flashing at 2 Hz	Internal safety-critical error (see **Module Error [▸ 30]**)
10	Local bus communication	Green	Local bus communication active
		Red	Local bus communication, error
11	PROFIsafe status	Off	PROFIsafe data exchange, inactive
		Green	PROFIsafe data exchange, active
		Green, flashing at 0.5 Hz	Acknowledgment by operator required (Operator Acknowledge, OA)
		Red	No valid PROFIsafe F parameters available
		Red, flashing at 1 Hz	PROFIsafe communication error (CRC2 error), watchdog time (F_WD_Time) exceeded

LED	Designation	LED State	Explanation
12	Parameterization	Off	Parameterization OK
		Red	F I/O module selected by WAGO-I/O-CHECK
		Red, flashing at 1 Hz	An incorrect PROFIsafe address or checksum was set in the engineering tool of the safe controller.
		Red, flashing at 2 Hz	iParameters have been transferred to the F I/O module, but not yet saved.

Note

Behavior when module error LED (LED 9) is flashing

A flashing module error LED (LED 9) indicates that the F I/O module has detected an internal safety-critical error. The cause may be a defect in the F I/O module or an environmental EMC fault. In this case, switch the F I/O module off completely and then back on.
If the problem recurs multiple times, this indicates a defect in the F I/O module. In this case, return the defective F I/O module to WAGO GmbH & Co. KG for fault analysis.

7.3 Behavior of the F I/O Module in the Event of an Error

The behavior of the F I/O module in the event of an error depends on the type of error; each case is described below.

7.3.1 Channel Error

If a channel error occurs, the corresponding bit in the channel status byte is set to the value “bad” (0). All passivated output channels are switched off.

The channel status LED is illuminated continuously in red. A diagnostic message corresponding to the error is displayed (see **Diagnostic Messages [▸ 25]**).

Detection of the correction of an error on a digital output can take up to 60 seconds.

7.3.2 Module Error

In the event of a module error, all bits in the channel status byte are set to the value “bad,” and the digital outputs are switched off.

The safe outputs are switched off.

All channel status LEDs of the module are switched off permanently. The module error LED assumes a state corresponding to the error. A diagnostic message corresponding to the error is displayed (see **Diagnostic Messages [▸ 25]**).

7.3.3 Configuration/Communication Error

In the event of a configuration or communication error, secure communication between the F I/O module and the safe PLC is not possible.

All output channels are switched off.

The PROFIsafe status LED, local bus communication LED and parameterization status LED assume states corresponding to the error. The module error LED is illuminated continuously in red. A diagnostic message corresponding to the error is displayed (see **Diagnostic Messages [▸ 25]**).

7.4 Error Message Acknowledgment

Errors that have been corrected are acknowledged by the safe controller via the PROFIsafe protocol.

7.4.1 Error Acknowledgment PROFIsafe V2.4

The F I/O module supports channel-granular passivation in PROFIsafe mode V2.4. Acknowledgement is performed via the WAGO status byte and the WAGO control byte.

The acknowledgment request for a corrected error is displayed on the F I/O module via the PROFIsafe status LED. The acknowledgement is also indicated in the F periphery data block (on the F PLC) via the ACK_REQ bit and in the WAGO status byte via the ChF_Ack_Req bit.

Errors are manually acknowledged with a rising edge on the "ACK_REI" variable of the F periphery data block. In addition, a high signal for at least two PROFIsafe telegram cycles must be applied to the ChF_Ack bit in the WAGO control byte.

