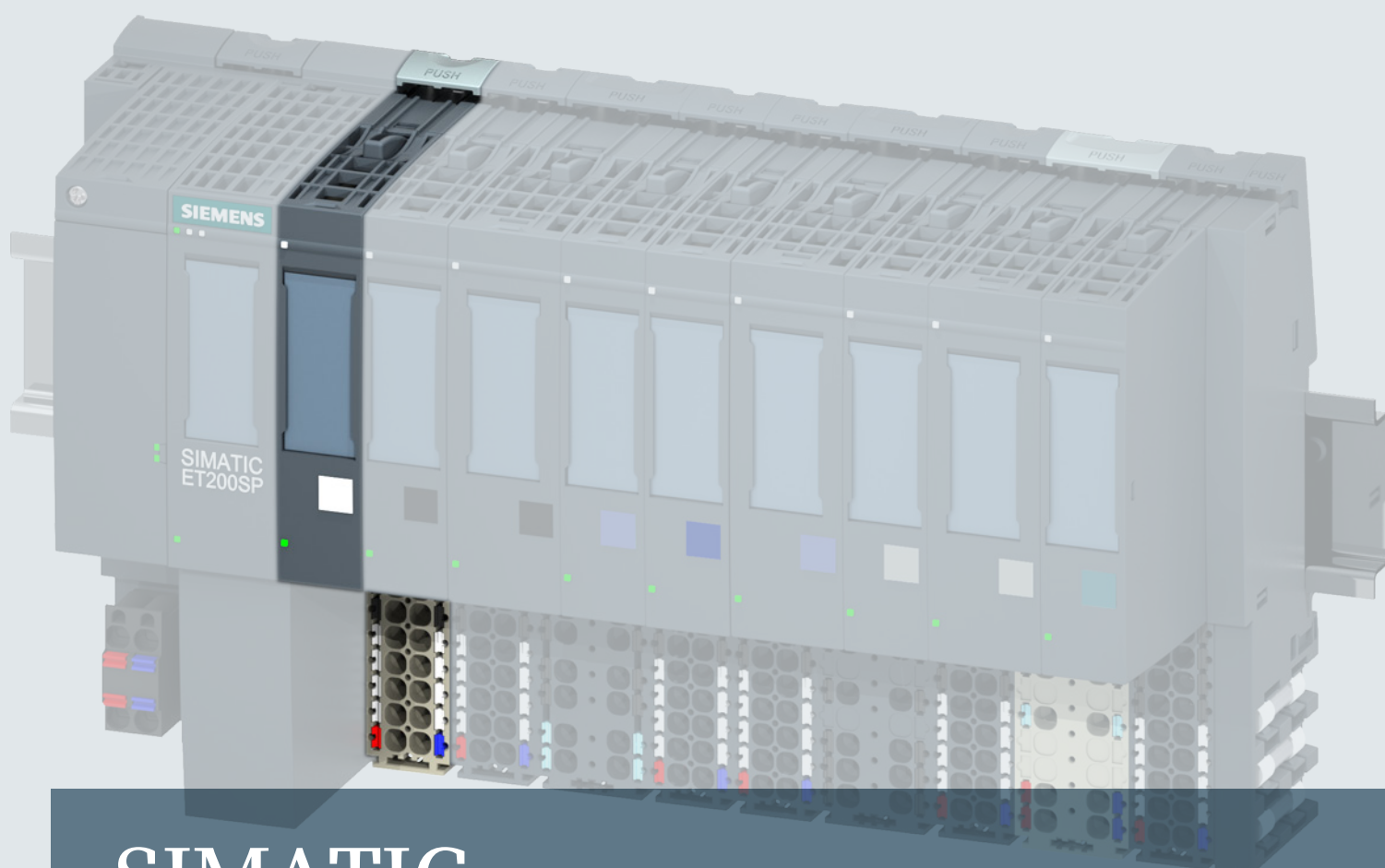


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SIMATIC

ET 200SP

Digital input module DI 8xNAMUR (6ES7131-6TF00-0CA0)

Manual

Edition

02/2014

Answers for industry.

SIEMENS

SIMATIC

ET 200SP
DI 8xNAMUR HF
digital input module
(6ES7131-6TF00-0CA0)
Manual

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 DANGER
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 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.
NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Preface

Purpose of the documentation

This device manual complements the system manual ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>). Functions that generally relate to the system are described in this manual.

The information provided in this manual and in the system/function manuals supports you in commissioning the system.

Conventions

Please also observe notes marked as follows:

Note

A note contains important information on the product described in the documentation, on the handling of the product and on the section of the documentation to which particular attention should be paid.

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Guide to documentation

Introduction

This modular documentation of the SIMATIC products covers diverse topics concerning your automation system.

The complete documentation for the ET 200SP distributed I/O system consists of a system manual, function manuals and product manuals.

The STEP 7 information system (online help) also supports you during the configuration and programming of your automation system.

Overview of documentation for digital input module DI 8×NAMUR HF

The following table shows additional documentation that you need for using the DI 8×NAMUR HF digital input module.

Table 1- 1 Documentation for the DI 8×NAMUR HF digital input module

Topic	Documentation	Key contents
System description	System manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293)	• Application planning • Installation • Wiring • Commissioning
Designing interference-free controllers	Function manual Designing interference-free controllers (http://support.automation.siemens.com/WW/view/en/59193566)	• Basics • Electromagnetic compatibility • Lightning protection
System diagnostics	Function manual Diagnostics (http://support.automation.siemens.com/WW/view/en/59192926)	• Overview • Diagnostics evaluation of hardware/software
BaseUnits	Manual ET 200SP BaseUnits (http://support.automation.siemens.com/WW/view/en/58532597/133300)	Technical specifications
Amendments and special features of the ET 200SP I/O system	ET 200SP Product information (http://support.automation.siemens.com/WW/view/en/73021864)	Current information not yet documented in the system manuals, function manuals, or product manuals.

SIMATIC manuals

All current manuals for SIMATIC products are available to download free of charge on the Internet (<http://www.siemens.com/simatic-tech-doku-portal>).

Product overview

2.1 Properties

Order number

6ES7131-6TF00-0CA0

View of the module

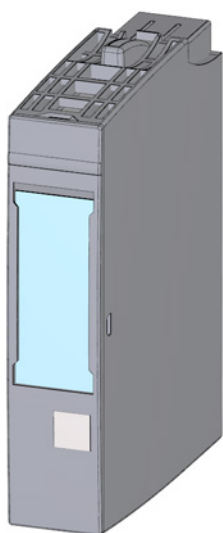


Figure 2-1 View of the DI 8xNAMUR HF module

Properties

The module has the following technical properties:

- 8 digital inputs each with a value status (quality information)
- 8.2 VDC sensor supply for individual connection and disconnection (PROFInergy)
- Selectable diagnostics (per channel)
- Suitable for connecting NAMUR sensors and connected and unconnected mechanical contacts

The module supports the following technology functions:

- Pulse stretching
- Chatter monitoring
- Diagnostics for changeover contact sensor type

The module supports the following functions:

- Firmware update
- Identification data I&M0 to I&M3
- Reconfiguration in RUN

You can configure the module with STEP 7 (TIA Portal) and with a GSD file.

