OVERSPEED/UNDERSPEED MONITOR
KF**-DWB-(EX)1.D
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# Overspeed/Underspeed Monitor KF**-DWB-(Ex)1.D

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1 Symbols Used

This symbol warns of possible danger.
Failure to heed this warning may result in personal injury or death, or property damage, including destruction.

This symbol warns the user of a possible fault.
Failure to heed this warning can lead to total failure of the device and any other connected equipment.

This symbol draws attention to important information.

2 Overview

2.1 Range of application

The K-System devices from Pepperl+Fuchs are used for transmitting signals between field devices and a process control system/control system. The devices marked with "Ex" in the type designation are suitable for the connection of field devices used in potentially explosive atmospheres. Safe field circuits for these devices are intrinsically safe and are galvanically isolated from non-intrinsically safe circuits. The devices thus establish an electromagnetic separation between the potentially explosive atmospheres and the safe areas in a system.

Devices without Ex-identification can be used to transmit signals between field devices and the process control system/control unit.
Typical applications for the Overspeed/Underspeed Monitors KF**-DWB-(Ex)1.D of the K-System (abbreviated DWB) are limit-value monitoring during flow and rotational-speed measurements (Max alarm and Min alarm).

The Overspeed/Underspeed Monitors are parameterized using an integrated control panel.

More information (for example, certificates and data sheets for the DWB and the operating manual for the K-System) can be found on our webpage www.pepperl-fuchs.com (enter "DWB" in the product search).

### 2.2 Model variants

The following variants of the Overspeed/Underspeed Monitor are available:

<table>
<thead>
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<tr>
<td>.D</td>
<td>with keypad</td>
</tr>
<tr>
<td>Ex</td>
<td>for connection of field devices in areas exposed to danger of explosion</td>
</tr>
<tr>
<td></td>
<td>without identifier letters = for connection of field devices in the safety area</td>
</tr>
<tr>
<td>D2</td>
<td>with a power supply of 24 V DC</td>
</tr>
<tr>
<td>A5</td>
<td>with a power supply of 115 V AC</td>
</tr>
<tr>
<td>A6</td>
<td>with a power supply of 230 V AC</td>
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</table>
2.3 Inputs and outputs

A K-System DWB from Pepperl+Fuchs has

- an input for connecting a field device,
  - With KF**-DWB-Ex1.D, this input is intrinsically safe (blue terminal block). You may connect either a NAMUR sensor or a mechanical contact.
  - With KF**-DWB-1.D, the input is not intrinsically safe (green terminal block). You may connect a NAMUR sensor, a mechanical contact or a 3-conductor sensor. A DWB also has
- two relay outputs for limit-value display. These are for
  - Max alarm and for
  - Min alarm and
- a non-intrinsically safe input for the
  - remote activation of the start-up override and the
  - resetting of the restart inhibition (alarm freeze).
The Overspeed/Underspeed Monitor KF**-DWB-(Ex)1.D must only be operated by trained personnel in accordance with this handbook.

Safety Notes

The protection of operating personnel and of the system is only ensured if the devices are used in accordance with their intended purpose. Any other type of operation than that described in this manual places the safety and functionality of the devices and systems connected to them in question.

The devices may only be installed, connected, and adjusted by electrical professionals outside the hazardous area.

If faults cannot be eliminated, the devices must be taken out of operation and protected from being placed in service again inadvertently. Devices must only be repaired directly by the manufacturer Pepperl+Fuchs. Tampering with or making changes to the devices is dangerous and therefore not permitted. They render the warranty void.

The responsibility for the adherence to local safety standards lies with the operator.

Note
4 Explosion Protection

For primary explosion protection, that is, for measures to be taken to prevent or hinder the development of a dangerous explosive atmosphere, please observe the guideline 1999/92/EC (ATEX 137) or the corresponding national guidelines.

For secondary explosion protection, that is, for measures to hinder the ignition of a surrounding explosive atmosphere by electrical devices, Pepperl+Fuchs will gladly make the "Explosion Protection Manual" available to you for a nominal fee.

Note in particular DIN EN 60079-10, DIN EN 60079-14, DIN EN 50014 and DIN EN 50020, or the corresponding national guidelines. Pepperl+Fuchs also offers a seminar on the topic of explosion protection.

5 Installation and Connection

5.1 Installation

The Overspeed/Underspeed Monitor KF**-DWB-(Ex)1.D is constructed in protection degree IP20 and must therefore be protected from undesirable ambient conditions (water, small foreign objects).

Attention

The devices of the K-system from Pepperl+Fuchs and thus also the Overspeed/Underspeed Monitor KF**-DWB-(Ex)1.D can be mounted on a 35 mm standard rail corresponding to DIN EN 60175. The devices must be snapped onto the rail vertically, and never slanted or tipped to the side.

