



## DX020

### Miniature Tachometer and Frequency Counter

#### Product features:

- Small housing dimensions of 48 x 24 mm (1.890 x 0.945")
- Bright LED display 6 decades/ 8mm (0.315")
- Add-on frame for 50 x 25 mm (1.969 x 0.984")
- 10 to 30 VDC power supply
- 60 kHz of counting frequency with 24 VDC power input
- Selectable filter for mechanical inputs
- Adjustable multiplier and divider
- Protection class IP65 on front
- Easy to set up by menu support

| Version:               | Description:                                                                                                                                                  |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DX02001b/K/hk/Jan02    | Valid for models until August, 2006                                                                                                                           |
| DX02002a/K/hk/Dec06    | 60 kHz, divider, brochure A5 format                                                                                                                           |
| DX02002b/hk/Aug07      | Modification of temperature range                                                                                                                             |
| Dx020_02c_oi/ag/July15 | - "Chapter 2." updated (setup procedure has been changed)<br>- "Safety instructions" and "Legal Notices" supplemented<br>- "Technical Specifications" updated |
| Dx020_02d_oi/ag        | Correction of the temperature range                                                                                                                           |

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# 1. Safety Instructions and Responsibility

## 1.1. General Safety Instructions

This operation manual is a significant component of the unit and includes important rules and hints about the installation, function and usage. Non-observance can result in damage and/or impairment of the functions to the unit or the machine or even in injury to persons using the equipment!

Please read the following instructions carefully before operating the device and observe all safety and warning instructions! Keep the manual for later use.

A pertinent qualification of the respective staff is a fundamental requirement in order to use these manual. The unit must be installed, connected and put into operation by a qualified electrician.

Liability exclusion: The manufacturer is not liable for personal injury and/or damage to property and for consequential damage, due to incorrect handling, installation and operation. Further claims, due to errors in the operation manual as well as misinterpretations are excluded from liability.

In addition the manufacturer reserve the right to modify the hardware, software or operation manual at any time and without prior notice. Therefore, there might be minor differences between the unit and the descriptions in operation manual.

The raiser respectively positioner is exclusively responsible for the safety of the system and equipment where the unit will be integrated.

During installation or maintenance all general and also all country- and application-specific safety rules and standards must be observed.

If the device is used in processes, where a failure or faulty operation could damage the system or injure persons, appropriate precautions to avoid such consequences must be taken.

## 1.2. Use according to the intended purpose

The unit is intended exclusively for use in industrial machines, constructions and systems. Non-conforming usage does not correspond to the provisions and lies within the sole responsibility of the user. The manufacturer is not liable for damages which has arisen through unsuitable and improper use.

Please note that device may only be installed in proper form and used in a technically perfect condition (in accordance to the Technical Specifications, see chapter [6](#)).

The device is not suitable for operation in explosion-proof areas or areas which are excluded by the EN 61010-1 standard.

### 1.3. Installation

The device is only allowed to be installed and operated within the permissible temperature range. Please ensure an adequate ventilation and avoid all direct contact between the device and hot or aggressive gases and liquids.

Before installation or maintenance, the unit must be disconnected from all voltage-sources. Further it must be ensured that no danger can arise by touching the disconnected voltage-sources.

Devices which are supplied by AC-voltages, must be connected exclusively by switches, respectively circuit-breakers with the low voltage network. The switch or circuit-breaker must be placed as near as possible to the device and further indicated as separator.

Incoming as well as outgoing wires and wires for extra low voltages (ELV) must be separated from dangerous electrical cables (SELV circuits) by using a double resp. increased isolation.

All selected wires and isolations must be conform to the provided voltage- and temperature-ranges. Further all country- and application-specific standards, which are relevant for structure, form and quality of the wires, must be ensured. Indications about the permissible wire cross-sections for wiring are described in the Technical Specifications (see chapter 6).

Before first start-up it must be ensured that all connections and wires are firmly seated and secured in the screw terminals. All (inclusively unused) terminals must be fastened by turning the relevant screws clockwise up to the stop.

Overvoltages at the connections must be limited to values in accordance to the overvoltage category II.

For placement, wiring, environmental conditions as well as shielding and earthing/grounding of the supply lines the general standards of industrial automation industry and the specific shielding instructions of the manufacturer are valid.

Please find all respective hints and rules on [www.motrona.com/download.html](http://www.motrona.com/download.html)  
--> "[General EMC Rules for Wiring, Screening and Earthing]".