Accessories

The following accessories can be ordered separately:

- Labeling strips
- Color identification labels
- Reference identification label
- Shield connection

You can find additional information on the accessories in the ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>) system manual.

See also

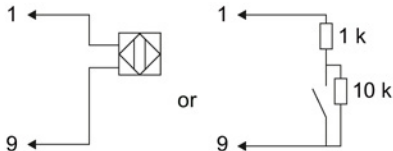
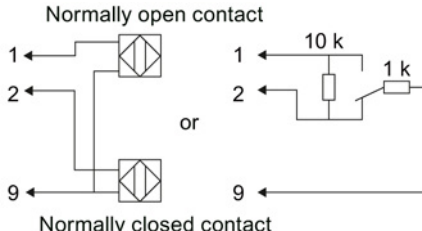
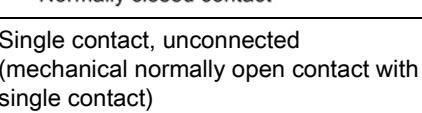
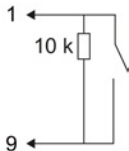
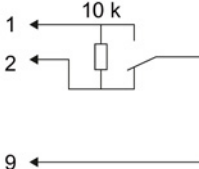
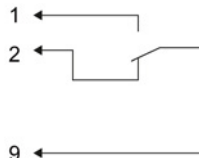
ET 200SP Product information
(<http://support.automation.siemens.com/WW/view/en/73021864>)

Wiring

3.1 Pin assignment

General pin assignment

Table 3- 1 Pin assignment for DI 8×NAMUR HF

Pin assignment for DI 8×NAMUR HF (6ES7131-6TF00-0CA0)						
Terminal	Assign- ment	Terminal	Assign- ment	Description	BaseUnit ¹	Color identification label (terminals 1 to 16)
1	DI ₀	2	DI ₁	- DI_n: Input signal, channel n - U_{Sn}: Sensor supply, channel n	A0	 CC01 6ES7193-6CP01-2MA0
3	DI ₂	4	DI ₃			
5	DI ₄	6	DI ₅			
7	DI ₆	8	DI ₇			
9	U _{S0}	10	U _{S1}			
11	U _{S2}	12	U _{S3}			
13	U _{S4}	14	U _{S5}			
15	U _{S6}	16	U _{S7}			
L+	24 VDC	M	M			
The figures below show the connections for input signal DI ₀ for all sensor types.						
NAMUR sensors / IEC 60947-5-6 sensors 		NAMUR changeover contacts / IEC 60947-5-6 changeover contacts Normally open contact  Normally closed contact 		Single contact connected with 10 kΩ (mechanical normally open contact) 		
Changeover contact connected with 10 kΩ (mechanical changeover contact) 		Single contact, unconnected (mechanical normally open contact with single contact) 		Changeover contact, unconnected (mechanical changeover contact) 		

¹ BaseUnit types that can be used are identified by the last two digits of the order number. See also "ET 200SP distributed I/O system" system manual.

Note

The first BaseUnit of a station must be a light-colored BaseUnit. Keep this in mind also during the configuration.

Firmware update

When updating the firmware, the L+ supply voltage must be applied to the module at the start and during the firmware update.

See also

ET 200SP distributed I/O system

(<http://support.automation.siemens.com/WW/view/en/58649293>)

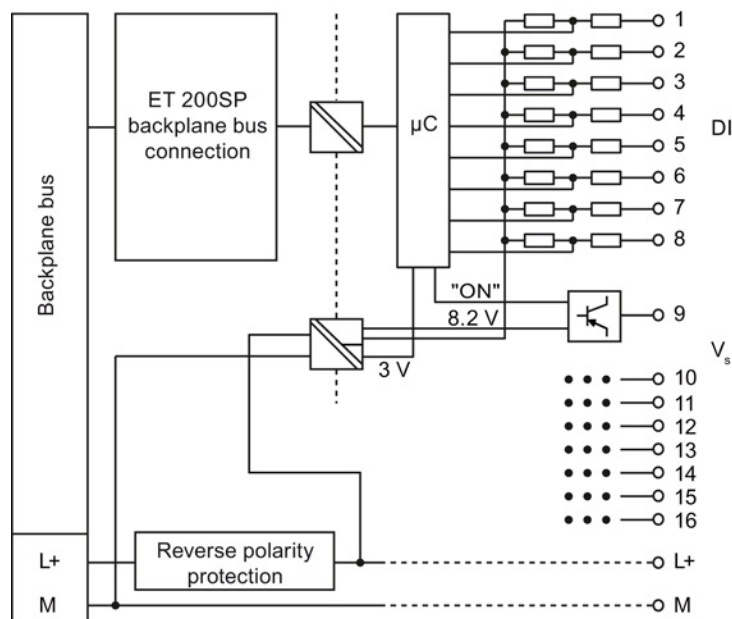
3.2 Block diagram**Block diagram**

Figure 3-1 Block diagram DI 8xNAMUR HF

Parameters/address space

4.1 Parameters

DI 8xNAMUR HF parameters

The following table lists the configurable parameters. The effective range of the configurable parameters depends on the type of configuration. The following configurations are possible:

- Distributed operation on PROFINET IO in an ET 200SP system
- Distributed operation with PROFIBUS DP in an ET 200SP system

When assigning parameters in the user program, use the "WRREC" instruction to transfer the parameters to the module using data records (refer to the section Parameter assignment and structure of parameter data record (Page 33)).

