



Instruction Manual

DND01

Nutating Disc Meter



PKP Prozessmesstechnik GmbH
Borsigstraße 24
D-65205 Wiesbaden-Nordenstadt
Tel.: ++49-(0)6122-7055-0
Fax: ++49-(0)6122-7055-50
Email: info@pkp.de www.pkp.de

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Safety Information

General Instructions

To ensure safe operation, the device should only be operated according to the specifications in the instruction manual. The requisite Health & Safety regulations for a given application must also be observed. This statement also applies to the use of accessories.

Every person who is commissioned with the initiation or operation of this device must have read and understood the operating instructions and in particular the safety instructions!

The work safety instructions in this manual as well as the safety, accident prevention and environmental protection regulations generally valid for the work area must be observed.

The liability of the manufacturer expires in the event of damage due to improper use, non-observance of this operating manual, use of insufficiently qualified personnel and unauthorized modification of the device.

Proper Usage

The nutating disc flow meters DND01 are designed to monitor continuous flow rates of liquids or gases which do not attack the device materials. All other usage is regarded as being improper and outside the scope of the device.

In particular, applications in which shock loads occur (for example, pulsed operation) should be discussed and checked in advance with our technical staff.

The series DND01 flow meter devices should not be deployed as the sole agents to prevent dangerous conditions occurring in plant or machinery. Machinery and plant need to be designed in such a manner that faulty conditions and malfunctions do not arise that could pose a safety risk for operators.

Dangerous substances

For dangerous media such as e.g. Oxygen, Acetylene, flammable or toxic substances as well as refrigeration systems, compressors, etc. must comply with the relevant regulations beyond the general rules.

Qualified Personnel

The DND01 devices may only be installed by trained, qualified personnel who are able to mount the devices correctly. Qualified personnel are persons, who are familiar with assembling, installation, placing in service and operating these devices and who are suitably trained and qualified.

Inward Monitoring

Please check directly after delivery the device for any transport damages and deficiencies. Additional with reference to the accompanying delivery note the number of parts must be checked.

Claims for replacement or goods which relate to transport damage can only be considered valid if the delivery company is notified without delay.

Installation

Before the first installation:

Please flush the meter with fresh water or the medium to measure before the first installation.

Before installing a meter in a new or modified pipework, the complete pipe system should be cleaned to remove any impurity like solder, sealing material, welding beads, etc. Inlet and outlet straight pipe runs are not necessary.

All mounting positions are possible.

Install the meter in such a way that no stress nor strain does effect the meter housing in order to avoid any damage of threads and/or meter housing. Make sure that the arrow on the meter housing shows in flow direction.

In case a solenoid valve is used in connection with very frequent switching cycles, the valve should be mounted on the inlet side of the meter in order to avoid pressure shocks. To maintain fullpipe conditions, a non-return valve may be mounted at the outlet. To ensure an exact measurement, please make sure that the measuring chamber is always fully filled.

- ◆ Do not place the device on an unstable place where it could fall.
- ◆ Never place the device near a radiator.
- ◆ Keep cables away from potential hazards.
- ◆ Ground the device before installation.

Putting into operation

As with any fine instrument, care must be taken in the installation. Your particular meter may be of special design and may require special information, however, these tips cover several points of concern with all models.

Please verify the following prior to installation and operation.

	Yes	No
— Has the piping system been cleaned and is free of any dirt and particles?	<input type="checkbox"/>	<input type="checkbox"/>
— Has a strainer been installed at the inlet of the meter? (only for P series)	<input type="checkbox"/>	<input type="checkbox"/>
— Is mounting position as per requirement?	<input type="checkbox"/>	<input type="checkbox"/>
— Is flow direction in accordance with the arrow marking?	<input type="checkbox"/>	<input type="checkbox"/>
— Is operating flow within specifications? (The maximum specified flow rate is an instrument maximum design flow rate and is not recommended for continuous operation. For optimum performance a continuous flow rate should not exceed 65% of design maximum)	<input type="checkbox"/>	<input type="checkbox"/>
— Is material compatibility verified and confirmed?	<input type="checkbox"/>	<input type="checkbox"/>
— Is operating pressure within limits?	<input type="checkbox"/>	<input type="checkbox"/>
— Have measures been taken, in case of low viscous fluids, that the pressure drop across the meter does not exceed 1.0 bar?	<input type="checkbox"/>	<input type="checkbox"/>
— Is operating temperature within limits?	<input type="checkbox"/>	<input type="checkbox"/>
— Have measures been taken to avoid pressure shocks? In case a solenoid valve is used in connection with very frequent switching cycles, the valve should be mounted on the inlet of the meter. To maintain full pipe conditions a non-return valve may be mounted at the outlet.	<input type="checkbox"/>	<input type="checkbox"/>
— Does wiring comply with attached wiring diagram?	<input type="checkbox"/>	<input type="checkbox"/>
— Have you carefully read the operating manual?	<input type="checkbox"/>	<input type="checkbox"/>

Begin start-up only once you have answered all questions with YES.

When putting into operation, always open the upstream valve slowly to apply with the fluid pressure of the meter and avoid any pressure shocks.

Please make sure that the following parameters are always observed:

- Maximum operating pressure is 16 bar for the M-series and 10 bar for the P-series.
- Maximum operating temperature is 50 °C for plastic meters and 120 °C for bronze meters with LCP chamber.
- Meters must always be operated within the specified flow range.
- Maximum pressure drop across the meter is 1 bar for low viscous fluids and 3,4 bar for liquids up to maximum 800 mPas.

