

Operating Instructions

NIVOMAT FM 1019 Measuring Amplifier

For Continuous Fill-Level Indication



NIVOMAT FM 1019

Safety Precautions

- Installation, initial start-up and maintenance may only be performed by trained personnel! All applicable European and national regulations regarding installation of electrical equipment must be adhered to.
- The device may only be connected to supply power which complies with the specifications included in the technical data and on the serial plate!
- The device must be disconnected from all sources of power during installation and maintenance work!
- The device may only be operated under the conditions specified in the operating instructions!

Caution!



The correct jumper setting must be selected **before** switching supply power on. The interconnected measuring transducer may be damaged if the setting has not been correctly selected.



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Technical Data

Supply Power

230 V \pm 10%, 50 / 60 Hz / 24 V DC \pm 10% (see serial plate)

Note:

The device may only be connected to supply power via a disconnecting device which is located in close proximity.

Connected Load

Approx. 8 VA / approx. 8 W

Ambient Temperature

-20 to +60° C

Housing

European plug-in module for 19" rack, 3 standard height units x 12 standard width units

DIN 41612 plug connector type F 32 d-z

Optional:

DIN panel mount housing: 138⁺¹ x 68⁺¹ mm, IP 65

Wall mount housing: 246 x 135 x 249 mm, IP 55

Note:

Contact protection per DIN EN 61010-1 is only assured when installed to a closed switch cabinet or housing with at least IP 54 protection!

Relay Outputs

4 floating changeover contacts

Switching voltage: max. 250 V, 50 to 60 Hz

max. 115 V DC

Switching current: max. 3 A AC, 0.5 A DC

Min. load: 10 mA at 5 V DC

Note:

Contacts are not protected against overload – use external protective device!

Current/Voltage Outputs:

1 ea. 0 to 20 mA, max. load: 400 Ω / 0.5% accuracy

1 ea. 4 to 20 mA, max. load: 400 Ω / 0.5% accuracy

1 ea. 0 to 10 V, min. load: 3.3 k Ω / 1% accuracy

Indicators

LCD panel with bar graph and digital display, setup menu with alphanumeric display

4 LEDs = threshold value relays pulled in

Threshold Value Relay On and Off Delay

Adjustable from 0.1 to 10 seconds

Measuring Circuit

0 to 20 mA / 100 Ω

Measuring Accuracy

< 0.5% of measuring range upper limit

Refresh Frequency

Digital display: approx. 5 Hz

Bar graph: approx. 20 Hz

Current/voltage output: approx. 20 Hz

CE Mark

In accordance with low-voltage directive (73/23/ECC), EMC directive (89/336/ECC) and Overvoltage category II – If transient overvoltages in excess of category II can be expected, special measures must be implemented accordingly.

Fouling factor 1 (clean environment)

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Functions Description

The NIVOMAT FM 1019 is a microprocessor controlled measuring amplifier for 0 to 20 mA measuring signals.

- Bar graph display from 0 to 100 (1% steps)
- 4½ place digital display with adjustable decimal point
- Assignable unit of measure: mA, %, ltr, m³, cm
- Integrated linearisation function
- Integrated quantisation function (2%,5%,10%)
- Integrated measured value memory (last valid measured value is stored in the event of power failure)
- Adjustable measured value interference filter
- 4 relay threshold values – separately adjustable delay time and hysteresis
- Measuring signal (mA) can be freely assigned to desired bar graph display value
- Bar graph display can be freely assigned to desired digital display value
- Hold input for “freezing” the current value

Controls and Display LEDs

- 4 control keys
Esc = up one menu level / back
Enter = down one menu level / next submenu
↑+ = cursor up / increase value
↓- = cursor down / decrease value
- 4 LEDs = threshold value relays pulled in

Menu Structure:

(See also overview diagram on page 5.)

Standard display = bar graph + digital value + U/M

Main Menu (A)

- - Threshold values
- - Scale
- - Decimal point
- - Unit of measure
- - Extras
- - Info

“Threshold Values” Submenu (B)

Select relays 1 through 4, switching point adjustment, on-delay and hysteresis adjustment

Switching threshold (H1-4):

Adjustable from 0 to 100% relative to the selected min-max mA range (see menu C)

Delay time in seconds (K1-4):

Setting range: 0.1 to 10 sec.