The following parameter settings are possible:

Table 4- 1 Configurable parameters and their defaults (GSD file)

Parameters	Value range	Default	Changing parameter settings in RUN	Effective range with configuration software, e.g. STEP 7 (TIA-Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP
Diagnostics: Missing supply voltage L+	• Disable • Enable	Disable	Yes	Channel	Channel
Diagnostics: Short-circuit to ground	• Disable • Enable	Disable	Yes	Channel	Channel
Diagnostics: Wire break	• Disable • Enable	Disable	Yes	Channel	Channel
Diagnostics: Changeover error	• Disable • Enable	Disable	Yes	Channel	Channel
Diagnostics: Chatter error	• Disable • Enable	Disable	Yes	Channel	-
Chatter monitoring: Monitoring window	• 0.5 s • 1 s to 100 s (can be set in 1 s-increments)	0.5 s	Yes	Channel	-
Chatter monitoring: Number of signal changes	• Deactivated • 2 to 32	Deactivated	Yes	Channel	-

4.1 Parameters

Parameters	Value range	Default	Changing parameter settings in RUN	Effective range with configuration software, e.g. STEP 7 (TIA-Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP
Hardware interrupts	- Deactivated - Rising edge - Falling edge - Falling and rising edge	Deactivated	Yes	Channel	-
Sensor type	- Channel deactivated - NAMUR sensor - Single contact, unconnected - Single contact, connected with 10 kΩ - NAMUR changeover contact - Changeover contact, unconnected - Changeover contact, connected with 10 kΩ	NAMUR sensor	Yes	Channel	Channel
Pulse stretching	- None 0.5 s 1 s 2 s	None	Yes	Channel	-
Inverted	- Disable - Enable	Disable	Yes	Channel	Channel
Potential group	- Use potential group of the left module - Enable new potential group	Use potential group of the left module	No	Module	Module

Changing parameter settings and effects on the technology functions

Reconfiguring a technology function resets its responses. Reconfiguring one technology function has no effect on other technology functions. Exception: Signal inversion and chatter monitoring, because an additional edge change is generated when signal inversion is disabled/enabled.

Technology functions

All technology functions, such as

- Pulse stretching
- Chatter monitoring
- Changeover errors
- Hardware interrupts

are executed only when there is an error-free signal ($QI = 1$). In other words, there is no diagnostics information on the channel (see also section Address space (Page 18)).

4.2 Explanation of parameters

Diagnostics: Missing supply voltage L+

The diagnostics alarm is enabled for missing or insufficient supply voltage L+.

Tip: To avoid a diagnostics overload, you should only enable "Diagnostics: Missing supply voltage" for an active channel.

Diagnostics: Short-circuit to ground

The diagnostics alarm is enabled if there is a short-circuit of the sensor supply to ground.

"Short-circuit to ground" diagnostics is available with the following sensor setting:

- NAMUR sensor
- NAMUR changeover contact

Diagnostics: Wire break

The diagnostics alarm is enabled if the line to the sensor is interrupted.

"Wire break" diagnostics is available with the following sensor setting:

- NAMUR sensor
- Single contact with 10 k Ω
- NAMUR changeover contact
- Changeover contact with 10 k Ω

Diagnostics: Changeover error

The diagnostics alarm is enabled when a changeover error occurs.

"Changeover error" diagnostics is available with the following sensor setting:

- NAMUR changeover contact
- Changeover contact, unconnected
- Changeover contact with 10 k Ω

Diagnostics: Chatter error

The diagnostics alarm is enabled when a chatter error occurs.

Chatter monitoring is a process control function for digital input signals. It detects and reports signal changes that are unexpected in process engineering, for example when an input signal fluctuates too often between "0" and "1". If signal characteristics like these occur, it is a sign that the sensors are faulty or that there are instabilities from a process engineering viewpoint.

Chatter monitoring: Monitoring window

Chatter monitoring: Setting of the monitoring window

Each input channel has a configurable monitoring window. The monitoring window is started the first time the input signal changes. If the input signal changes within the monitoring window more often than the configured number of signal changes, this is recognized as a chatter error. If no chatter error is detected within the monitoring window, the window is restarted at the next signal change.

Chatter monitoring: Number of signal changes

Chatter monitoring: Setting of the signal change

Settings for the tolerated number of signal changes during chatter monitoring within the monitoring window.

Number of signal changes = 0 deactivates the chatter monitoring function.

Hardware interrupts

Specifies whether the rising or falling edge or both edges trigger a hardware interrupt.

Sensor type

Specifies which sensor type is connected (see Table 3-1 Pin assignment for DI 8×NAMUR HF (Page 9)).

For the following sensor types

- NAMUR changeover contact
- Changeover contact, unconnected
- Changeover contact with 10 kΩ

the following applies: The normally open contact channel must be set according to the sensor type. The normally closed contact channel must be deactivated.

If "Channel deactivated" is shown, this means that the channel is not activated.

Pulse stretching

Sets whether and for how long pulse stretching is to take place.

Pulse stretching is a function for changing a digital input signal. A pulse at a digital input is extended to at least the configured length. If the input pulse is already longer than the configured length, then the pulse will not be changed.

Inverted

Specifies whether or not the input signal is to be inverted.

Inversion is only possible with the following sensor types:

- NAMUR sensor
- Single contact, unconnected
- Single contact with 10 kΩ

Potential group

Specifies that a BaseUnit with an incoming supply voltage is located in this slot (see ET 200SP distributed I/O system

(<http://support.automation.siemens.com/WW/view/en/58649293>) system manual).

See also

Pin assignment (Page 9)

Pulse stretching (Page 16)

Diagnostics for changeover contact sensor type (Page 25)

4.3 Pulse stretching

Description

Pulse stretching is a function for changing a digital input signal. A pulse at a digital input is extended to at least the configured length. If the input pulse is already longer than the configured length, then the pulse will not be changed.

The pulse-stretched signal is the input signal for the hardware interrupt.

Principle of pulse stretching

The following figure uses examples to show if and how input pulses are changed.

