## Technical description

The KHU8-DW-1.D is a device used to **indicate and monitor periodic signals** which occur in almost all areas of automation and process engineering, i.e. frequencies in general and rotational speeds in particular.
The input signals are evaluated using the cycle method, i.e. by measuring the duration of a period, and then converted by a very fast µ-controller to frequency, or rotational speed.

The frequently occuring special case of rotational speed measurement was given particular attention. For this reason, **indications** and **inputs** can be either in **Hz** or in **rpm**.
In addition, the possibility exists, on applications involving lengthy processes, whose sensors provide a **number of pulses per revolution**, to operate automatically with the **actual rotational speed** of the drive, by presetting the number of pulses.

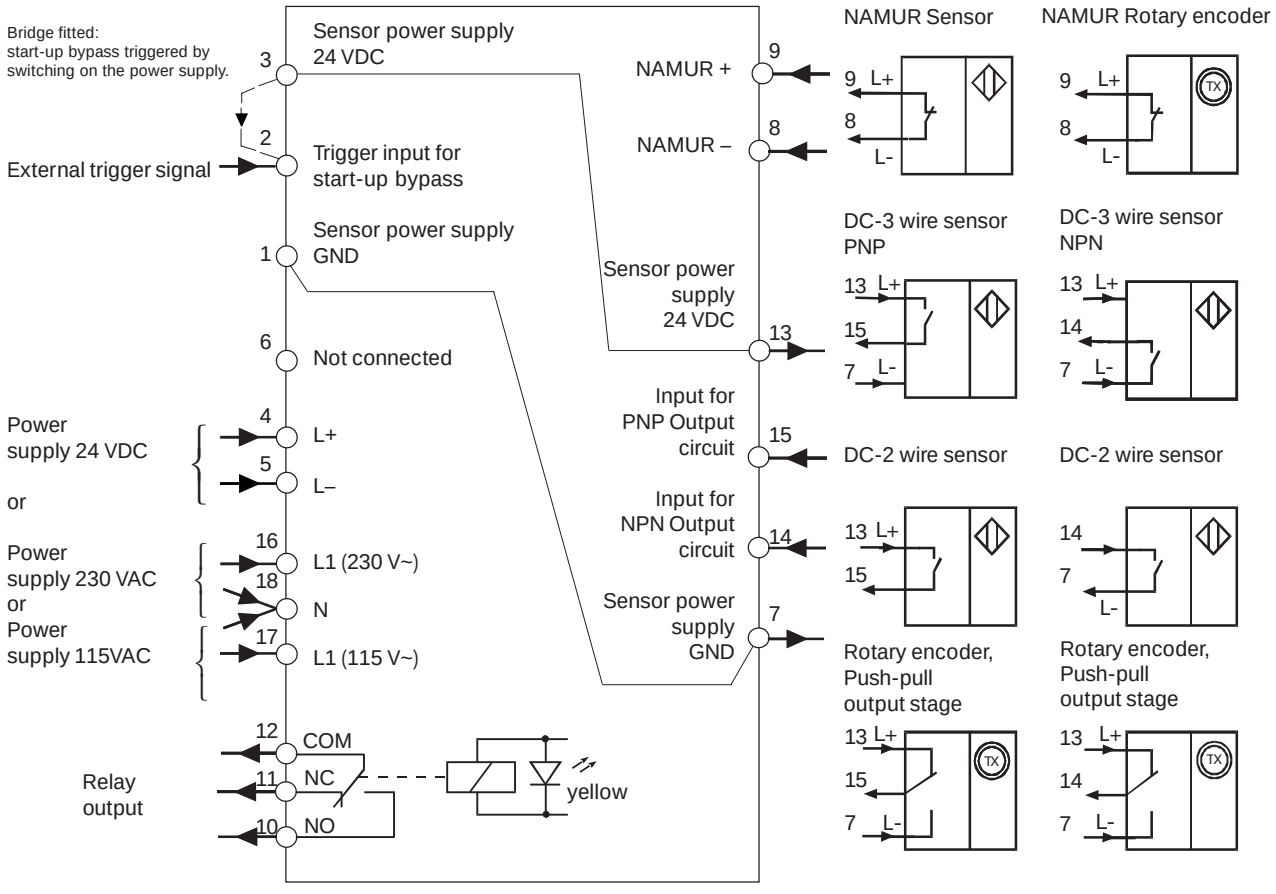
Indication of the measured value is achieved by means of a **4-digit 7-segment-LED-display** on the front of the device, with **up to 3 places following the decimal point**.