Evaluation units general

Features:

- ◆ Large, six-digit LCD display
- ◆ Display in litres, pints, quarts or gallons freely programmable
- ◆ 11-digit non-resettable totaliser and 6-digit resettable totaliser
- ◆ Replaceable battery with long life
- ◆ Stored calibration factor
- ◆ 9-point linearisation
- ◆ Scalable pulse output (with output signal code B and option D2)
- ◆ 4-20 mA output (for output signal code B and option D2)
- ◆ Protection class: IP65

Description:

The electronic evaluation unit (register) consists of a microprocessor board powered by a lithium battery. It can be programmed in litres, pints, quarts or gallons and adds in litres or gallons.

A calibration factor and a unit of measure are programmed during a factory test. Unlike mechanical units, these can be electronically recalibrated in the field if necessary. A 6-digit LC display with three decimal places shows the exact amount of liquid flowing through the meter. The register is protected from normal wear and tear by a robust, shockproof housing.

Operation:

The magnets integrated in oval gear counters send pulses to the register.

The register is in sleep mode until pulses arrive. The pulses are generated by the liquid flowing through the meter.

The register shows the current flow rate, the subtotal and the total.

The resettable totaliser has a 6-digit display with three digits after the decimal point. If the measured quantity exceeds 999.999, the display jumps over. Then only 2 digits behind the decimal point 9999.99 are displayed and so on up to the maximum value of 999999. After 999999 is reached, the totaliser starts again with 0.000. When the reset button is pressed, the totaliser is reset to zero. The register also has a resettable total counter. To reset this, the total and reset keys must be pressed simultaneously ("Total" key pressed and held, "Reset" key pressed). This can be used for several subtotals.

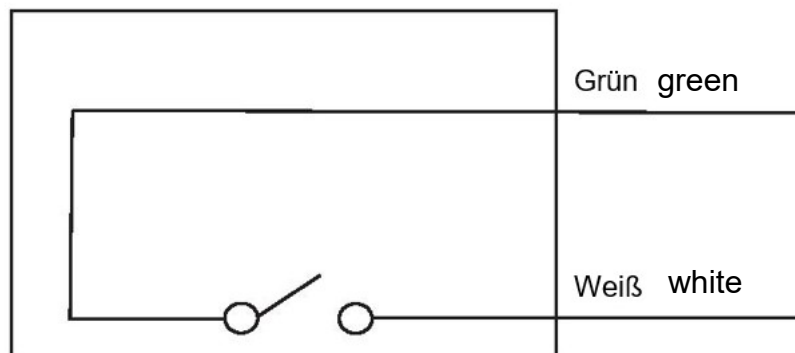
The non-resettable totalisers have 11 digits and count arbitrarily in either gallons or litres.

Electrical Connection / Evaluation units

DND01, Code R

potential free Reed contact, pulse output, 2,7 m cable:

Connection plan:



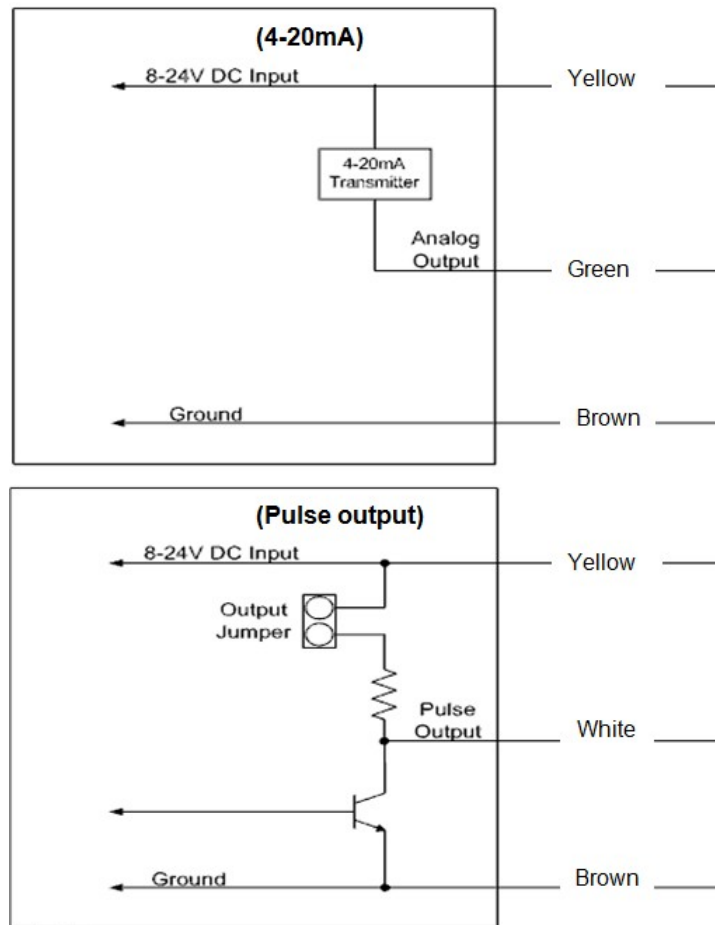
Pulse per unit of measure

Model	Connection	Pulses/litre	Pulses/Gallon
DND01.01....	3/4" male	52,4	198,3
DND01.02....	1" male	52,4	198,3
DND01.03....	3/4" male	52,4	198,3
DND01.04....	1" male	52,4	198,3
DND01.05....	3/4" male	52,4	198,3
DND01.06....	1" male	52,4	198,3
DND01.08....	1" male	52,4	198,3
DND01.09....	1 1/4" male	23,7	89,8
DND01.10....	1 1/4" male	23,7	89,8
DND01.11....	1 1/4" male	12,3	46,8
DND01.12....	1 1/4" male	12,3	46,8
DND01.13....	1 1/2" female NPT	6,3	23,9
DND01.14....	1 1/2" female NPT	6,3	23,9
DND01.15....	2" female NPT	3,8	14,6

Note: Pulses per liter are shown unit-specifically on the calibration certificate supplied and on the type plate.