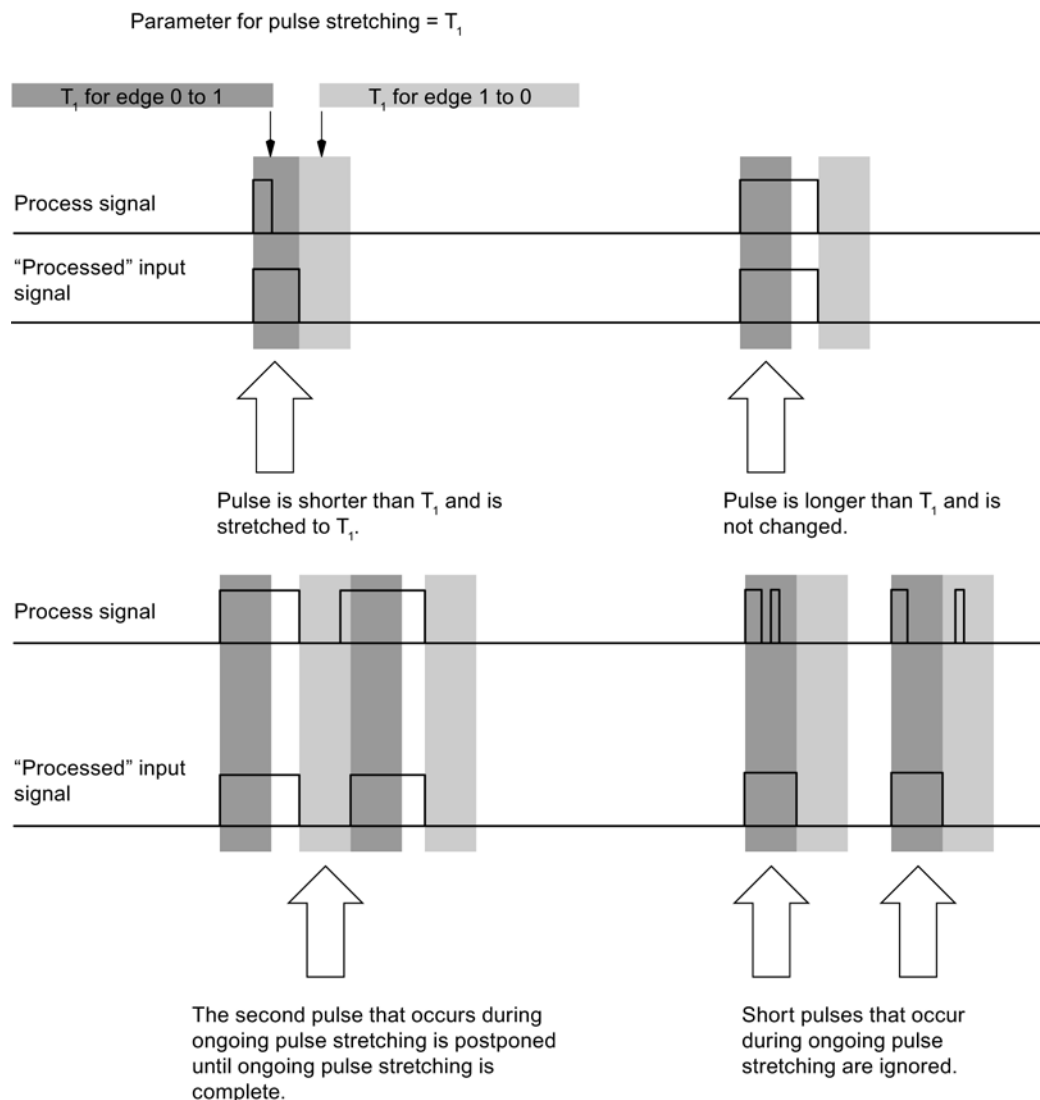


Figure 4-1 Principle of pulse stretching

Note

If you set pulse stretching for an input channel, this will also affect the chatter monitoring that is enabled for this channel. The "pulse-stretched" signal is the input signal for the chatter monitoring. You should therefore match the parameter settings for pulse stretching and chatter monitoring to one another. By selecting the appropriate values for the parameters you can adjust the functions optimally to your process.

Note

Pulse stretching in progress is reset in the event of an error in the value status (QI = 0, e.g. wire break).

4.4 Address space

Configuration options of the DI 8×NAMUR HF

Configuration with value status:

- DI 8×NAMUR HF QI

Evaluating the value status

As a result of configuration with value status (QI), an additional byte is allocated in the input address space. Each bit in this byte is assigned to a channel and returns information about the validity of the digital value.

Deactivated channels or channels that are not operating correctly return a value status of QI = 0.

With changeover contacts, the value status of a normally closed contact channel is always QI = 0. The validity of the signal must be checked on the normally open contact channel.

Address space of the digital input module DI 8×NAMUR HF

The following figure shows the assignment of address space for the DI 8×NAMUR HF with value status (Quality Information (QI)).

Assignment in the process image input (PII)

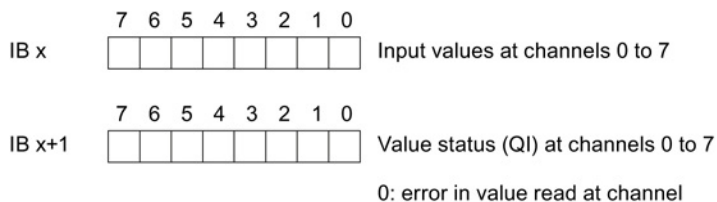


Figure 4-2 Address space of the DI 8×NAMUR HF digital input module with value status

Technology functions

All technology functions, such as

- Pulse stretching
- Chatter monitoring
- Changeover error
- Hardware interrupt

require a valid input signal that returns QI = 1 (no diagnostics detected). Otherwise, they will not run.

Interrupts/diagnostics alarms

5.1 Status and fault displays

LED displays

The figure below shows the LED displays (status and fault displays) of the DI 8×NAMUR HF.

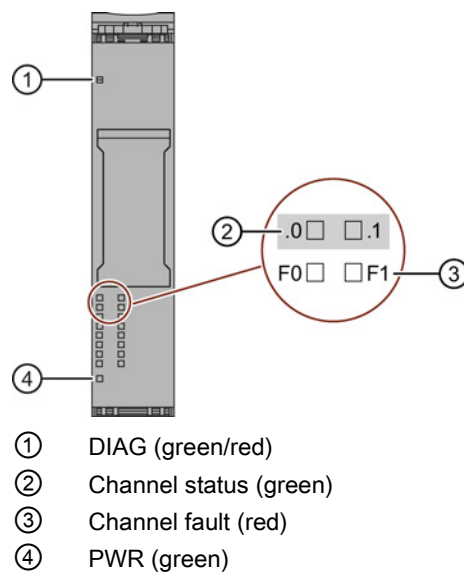


Figure 5-1 LED display

Meaning of the LEDs

The tables below explain the meaning of the status and fault displays. Corrective measures for diagnostics alarms can be found in chapter Diagnostics alarms (Page 24).

LED DIAG

Table 5- 1 LED DIAG fault display

LED DIAG	Meaning
 Off	Supply voltage of the ET 200SP not OK
 Flashing	Module not ready for operation (no parameters or invalid parameters assigned)
 On	Module configured and no module diagnostics
 Flashing	Module configured and module diagnostics

LED channel status/channel fault

The channel status LED shows the signal state of the user data of an input. If inversion is enabled, the channel status LED shows the inverted status of the signal applied to the terminal.

If there is a diagnostics event on the channel, the channel status LED is always off if diagnostics is enabled and therefore does not indicate the signal state of the user data of the input.

Table 5- 2 Channel status/channel fault LED status and fault display

LED		Meaning
Channel status	Channel fault	
 Off	 Off	Input returns "0" signal and no channel diagnostics or channel deactivated
 On	 Off	Input returns "1" signal and no channel diagnostics
 Off	 On	Channel activated and channel diagnostics
 On	 On	Not permitted (fault)

LED PWR

Table 5- 3 LED PWR status display

LED PWR	Meaning
 Off	Supply voltage L+ is missing, is too low or polarity reversed
 On	Supply voltage L+ present

5.2 Interrupts

Digital input module DI 8×NAMUR HF supports the following diagnostics and hardware interrupts.

Diagnostics interrupt

The module generates a diagnostics interrupt at the following events:

- Short-circuit to ground
- Wire break
- Supply voltage missing
- Changeover error
- Chatter error

Evaluating hardware interrupts with IO controller

The module generates a hardware interrupt at the following events:

- Upon a rising edge (signal change from 0 to 1)
- Upon a falling edge (signal change from 1 to 0)

In the event of an interrupt, interrupt OBs run automatically in the CPU of the IO controller.