Reset hysteresis as percentage (P1-4):

Setting range: 0 to 99%

“Scale” Submenu (C)

Assignment of input signal (mA) to digital display and bar graph values

mA max. value (J)

Adjustable from 0 to 20.4 mA

mA min. value (L)

Adjustable from 0 to 20.4 mA

Max. scale value (M)

Setting range: 0.1 to 1999.9 (U/M from menu E)

Scale zero point (N)

Setting range: 0.1 to 1999.9 (U/M from menu E)

“Decimal Point” Submenu (D)

- Decimal place shift within the digital display value with ↑+ and ↓- keys

“Unit of Measure” Submenu (E)

- Assignment of a U/M to the display value
 - %
 - mA
 - ltr (litre)
 - cbm (m³)
 - cm (fill-level height)

“Extras” Submenu (F)

- Function selection
 - Linearisation
 - Filter
 - Quantisation
 - Power failure memory
 - Language

“Info” Submenu (G)

- Device and manufacturer information
- Software version
- IER phone number

General information

Overranging display:

As soon as the measuring signal violates the mA range selected in the “Scale” submenu (C), overranging is indicated at the left-hand side of the standard display by means of an arrow (↑/↓).

If none of the keys are activated for a duration of **greater than 2 minutes** when the main menu is open, the device is automatically returned to the standard display (bar graph and digital value).

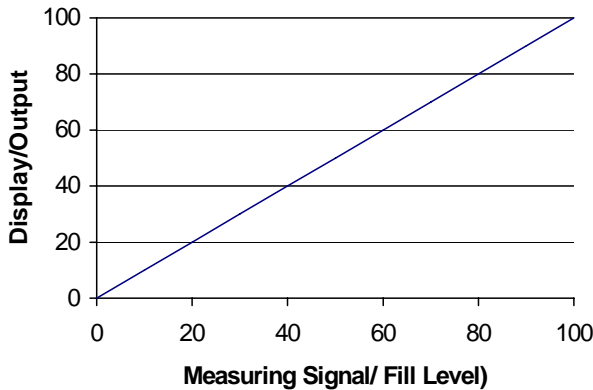
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“Linearisation” Submenu (O)

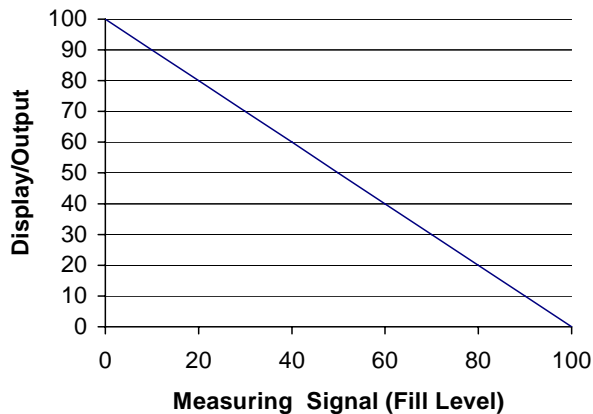
- Selection of the linearisation waveform

The measuring signal is converted based upon on of the following functions:

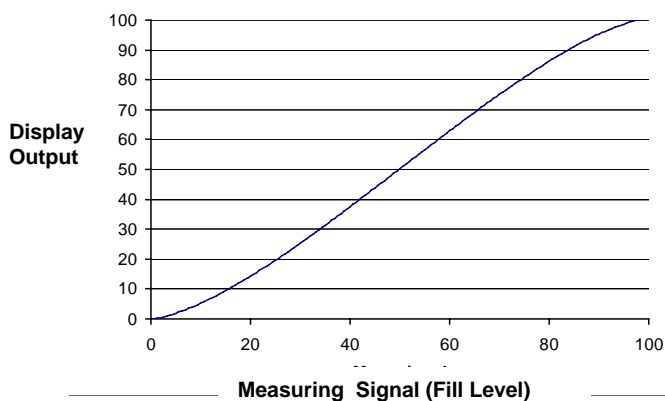
“Linear +” function:



“Linear -” function:



“L tank” function:



The volume chart for a flat-lying, cylindrical tank is emulated with this function. This chart is necessary if volume needs to be calculated based upon the measured fill-level.

The zero and hundred levels of the L tank function are assigned to the range (excerpt) in accordance with menu items J and L.

“Sphere” function:

The volume chart for a spherical tank is emulated with this function. This chart is necessary if volume needs to be calculated based upon the measured fill-level.

“FS1/2/3” function:

This function must be activated if an old “NIVOMAT FS..” fill-level probe* (with resistance summation) is used. The following additional settings are also required in this case:

For NIVOMAT FS2/3

“Quantisation” submenu	5%
“Scale” submenu -> mA-Max:	12.5 mA
“Scale” submenu -> mA-Min;	2.8 mA
Jumper setting:	1

A 1 kΩ resistor must be looped into the measuring circuit!

