

# X20DIF372

## 1 General information

The module is equipped with 16 inputs for 1-wire connections. The module is designed for a source input circuit.

- 16 digital inputs
- Source circuit
- 1-wire connections
- Configurable software input filter for entire module

## 2 Order data


| Order number | Short description  | Figure   |
|--------------|--|--|
|              | <b>Digital inputs</b>  |  |
| X20DIF372    | X20 digital input module, 16 inputs, 24 VDC, source, configurable input filter, 1-wire connections |  |
|              | <b>Required accessories</b>  |  |
|              | <b>Bus modules</b>   |  |
| X20BM11      | X20 bus module, 24 VDC keyed, internal I/O power supply connected through                          |  |
| X20BM15      | X20 bus module, with node number switch, 24 VDC keyed, internal I/O power supply connected through |  |
|              | <b>Terminal blocks</b>   |  |
| X20TB1F      | X20 terminal block, 16-pin, 24 VDC keyed   |  |

Table 1: X20DIF372 - Order data

### 3 Technical data


|  |  |
|--|--|
| <b>Order number</b>  | <b>X20DIF372</b>   |
| <b>Short description</b>   |  |
| I/O module   | 16 digital inputs 24 VDC for 1-wire connections  |
| <b>General information</b>                                       |  |
| B&R ID code  | 0x292B   |
| Status indicators  | I/O function per channel, operating state, module status                               |
| Diagnostics  |  |
| Module run/error   | Yes, using LED status indicator and software   |
| Power consumption  |  |
| Bus  | 0.14 W   |
| Internal I/O   | 1.4 W  |
| Additional power dissipation caused by actuators (resistive) [W] | -  |
| Certifications   |  |
| CE   | Yes  |
| EAC  | Yes  |
| <b>Digital inputs</b>  |  |
| Nominal voltage  | 24 VDC   |
| Input characteristics per EN 61131-2                             | Type 1   |
| Input voltage  | 24 VDC -15% / +20%   |
| Input current at 24 VDC  | Typ. 2.68 mA   |
| Input circuit  | Source   |
| Input filter   |  |
| Hardware   | ≤100 µs  |
| Software   | Default 1 ms, configurable between 0 and 25 ms in 0.2 ms increments                    |
| Connection type  | 1-wire connections   |
| Input resistance   | Typ. 8.9 kΩ  |
| Simultaneity <sup>1)</sup>                                       |  |
| With 24 V I/O power supply                                       | 100% (16 channels) <sup>2)</sup>   |
| With 28.8 V I/O power supply                                     | 75% (12 channels) <sup>2)</sup>  |
| Switching threshold  |  |
| Low  | <5 VDC   |
| High   | >15 VDC  |
| Insulation voltage between channel and bus                       | 500 V <sub>eff</sub>   |
| <b>Electrical properties</b>                                     |  |
| Electrical isolation   | Channel isolated from bus<br>Channel not isolated from channel                         |
| <b>Operating conditions</b>                                      |  |
| Mounting orientation   |  |
| Horizontal   | Yes  |
| Vertical   | Yes  |
| Installation elevation above sea level                           |  |
| 0 to 2000 m  | No limitation  |
| >2000 m  | Reduction of ambient temperature by 0.5°C per 100 m                                    |
| Degree of protection per EN 60529                                | IP20   |
| <b>Ambient conditions</b>  |  |
| Temperature  |  |
| Operation  |  |
| Horizontal mounting orientation                                  | -25 to 60°C  |
| Vertical mounting orientation                                    | -25 to 50°C  |
| Derating   | See section "Derating".  |
| Storage  | -40 to 85°C  |
| Transport  | -40 to 85°C  |
| Relative humidity  |  |
| Operation  | 5 to 95%, non-condensing   |
| Storage  | 5 to 95%, non-condensing   |
| Transport  | 5 to 95%, non-condensing   |
| <b>Mechanical properties</b>                                     |  |
| Note   | Order 1x terminal block X20TB1F separately.<br>Order 1x bus module X20BM11 separately. |
| Pitch  | 12.5 <sup>+0.2</sup> mm  |