The monitoring function is actuated by a **limiting value**, whose upper and lower hysteresis values can **be selected** within the appropriate measuring and indicating range.
The **output signal** is generated by a change-over relay when the hysteresis limits are either **exceeded or fallen below**. Due to its high switching capability, the relay output can be used to **directly drive** an actuator, or as an **input signal to a higher level control**.
In addition, the switching state of the relay is indicated by **a yellow LED** on the front face of the device.
A function block is connected in line with the output relay, which enables **10 different timer functions** to be employed; thus there is no need to connect a separate timer relay in series. In addition to **ON delay and OFF delay, defined ON time and pulse lengthening**, the **direction of operation of the relay**, i.e. to monitor underspeed or overspeed, can also be selected. The built-in **start-up bypass**, triggered by switching on the supply voltage, or by an external signal, **prevents false signals** from occuring during the start-up of the monitored system.

The speed monitor may be supplied with **115 VAC, 230 VAC or 24 VDC.** When an alternating voltage is connected, a **24 VDC source is available for the signal transducer**.

All currently available **two-, three- or four-wire proximity switches** and incremental **rotary encoders** are accepatable as the **sensor**. Moreover two terminals are reserved for the connection of **proximity switches to DIN 19234 (NAMUR)**.

## Connection diagram

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**Technical data**

| | |
|---|---|
| Supply voltages | 230 VAC ± 10 %, 47 Hz ... 63 Hz, < 5 VA (Terminal 16, 18)<br>115 VAC ± 10 %, 47 Hz ... 63 Hz, < 5 VA Terminal 17, 18)<br>24 VDC +15/-10 %, $u_{ss}$ ≤ 10 %, < 5 W (Terminal 4, 5) |
| Signal inputs | |
| Frequency | 0.001 Hz ... 5000 Hz<br>Minimum pulse length/duration: 20 µs |
| NAMUR | Switch points: ≥1.2 mA; ≤ 2.1 mA (Terminal 8, 9)<br>No load voltage: 8.2 V; Short circuit current: 6.5 mA<br>Impedance: 1.2 kΩ |
| PNP-sensor | Switch point: 12 V (Terminal 15)<br>Max. input voltage: 30 V<br>Impedance: 2.8 kΩ |
| NPN-sensor | Switch point: 12 V (Terminal 14)<br>Impedance: 3.3 kΩ |
| Triggerinput | Switch point: 12 V (Terminal 2)<br>Max. input voltage: 30 V<br>Impedance: 2.8 kΩ |
| Output relay | Terminal 10: NO;Terminal 11: NC; Terminal 12: COM<br>250 VAC, 2 A, cos φ ≥ 0.7<br>40 VDC, 2 A<br>ON/OFF delay (incl. computation time) ≤ 20 ms<br>Mechanical life ≥ 30 000 000 switch cycles |
| Switch state indicator | 3 mm - yellow LED |
| Timer functions | ON/OFF delay, defined ON time, pulse lengthening<br>Timer period: 0 s ... 999.9 s |
| Direction of operation | reversible |
| Sensor power supply | Terminal 3, 13: L+; Terminal 1, 7: L-<br>24 VDC ± 10 %, $U_{ss}$ ≤ 10 %, 30 mA short circuit protected |
| Start-up bypass | Triggered by external signal (Terminal 2) or by switching on<br>the supply voltage (Terminal 2 and Terminal 3 bridged)<br>Bypass time: 0.1 s ... 999.9 s |
| Error of measurement | 0.001 Hz ... 100 Hz: ≤ 0.1 %<br>100 Hz ... 1 kHz: ≤ 0.3 %<br>1 kHz ... 5 kHz: ≤ 1.5 %<br>Display: ± 1 digit |
| Ready delay | ≤ 400 ms |
| Display rate of rotation<br>and frequency | 4-digit 7-segment-LED-display, red, digit height: 7 mm |
| Design | Modular terminal housing of Makrolon |
| Mounting | By clipping onto 35 mm standard rail<br>according to DIN EN 50022<br>or srew mountable by pull-out clip with 90 mm grid |
| Terminal connections | Self-opening instrument terminals<br>cross sectional area: ≤ 2 x 2.5 $mm^2$ |
| Operating temperature<br>Storage temperature | -25 °C ... +70 °C<br>-40 °C ... +85 °C |
| Protection class<br>EMC to | IP 20<br>EN 50081-2, EN 50082-2 |