Additional possibilities for mounting, e.g. using the Power Rail, can be found in the data sheets and in the K-system operating manual on our webpage www.pepperl-fuchs.com (enter "DWB" in the product search).
5.2 Connection

The removable terminals of the KF-series considerably simplify the connection and the switch cabinet assembly. They make it possible to replace devices quickly and without error if a customer service becomes necessary.

Terminals are equipped with screws, are self-opening, have a large connection area for a wire cross-section up to 2.5 mm² and coded plugs, making it impossible to mix them up.
5.2.1 Connection input (field circuit)

The intrinsically safe field circuit is connected at the blue terminals 1 ... 3 of the KF**-DWB-Ex1.D. These may be guided into the potentially explosive areas with connector cables in accordance with DIN EN 60079-14. You may connect:

- a sensor in accordance with DIN EN 60947-5-6 (NAMUR)
- a mechanical contact
- a mechanical contact with shunt resistor
- a mechanical contact with series and shunt resistors

The non-intrinsically safe field circuit is connected at the green terminals 1 ... 3 of the KF**-DWB-1.D. In addition to the possibilities listed above, you may also connect:

- a 3-wire sensor

Terminals 4 ... 6, 7 ... 9 and 19 ... 21 do not exist on the DWB.
5.2.2 Connection output

The remaining green terminals serve the following functions:

- Terminals 10 ... 12: relay 1
- Terminals 13 and 14: input start-up override (15 free)
- Terminals 16 ... 18: relay 2
- Terminals 23 and 24: power supply (22 free)

More information on connecting the DWB (e.g., using the Power Rail) can be found in the data sheets and the K-System operating manual on our webpage www.pepperl-fuchs.com (enter “DWB” in the product search).
5.3 Indicating and operating elements of the DWB

Located on the front side of the DWB are:

- LED IN/CHK 1 (yellow/red) for displaying the input signal (flashes yellow in time), an input error (flashes red) and a device error (permanent red)
- LED PWR (green) for displaying the supply voltage
- LED OUT 1 (yellow) to indicate relay 1 active
- LED OUT 2 (yellow) to indicate relay 2 active
- a display for measuring-value and error indication and for parameterization mode
- four keys for setting the parameters of the DWB:
  ▲ (Up)  ▼ (Down)  ESC (Escape)  OK
6 Parameterization menu overview

The following figure should serve as a reference for quick orientation, particularly when you are already familiar with how to parameterize the DWB. A detailed description of the operating steps can be found in chapter 7.
7 Editing device data

7.1 Display mode

In normal operation the current measuring value is shown on the display in the selected unit. To select the unit see chapter 7.3.

If the restart inhibit (see chapter 7.5.6) has been triggered and the device is still in normal operation, Alarm freeze is shown in the second line of the display in addition to the current measuring value.

In the event of an error, an error message is displayed (if appropriately parameterized) until corrected:

- **Err device** for a device error
- **Err SC** for a short circuit in the sensor line
- **Err LB** for an interruption in the sensor line

To select the error messages see chapter 7.4.1. The relays always switch to the de-energized state in the event of an error.
7.2 Main menu

To change to the Main menu of the parameterization mode from the display mode, simultaneously press the Esc and OK buttons for approx. 1 second.

You can prevent unauthorized persons from making changes in the parameterization mode by means of a password (see chapter 7.6.1). While it is possible in this case to view the various settings in the parameterization mode before entering a password, no changes can be made. The first time an attempt is made to change a setting, the device automatically prompts the user for a password. The password must be entered once each time you change from display mode to parameterization mode. The entry is described in chapter 7.6.1.

The Main menu consists of 4 menu items (Unit, Input, Output, Service). You can switch between them using the ▲ and ▼ buttons. With the Esc button, you can return at any time from the Main menu to the display mode.

If no button is pressed for 10 minutes while in the parameterization mode, the device automatically returns to the display mode.
From the menu option Unit of the Main menu, you can use the OK button to access the selection for the unit of the measuring value display (Hz or rpm = rotations per minute).

How to change the setting:

- The current selection is displayed. Use the ▲ and▼ buttons to alternate between the possible settings. If neither the ▲ nor▼ button is pressed, the new set value flashes.
- If you press the Esc button, the old value is redisplayed.
- If you press the OK button, the displayed value is saved and then displayed without flashing.
- If the value does not flash, you can use the Esc button to return to the next-higher menu.