Table 2: X20DIF372 - Technical data

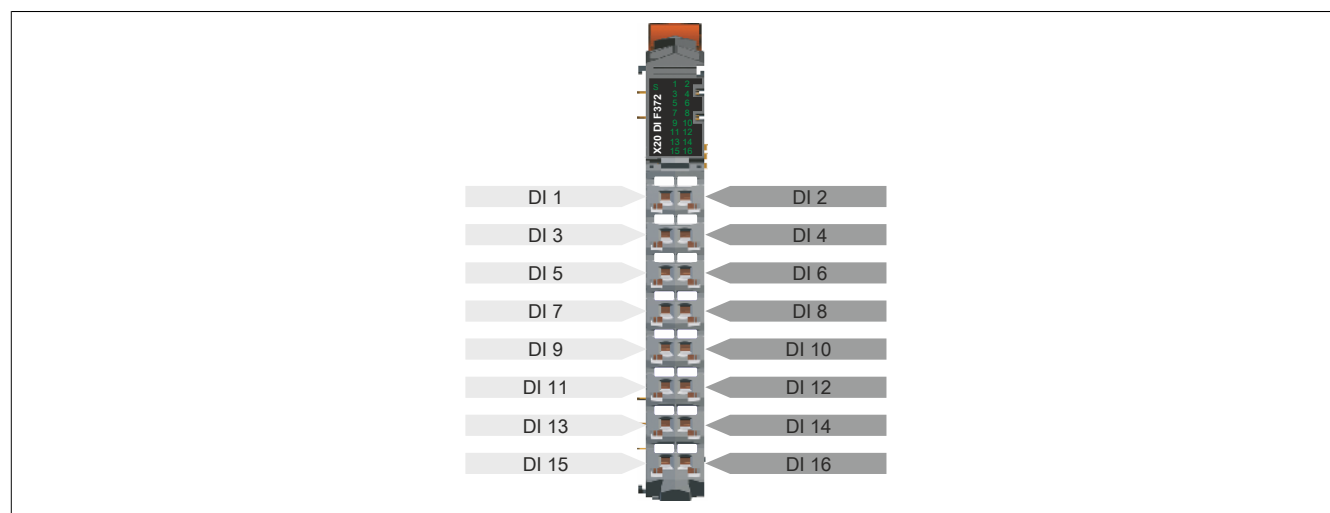
- 1) Maximum permissible number of simultaneously enabled inputs  
 2) Derating must be taken into account.

## 4 LED status indicators

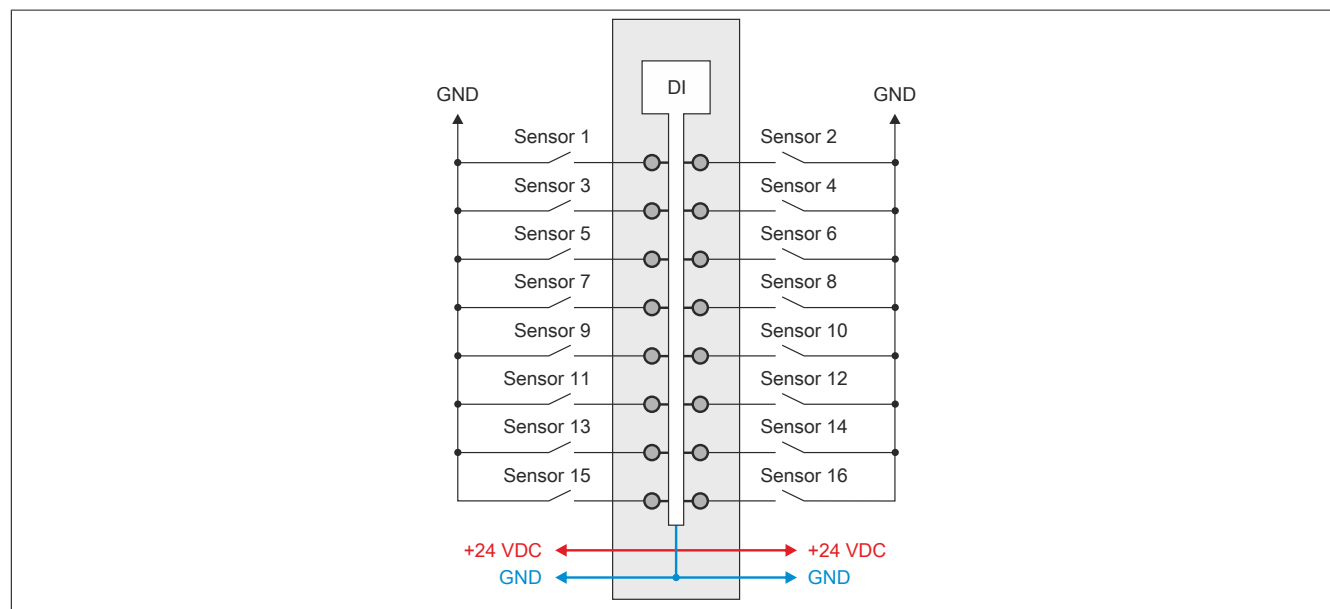
For a description of the various operating modes, see section "Additional information - Diagnostic LEDs" in the X20 system user's manual.