4. Terminal allocation

Term. 1: Sensor power supply, GND
Term. 2: Trigger input for start-up bypass
Term. 3: Sensor power supply, 24 VDC
Term. 4: Power supply, 24 VDC
Term. 5: Power supply, GND
Term. 6: Not connected
Term. 7: Sensor power supply, GND
Term. 8: NAMUR input L-
Term. 9: NAMUR input L+
Term. 10: Relay normally open contact, NO
Term. 11: Relay normally close contact, NC
Term. 12: Relay root, COM
Term. 13: Sensor power supply, 24 VDC
Term. 14: for NPN-sensor Input
Term. 15: for PNP-sensor Input
Term. 16: Power supply L1, 230 VAC
Term. 17: Power supply L1, 115 VAC
Term. 18: Power supply N

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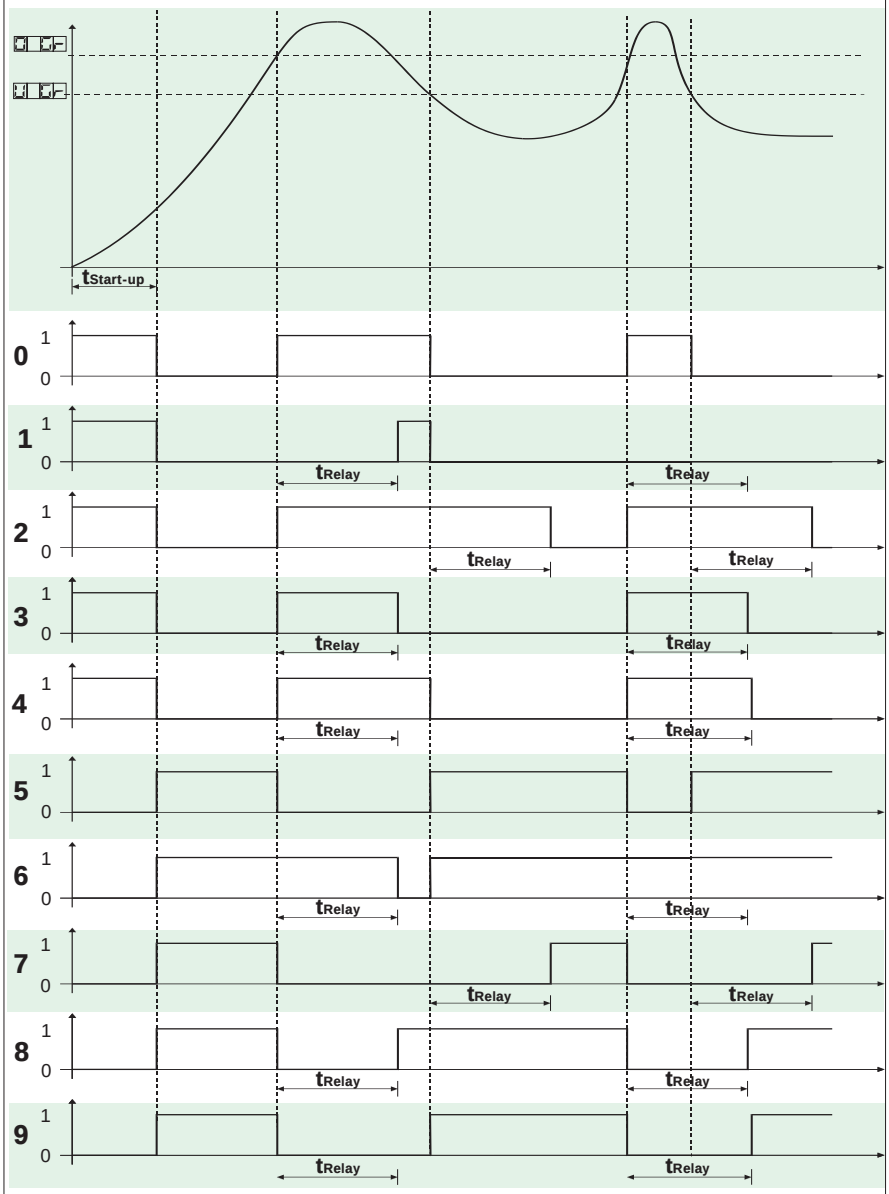
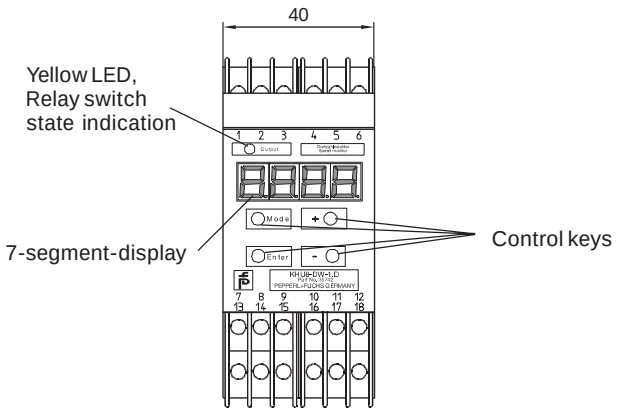
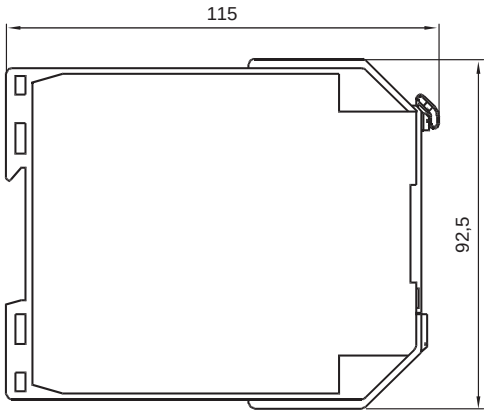
## Timer functions, reversal of direction of action of the output relay

| No. | Function |
|---|---|
| 0 | no timer function |
| 1 | ON delay |
| 2 | OFF delay |
| 3 | Defined ON time |
| 4 | Pulse lengthening |
| 5 | no timer function, inverted |
| 6 | ON delay, inverted |
| 7 | OFF delay, inverted |
| 8 | Defined ON time, inverted |
| 9 | Pulse lengthening, inverted |