You will find detailed information on the event in the hardware interrupt organization block with the "RALRM" instruction (read additional interrupt info) and in the STEP 7 online help.

The module channel that triggered the hardware interrupt is entered in the start information of the organization block. The following figure shows the assignment to the bits of double word 8 in local data.

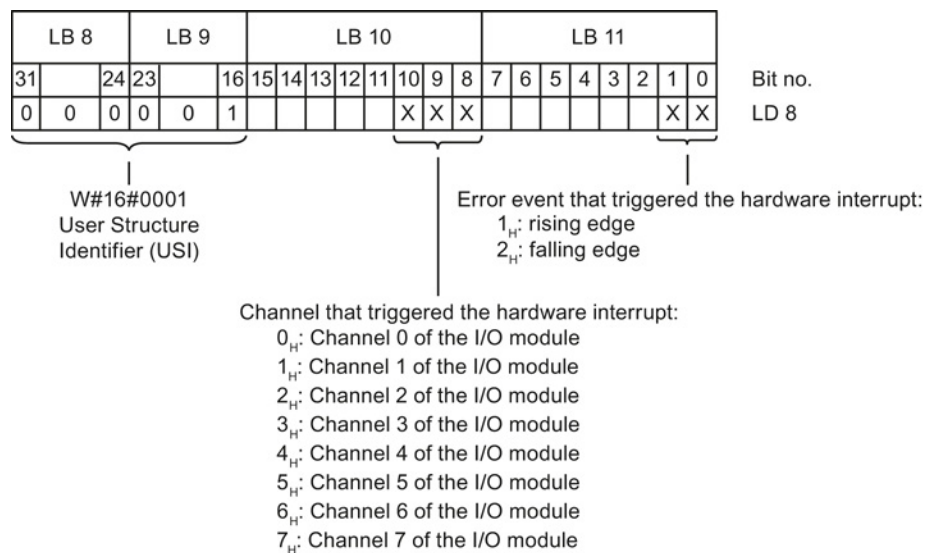


Figure 5-2 Organization block start information

Structure of the additional interrupt information

Table 5- 4 Structure of USI = W#16#0001

Data block name	Contents	Comment	Bytes
USI (User Structure Identifier)	W#16#0001	Additional interrupt information for hardware interrupts of the I/O module	2
The channel that triggered the hardware interrupt follows.			
Channel	B#16#00 to B#16#07	Channel 0 to 7 of the I/O module	1
The event that triggered the hardware interrupt follows.			
Event	B#16#01	Rising edge	1
	B#16#02	Falling edge	

5.3 Diagnostics alarms

Diagnostics alarms

A diagnostics alarm is output for each diagnostics event and the LED DIAG flashes on the module. Diagnostics alarms can, for example, be read from the diagnostics buffer of the CPU. You can evaluate the fault codes with the user program.

Table 5- 5 Diagnostics alarms, meaning and corrective measures

Diagnostics alarm	Fault code	Meaning	Remedy
Short-circuit (NAMUR changeover contact and NAMUR sensor only) Tip: Check the normally open and normally closed contact channels of the NAMUR changeover contact.	1 _H	Short-circuit in the signal line to the sensor	Correct the process wiring
		Sensor defective	Replace the sensor
		Wrong sensor type configured	Correct the parameter assignment
		Load impedance too low	Use a sensor with a higher impedance
Wire break (only NAMUR changeover contact, NAMUR sensor, sensor connected with 10 kΩ and single contact connected with 10 kΩ) Tip: Check the normally open and normally closed contact channels of the NAMUR changeover contact	6 _H	Signal line to a sensor interrupted	Correct the process wiring
		Sensor defective	Replace the sensor
		Wrong sensor type configured	Correct the parameter assignment
		Load impedance too high	Use a different sensor type or modify the wiring, for example, using cables with a larger cross-section
		Channel not connected (open)	Disable diagnostics, connect sensor contacts
Fault	9 _H	Sensor supply defective	Replace the module
		Hardware failure	
No load voltage	11 _H	Supply voltage L+ missing or too low	Check supply voltage L+ on the BaseUnit Check BaseUnit type
External fault (changeover sensors only)	1A _H	Changeover error: Validity check between normally closed and normally open contact channel negative	Check process wiring, change sensor
Fault 1 in actuator/sensor = signal chatters	1D _H	Chatter error: Signal chatters: too many signal changes within the monitoring window If no further chattering of the input signal is detected within three monitoring windows, an outgoing diagnostics alarm is triggered. The status of the value of the current signal in the process image is set to "valid".	Verify the chatter monitoring parameters
			Check process wiring, if necessary change sensor
Channel/component temporarily unavailable	1F _H	Firmware update is currently in progress or was canceled while running	Connect the supply voltage Restart the firmware update

5.4 Diagnostics for changeover contact sensor type

Diagnostics for changeover contact sensor type

With the changeover error diagnostics, the switchover between two input channels is checked. If there is a signal change in a changeover contact channel and there is no signal change at the other contact changeover channel after the tolerated switchover time, the diagnostics module returns a changeover error.

The tolerated switchover time between the two channels is set to the fixed value of 300 ms.

Changeover sensors are always assigned to two adjacent channels: The normally open contact channel should be set in accordance with the sensor type to channel 0, 2, 4, 6, and the respective corresponding normally closed contact channel 1, 3, 5, 7 deactivated.

Principle of changeover contact diagnostics

If the digital inputs of a channel group are configured as "changeover contacts", the module for this channel group carries out diagnostics for the changeover contact sensor type.

If the validity check is negative, the following applies:

- The module identifies the value status of the normally open contact channel as "invalid" (QI = "0"),
- The module creates a diagnostics entry for the normally open contact channel and
- A diagnostics interrupt is triggered if changeover error diagnostics is enabled.

The digital input signal and the value status are only updated for the normally open contact channel (channels 0, 2, 4, 6). The digital input signal is 0 and the value status is "invalid" (QI = "0") for the normally closed contact channel (channels 1, 3, 5, 7). This channel is only used for a validity check of the sensor.

Please note the following special features for changeover contact diagnostics:

- If the normally open and normally closed contact signals are not plausible after 300 ms, a changeover error is output as diagnostics information.
- If there is already a fault (QI = 0, e.g. a wire break), the module will no longer perform diagnostics for changeover errors.
- There are different diagnostics options depending on the type of changeover contact (Dependencies when configuring with GSD files (Page 32)). Depending on the sensor type, a changeover error can have different causes.
 - In the case of connected changeover contacts, a changeover error may also be the result of a short-circuit (sensor is not defective; there is a short-circuit).
 - In the case of unconnected changeover contacts, a changeover error may also be the result of a wire break.
 - If a wire break or short-circuit can be detected with the particular sensor type but its diagnostics is not enabled, instead of the wire break or short-circuit diagnostics information, the changeover error diagnostics information is displayed if this is enabled.