### 1.4. Cleaning, Maintenance and Service Notes

To clean the front of the unit please use only a slightly damp (not wet!), soft cloth. For the rear no cleaning is necessary. For an unscheduled, individual cleaning of the rear the maintenance staff or assembler is self-responsible.

During normal operation no maintenance is necessary. In case of unexpected problems, failures or malfunctions the device must be shipped for back to the manufacturer for checking, adjustment and reparation (if necessary). Unauthorized opening and repairing can have negative effects or failures to the protection-measures of the unit.




## 2. Front Key Operation

### 2.1. Enter the Setup Mode

There are two different ways to enter the setup mode:

- keep both front keys pressed when powering on
- keep both front keys pressed for 5 seconds, if the power is already on

### 2.2. Parameter Settings

|                                                                                                                                                                                                                                                                                                                                                                            |                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| With an activated <b>setup mode</b> , the display shows:                                                                                                                                                                                                                                                                                                                   |   |
| After <u>releasing the keys</u> , the display shows:                                                                                                                                                                                                                                                                                                                       |   |
| <b>In order to cancel the setup</b> <u>hold the left key pressed and additionally press the right one</u>                                                                                                                                                                                                                                                                  |                                                                                      |
| By <u>pressing the right key</u> , the display changes to:                                                                                                                                                                                                                                                                                                                 |  |
| <b>To jump into the first parameter</b> , <u>hold the left key pressed and additionally press the right one</u>                                                                                                                                                                                                                                                            |                                                                                      |
| After <u>releasing the keys</u> , the display alternates between the parameter title and the setting of the parameter. After <u>pressing any key</u> , only the parameter value for setting is displayed.                                                                                                                                                                  |                                                                                      |
| <u>Press the right key</u> , to jump into the next parameter.                                                                                                                                                                                                                                                                                                              |                                                                                      |
| <b>For numerical inputs</b> <u>select the decade with the left key and change the value by the right one</u>                                                                                                                                                                                                                                                               |                                                                                      |
| <b>To jump into the next parameter</b> , <u>hold the left key pressed and additionally press the right one</u>                                                                                                                                                                                                                                                             |                                                                                      |
| After reaching the last menu item " <b>Endpro</b> ", two selections can be done:<br>„ <b>Yes</b> “: will <u>store</u> all new entries, before the unit automatically switches to normal operation.<br>„ <b>No</b> “: will <u>repeat</u> the setup routine. The latest values will remain without saving and can be checked or modified before they are permanently stored. |                                                                                      |

### 3. Operational parameters

Please enter all of the subsequent parameters, like shown in section [2](#).

#### 3.1. Input polarity

|                           |       |                                                                                                          |
|---------------------------|-------|----------------------------------------------------------------------------------------------------------|
| <b>InPoL</b>              | InPol |                                                                                                          |
| <input type="radio"/> nPn | nPn   | NPN: The count input must switch to "0"                                                                  |
| <input type="radio"/> PnP | PnP   | PNP: The count input must switch to "+".<br>Namur: Set to NPN. Learn more in section <a href="#">4</a> . |

#### 3.2. Input filter

|                           |        |                                            |
|---------------------------|--------|--------------------------------------------|
| <b>FILtEr</b>             | Filter |                                            |
| <input type="radio"/> oFF | oFF    | Filter off: maximum input frequency 60 kHz |
| <input type="radio"/> on  | On     | Filter on: maximum input frequency 30 Hz   |

#### 3.3. Scaling factors

|                                      |         |                                                                                                                              |
|--------------------------------------|---------|------------------------------------------------------------------------------------------------------------------------------|
| <b>FActor</b>                        | Factor  |                                                                                                                              |
| <input type="text" value="00.0001"/> | 00.0001 | Multiplies the input frequency with the factor setting.<br>Range 0.0001 to 99.9999.<br>Setting "0" will not be accepted.     |
| <input type="text" value="99.9999"/> | 99.9999 |                                                                                                                              |
| <b>diVider</b>                       | Divider |                                                                                                                              |
| <input type="text" value="00.0001"/> | 00.0001 | Divides the input frequency by the divider setting.<br>Setting range 0.0001 to 99.9999.<br>Setting "0" will not be accepted. |
| <input type="text" value="99.9999"/> | 99.9999 |                                                                                                                              |

#### 3.4. Decimal point

|                                    |       |                                                                                                                                               |
|------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>dP</b>                          | dP    |                                                                                                                                               |
| <input type="text" value="0"/>     | 0     | Adjustable between no decimal position and max. 3 decimal positions. This setting does not affect the numeric value of the frequency display. |
| <input type="text" value="0.000"/> | 0.000 |                                                                                                                                               |