| Figure  | LED    | Color                          | Status       | Description                                     |
|---|--------|--------------------------------|--------------|---|
|  | S      | Green                          | Off          | No power to module                              |
|   |        |                                | Single flash | Mode RESET                                      |
|   |        |                                | Blinking     | Mode PREOPERATIONAL                             |
|   |        |                                | On           | Mode RUN  |
|   |        | Red                            | Off          | Module not supplied with power or everything OK |
|   |        | Solid red / Single green flash |              | Invalid firmware                                |
|   | 1 - 16 | Green                          |              | Input state of the corresponding digital input  |

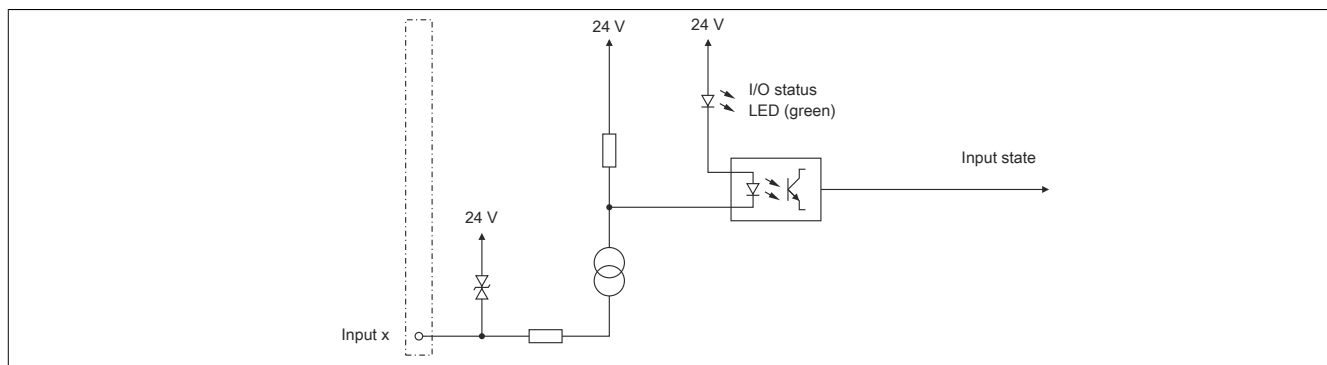
## 5 Pinout



## 6 Connection example

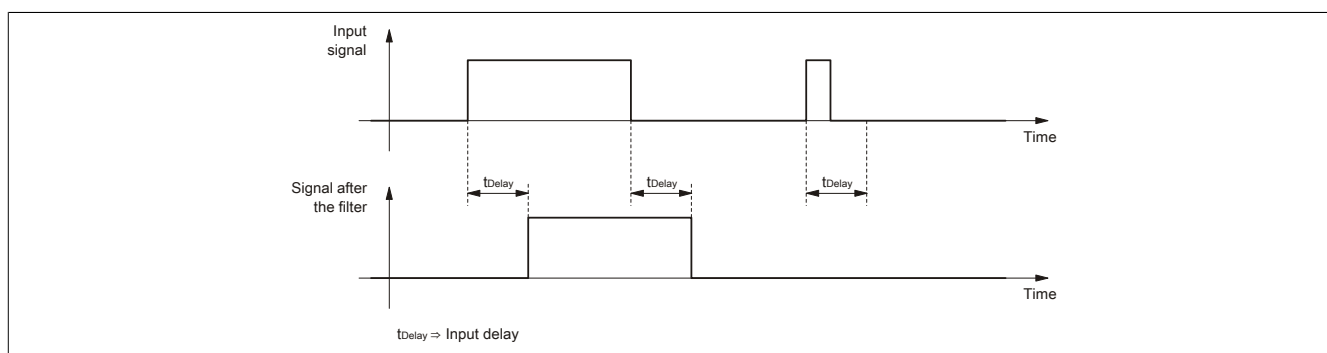


## 7 Input circuit diagram



## 8 Input filter

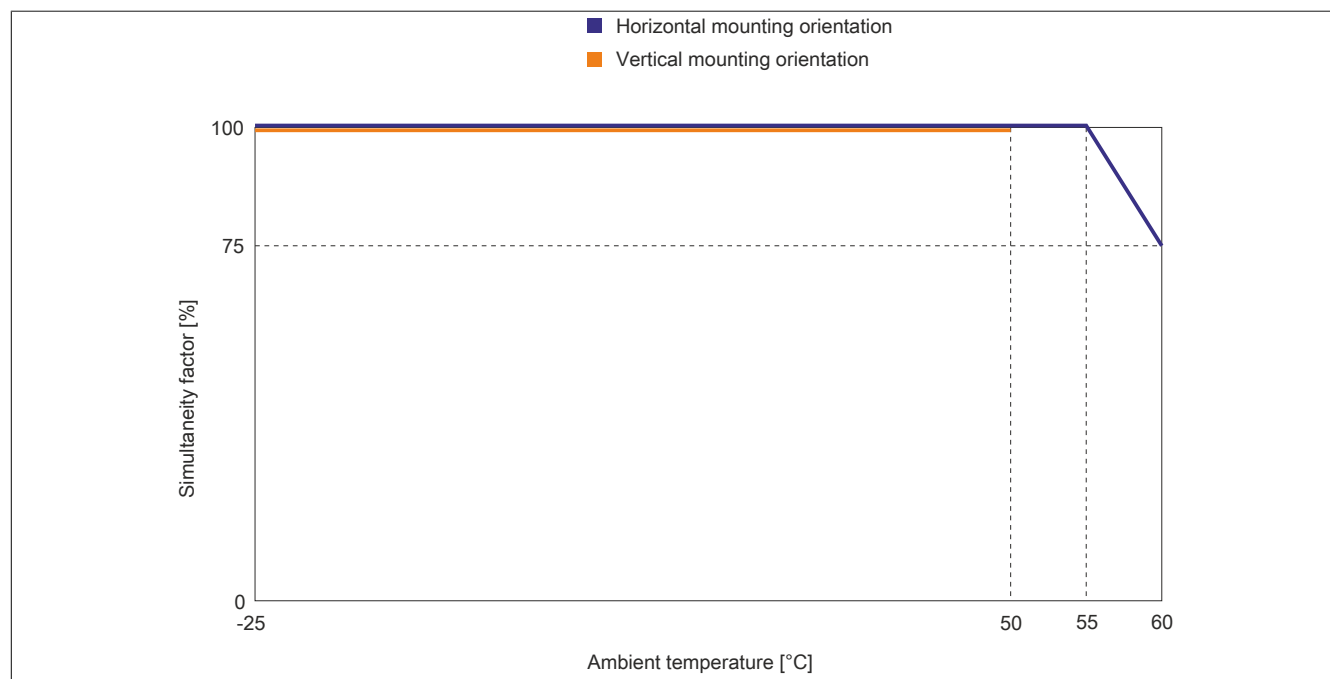
An input filter is available for each input. The input delay can be set using register "[ConfigOutput01](#)" on page 7. Disturbance pulses that are shorter than the input delay are suppressed by the input filter.