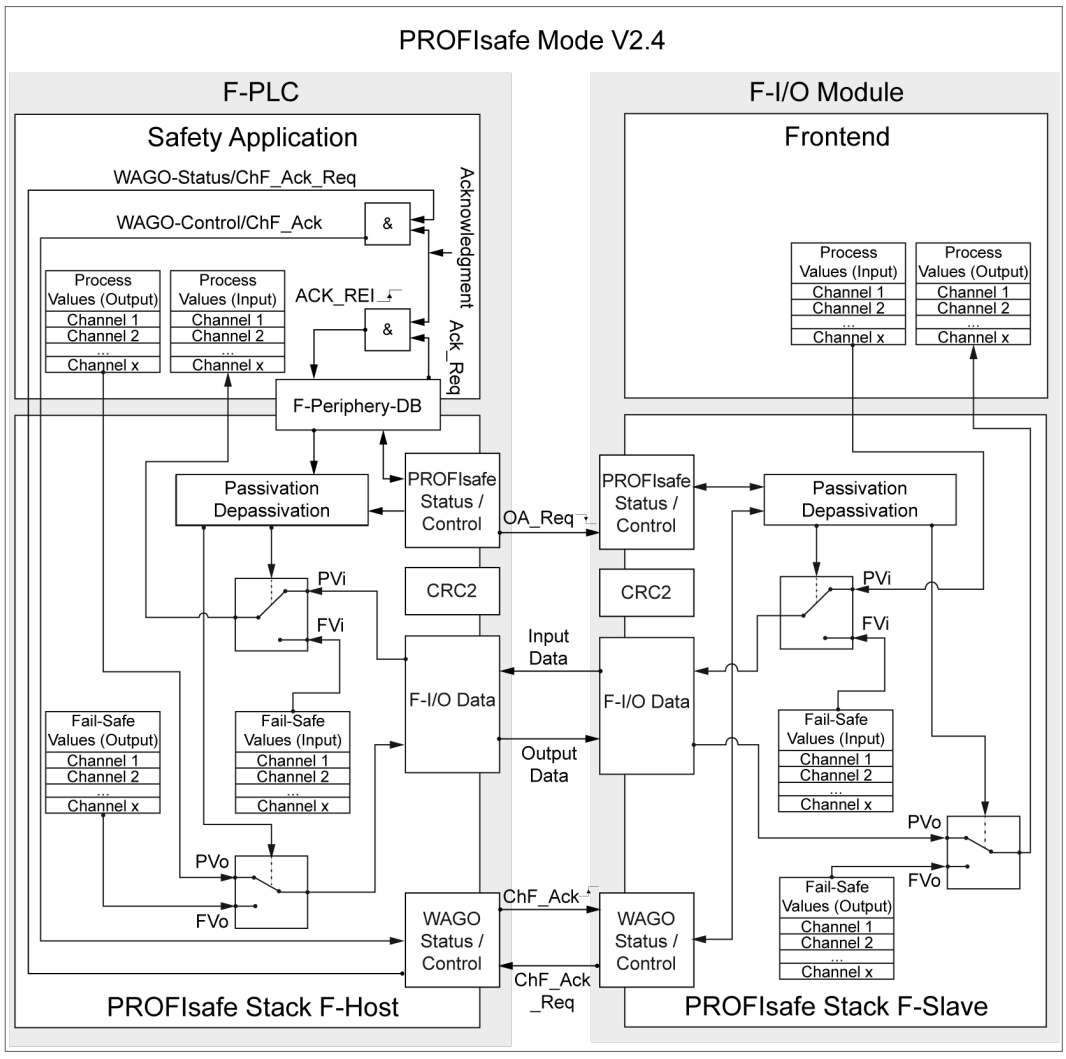


Figure 16: Schematic Representation for Acknowledgement in PROFIsafe Mode V2.4

7.4.2 Error Acknowledgment PROFIsafe V2.6

The F I/O module supports channel-granular passivation in PROFIsafe mode V2.6. Acknowledgement is performed in accordance with the RIOforFA specifications.

The acknowledgment request for a corrected error is indicated on the F I/O module via the PROFIsafe status LED (green, 0.5 Hz flashing). Acknowledgment is also displayed in the F periphery DB (on the F PLC) via the ACK_REQ bit.

Errors are manually acknowledged with a rising edge of the "ACK_REI" bit of the F periphery database.