**On Site Display (mounted or separate), Pulse output NPN,
Analoge output (4...20 mA), 3 m cable, order code B or Option D2**

Connection plan:



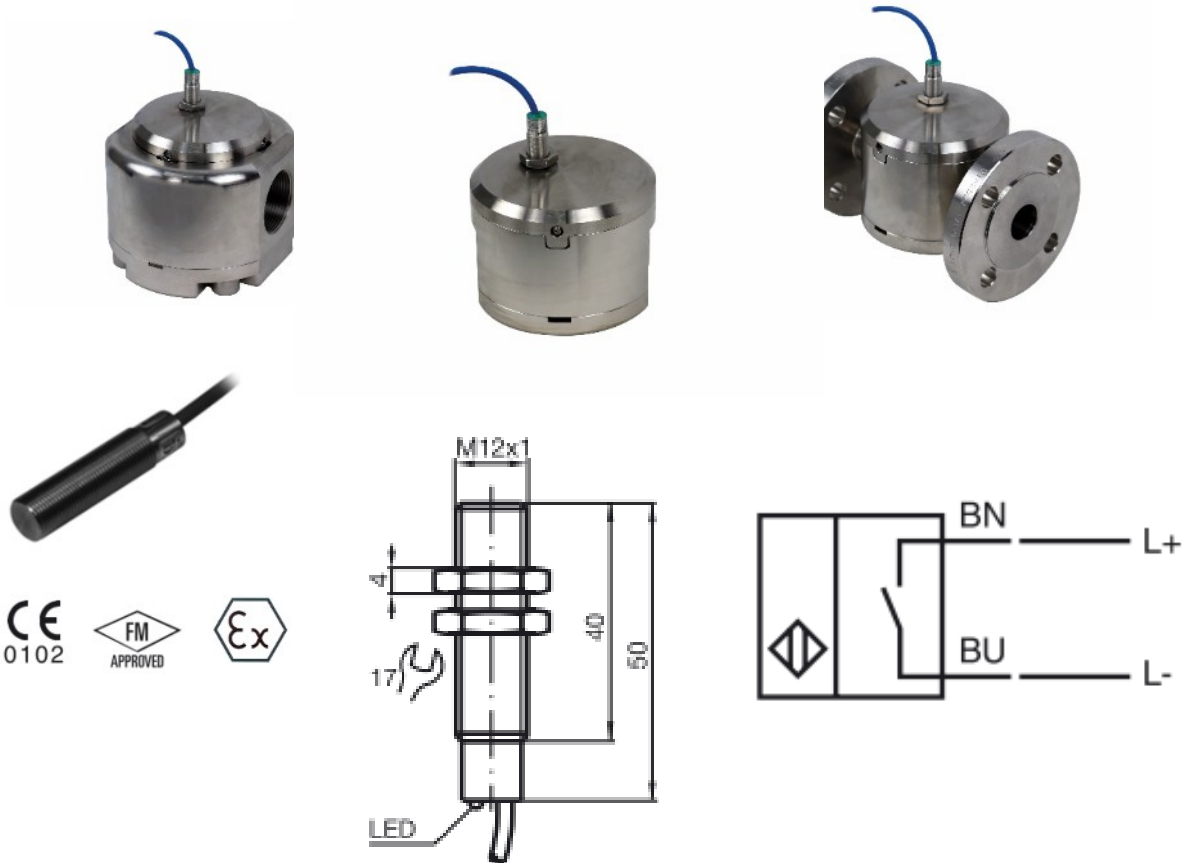
Register wiring

External DC+	:	Yellow
External ground	:	Brown
Pulse output	:	White
Analog output	:	Green
DC input	:	8 to 24 VDC; 20 to 40 mA

Outputs:

- Analogue 4 to 20 mA output in loop powered configuration; external load of 50 ohms to 250 ohms; flow rate is linear scaled between 4 mA minimum and 20 mA maximum set points; flow rates below programmed minimum read 4 mA.
- Pulse output with internal pull-up resistor (10 K Ω); optional open collector output with output jumper removal; pulse output is scalable in pulses per liter or pulses per gallon.

DND01, Code M
NAMUR Pulse output, unscaled, 2 m cabel



Technical data:

Switching function	Normally open (NO)
Output type	NAMUR 2-wire
Nominal voltage	Uo 8,2 V (Ri ca. 1 kΩ)
Effective inductivity	internal Ci ≤ 15 nF; a cable length of 10m is considered
Effective inductance	internal Li ≤ 35 μH; a cable length of 10m is considered
Switch state indicator	LED (yellow)
Ambient temperature	-25 to 70°C (-13 to 158°F)
Cable length	2 meters (PVC)
Core cross-section	0,34 mm ²
Material	Stainless steel 1.4404 (316L)
Protection class	IP66 / IP67

Marking:

Namur	CE 0102 / Ex II2G Ex ib IIC T6 Gb
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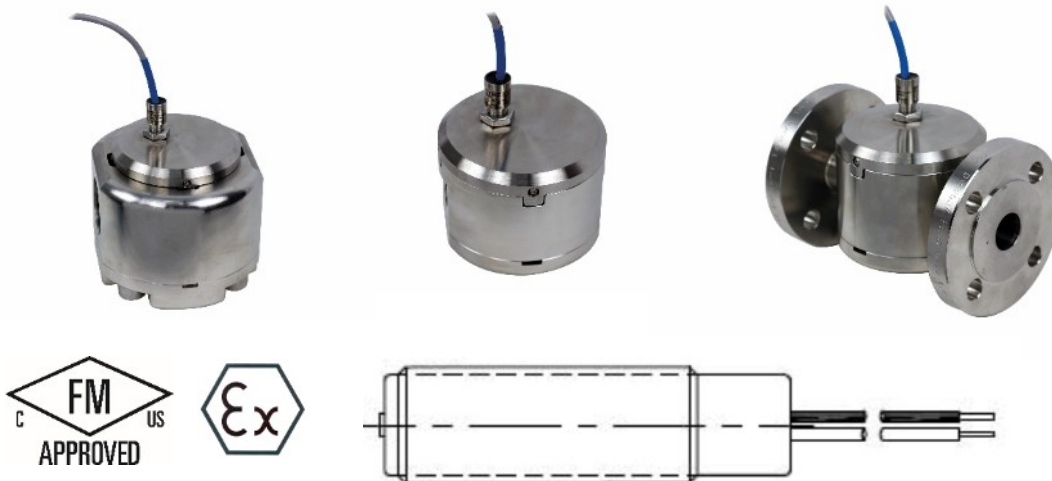
Pulse per unit of measure

Model	Connection	Pulses/litre	Pulses/Gallon
DND01.01....	3/4" male	52,4	198,3
DND01.02....	1" male	52,4	198,3
DND01.03....	3/4" male	52,4	198,3
DND01.04....	1" male	52,4	white 198,3
DND01.05....	3/4" male	52,4	198,3
DND01.06....	1" male	52,4	198,3
DND01.08....	1" male	52,4	198,3
DND01.09....	1 1/4" male	23,7	89,8
DND01.10....	1 1/4" male	23,7	89,8
DND01.11....	1 1/4" male	12,3	46,8
DND01.12....	1 1/4" male	12,3	46,8
DND01.13....	1 1/2" female NPT	6,3	23,9
DND01.14....	1 1/2" female NPT	6,3	23,9
DND01.15....	2" female NPT	3,8	14,6

Note: Pulses per litre are shown unit-specifically on the calibration certificate supplied and on the type plate.

DND01, Code P or N

PNP or NPN pulse output, Open Collector, unscaled, 3 m cabel



Connection: white \perp
red (+)
black (-)

Technical data:

Switching function	Open collector
Output type	NPN or PNP 3-wire (2 versions available)
Supply voltage	5-30 VDC ($I \leq 15$ mA)
Supply current	100 mA max ($P_{max} = 0,66$ watt)
Effective internal inductivity	$C_i \leq 12$ nF
Effective internal inductance	$L_i \leq 0$ μ H
Cable length	3 meters
Material	Stainless steel 1.4404 (316L)
Protection class	IP66 / IP67

Marking:

USA	Intrinsically safe Class I, II, III, Division 1 GROUP ABCDEFG T6 to T5 Class I, Zone 0, AEx ia IIC T6 to T5
Canada	Intrinsically safe Class I, Division 1 GROUP ABCD T6 to T5 Class I, Zone 0, Ex ia IIC T6 to T5
ATEX	Ex II 1G Ex ia IIC T6 to T4 Ga
IIECEX	Ex ia IIC T6 to T4 Ga

Pulse per unit of measure

Model	Connection	Pulses/liter	Pulses/gallon
DND01.01....	3/4" male	52,4	198,3
DND01.02....	1" male	52,4	198,3
DND01.03....	3/4" male	52,4	198,3
DND01.04....	1" male	52,4	198,3
DND01.05....	3/4" male	52,4	198,3
DND01.06....	1" male	52,4	198,3
DND01.08....	1" male	52,4	198,3
DND01.09....	1 1/4" male	23,7	89,8
DND01.10....	1 1/4" male	23,7	89,8
DND01.11....	1 1/4" male	12,3	46,8
DND01.12....	1 1/4" male	12,3	46,8
DND01.13....	1 1/2" female NPT	6,3	23,9
DND01.14....	1 1/2" female NPT	6,3	23,9
DND01.15....	2" female NPT	3,8	14,6

Note: Pulses per liter are shown unit-specifically on the calibration certificate supplied and on the type plate.

Function of the on-site display

The register display consists of two rows of seven-segment digits, status, unit of measures, flow rate, and battery indicators.

Operating function settings and programming are provided using the **TOTAL** and **RESET** buttons.



Normal operation

To enter normal operation mode - when the screen is blank after exiting programming mode, or upon initial use, press either the **TOTAL** or **RESET** button once.

Status

The status indicators are RESET and TOTAL

Totalizers

The top row of indicators is the batch totalizer. This totalizer displays the cumulative volume of flow through the meter with six digits. The batch totalizer totalizes in selected units of measure.

To reset the batch totalizer, after 2 seconds of no flow, press and release the **RESET** button.

The bottom row of indicators display the resettable totalizer with five digits or the five least significant digits of the non-resettable totalizer. RESET and TOTAL is indicated when the resettable total is displayed in the five-digit lower row. Only TOTAL is indicated when the non-resettable total is displayed.

To toggle between the non-resettable totalizer and the resettable totalizer, press and release the TOTAL button.

To reset the resettable totalizer, press and hold the TOTAL button and then press and release the RESET button.

To display 11-digit non-resettable totalizer, while the non-resettable total is displayed, press and hold the TOTAL button for seconds. The top row displays the 6 most significant digits; the bottom row displays five least-significant digits.

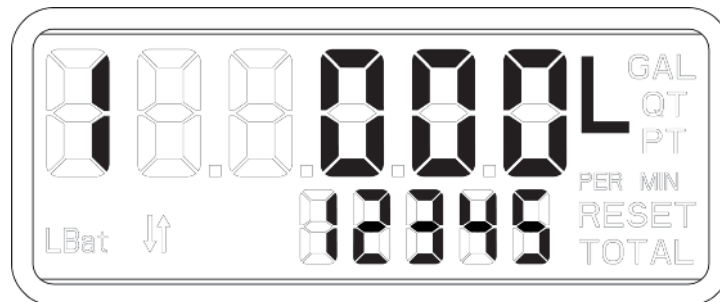
NOTE: The non-resettable totalizer normally displays 5 least-significant digits.