For NIVOMAT FS1

“Quantisation” submenu	10%
“Scale” submenu -> mA-Max:	12.5 mA
“Scale” submenu -> mA-Min;	4.4 mA
Jumper setting:	1

A 1 kΩ resistor must be looped into the measuring circuit!

Observe:

Due to long connection cable, transition resistance of terminals and tolerance of the sensor if necessary the current must be adjusted in the range of +/-0,2 mA.

“EPROM” function

Optional: curve per customer specification (programmed by the manufacturer)

“Filter” Submenu (T)

Adjustable filter for attenuating measured value fluctuations and interference
Integration time constant: 0.01 to 5.00 sec.

“Quantisation” Submenu (P)

Activate and select quantisation steps:

- None
- 2%
- 5%
- 10%

After activating the quantisation function, set the following to steps of 2%, 5% or 10%:

- Digital display value / bar graph
- Current and voltage outputs
- threshold value relays

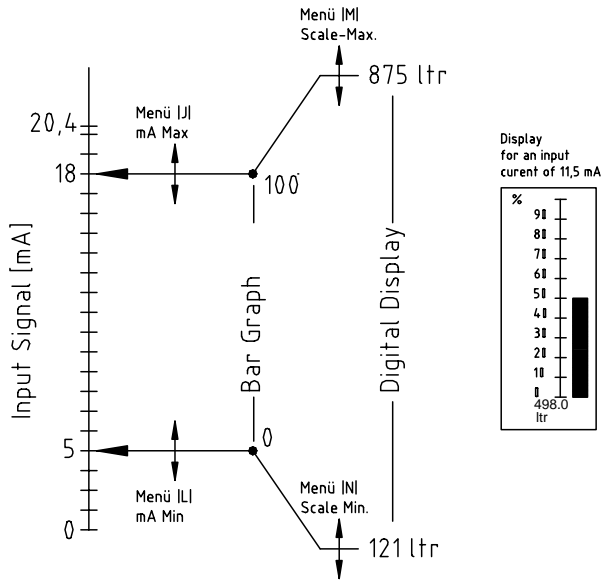
“Language” Submenu (S)

One of the following user interface languages can be selected:

- English
- French
- German
- Spain

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Assigning Display Values to the Input Signal



Example:

A range or portion of the input signal can be selected with menu items (J) and (L).

In this example: 5 to 18 mA

Result:

With an input current of 5 mA, the bar graph indicates "0", and at 18 mA it indicates full value (100).

A digital display value can be assigned to the **selected range** with menu items (M) and (N).

In this example: 5 mA = 121 and 18 mA = 875

Result:

With an input current of 5 mA, the digital display indicates "121", and at 18 mA it indicates "875".

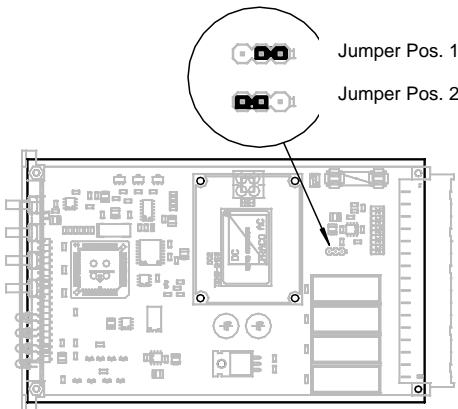
The appropriate unit of measure can be assigned to the display with menu item (E).

In this example: ltr litre

Result:

The "ltr" U/M appears underneath the digital display.

Jumper Position



Jumper position 1:

- For supplying power to measuring transducers via the signal line (2-wire connection, 4 to 20 mA):

J1: pins 1 and 2 connected = +15 V at terminal 0V/15V(13) (e.g. MEMPRO, FS probes etc.)

Jumper position 2:

- Passive measuring transducers with own power supply (0 to 20 mA):

J1: pins 1 and 2 connected = 0 V at terminal 0V/15V(13)

Hold input:

- As long as the hold input is connected to zero potential, the display/output values and the relay states derived therefrom are frozen at their momentary values.

Maintenance

The device is maintenance-free if used for its intended purpose.