Tip: Data records 0 to 7 and changeover sensor

Using the data records 1, 3, 5 and 7, you can configure a changeover sensor on an even channel (normally closed contact channel).

The corresponding normally open contact channel can be configured with the data records 0, 2, 4 and 6.

An even changeover contact channel must be followed by an odd, deactivated channel. Otherwise:

- you receive a parameter assignment error or
- the parameter assignment is rejected and the current parameter assignment retained.

Remedy: First, send data records 1, 3, 5 and 7 with deactivated, and then send data records 0, 2, 4 and 6 with changeover contact.

5.5 Chatter monitoring

Description

Chatter monitoring is a process control function for digital input signals. It detects and reports signal changes that are unexpected in process engineering, for example when an input signal fluctuates too often between "0" and "1". This period is known as the "monitoring window". If signal characteristics like these occur, it is a sign that the sensors are faulty or that there are instabilities from a process engineering viewpoint.

Activating chatter monitoring

You activate chatter monitoring by specifying a permitted number of input signal changes between "0" and "1" within the monitoring window. The number 0 deactivates the chatter monitoring function.

A chatter error detected by the chatter monitoring has a direct effect on the value status (QI).

Detecting a chatter error

Each input channel has a monitoring window that has been assigned parameters. The monitoring window is started the first time the input signal changes. If the input signal changes within the monitoring window more often than the configured number of signal changes, this is recognized as a chatter error. If no chatter error is detected within the monitoring window, the window is restarted at the next signal change.

Reporting a chatter error

If a chatter error occurs, the current signal status is entered in the process image and the value status of the signal is set to "invalid" (QI = 0). If "Chatter error" diagnostics is enabled, "Chatter error" is also entered as diagnostic information, triggering an incoming diagnostics interrupt.

You can evaluate and process the value status (QI) and the diagnostics information in the user program.

Resetting a chatter error

If no further chattering of the input signal is detected within three monitoring windows, an outgoing diagnostics interrupt is triggered. The status of the value of the current signal in the process image is set to "valid".

Note

Active chatter monitoring is reset if there is an error in the input signal (value status QI = 0).

Principle

The following figure gives you another graphic illustration of the principle of chatter monitoring.

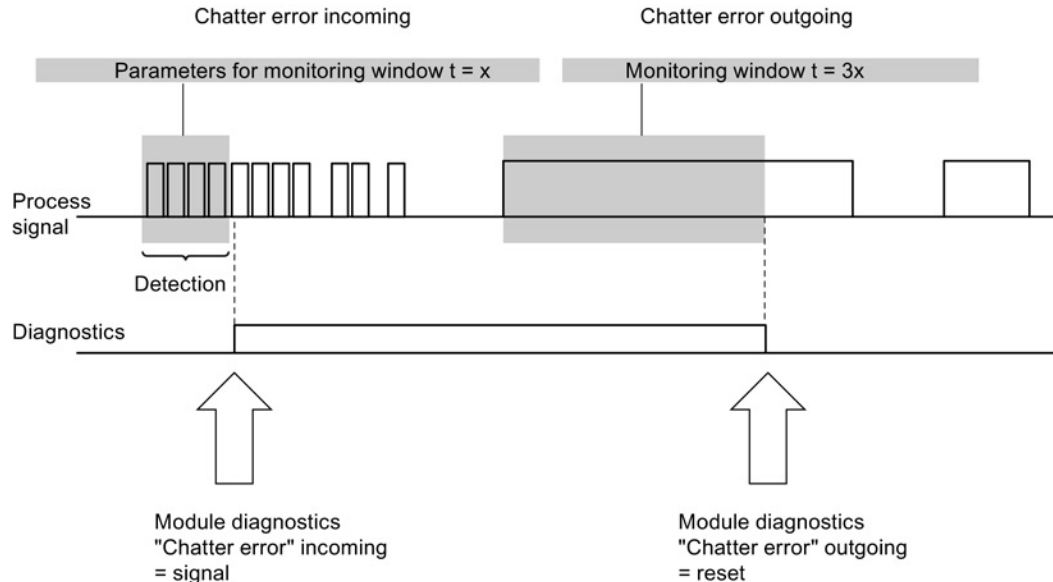


Figure 5-3 The principle of chatter monitoring

Chatter monitoring and "settling time" if a chatter error occurs

Does the monitoring time in the event of a fault restart as three monitoring windows if the signal continues to change?

The signal changes...	Result
once more often than set in the "Number of signal changes".	Monitoring time is restarted.
less often than set in the "Number of signal changes".	The monitoring time is not started again, in other words, the monitoring time runs once after a chatter error is detected. Even a change just before the time is up is tolerated.

Technical specifications

6.1 Technical specifications

DI 8×NAMUR HF technical specifications

	6ES7131-6TF00-0CA0
Product type designation	DI 8×NAMUR HF
General information	
Usable BaseUnits	BU type A0
Product function	
I&M data	Yes; I&M0 to I&M3
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V13 / V13
STEP 7 can be configured/integrated as of version	V5.5 SP3 / V5.5 SP4
PROFIBUS as of GSD version/GSD revision	GSD revision 5
PROFINET as of GSD version/GSD revision	V2.3
Supply voltage	
Rated value (DC)	24 V
Valid range, low limit (DC)	20.4 V
Valid range, high limit (DC)	28.8 V
Reverse polarity protection	Yes
Sensor supply	
Number of outputs	8
Output current	
Short-circuit protection	Yes
Power loss	
Power loss, typ.	1.5 W
Address area	
Address space per module	
Address space per module, max.	1 byte; + 1 byte for QI information
Digital inputs	
Number of inputs	8
Digital inputs, configurable	Yes
Type	NAMUR
Pulse stretching	Yes; 0.5 s, 1 s, 2 s
Edge evaluation	Yes, rising edge, falling edge, edge change
Signal change chatter	Yes, 2 to 32 signal changes
Chatter monitoring window	Yes, 0.5 s, 1 s to 100 s in 1 s increments