Flow rate

PER MIN is displayed in conjunction with the unit of measure. All flow rates are calculated in volume unit per minute.

Battery

The "LBat" indicator will indicate when the battery is approaching end of life. When the indicator is illuminated, the CR123A, 3.0 VDC lithium battery is drained to 10% of its total capacity and should be changed. Normal battery life is five years.



Checksum

To display the firmware checksum, press and hold the RESET button for three seconds. To return to normal display, release the RESET button.

Display scale factor

To display the scale factor:

At the same time, press and hold the TOTAL and RESET buttons for two seconds to display the programmed scale factor. To return to the normal display, release both buttons.

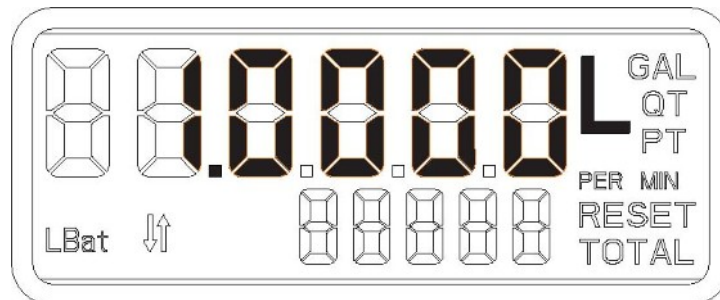
Programming of the on-site display

In programming mode only, pressing and releasing the **TOTAL** button advances to the next parameter on the current screen. Pressing and releasing the **RESET** button changes the current flashing selection to another selection (such as “L” to “GAL”).

To enter the programming mode, press the TOTAL button three times and then press the RESET button three times (the time lag between pressing both buttons six times must be within two seconds).

Changing the unit of measure and scale factor:

Unit of measure:



1. Press and release the RESET button to change the unit of measure (L, GAL, QT, PT).
2. Press and release the TOTAL button to select desired the unit of measure (theselected unit of measure will flash).
3. When the appropriate unit of measure is selected, press the TOTAL button to advance to the scale factor programming.

Scale factor

The register collects input pulses from the oval gear meter and then determines the appropriate display output using the scale factor. This scale factor varies depending upon the viscosity of the liquid being measured, therefore calibrating the meter and register in the appropriate liquid will affect the scale factor. The scale factor is displayed as 5 digits (on the top row) next to the unit of measure. The scale factor consists of 1 integer digit and 4 decimal digits (see figure 5).

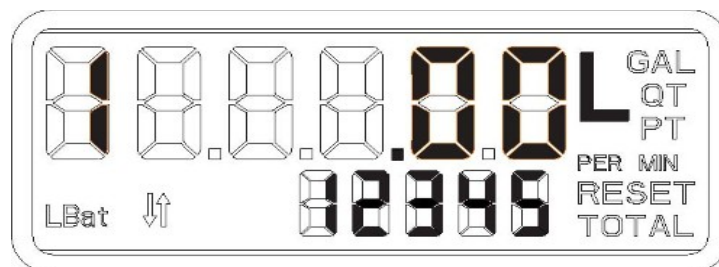
1. Press the TOTAL button to select a digit (selected digits flash). After cycling through all 5 digits of the scale factor, the register will return to the unit of measure selection.
2. Press RESET to change the selected digit. The scale factor must fall between the values of 0.5000 and 2.0000. The factory preset is set between those values at 1.0000.
3. When finished adjusting the unit of measure and scale factor, press and hold the TOTAL button for one second to advance to the Pulse Rate section.

NOTE: Error checking will not allow the user to advance to the next screen.

Changing the meter pulse rate

The meter pulse rate (screen is indicated by the "I" on the top row, on the left side) is the number of pulses per unit of measure as detected by the register. The pulse rate varies according to the type of attached meter. The bottom row consists of the 5-digit integer value of the meter pulse rate, whereas the top row consists of the 2-digit decimal value of the meter pulse rate.

The meter pulse rate is entered in pulses per liter if the selected unit of measure is liters. The meter pulse rate is entered in pulses per gallon if the selected unit of measure is gallons, quarts or pints.

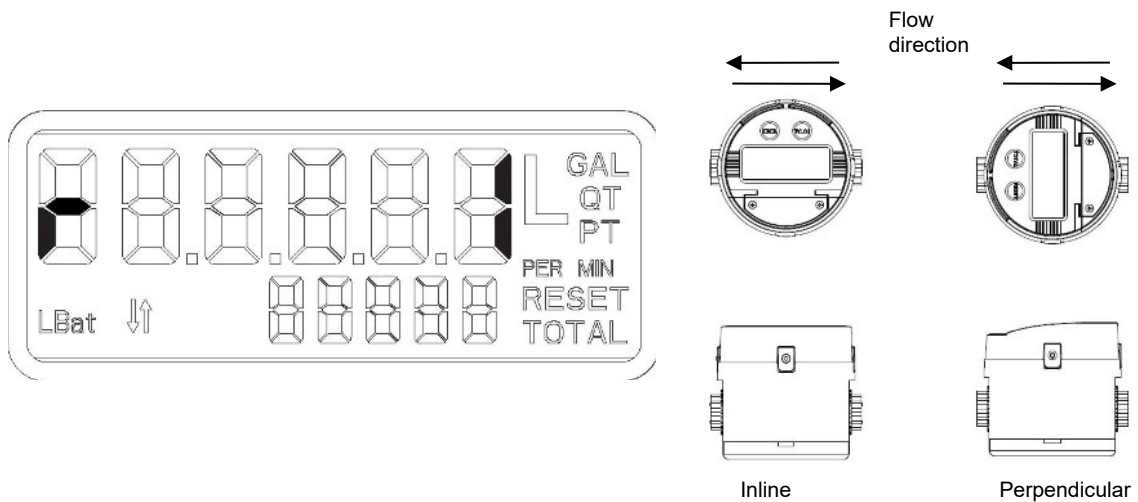


1. Press the TOTAL button to select a digit (selected digits flash). Press RESET to change the selected digit. The pulse rate can be any value between 00000.01 and 99999.99 on the top row; integer values are displayed on the bottom row. Example: 10.45 would display .45 on the top row and 10 would be displayed on the bottom row.
2. When finished adjusting the pulse rate, press and hold the TOTAL button for one second to advance to the "register orientation" section.