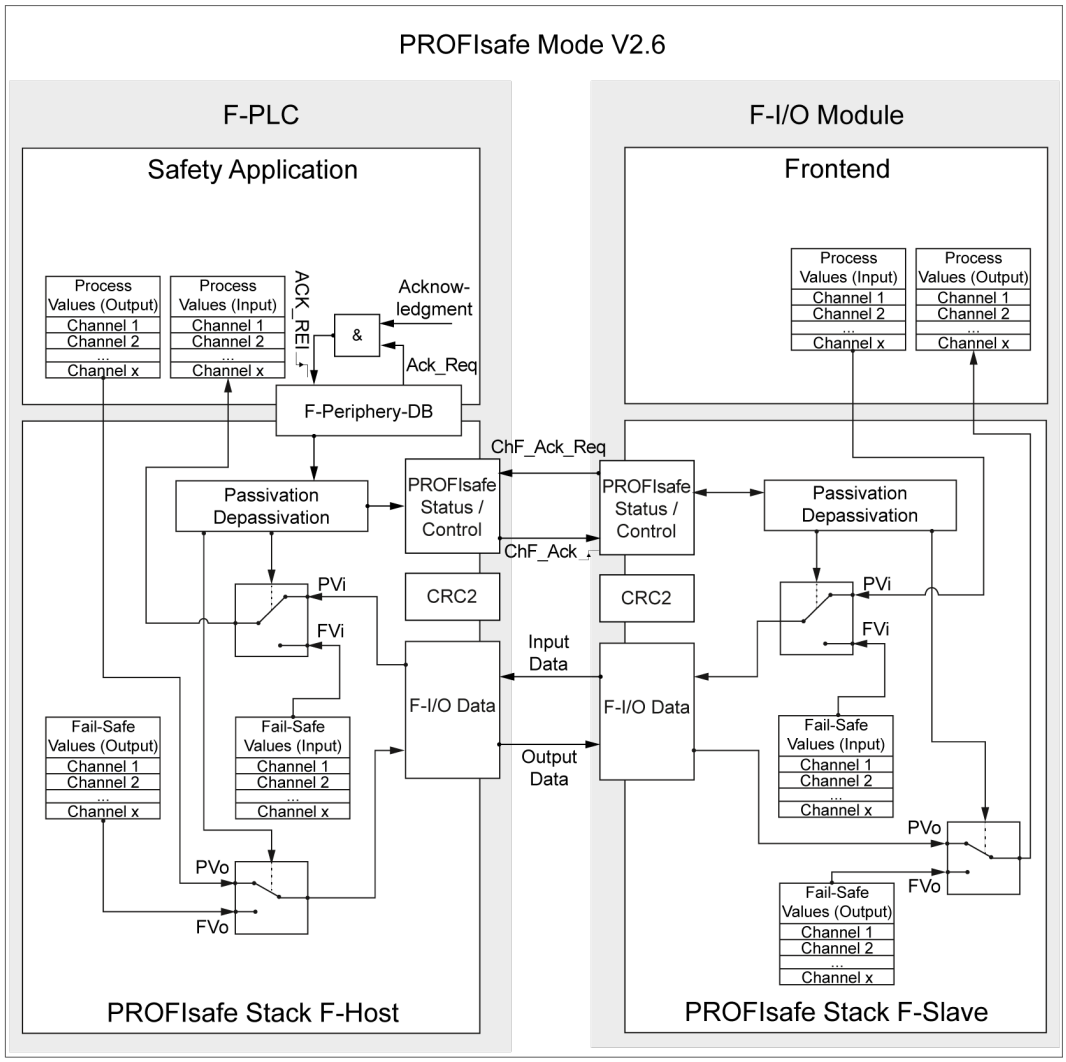


Figure 17: Schematic Representation for Acknowledgement in PROFIsafe Mode V2.6

ⓘ Note

Note manufacturer's documentation

Follow the required procedures listed in the respective controller manufacturer's documentation. Check and document all safety functions.

Only corrected errors are acknowledged with error acknowledgment. Pending errors can only be acknowledged after the error has been corrected.