Diagram:

- Unit
- rpm
- Hz
- ▲
- ▼
- OK
- Esc

Hz = KHz

OK = save

Esc = return to next higher menu.
7.4 Input

From the menu option Input of the Main menu, you can use the OK button to switch to the Input menu. This consists of 4 or 5 menu options (Error, Smoothing, Pulses per revolution, Contact bounce filter and Start-up override). You can switch between these options with the ▲ and ▼ buttons. The menu option Pulses per revolution only appears when rpm has been selected as the unit for the measuring value display (see chapter 7.3). With the Esc button, you can return at any time from the Input menu to the Main menu.
7.4.1 Input: Error

From the menu option Error of the Input menu, you can use the OK button to switch to the Error menu. This menu consists of 2 menu options (LB = line break and SC = short circuit). You can switch between them using the ▲ and ▼ buttons. With the Esc button, you can return at any time from the Error menu to the Input menu.

From the menu option LB of the Error menu, you can use the OK button to access the line-breakage monitoring selection (ON or OFF). If a mechanical contact is connected as a sensor, an appropriate shunt resistor must be present for the line-breakage monitoring. The selection of short-circuit monitoring is performed analogously. If a mechanical contact is connected as a sensor, an appropriate series resistor must be present for the short-circuit monitoring.
7.4.2 Input: Smoothing

From the menu option Smoothing of the Input menu, you can use the OK button to access the selection for the smoothing value.

With strongly fluctuating measuring values, you can use smoothing to influence how fast a relay reacts to a change in input value. You can set values between 0 (no smoothing) and 255 (maximum smoothing).

How to change the setting:

- The set value is displayed. This value can be changed using the ▲ and ▼ buttons. When you quickly press either the ▲ or ▼ button, the value changes incrementally. If either the ▲ or ▼ button is pressed for a longer period of time, the setting "rolls" to higher or lower values, respectively. If neither the ▲ nor ▼ button is pressed, the new set value flashes.
- If you press the Esc button, the old value is redisplayed.
- If you press the OK button, the displayed value is saved and then displayed without flashing.
- If the value does not flash, you can use the Esc button to return to the next-higher menu.
7.4.3 Input: Pulses per revolution

The menu option Pulses per revolution of the Input menu only appears together with the unit rpm. From the menu option Pulses per revolution, you can use the OK button to set the value for the pulses per revolution. This value, which is dependent on the sensor used, is required for the output of the measuring value when the unit rpm is used (rotations per minute). Values between 1 and 65535 may be set for pulses/revolution. How to change the setting is described in chapter 7.4.

7.4.4 Input: Contact bounce filter

From the menu option Contact bounce filter of the Input menu, you can use the OK button to access the selection of the bounce filter (ON or OFF). A bounce filter may be necessary when using a mechanical contact. How to change the setting is described in chapter 7.4.
7.4.5 Input: Start-up override
From the menu option Start-up override of the Input menu, you can use the OK button to access the setting for the duration of the start-up override.
Values between 1 and 1000 seconds may be set.
How to change the setting is described in chapter 7.4.

7.4.6 Activating start-up override
- If no signal at terminals 13/14 the start-up override is inactive.
- With a signal at terminals 13/14 (min. 100 ms), a relay from reporting a limit-value underrange during the override period (start-up phase).
- Start-up override only affects relays with switch direction Min. If the operating mode of such a relay is Active, it remains released during the override period; if the operating mode is Passive, it is forcibly triggered during the override period.
- The start-up override is edge triggered: before it can be retriggered, the signal at terminals 13/14 must be switched off for at least 200 ms. If a signal interruption occurs and a new signal arrives during the override period, the timer is restarted.
7.5 Output

From the menu option Output of the Main menu, you can use the OK button to switch to the Output menu.

This menu consists of 2 menu options (Rel 1 and Rel 2). You can switch between them using the ▲ and ▼ buttons.

With the Esc button, you can return at any time from the Output menu to the Main menu.

With the OK button, you can switch from both menu options of the Output menu to the Trip value menu. This is identical for both relays and is, for this reason, described here only once.

The Trip value menu consists of 5 menu options (Min/Max, Trip point, Hysteresis, Mode of operation and Alarm freeze). You can switch between them using the ▲ and ▼ buttons.

With the Esc button, you can return at any time from the Trip value menu to the Output menu.
7.5.1 Switching behavior of the relay

Available settings for the switch direction are Min and Max; available settings for the operating mode (mode) are Active and Passive.