Device reset

Reset to default values:

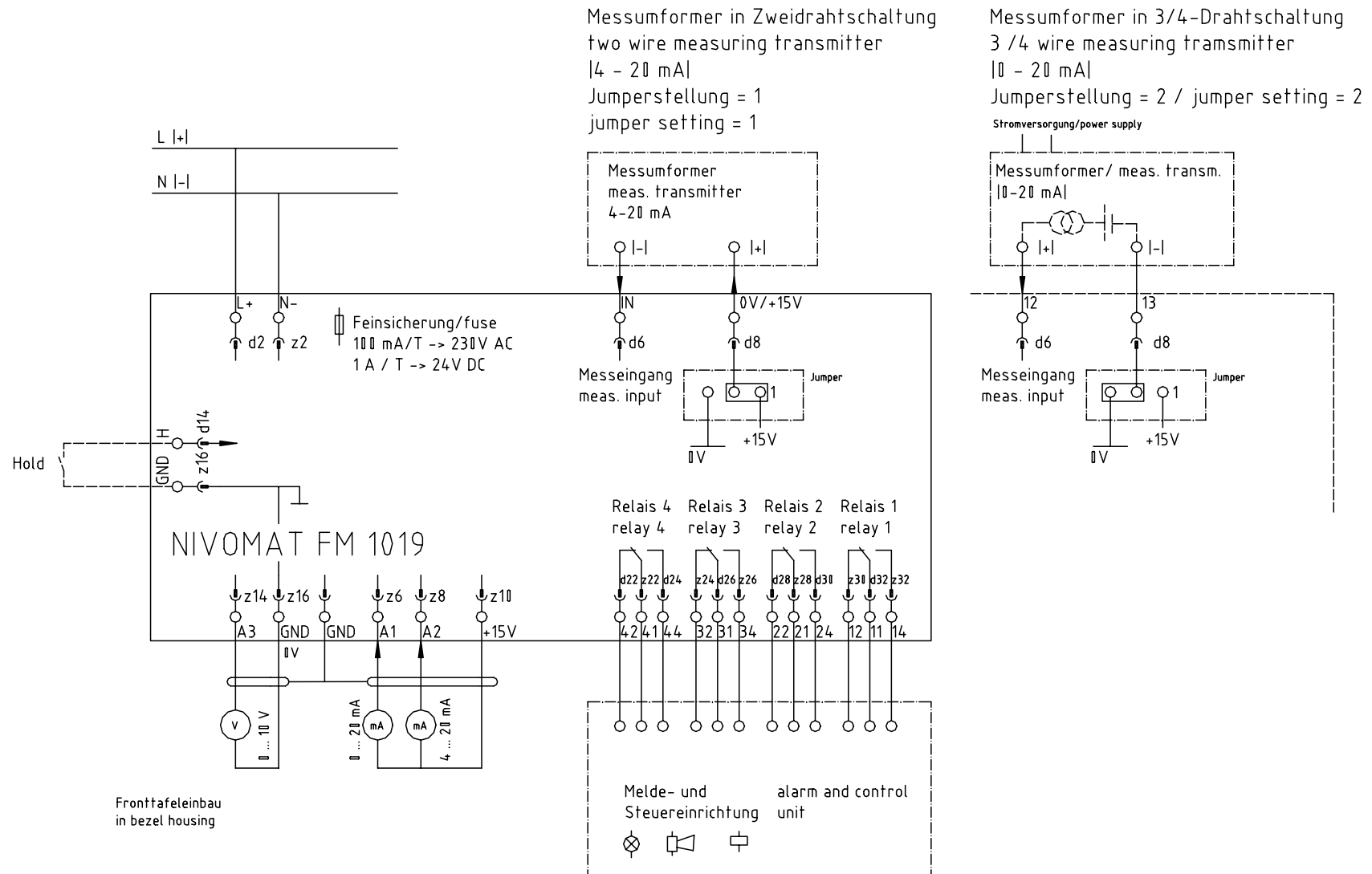
- Disconnect from supply power or unplug the device.
- Wait for 1 to 2 seconds.
- Reconnect supply power or plug the device back in.
- Press **all four buttons** while dosing so.
- The reset procedure is displayed.
- Continue to hold the buttons depressed until the small bar graph has advanced to the right-hand edge of the display.

The following default values are written to the EPROM:

- Limit value 1: 80%
- Limit value 2: 60%
- Limit value 3: 40%
- Limit value 4: 20%
- Delay time: 0.1 sec.
- Hysteresis: 1%
- mA min. value: 4.00 mA
- mA max. value: 20.00 mA
- Scale minimum: 0.0
- Scale maximum: 100.0
- Decimal place: one place
- Unit of measure: %
- Linearisation: "Linear +" function
- Filter: 0.1 sec. integration time
- Quantisation: none
- Power failure memory: Off
- Language: German

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Electrical Connection:



Connection Schematic: **NIVOMAT FM1019 F (in bezel housing)**

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Menu Structure Overview Diagram