### 3.5. Display mode

|                |        |  |                                                                                                     |
|----------------|--------|--|-----------------------------------------------------------------------------------------------------|
| <b>diSPm</b>   | diSPm  |  |                                                                                                     |
| <b>5Ec - 1</b> | Sec -1 |  | The unit displays the frequency as number of impulses per second (Hz). (With factor setting 1.0000) |
| <b>Min - 1</b> | Min -1 |  | The unit displays the frequency as number of impulses per minute. (With factor setting 1.0000).     |

### 3.6. Maximum waiting time

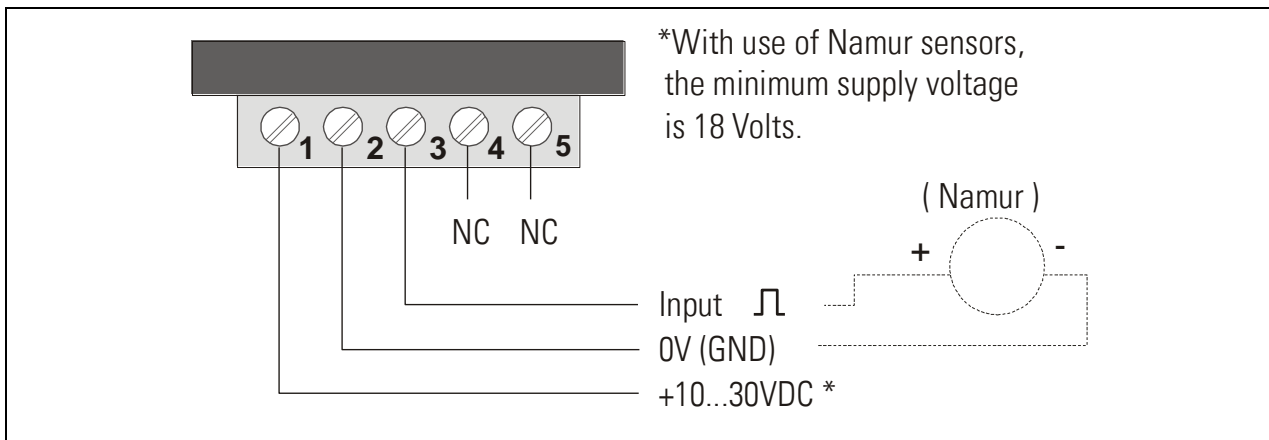
|              |       |  |                                                                                                                                                   |
|--------------|-------|--|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WAit0</b> | WAit0 |  |                                                                                                                                                   |
| <b>01.1</b>  | 01.1  |  | This setting specifies the maximum waiting time from one input impulse to the next, before the display sets to zero.<br>Range 1.1 sec to 99.9 sec |
| <b>99.9</b>  | 99.9  |  |                                                                                                                                                   |

### 3.7. End of program

|               |        |  |                                                                                  |
|---------------|--------|--|----------------------------------------------------------------------------------|
| <b>EndPro</b> | EndPro |  |                                                                                  |
| <b>no</b>     | No     |  | Select "No" to return to the beginning of the menu for verification of settings. |
| <b>YES</b>    | YES    |  | Select "Yes" to store data and exit the menu.                                    |

## 4. Terminal Assignment

(also printed to the top of the unit)



## 5. Delivery includes

- Panel mounting clip
- Bezel for screw mount with panel cut out 50 x 25mm
- Bezel for clip mount with panel cut out 50 x 25mm
- Sealing