	6ES7131-6TF00-0CA0
Input voltage	
Type of input voltage	DC
Rated value, DC	8.2 V
Input current	
For 10 k connected contact	
• For signal "0"	0.35 mA to 1.2 mA
• For signal "1"	2.1 to 7 mA
For unconnected contact	
• For signal "0", max. (permissible quiescent current)	0.5 mA
• For signal "1"	typ. 8 mA
For NAMUR sensors	
• For signal "0"	0.35 mA to 1.2 mA
• For signal "1"	2.1 to 7 mA
Input delay (for rated value of input voltage)	
Tolerated switchover time for changeover contacts	300 ms
For NAMUR inputs	
• with "0" to "1", max.	12 ms
• with "1" to "0", max.	12 ms
Cable length	
Cable length shielded, max.	200 m
Sensors	
Connectable sensors	
NAMUR sensor / changeover contact according to EN 60947	Yes
Single contact / changeover contact unconnected	Yes
Single contact / changeover contact connected with 10 kΩ	Yes
Interrupts/diagnostics/status information	
Interrupts	
Diagnostics interrupt	Yes; channel-based
Hardware interrupt	Yes, selectable, channels 0 to 7
Diagnostics alarms	
Diagnostics information can be read	Yes
Monitoring of supply voltage	Yes
Wire break	Yes
Short-circuit	Yes
Group error	Yes

	6ES7131-6TF00-0CA0
Diagnostics indicator LED	
Monitoring of supply voltage	Yes; green PWR LED
Channel status display	Yes; green LED
For channel diagnostics	Yes; red LED
For module diagnostics	Yes; green/red DIAG LED
Electrical isolation	
Electrical isolation of channels	
Between channels	No
Between the channels and the backplane bus	Yes
Between the channels and the supply voltage of the electronics	Yes
Permissible potential difference	
Between different circuits	75 VDC / 60 VAC
Insulation	
Insulation tested with	707 VDC (type test)
Dimensions	
Width	15 mm
Weights	
Weight, approx.	32 g

NAMUR sensors and connected contacts

Monitoring for short-circuit and wire break only for NAMUR sensors and connected contacts.
The response ranges of the diagnostics correspond to IEC 60947-5-6.

Dimension drawing

See manual BaseUnits

(<http://support.automation.siemens.com/WW/view/en/58532597/133300>)

Parameter data record

A.1 Dependencies when configuring with GSD files

When configuring the module with a GSD file, remember that the settings of some parameters are dependent on each other, see the tables below.

Configuring with a PROFINET GSD file

The table lists the diagnostics information and its dependencies on the sensor types for PROFINET.

Sensor type	Diagnostics information					
	Missing supply voltage L+	Short-circuit to ground	Wire break	Chatter error	Changeover error	Inversion
NAMUR sensor	x	x	x	x	-	x
Single contact, unconnected	x	-	-	x	-	x
Single contact, connected with 10 kΩ	x	-	x	x	-	x
NAMUR changeover contact	x	x	x	x	x	-
Changeover contact, unconnected	x	-	-	x	x	-
Changeover contact, connected with 10 kΩ	x	-	x	x	x	-

Configuring with a PROFIBUS GSD file

The table lists the diagnostics information and its dependencies on the sensor types for PROFIBUS.

Sensor type	Diagnostics information				
	Missing supply voltage L+	Short-circuit to ground	Wire break	Changeover error	Inversion
NAMUR sensor	x	x	x	-	x
Single contact, unconnected	x	-	-	-	x
Single contact, connected with 10 kΩ	x	-	x	-	x
NAMUR changeover contact	x	x	x	x	-
Changeover contact, unconnected	x	-	-	x	-
Changeover contact, connected with 10 kΩ	x	-	x	x	-

A.2 Parameter assignment and structure of parameter data record

The data record 128 of the module has an identical structure, regardless of whether you configure the module with PROFIBUS DP or PROFINET IO. With data record 128, you can change the parameter assignment of the module in your user program regardless of its configuration. This means that you can use all the functions of the module even if you configured it using PROFIBUS GSD.

With data records 0 to 7, you can configure the individual channels.

Parameter assignment in the user program

You can change the parameters of the module in RUN (e.g. switch diagnostics on can be changed in RUN).

Changing parameters in RUN

The "WRREC" instruction is used to transfer the parameters to the module using data record 128 or data records 0 to 7. The parameters set with STEP 7 will not be changed on the CPU, which means that the parameters set in STEP 7 will be valid again after a restart.

If you reconfigure a module and diagnostics are pending prior to the reconfiguration, these diagnostics are not signaled as "outgoing".

Output parameter STATUS

If errors occur when transferring parameters with the "WRREC" instruction, the module continues operation with the previous parameter assignment. However, a corresponding error code is written to the STATUS output parameter.

You will find a description of the "WRREC" instruction and the error codes in the STEP 7 online help.

Structure of data record 128 and data records 0 to 7

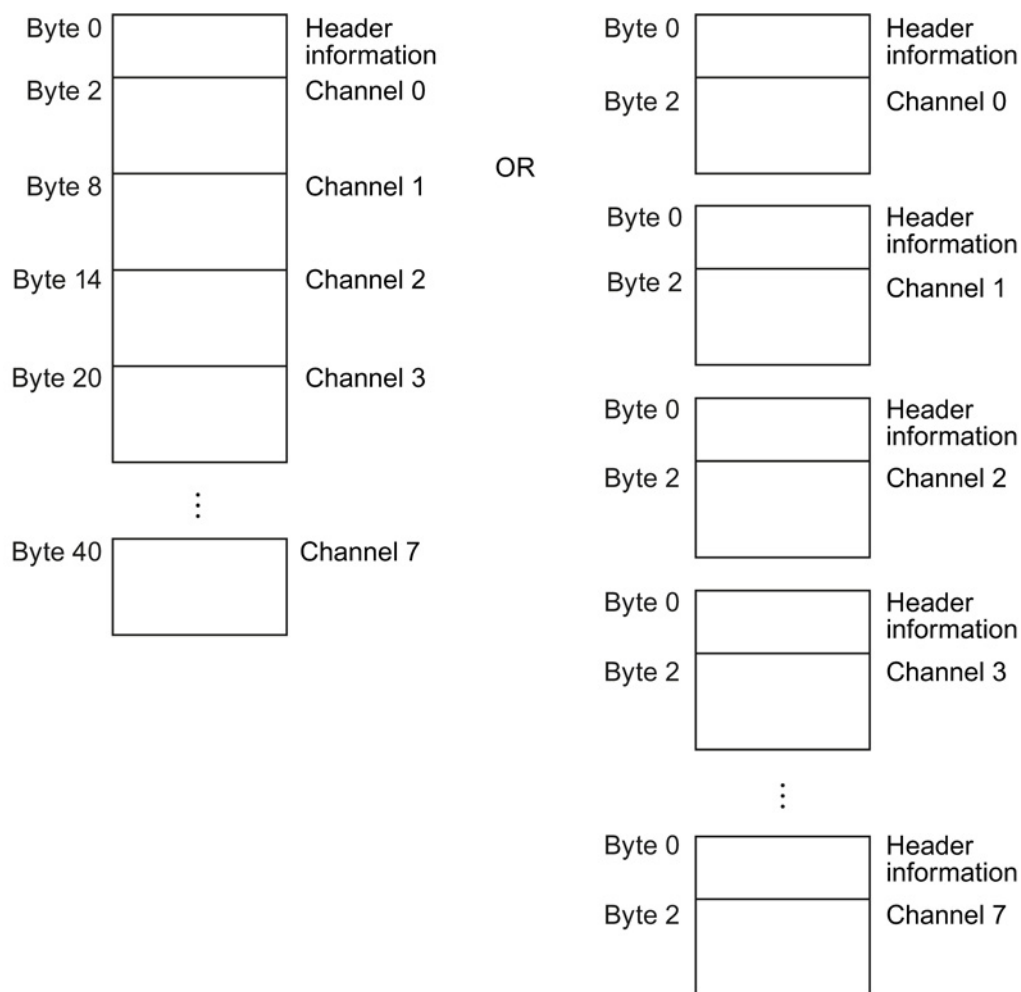


Figure A-1 Structure of data record 128 and data records 0 to 7

Header information

The figure below shows the structure of the header information.