7.5 Signal Sequence Diagrams

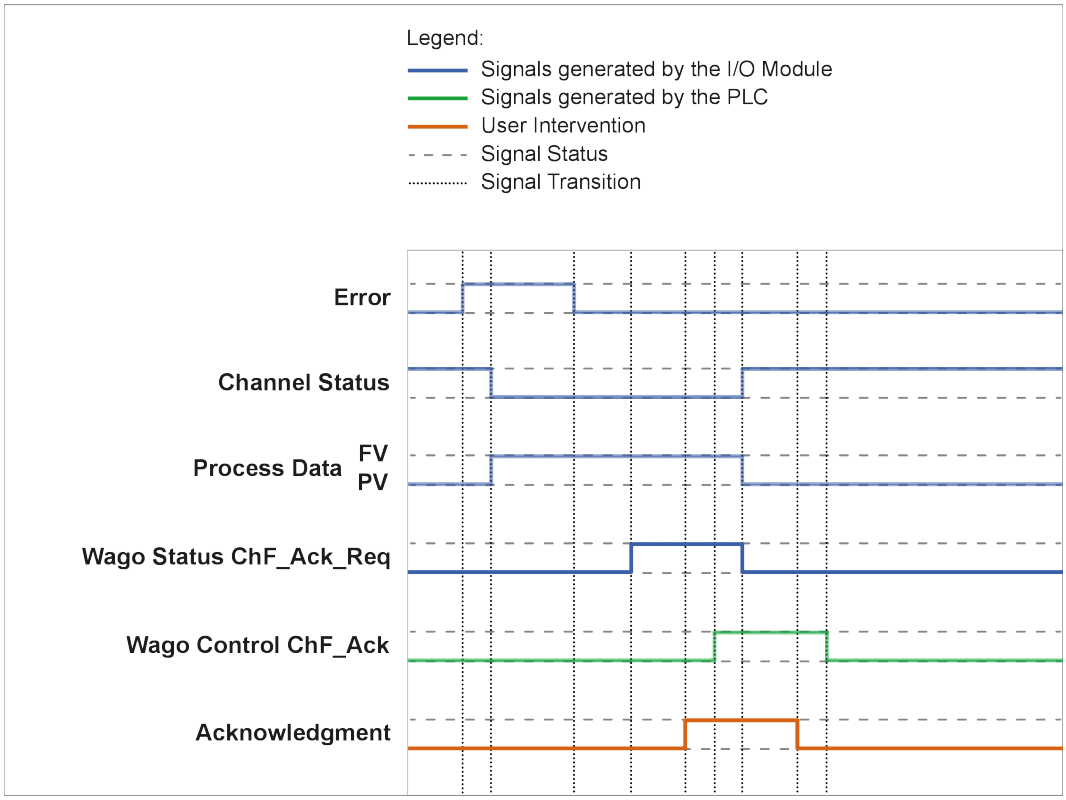


Figure 18: PROFIsafe Mode V2.4 – Signal Sequence, Channel-Granular Passivation

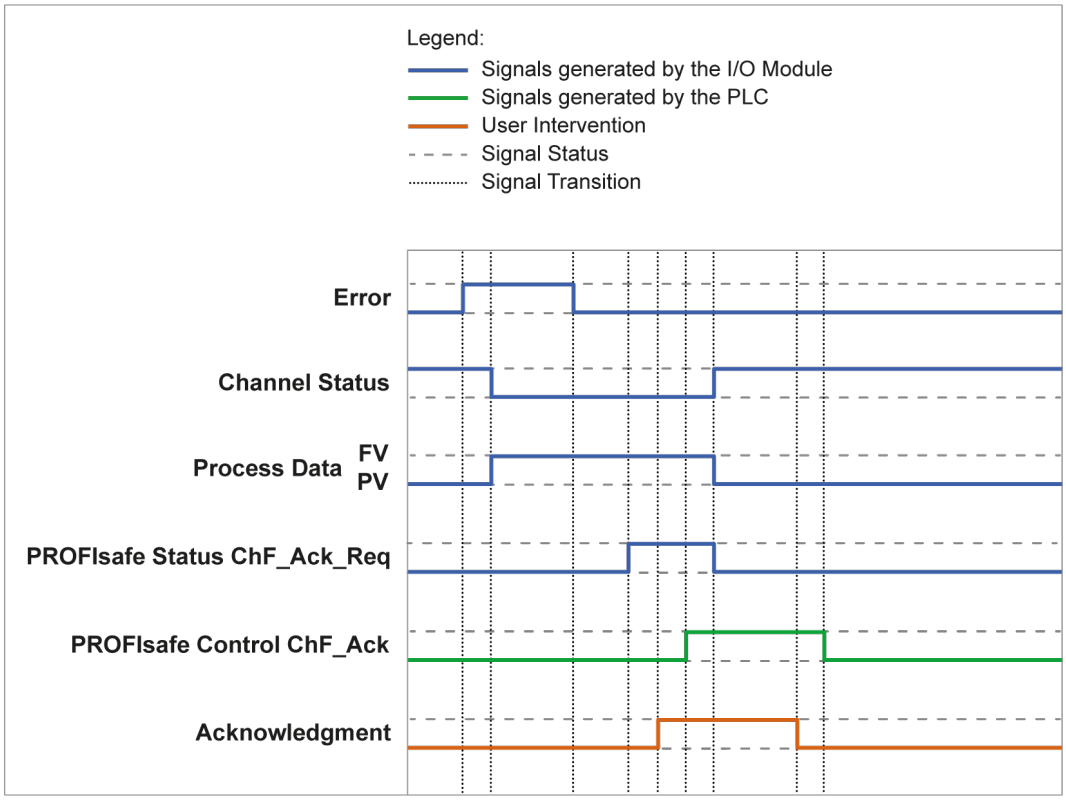


Figure 19: PROFIsafe Mode V2.6 – Signal History User Acknowledgment Channel Error

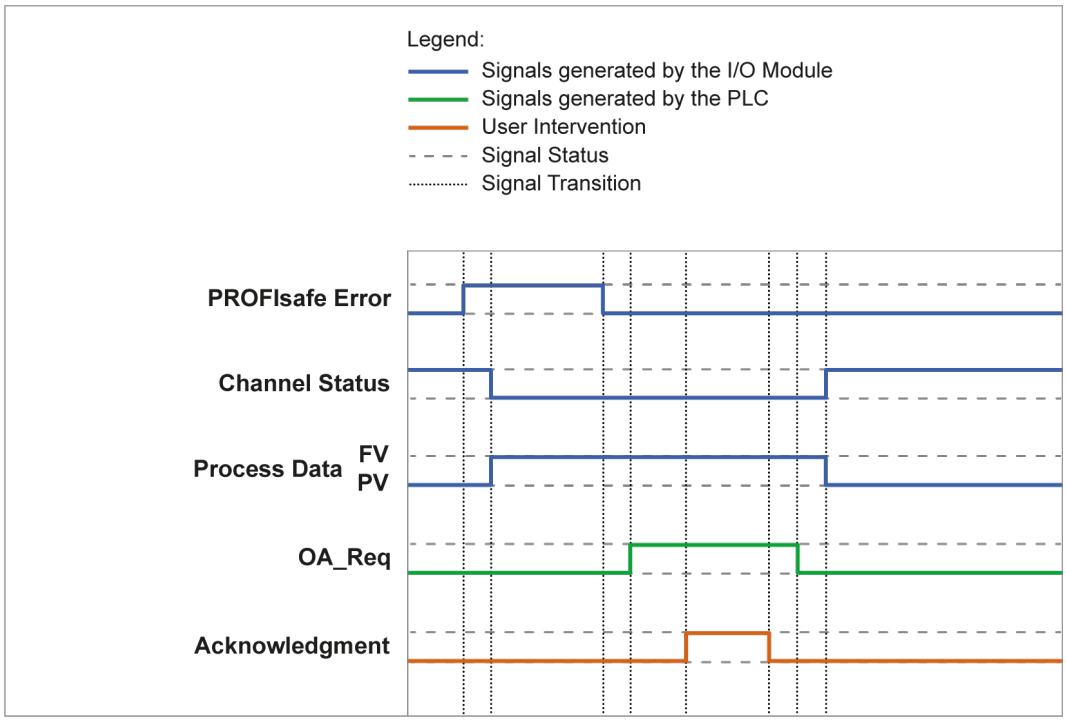


Figure 20: PROFIsafe Mode V2.4 and V2.6 – Signal Course Communication Error

8 Service

8.1 Firmware Update/Downgrade

You can update the firmware on the Series 750, 753 and 750 XTR I/O modules with the "WAGO IO-Update 750" software. The I/O module is updated via the service interface. For ETHERNET-based fieldbuses, the I/O module can also be updated via the fieldbus connection on the head station.