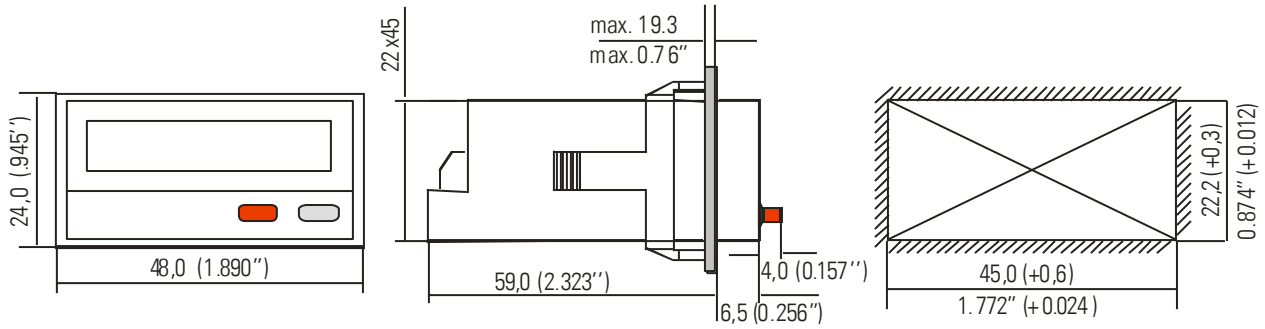


## 6. Technical Specifications

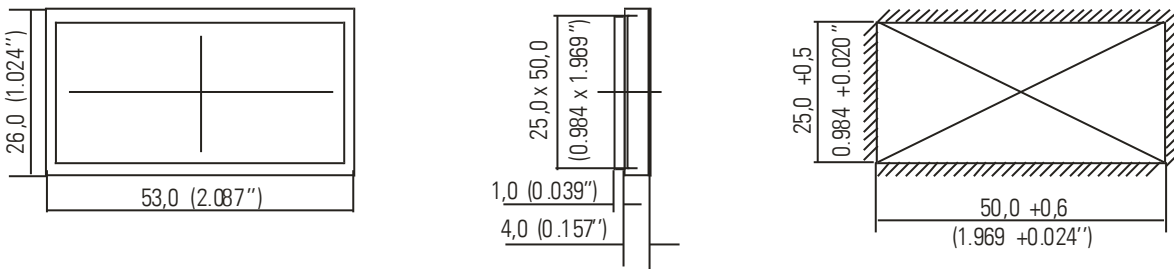
|                                    |                      |                                                                                                                                       |
|------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Power supply:</b>               | Input voltage:       | 10 ... 30 VDC                                                                                                                         |
|                                    | Protection circuit:  | reverse polarity protection                                                                                                           |
|                                    | Consumption:         | max. 50 mA                                                                                                                            |
| <b>Connections:</b>                | Type of connection   | screw terminal, 1.5 mm <sup>2</sup> / AWG 16                                                                                          |
| <b>Inkremental-Eingang:</b>        | Characteristic:      | NPN / PNP / Namur                                                                                                                     |
|                                    | Channels:            | single track                                                                                                                          |
|                                    | Signal levels:       | LOW = 0 V.....0.2 x UB, HIGH = 0.6 x UB...30V                                                                                         |
|                                    | Pulse form:          | arbitrary (Schmitt-Trigger)                                                                                                           |
|                                    | Internal resistance: | Ri ≈ 10 kOhm                                                                                                                          |
|                                    | Input frequency:     | max. 20 kHz with 12 V power supply<br>max. 60 kHz with 24 V power supply<br>max. 30 Hz with activated filter                          |
| <b>Accuracy:</b>                   | Measurement error:   | < 0.1 %                                                                                                                               |
| <b>Power down memory:</b>          | Data retention:      | 10 years (EEPROM)                                                                                                                     |
|                                    | Storage Cycles:      | 10 <sup>6</sup>                                                                                                                       |
| <b>Display:</b>                    | Type:                | 6 digit LED, red                                                                                                                      |
|                                    | Digit height:        | 8 mm / 0.3149 inch                                                                                                                    |
|                                    | Range:               | 0 ... 999999                                                                                                                          |
| <b>Housing:</b>                    | Material:            | plastic                                                                                                                               |
|                                    | Mounting:            | panel                                                                                                                                 |
|                                    | Dimensions:          | cut out (w x h):<br>45 x 22 mm / 1.772 x 0.866 inch<br>outer dimensions (w x h x d):<br>48 x 24 x 59 mm / 1.889 x 0.9449 x 2.323 inch |
|                                    | Miscellaneous:       | additional bezels for clip or screw mounting are included in the delivery                                                             |
|                                    | Protection class:    | front: IP 65 / rear: IP20                                                                                                             |
|                                    | Weight:              | approx. 50 g                                                                                                                          |
| <b>Ambient temperature:</b>        | Operation:           | -20°... + 55° C / -4° ... 131° F (not condensing)                                                                                     |
|                                    | Storage:             | -25°... + 70° C / -13° ... 158° F (not condensing)                                                                                    |
| <b>Conformity &amp; standards:</b> | EMC 2004/108/EC:     | EN 61000-6-2, EN 61000-6-3, EN 61000-6-4                                                                                              |
|                                    | RoHS 2011/65/EU:     | EN 50581                                                                                                                              |

# 7. Dimensions

## 7.1. Mounting without use of add-on frames



## 7.2. Bezel 50 x 25 mm (1.969 x 0.984'') for clip mounting



## 7.3. Bezel 50 x 25 mm (1.969 x 0.984'') for screw mounting