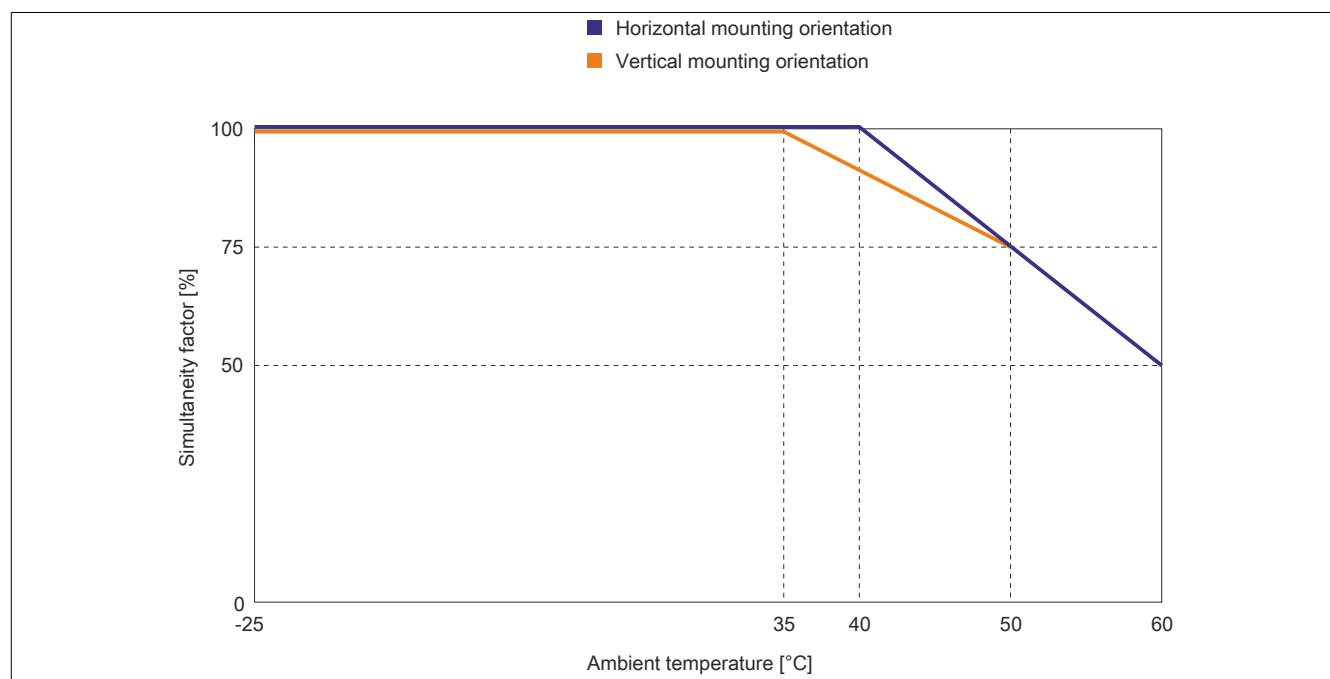
## 9 Derating

The derating values below must be taken into account for the simultaneity factor.

### Derating of the simultaneity factor at 24 VDC input voltage



### Derating of the simultaneity factor at 28.8 VDC input voltage



## 10 Register description

### 10.1 General data points

In addition to the registers described in the register description, the module has additional general data points. These are not module-specific but contain general information such as serial number and hardware variant.

General data points are described in section "Additional information - General data points" in the X20 system user's manual.

### 10.2 Function model 0 - Standard

| Register      | Fixed offset | Name                                  | Data type | Read   |         | Write  |         |
|---------------|--------------|---------------------------------------|-----------|--------|---------|--------|---------|
|               |              |                                       |           | Cyclic | Acyclic | Cyclic | Acyclic |
| Configuration |              |                                       |           |        |         |        |         |
| 18            | -            | ConfigOutput01 (input filter)         | USINT     |        |         |        | •       |
| Communication |              |                                       |           |        |         |        |         |
| -             | 1            | DigitalInput                          | UINT      | •      |         |        |         |
| 0             | 1            | Input state of digital inputs 1 to 8  | USINT     |        |         |        |         |
|               |              | DigitalInput01                        | Bit 0     |        |         |        |         |
|               |              | ...                                   | ...       |        |         |        |         |
|               |              | DigitalInput08                        | Bit 7     |        |         |        |         |
| 1             | 2            | Input state of digital inputs 9 to 16 | USINT     | •      |         |        |         |
|               |              | DigitalInput09                        | Bit 0     |        |         |        |         |
|               |              | ...                                   | ...       |        |         |        |         |
|               |              | DigitalInput16                        | Bit 7     |        |         |        |         |

Fixed modules require their data points to be in a specific order in the X2X frame. Cyclic access occurs according to a predefined offset, not based on the register address.

Acyclic access continues to be based on the register numbers.