Observe the following information:

- Ensure that communication with the head station is not interrupted during the update process.
- The application running on the controller must be stopped before the update process.
- Before an update via the service interface, disconnect the fieldbus cable from the head station.
- Do not close the software during the update.
- Only run the software from a local hard disk.

NOTICE

Property damage due to interruption!

Interrupting the update process can damage the product.

- Complete the update/downgrade process!

Technical Support

- Additional information about the **WAGO IO-Update 750** software is available from ✉ **WAGO Support**.
- Contact ✉ **WAGO Support** to discuss whether a **firmware downgrade** is possible in your situation:
  Tel.: +49 (0) 571/8 87 – 4 45 55
  Fax: +49 (0) 571/8 87 – 84 45 55

9 Appendix

9.1 Technical Data, Approvals, Guidelines and Standards

Note

Subject to changes!

Please also observe the further product documentation! You can generate the current datasheet at any time at: www.wago.com /<item number>.

Supplementary Technical Data for the Data Sheet

Table 14: Module designations in the device catalog

PROFIBUS with PROFIsafe Mode V2.4	
F I/O module	750-1665 8FDO 4th Gen.
PROFINET with PROFIsafe Mode V2.4	
F I/O module	750-1665 8FDO 24V/0.5A
Using the engineering tool of the controller	8FDO PROFIsafe V2.4
PROFINET with PROFIsafe Mode V2.6	
F I/O module	750-1665 8FDO 24V/0.5A
Using the engineering tool of the controller	8FDO PROFIsafe V2.6

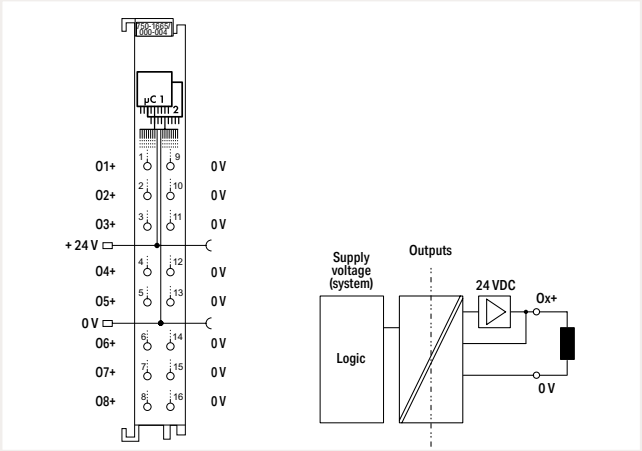
Table 15: Distance Modules

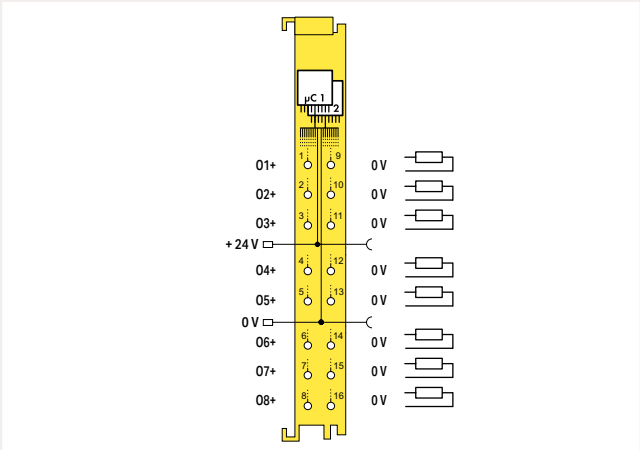
750-600	750-612	750-624/000-001	750-1605
750-602	750-614	750-624/020-001	750-1606
750-603	750-616	750-626	750-1607
750-604	750-616/030-000	750-626/020-000	

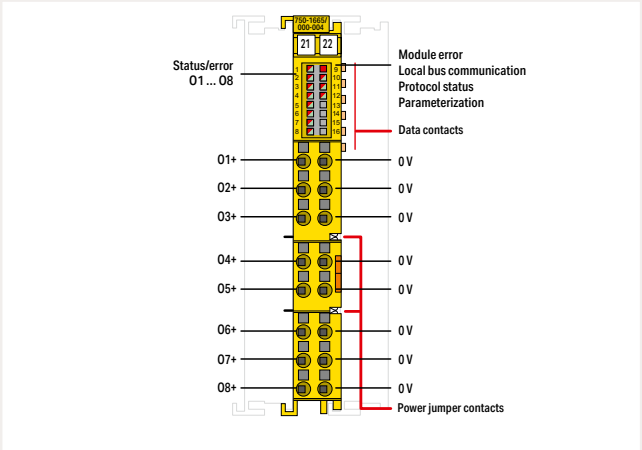
See also

Data sheet 750-1665/000-004 [▸ 37]