Range of application (see figure on page 23):

- Switch direction Max, operating mode active:
  - alarm on overrange, e.g. horn on

- Switch direction Max, operating mode passive:
  - overcharge protection, monitoring for excess speed, e.g., pump or drive off, with large hysteresis
  - Min/Max operation, e.g., pump/drive on/off

- Switch direction Min, operating mode active:
  - alarm on underrange, e.g. horn on

- Switch direction Min, operating mode passive:
  - overload protection, monitoring for underspeed, e.g., pump off, when nothing flows
Overspeed/Underspeed Monitor KF**-DWB-(Ex)1.D
Editing device data: Output

Switching performance of the relay

Measuring value
Max
Max - hysteresis
Min + hysteresis
Min

Switch direction Max, operating mode active:
en ergized
de-energized

Switch direction Max, operating mode passive:
en ergized
de-energized

Switch direction Min, operating mode active:
en ergized
de-energized

Switch direction Min, operating mode passive:
en ergized
de-energized
7.5.2 Output: Min/Max (switch direction)

From the menu option Min/Max of the Trip value menu, you can use the OK button to access the selection of the switch direction for the selected relay (Max or Min). How to change the setting is described in chapter 7.5.

7.5.3 Output: Trip point

From the menu option Trip point of the Trip value menu, you can use the OK button to access the selection of the value for the trip point of the selected relay. This value is to be entered in the unit which was selected under Unit (see chapter 7.3). Values between 0.001 Hz and 5000 Hz may be entered. The maximum value which may be entered for rpm is calculated from the Pulses per revolution value (see chapter 7.4.3) as 0.001 x 60 / pulses per revolution and 5000 x 60 / pulses per revolution.

How to change the setting is described in chapter 7.4.2. The decimal point is shifted automatically.
7.5.4 Output: Hysteresis

From the menu option Hysteresis of the Trip value menu, you can use the OK button to access the selection for the value of the hysteresis of the selected relay.

This value is to be entered in the unit which was selected under Unit (see chapter 7.3). Values between 0.001 Hz and 5000 Hz may be entered. The maximum value which may be entered for rpm is calculated from the Pluses per revolution value (see chapter 7.4.3) as 0.001 x 60 / pulses per revolution and 5000 x 60 / pulses per revolution.

The hysteresis should be > 1 % of the trip point to prevent relay chatter.

How to change the setting is described in chapter 7.4.2.

The decimal point is shifted automatically.

7.5.5 Output: Mode of operating

From the menu option Mode of operating of the Trip value menu, you can use the OK button to access the selection of the operating mode for the selected relay (Active or Passive).

How to change the setting is described in chapter 7.5.
7.5.6 Output: Alarm freeze (restart inhibit)

From the menu option Alarm freeze of the Trip value menu, you can use the OK button to access the selection of the restart inhibit (ON or OFF).

The restart inhibit is used to prevent brief trip value overranges or line interference (LB, SC; see chapter 7.4.1) from not being noticed by the operating personnel.

If Alarm freeze On is selected, the relay remains in the new state after it is switched until one of the following actions occurs:

- Device restart
- Signal at terminals 13/14 (start-up override)
- The Esc button is pressed

Any one of these actions resets the relay.

If Alarm freeze On is selected and the relay is configured with the switch direction Min, the start-up override must be triggered on device start-up. Otherwise, the relay is immediately blocked by a trip value alarm and the restart inhibit.

How to change the setting is described in chapter 7.5.
7.6 Service

You can enter the Service menu by pressing OK on the Service menu item in the main menu.

You can switch between both submenus (Password or Language) via the ▲ and ▼ buttons.

With the Esc button, you can return at any time from the Service menu to the main menu.

You can use the OK button to access the selection of the Password menu.

7.6.1 Entering and activating password

Activating password protection

From the menu option Password of the Service menu, you can use the OK button to access the selection of password protection.

You can switch between both menu options (ON or OFF) via the ▲ and ▼ buttons.

With the Esc button, you can return at any time from the Password menu to the Service menu.

You can use the OK button to access the activation status.

On delivery of the Overspeed/Underspeed Monitor, password protection is inactive. The password cannot be changed and is 1234.
Entering password
When password protection is activated, the password must be entered once each time you change from the display mode to the parameterization mode. The first time an attempt is made to change a setting, the device automatically prompts the user for a password.

How to enter the password:
- The value 0000 is displayed. The value can be changed using the ▲ and ▼ buttons. When you press either the ▲ or ▼ button, the value changes incrementally. If either the ▲ or ▼ button is pressed for a longer period of time, the setting "rolls" to higher or lower values, respectively. If neither the ▲ nor ▼ button is pressed, the new set value flashes.
- If you press the Esc button, 0000 is redisplayed.
- When you press the OK button and the correct password has been entered, the value is displayed without flashing. If an incorrect password has been entered, 0000 is displayed again.
- Use the Esc button to return to the position at which you would like to change a setting.
If you have entered the correct password, you may now make your changes. If the correct password was not entered, no parameterization changes may be made.

7.6.2 Selecting display language
You can set the language value by pressing OK on the Language menu item in the Service menu. (ENG or DE).
You can switch between both menu options (ENG or DE) via the ▲ and ▼ buttons.
With the Esc button, you can return at any time from the Language menu to the Service menu.
You can use the OK button to access the selected language.
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