NOTE: Error checking will not allow the user to advance to the next screen.

Changing the display orientation

Depending on the orientation perpendicular or inline on the meter. For remote version, this will be set to “o”.

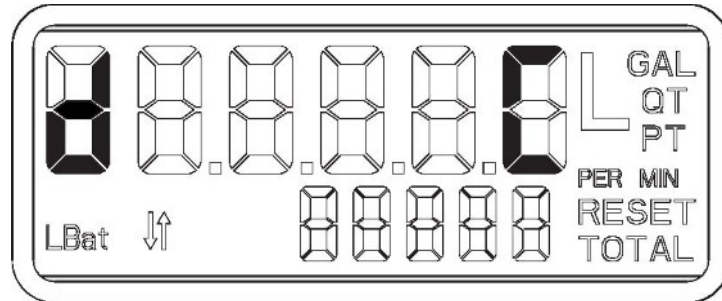


1. Press the RESET button to toggle between available options (“I”, for an inline-to-flow orientation and “P” for a perpendicular-to-flow orientation or “O” for Remote versions and for the nutating disc meters).
2. When finished adjusting the register orientation, press and hold the TOTAL button for one second to advance to the “Default Display” section.

Changing the display mode

The display mode screen (indicated by a “d” on the top row, on the left side) determines the information displayed on the top line of the register during normal operation. The display mode may be either the totalizer screen or the flow rate screen.

“C,” indicates the totalizer screen and “F” indicates the flow rate screen. The totalizer screen is depicted below:



1. While a letter is flashing on the display, press the RESET button to select either totalizer or flow rate.
2. Upon completion of this setting, the programming of the industrial standard register and the industrial dual pulse output is complete.

Exiting programming mode

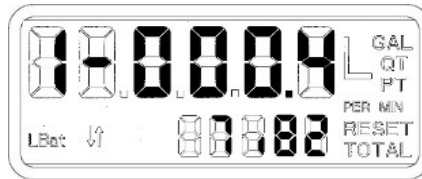
To exit the programming mode:

On any screen, press and hold the both the TOTAL and RESET buttons. The screen will revert back to the programmed scale factor, and then flash. Following the three flashes, the register display will be blank.

NOTE: Pressing the TOTAL or RESET buttons will turn the display back on.

Linearisation

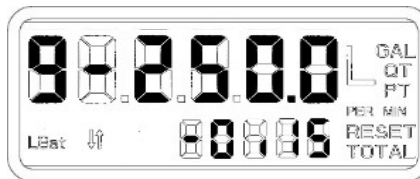
Indicated by 1 – 9 on the left hand side of the display, followed by a hyphen (-), this screen allows the setting of the linearisation (in total 9 points).



Linearisation point 1 (of 9)

Press the TOTAL button to select a digit (selected digits flash). Press RESET to change the selected digit. The flow rate will be set in the top row of the meter and is displayed in the unit you selected at step 9.1 (unit of measure). In the sample shown above this would be the flow rate 0.4 liter per minute. On the bottom line of the meter you can set in the correction of the error in %. In the sample below, the error at a flow rate of 0,4 liter per minute would be -7,82%; to correct this, +7,82% needs to be set in (the plus symbol [+] will not be shown).

Once the adjustment of the linearisation is completed, press and hold the TOTAL button for one second to advance to the next linearisation point.



Linearisation point 9 (of 9)

Number 9 at the left hand side of the display shows the 9th linearisation point. The sample shows a flow rate of 250.0 liter per minute and a deviation of the flow meter of +0,15%. To correct this error, -0,15% needs to be set as correction.

NOTE:

Minimum 3 linearisation points needs to be programmed.

The flow rates do not have to be programmed from low to high; the software will sort the flow rates automatically, no matter at which point (1-9) they are programmed.

To exit the programming mode:

On any screen, press and hold both the TOTAL and RESET buttons. The screen will revert back to the programmed scale factor, and then flash. Following the three flashes, the register display will be blank.

NOTE: Pressing the TOTAL or RESET buttons will turn the display back on.

Additional programming of more parameters for display with pulse and analogue output (Type B and D2)

Analogue minimum flow rate

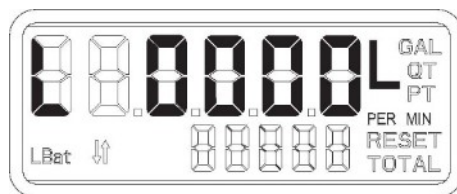
Indicated by a “L” on the left hand side of the display, this screen allows the setting of the flow rate that corresponds to the 4 mA output:

NOTE: The minimum flow rate value must be less than the maximum flow rate value.

- Minimum 0.0 LPM/GPM
- Maximum 100.0 LPM/GPM
- Default 0.0 LPM/GPM

NOTE: Error checking will not allow the user to advance to the next screen.

To advance to the next programming screen, hold the TOTAL button for one second.