Safe Digital Output; 8 Channels; 24 VDC ; 0.5 A; PROFIsafe







This module (Item No. 750-1665/000-004) has 8 power outputs (O1+ ... O8+).
The power outputs switch resistive, capacitive and inductive loads according to DC 13 with a nominal current of up to 0.5 A without external additional circuit.
The power outputs can be operated unipolar (common potential on one side of the load).
Short circuit and 24 V power supply are monitored.
The PROFIsafe address is set on the coding switch located on the side, via WAGO-I/O-*CHECK* or via the Safe Controller Engineering Tool.
The module supports PROFIsafe protocols V2.4 and V2.6 (PROFIBUS and PROFINET).
Field and system levels are electrically isolated from each other.
The individual safe modules can be arranged as required when configuring the field-bus node.

If required (e.g., cable length of the 24 V power supply greater than 3 m), a WAGO filter module or a suitable external filter must be used for the 24 V power supply to protect against surge and burst (per EN 61000-6-7, EN 61326-3-1 and marine applications).
For more information, see the manual (German and English).
The module (Item No. 75x-1665/000-004) was evaluated by UL in accordance with UL/CSA 61010-1, UL/CSA 61010-2-201 and UL 121201, CSA-C22.2 No. 213.
The functional safety assessment according to the above standards was carried out by TÜV Rheinland.

Technical Data

Protocols	Safe communication via PROFIsafe V2.4 and PROFIsafe V2.6 (PROFINET® and PROFI-BUS)
Configuration options	Device address adjustable via DIP switch, WAGO Safety Editor 75x or engineering software for the safety controller
Indicators	LED (1-8) green/red: Status/error O1+ ... O8+; LED (9) red: Module error; LED (10) red/green: Local bus communication; LED (11) red/green: Protocol status; LED (12) red/green: Parameterization
GSD specification	V2.4
Number of F I/O modules per node (fieldbus coupler/controller)	See information in the manual about the respective fieldbus coupler/controller
Channel-granular passivation	Available

Safe Digital Output; 8 Channels; 24 VDC ; 0.5 A; PROFIsafe

Digital outputs	
Number of channels	8 (internal double-channel)
Signal type	Digital
Signal type (voltage)	24 VDC
Output characteristic	Two-Channel High-Side with Test Pulses
Output characteristics	0.5 ADC per IEC 61131-2
Output current per channel	0.5 ADC
Total output current (max.)	8 x 0.5 ADC to 40 °C; 8 x 0.375 ADC to 55 °C; Note: Observe the permissible mounting positions and the use of distance modules (see "Derating" in the product manual).
Output residual current at signal "0"	< 0.5 mA
Output protection	Protected and short-circuit-protected per IEC 61131-2
Response threshold (output protection) min.	0.6 ADC
Response threshold (output protection) max.	1.2 ADC
Limitation of the inductive transient voltage	See product manual
Parallel connection of outputs	Not possible
Controlling an IEC 61131-2-compatible input	Possible; see product manual
Response times	See product manual
Switching frequency (max.)	Resistive load = 30 Hz; inductive load = 0.1 Hz; capacitive load = 0.1 Hz
Capacitive load per channel (max.)	10 µF

Digital outputs	
Cable length (max.)	200 m (unshielded or shielded)
Read-back time	max. 50 ms
Test pulse duration	1 … 50 ms; test pulse duration is adaptively adjusted to the actuator
Response threshold (output monitoring O1+ … O8+) min.	8 VDC
Response threshold (output monitoring O1+ … O8+) max.	10 VDC
Supply voltage (system)	5 VDC; via data contacts
Current consumption (5 VDC system supply)	60 mA
Supply voltage (field)	SELV/PELV 24 VDC (−25 … +20 %) for inductive loads (pilot duty / DC 13); SELV/PELV 24 VDC (−25 … +30 %) for resistive and general use
Current consumption (field supply)	25 mA DC + load current of the digital outputs O1+ … O8+
Isolation	500 VDC system voltage / field level (power contacts)
Number of incoming power jumper contacts	2
Number of outgoing power jumper contacts	2
Current carrying capacity of power jumper contacts	10 A
Reverse voltage protection for power jumper contacts	Yes

Functional Safety

Achievable safety classes	Digital outputs: Cat. 4/PL e per EN 13849-1; SIL 3 per IEC 61508 / EN 62061
Safety standards	IEC 61508-1 … -7; EN ISO 13849-1; EN 62061
Interface types per ZVEI CB24I (digital outputs)	Source; C0