## Dimensions, controls and indicators

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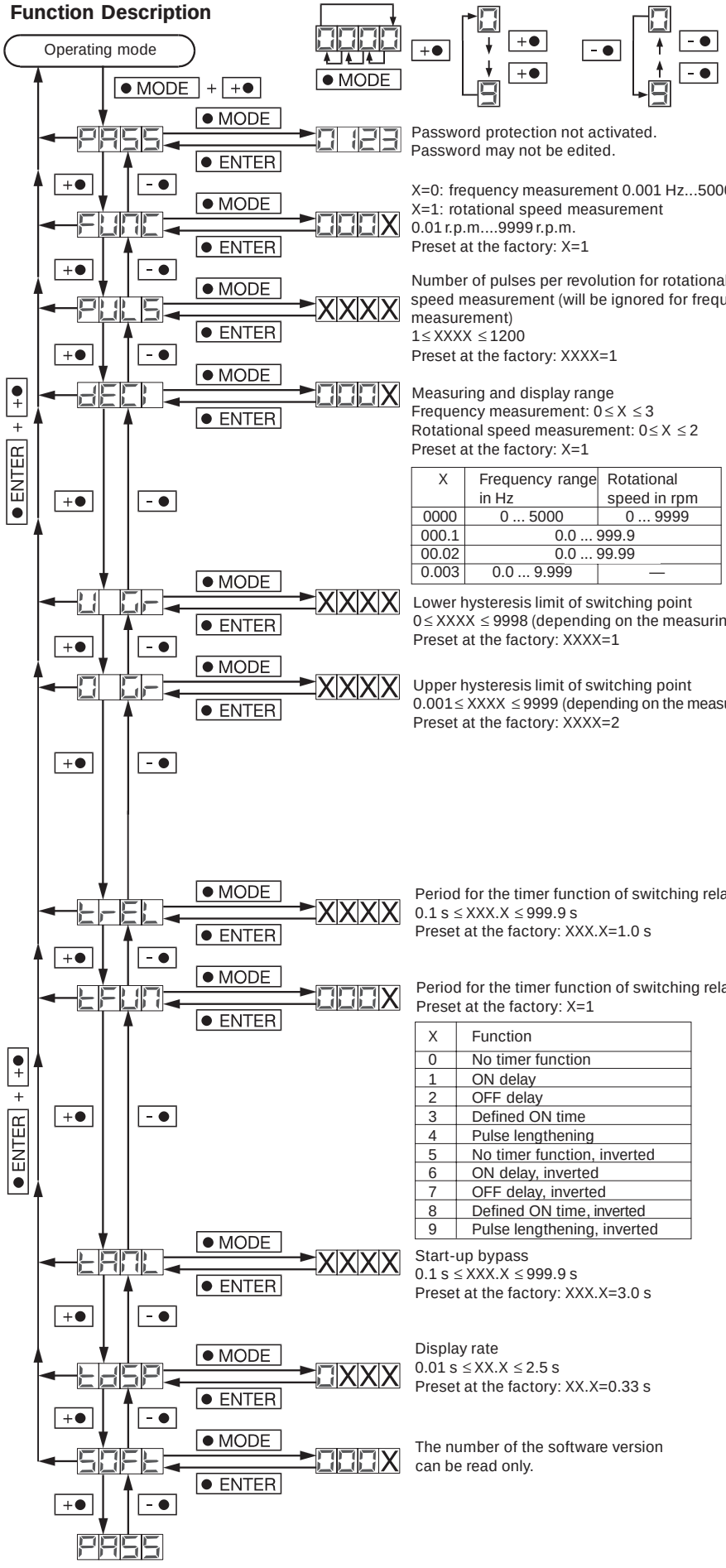
## Function Description




| X | Frequency range in Hz | Rotational speed in rpm |
|---|---|---|
| 0000 | 0 ... 5000 | 0 ... 9999 |
| 000.1 | 0.0 ... 999.9 | |
| 00.02 | 0.0 ... 99.99 | |
| 0.003 | 0.0 ... 9.999 | — |

| X | Function |
|---|---|
| 0 | No timer function |
| 1 | ON delay |
| 2 | OFF delay |
| 3 | Defined ON time |
| 4 | Pulse lengthening |
| 5 | No timer function, inverted |
| 6 | ON delay, inverted |
| 7 | OFF delay, inverted |
| 8 | Defined ON time, inverted |
| 9 | Pulse lengthening, inverted |

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