Analogue minimum flow rate screen

Analogue maximum flow rate

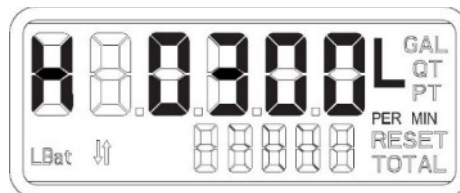
Indicated by a “H” on the left hand side of the display, this screen allows the setting of the flow rate that corresponds to the 20mA output:

NOTE: The maximum flow rate value must be greater than the minimum flow rate value.

- Minimum 0.0 LPM/GPM
- Maximum 100.0 LPM/GPM
- Default 30 LPM / 8 GPM

To advance to the next programming screen, hold the TOTAL button.

NOTE: Error checking will not allow the user to advance to the next screen.



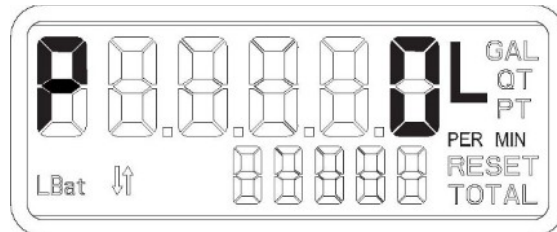
Analogue maximum flow rate screen

Output pulse length

Indicated by a “P” on the left hand side of the display, this screen allows the selection of the low duration of the output pulse.

- “0” for zero milliseconds (pulse output is disabled)
- “2” for 2 milliseconds
- “10” for 10 milliseconds
- “20” for 20 milliseconds
- “40” for 40 milliseconds
- “100” for 100 milliseconds

To advance to the next programming screen, hold the TOTAL button.



Output pulse length screen

About Output Pulse Length: The pulse rate duration should take into account the "Pulse Rate Out" and maximum meter flow rate, to prevent an output pulse duration greater than the required time between pulses. The Output Pulse Length should be set to less than the value of “t.”

Per the equation:

$$t = \frac{\text{Maximum meter flow rate (in GPM or l/m)}}{60 \times \text{output pulse rate}} \times 1000$$

where t = the required pulse rate in milliseconds.

The output pulse rate = the programmed parameter (default = 1.00 PPL/PPG)

The maximum meter flow rate = the maximum flow rate of the meter for the application.

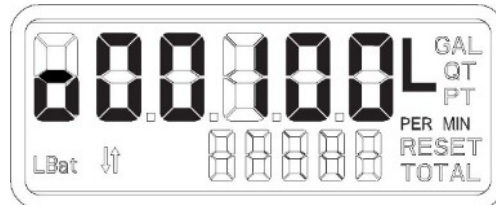
Pulse rate out

Indicated by an “o” on the left hand side of the display, this screen allows selection of the pulses output per liter or per gallon depending on unit of measure (0.01 PPL/PPG to 999,99 PPL/PPG).

The meter pulse rate is entered in pulses per liter if the selected unit of measure is liters. The meter pulse rate is entered in pulses per gallon if the selected unit of measure is gallons, quarts or pints.

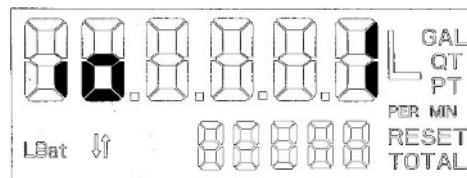
To advance to the next programming screen, hold the TOTAL button.

NOTE: Error checking will not allow the user to advance to the next screen.



pulse rate out screen

Signal sequence of pulse output



Signal sequence of pulse output

This parameter can be changed for the signal inversion of the pulse output.

io = 1 default setting – (no signal inversion) at no flow condition the pulse output signal is “1” (high) 24V for example

io = 0 the output is inverted by the software, at no flow condition the pulse output signal is “0” (low) 0V

Cleaning

Before cleaning, switch off the appliance and disconnect it from the mains. Clean with a damp cloth. Do not use cleaning agents.

Clean parts in isopropyl alcohol, methanol (wood alcohol) or ethanol (grain alcohol). If necessary, use a nylon bristle brush, but never a wire brush! Lime deposits may be removed with a five minute soak in regular household vinegar followed by scrubbing with a nylon bristle brush. Then soak parts in a 1% solution of water and detergent prior to rinsing them with clear warm water.

Battery disposal:

The batteries contained in our devices must be disposed of properly in accordance with §12 of the BattV.
in accordance with §12 of the German Battery Ordinance (BattV) and in accordance with the the EU directive 2006/66/EC.



DND01

Nutating Disc Meter

- for liquids and oils
- Process connection: 3/4" male, 1" male, 1 1/4" male, 1 1/2" female and 2" female
- max. viscosity: 700 mPas
- measuring range: 1...100 l/min up to 8...643 l/min
- materials: PA, PPO, bronze, LCP, st. steel
- output signals:
pulse output (Reed, PNP, NPN or NAMUR)
- optional with separate display and analogue and pulse output
- P_{max} : 16, T_{max} : 120 °C



Description:

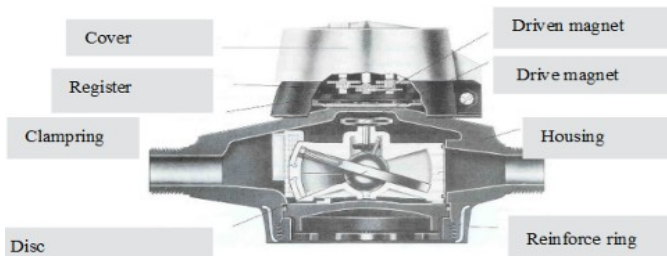
Nutating disc meters measure the volume flow directly. In the spherical measuring chamber there is – as a movable chamber wall – the nutating disc with a central bearing, which is driven by the liquid flowing through it. With each complete wobble movement, a defined volume flows through the measuring chamber. An O-ring seal at the outlet guarantees that the incoming medium can only leave the meter through the measuring chamber, thus ensuring measuring accuracy. The number of nutating disc movements is transmitted via a magnetic coupling to the surface-mounted device.