Connection Data

Connection technology: inputs/outputs	16 x CAGE CLAMP®
Connection type 1	Outputs
Connectable conductor materials	Copper
Solid conductor	0.08 … 1.5 mm² / 28 … 16 AWG
Fine-stranded conductor	0.25 … 1.5 mm² / 22 … 16 AWG
Strip length	8 … 9 mm / 0.31 … 0.35 inch

Physical Data

Width	12 mm / 0.472 inch
Height	100 mm / 3.937 inch
Depth	69 mm / 2.717 inch
Depth from upper-edge of DIN-rail	61.8 mm / 2.433 inch

Mechanical Data

Mounting type	DIN-35 rail
Pluggable connector	Fixed

Material Data

Housing material	Polycarbonate; Polyamide 6.6
Weight	Approx. 65 g

Safe Digital Output; 8 Channels; 24 VDC ; 0.5 A; PROFIsafe

Environmental Requirements

Ambient temperature (operation)	0 … +55 °C
Ambient temperature (storage)	–40 … +85 °C
Protection type	IP20
Pollution degree	2 per IEC 61131-2
Protection class	III
Overvoltage category	II per IEC 61131-2
Operating altitude	0 … 2000 m
Storage altitude	0 … 3000 m
Mounting position	Horizontal left, horizontal right, horizontal up, vertical top and vertical bottom (up to 40 °C ambient temperature); horizontal left, horizontal right and horizontal up (up to 55 °C ambient temperature)
Relative humidity (without condensation)	95 %
Vibration resistance	4g per IEC 60068-2-6
Shock resistance	15g per IEC 60068-2-27
Marine applications	DNV
EU EMC Directive 2014/30/EU	
EMC immunity to interference	EN 61000-6-2; marine applications; EN 61000-6-7 (FS); EN 61326-3-1:2017
EMC emission of interference	EN 61000-6-4; marine applications; EN 61000-6-3
Exposure to pollutants	Per IEC 60068-2-42 and IEC 60068-2-43
Permissible H_2S contaminant concentration at a relative humidity < 75 %	10 ppm
Permissible SO_2 contaminant concentration at a relative humidity < 75 %	25 ppm
E175199 Ordinary Locations	
UL E198726 Hazardous Locations	Class I, Div2 ABCD T4

Compliance

Conformity marking	CE; UKCA
EU Machinery Directive	2006/42/EC

9.2 Overview of PROFIsafe F Parameters

Table 16: PROFIsafe F Parameters

PROFIsafe F Parameter	Default Value	Description	
F_Check_ SeqNr	No Check	The F I/O module only supports PROFIsafe mode V2. The parameter is not evaluated and therefore must be set to “No Check.”	
F_Check_iPar	No Check	For the F I/O module, this value must always be set to “No Check.”	
F_SIL	SIL 3	The **F_SIL** parameter specifies the required safety integrity level of the F I/O module. The F I/O module supports SIL3. This value is specified by the WAGO device description file (GSD/GSDML).	
F_CRC_Length	3 byte CRC	The **F_CRC_Length** parameter specifies the length of the CRC2 key to be used in the PROFIsafe telegram. The required length depends on the length of the user data to be transferred. Valid combinations are:	
		F_CRC_Seed, F_Passivation	F_CRC_Length
		0, 0 (PROFIsafe V2.4)	3 byte CRC
		1, 1 (PROFIsafe V2.6)	4 byte CRC
F_CRC_Seed	0	The **F_CRC_Seed** parameter specifies the calculation type of the CRC2. The value of the parameter must exactly match the value of the **F_Passivation** parameter. If the F I/O module is to be operated in PROFIsafe Mode V2.4, both parameters must be set to “0”. If PROFIsafe Mode V2.6 is to be used, both parameters must be set to “1.” Valid combinations are:	
		F_Passivation	F_CRC_Seed
		0 (PROFIsafe V2.4)	0
		1 (PROFIsafe V2.6)	1
F_Passivation	0	The **F_Passivation** parameter sets the passivation type of the I/O module. If PROFIsafe Mode V2.4 is to be used, this parameter and the **F_CRC_Seed** parameter must be set to “0”. If PROFIsafe Mode V2.6 is to be used, this parameter and the **F_CRC_Seed** parameter must be set to “1”. In this case, the F I/O module uses channel-granular passivation according to RIOforFA. Valid combinations are:	
		F_CRC_Seed	F_Passivation
		0 (PROFIsafe V2.4)	0
		1 (PROFIsafe V2.6)	1 (channel-granular RIOforFA passivation)
F_Block_ID	0	The **F_Block_ID** parameter specifies the format of the F parameter set. The F I/O module only supports the value “0.”	
F_Par_Version	V2 mode	The **F_Par_Version** parameter specifies the PROFIsafe version to be used for communication. The F I/O module only supports PROFIsafe Mode V2.	
F_Source_Add	–	The **F_Source_Add** parameter specifies the PROFIsafe source address. To prevent incorrect parameterization, the address of the configuration tool is assigned automatically and cannot be changed. The parameter can take values from 1 to 65534. The F I/O module only supports PROFIsafe address type 1 and does not check the F source address.	
F_Dest_Add	–	The **F_Dest_Add** parameter specifies the PROFIsafe destination address of the F I/O module. For F_Dest_Add, values from 1 to 65534 can be selected. Each address value is only allowed to appear in the system once. This is verified by the configuration tool of the safe PLC. For PROFIsafe communication to be established, the parameter value must match the setting for the PROFIsafe address of the F I/O module. The F I/O module only supports PROFIsafe address type 1.	