### 10.3 Function model 254 - Bus controller

| Register      | Offset <sup>1)</sup> | Name                                  | Data type | Read   |         | Write  |         |
|---------------|----------------------|---------------------------------------|-----------|--------|---------|--------|---------|
|               |                      |                                       |           | Cyclic | Acyclic | Cyclic | Acyclic |
| Configuration |                      |                                       |           |        |         |        |         |
| 18            | -                    | ConfigOutput01 (input filter)         | USINT     |        |         |        | •       |
| Communication |                      |                                       |           |        |         |        |         |
| 0             | 0                    | Input state of digital inputs 1 to 8  | USINT     | •      |         |        |         |
|               |                      | DigitalInput01                        | Bit 0     |        |         |        |         |
|               |                      | ...                                   | ...       |        |         |        |         |
|               |                      | DigitalInput08                        | Bit 7     |        |         |        |         |
| 1             | 1                    | Input state of digital inputs 9 to 16 | USINT     | •      |         |        |         |
|               |                      | DigitalInput09                        | Bit 0     |        |         |        |         |
|               |                      | ...                                   | ...       |        |         |        |         |
|               |                      | DigitalInput16                        | Bit 7     |        |         |        |         |

1) The offset specifies the position of the register within the CAN object.

#### 10.3.1 Using the module on the bus controller

Function model 254 "Bus controller" is used by default only by non-configurable bus controllers. All other bus controllers can use other registers and functions depending on the fieldbus used.

For detailed information, see section "Additional information - Using I/O modules on the bus controller" in the X20 user's manual (version 3.50 or later).

#### 10.3.2 CAN I/O bus controller

The module occupies 2 digital logical slots on CAN I/O.

## 10.4 Digital inputs

### Unfiltered

The input state is collected with a fixed offset to the network cycle and transferred in the same cycle.

### Filtered

The filtered state is collected with a fixed offset to the network cycle and transferred in the same cycle. Filtering takes place asynchronously to the network in multiples of 200 µs with a network-related jitter of up to 50 µs.

### 10.4.1 Digital input filter

Name:

ConfigOutput01

The filter value for all digital inputs can be configured in this register.

The filter value can be configured in steps of 100  $\mu$ s. It makes sense to enter values in steps of 2, however, since the input signals are sampled every 200  $\mu$ s.

| Data type | Values | Filter  |
|-----------|--------|---|
| USINT     | 0      | No software filter (bus controller default setting) |
|           | 2      | 0.2 ms  |
|           | ...    | ...   |
|           | 250    | 25 ms - Higher values are limited to this value.    |

### 10.4.2 Input state of digital inputs 1 to 16

Name:

DigitalInput or

DigitalInput01 to DigitalInput16

This register contains the input state of digital inputs 1 to 8 and 9 to 16.

Only function model 0 - Standard:

Setting "Packed inputs" in the Automation Studio I/O configuration can be used to determine whether all bits of this register should be applied individually as data points in the Automation Studio I/O mapping ("DigitalInput01" to "DigitalInput16") or whether this register should be displayed as a single UINT data point ("DigitalInput").

| Data type | Values                 | Information   |
|-----------|------------------------|---|
| UINT      | 0 to 65535             | Packed inputs = On  |
| USINT     | See the bit structure. | Packed inputs = Off or function model $\neq$ 0 - Standard |

Bit structure:

**Register 0:**

| Bit | Name           | Value  | Information                   |
|-----|----------------|--------|-------------------------------|
| 0   | DigitalInput01 | 0 or 1 | Input state - Digital input 1 |
| ... |                | ...    |                               |
| 7   | DigitalInput08 | 0 or 1 | Input state - Digital input 8 |

**Register 1:**

| Bit | Name           | Value  | Information                    |
|-----|----------------|--------|--------------------------------|
| 0   | DigitalInput09 | 0 or 1 | Input state - Digital input 9  |
| ... |                | ...    |                                |
| 7   | DigitalInput16 | 0 or 1 | Input state - Digital input 16 |

## 10.5 Minimum cycle time

The minimum cycle time specifies how far the bus cycle can be reduced without communication errors occurring. It is important to note that very fast cycles reduce the idle time available for handling monitoring, diagnostics and acyclic commands.

| Minimum cycle time |             |
|--------------------|-------------|
| Without filtering  | 100 $\mu$ s |
| With filtering     | 150 $\mu$ s |

## 10.6 Minimum I/O update time

The minimum I/O update time specifies how far the bus cycle can be reduced so that an I/O update is performed in each cycle.

| Minimum I/O update time |             |
|-------------------------|-------------|
| Without filtering       | 100 $\mu$ s |
| With filtering          | 200 $\mu$ s |