Typical applications:

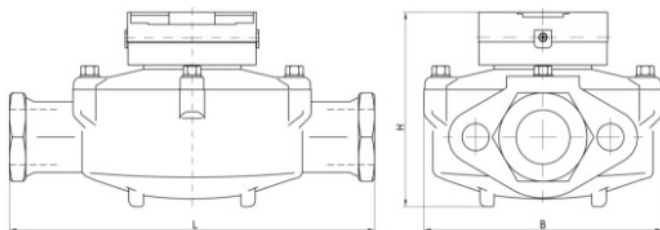
Nutating disc meters of the DND01 series are mainly used for clean to slightly contaminated liquids, hard and demineralised water, oils, fuels and solvents.

Construction:

The measuring chamber with nutating disc, positioning bar and transmission magnet forms a unit which is completely inserted into the meter housing. A sieve at the meter inlet protects the measuring chamber from coarse impurities in the liquid.



Dimensions / Technical Data:



Connection code:	P _{max} [bar]	T _{max} [° C]	Weights [kg]	L [mm]	B [mm]	H [mm]
01	16	50	1,2	190	122	125
02	16	50	1,2	190	122	125
03	16	50	1,8	190	122	125
04	16	50	1,8	190	122	125
05	16	120	1,8	190	122	125
06	16	120	1,8	190	122	125
07	16	50	5,8	190	135	130
08	16	120	5,8	190	135	130
09	16	50	1,8	270	151	150
10	16	50	7	230	135	130
11	16	50	5,5	270	184	165
12	16	120	5,5	270	184	165
13	16	50	10,5	321	223	178
14	16	120	10,5	321	223	178
15	16	50	13,6	387	240	204

Output Signals / Technical Data

Pulse output R: potential free, reed contact, IP65
 Pulse output N/P: PNP or NPN, open collector, 3-wire
 5-30 VDC (I ≤ 15 mA), IP66 / IP67
 3 m cable
 NAMUR M: N/O, 2-wire, U₀ 8,2 V (R_i approx.. 1 kΩ)
 LED switching status display,
 2 m cable, IP66 / IP67, -25...70 °C
 Gasket material: measur. chamber of PPO: Buna (rubber)
 measur. chamber of LCP: FKM
 Accuracy: ± 1,5 % m.v. (± 0,5 % with MB span 1:10)
 Viscosity: max. 700 mPa s

Info on viscosity specification:

$$1 \text{ mPa s (as well cPoise)} = \frac{1 \text{ mm}^2/\text{s (cStoke)}}{\text{medium density [g/cm}^3\text{]}}$$

Order Code:

Order number: **DND01. 01. 0. R. 0**

Nutating disc meter

Connection / housing / measuring chamber / integrated filter / measuring range :

01 = 3/4" male / PA 6.6 / PPO / with int. filter / 1...100 l/min
 02 = 1" male / PA 6.6 / PPO / with int. filter / 1...100 l/min
 03 = 3/4" male / bronze / PPO / with int. filter / 1...100 l/min
 04 = 1" male / bronze / PPO / with int. filter / 1...100 l/min
 05 = 3/4" male / bronze / LCP / without filter / 3...100 l/min
 06 = 1" male / bronze / LCP / without filter / 3...100 l/min
 07 = 1" male / st. steel* / PPO / without filter / 1...100 l/min
 08 = 1" male / st. steel* / LCP / without filter / 3...100 l/min
 09 = 1 1/4" male / PA6.6 / PPO / with int. filter / 2...160 l/min
 10 = 1 1/4" male / st. steel* / PPO / without filter / 2...160 l/min
 11 = 1 1/4" male / bronze / PPO / with filter / 4...265 l/min
 12 = 1 1/4" male / bronze / LCP / without filter / 19...265 l/min
 13 = 1 1/2" female NPT / bronze / PPO / with filter / 8...454 l/min
 14 = 1 1/2" female NPT / bronze / LCP / without filter / 18...454 l/min
 15 = 2" female NPT / bronze / PPO / with filter / 8...643 l/min
 * stainless steel 1.4571

Nickel plated:

0 = no
 N = nickel plated (only possible with bronze housing)

Output signal:

R = potential free reed contact, pulse output, 2,7 m cable
 M = NAMUR pulse output, unscaled, 2 m cable
 P = PNP pulse output, open collector, unscaled, 3 m cable
 N = NPN pulse output, open collector, unscaled, 3 m cable
 A = built-up on-site display, battery-powered
 B = built-up on-site display, pulse output NPN,
 analogue output (4...20 mA)
 D1 = on-site display with wall bracket
 D2 = on-site display with wall bracket,
 analogue and pulse output NPN

Options:

0 = without
 9 = please specify in plain text

ATEX version on request

On-Site Display, Transmitter

Output signal A or D1 and
 Output signal B or D2:

Display: 6-digit, LCD (different units of measurement possible)
 flow rate or total display

Totalizer: 11-digit (not resettable)
 6-digit (resettable)

Ambient temperature: -20 °C ... 80 °C

Supply: battery, replaceable (CR123A)

Calibration factor: can be entered and stored

9-point linearization: medium: water, for other media
 please contact PKP.

Protection class: IP65

Additionally only for output signal B and D2:

Pulse output: NPN open collector, scalable,
 adjustable pulse length

Analogue output: 4...20 mA (min / max values
 programmable)

Supply: battery CR123A, additional
 5...30 VDC (I ≤ 15 mA)