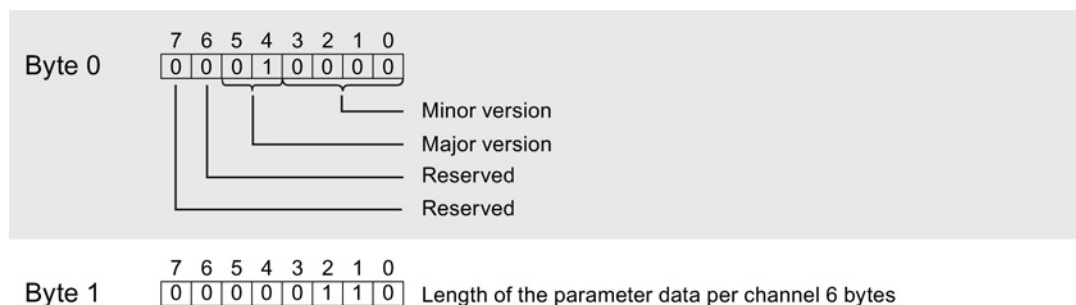
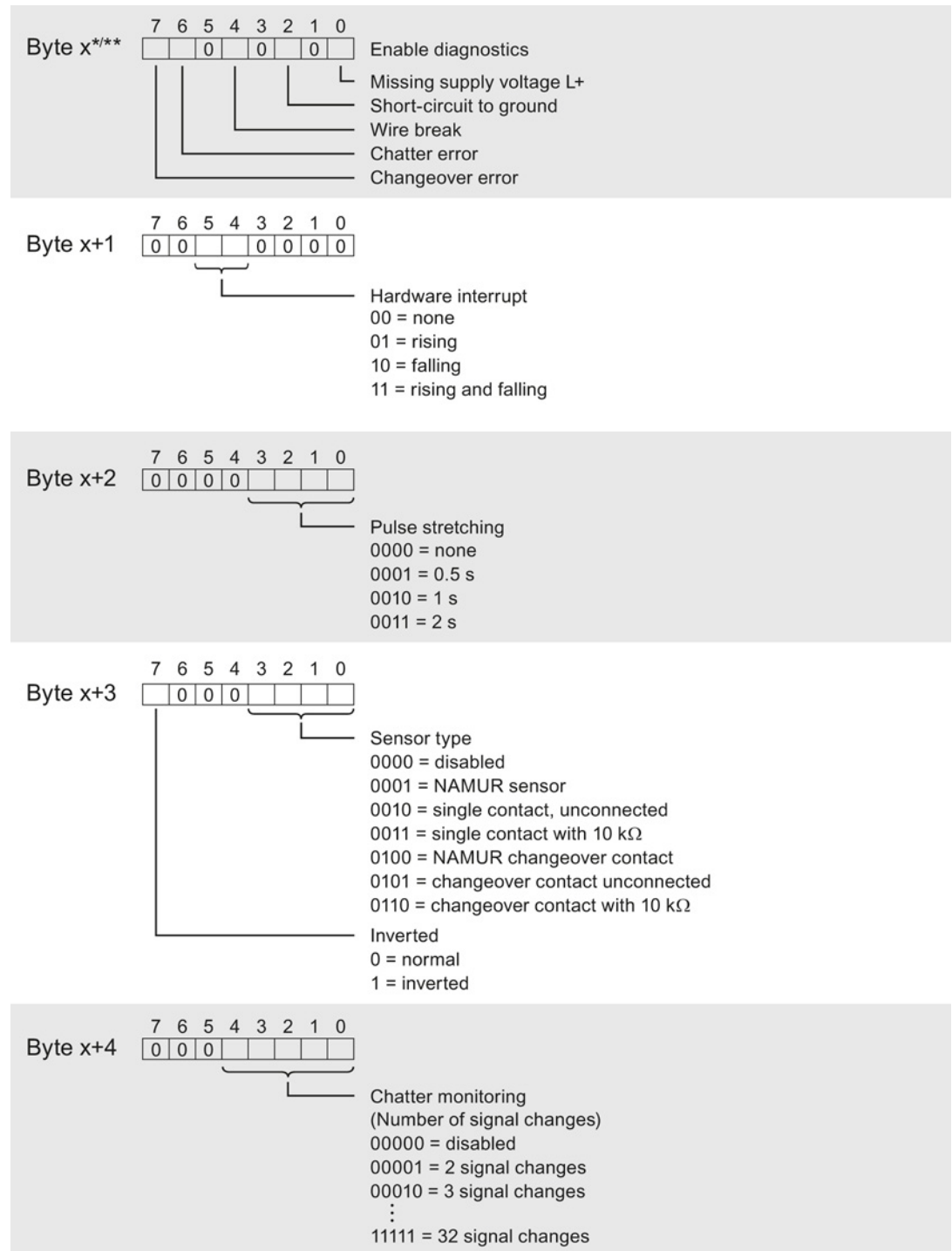
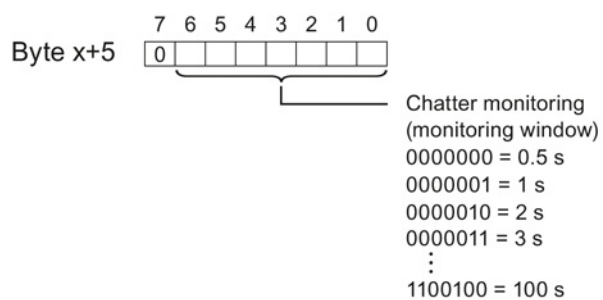


Figure A-2 DR 128 or DR 0 to 7: Bytes 0 and 1; header information

Parameters

The following figure shows the structure of the parameters for a channel. This structure also applies to channels 0 to 7.





* $x = 2 + (\text{channel number} \times 6)$; channel number = 0 to 7 for DR 128

** $x = 2$ for DR 0 to DR 7

Figure A-3 DR 128 or DR 0 to 7: Byte x to x+5: Structure for channels 0 to 7

See also

Parameters (Page 11)