PROFIsafe F Parameter	Default Value	Description
F_WD_Time	150 ms	The **F_WD_Time** parameter determines the monitoring time for PROFIsafe communication between the safe PLC and F I/O module. At least one valid PROFIsafe telegram must be exchanged between the safe PLC and the F I/O module within the monitoring time. If this condition is not met, the safe PLC or F I/O module initiates a safe state. The monitoring time must be selected in such a way as to tolerate the telegram execution times but still detect an interruption of the connection quickly enough. The monitoring time can be specified in 1 ms increments. The possible value range (50 … 10000 ms) is specified by the WAGO device description file (GSD/GDML).

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Glossary

Acknowledgment

Confirmation of an acknowledgment request, which causes start-up of a machine or system. Acknowledgment is necessary for the F I/O module – for example, after errors are detected by the F I/O module and eliminated by maintenance personnel – and is initiated from the control level.

Cat.

The categories (Cat.) of EN ISO 13849-1 (B, 1, 2, 3 and 4) specify the required behavior of a safe device in terms of its resistance to errors based on its design.

CRC (Cyclic Redundancy Check)

Procedure for determining a test value for data to allow detection of errors during transmission or storage

Cross Circuit

Short between channels

Dangerous Failure

Failure that has the potential to bring a unit into a dangerous state or cause a malfunction (see "Failure")

DC13 (Utilization Category)

Utilization category DC13 of EN 60947-5-1 describes the making and breaking capacity for switching elements in order to be able to switch an electromagnetic load.

Diagnostic Coverage Level

A measure of the effectiveness of the diagnostic measures, determined as the ratio of the failure rate of the detected dangerous failures to the total rate of dangerous failures

Engineering tool of the safe PLC

Tool for configuring hardware and creating the controller's safety program

F Parameters

Parameters for configuring data communication between the controller and the F I/O module

Hardware Fault Tolerance

Capacity of a safety-related unit, subsystem or subsystem element to continue performing a required safety function even in the presence of a fault

iParameters

Individual or device-specific parameters of a safe unit or safe device; "iPar" for short

MTTF(D) (Mean Time To Failure (Dangerous))

Value indicating the mean time until a dangerous failure of a safe unit or sub-unit

Passivate/Passivation

The F I/O module automatically performs passivation of safe digital outputs after switch-on or detection of errors. Operator acknowledgment is required after passivation in order for the F I/O module to start up.

PFD (Probability of Failure on Demand)

Value indicating the probability of a hazardous failure

PFH (Probability of Dangerous Failure per Hour)

Safety parameter indicating the probability of a dangerous failure within one hour

PL (Performance Level)

Indicates the ability of safety-related devices to perform a safety function under foreseeable conditions

PROFIsafe Address

Address that must be assigned to a safe device with PROFIsafe data communication so data communication can be established between a PROFIsafe master and a PROFIsafe slave

PROFIsafe Mode V2.6

PROFIsafe – Profile for Safety Technology on PROFIBUS and PROFINET Profile part, related to IEC 61784-3-3 Technical Specification Version 2.6 MU1

PROFIsafe V2 Mode per IEC 61784-3-3

PROFIsafe V2 Mode – Services and protocols of the safety-oriented PROFIsafe communication profile according to PROFIBUS Guideline: PROFIsafe – Profile for Safety Technology, V2.4, March 2007.

Request

Event that causes the F I/O module to execute its safety function

RIOforFA

Remote IO for Factory Automation Common Profile Specification for PROFINET and PROFIBUS Version 1.10

Safe PLC

Safety-related PLC that supports safe devices such as F I/O modules

Safety Function

Function of a machine whose failure may result in an immediate increase in risk(s)

Safety Response Time

The safety response time describes the time between a request and when the safe state is established, even in the presence of an individual error. With single-channel use, external measures may be the only way to achieve the safe state.

Short Circuit

A conductive connection between two live electrical lines with nearly no resistance

SIL (Safety Integrity Level)

The Safety Integrity Level (SIL) is used to assess electrical/electronic/programmable electronic (E/E/PE) systems in terms of the reliability of safety functions. There are four levels for specifying the requirement for the safety integrity of safety functions, where “Safety Integrity Level 4” is the highest level of safety integrity and “Safety Integrity Level 1” is the lowest.

Single Fault Safety

Even after an error occurs, the required safety function is still ensured. In other words, one error does not lead to the loss of the safety function.

User Acknowledgment

See “Acknowledgment.”

WAGO Safety Editor

WAGO parameterization tool; together with the WAGO-I/O-Check, it is required for configuring the F I/O modules

WAGO-I/O-CHECK

Manufacturer tool; together with WAGO Safety Editor, it is required for configuring the F I/O modules

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