



NORTH Instruments LLC

ANALOG
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GERÄTE UND SYSTEME FÜR
FORSCHUNG • ENTWICKLUNG • VERSUCH • SERVICE

ADM Messtechnik GmbH & Co. KG

Zum Wartturm 9 • 63571 Gelnhausen

Tel. (06051) 916557-1 • Fax 916557-9

sales@adm-messtechnik.de



NID-1100 Rotor Speed Simulator User manual

(Version 1.0)

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**This manual should be read carefully
before using
Rotor Speed Simulator NID-1100**

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1. Carrying Case Interior



- ① Carrying Case
- ② Rotor Speed Simulator NID-1100
- ③ Cable Accessories
- ④ Batteries

2. In Brief

NID-1100 is a battery operated, handheld instrument which is used to electronically simulate outputs from various types of RPM sensors and transmitters in the range from 1.0 RPM to 60,000 RPM. It is suitable for inspecting the RPM measurement lines and checking the Alarm and Trips values. This device is designed especially for Condition Monitoring Systems (CMS) and/or Vibration Monitoring Systems (VMS) that are independent or connected to SCADA or DCS Systems.

NID-1100 uses a menu-driven, 1.8" TFT display (160 x 128 pixel, 18-bit colors) to establish appropriate settings. The key panel contains five sealed switches: Up Arrow, Down Arrow, E (Enter), Run/Stop and On/Off. This keyboard enables the user to navigate through the menu and submenu systems and also to adjust the output parameters. All adjusted parameters are automatically saved in the internal memory and kept for next RPM settings procedure.

NID-1100 also has embedded calculation for RPM Multiplications (e.g. using the Toothed Wheel for this purpose).

The operating modes are: Manual and Automatic.

In Manual mode, the user can select the Number of Teeth (to simulate the Toothed Wheel for RPM multiplication), nominal RPM value, and type of the output. NID-1100 has four RPM outputs - three digital outputs (TTL, Proximity Probe output powered by positive supply voltage, Proximity Probe output powered by negative supply voltage), available through the ODU Connector and one Optical Speed Output (OSO) available through the LED. During the generation of RPM output in this operating mode, the user can continually increase/decrease the RPM value (in On-Line regime) using the Up/Down arrow keys.

In Automatic mode, the user can select the Number of Teeth (to simulate the Toothed Wheel for RPM multiplication), nominal RPM value, the acceleration time (the time which is needed that RPM output signal reach the nominal RPM starting from the zero speed), steady state time (during this time there are no changes in the output signal and it is equal to the nominal RPM value), deceleration time (the time which is needed that RPM output signal reach the zero speed, starting from the nominal RPM value) and type of the output (TTL, RPM Digital Proximity Sensor output powered by positive supply voltage, RPM Proximity Probe with its driver output powered by negative supply voltage or Optical Speed Output - OSO).

Electric connection with Condition Monitoring Systems (CMS) or Vibration Monitoring Systems (VMS) is established using the front mounted 4-pole ODU® connector and a connection cable. The connection cable is supplied with the simulator.

The NID-1100 is powered by three AAA (LR03) alkaline batteries (supplied with the simulator) that provide approx. 8 hours of continuous operation. The voltage status of the batteries is displayed on the TFT screen, in the upper right corner. NID-1100 Technical Specifications are given below.

3. Technical Specifications

Outputs

Type	RPM Tachometer Output (TTL Level) RPM Proximity Probe Output (Powered by +30VDC max.) RPM Proximity Probe Output (Powered by - 30VDC max.) OSO [®] - Optical Speed Output
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RPM Range	1.0 RPM to 60,000 RPM (without RPM multiplication activated) 1.0 RPM to 300,000 RPM (with RPM multiplication activated)
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Accuracy	± 0.005% of settings
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Transfer Characteristics

Amplitude Stability	0.03%/°C maximum change from -10°C to +65°C
RPM Accuracy	± 0.005% of settings
RPM Stability	± 0.005% of maximum change from -10°C to +65°C

Environmental Characteristics

Temperature	
Operating	-10°C to +65°C
Storage	-18°C to +65°C
Humidity	max. 95% R.H.

Power

Battery	3 x AAA (LR03) Alkaline batteries (supplied with the simulator)
Autonomy	approx. 8 hours

Physical Characteristics

Dimensions	125 mm x 67 mm x 40 mm
Weight	0.175 kg typical
Case	ABS molded plastic
Connection	4-pole ODU [®] Connector
Front Panel Controls	Five sealed keys (Up Arrow, Down Arrow, Enter, Start/Stop and ON/OFF switch)
Front Panel Display	1.8" TFT Color Display (160 x 128 pixel, 18-bit colors)

4. Map and Legend



Figure 1- NID-1100 Legend

LEGEND

- 1 ON/OFF button, used for switching the device On and Off
- 2 UP Arrow, used for navigation through the menu
- 3 START/STOP button, used for Start/Stop the simulation
- 4 DOWN Arrow, used for navigation through the menu
- 5 ENTER button, used for entering and confirmation in the menu
- 6 1.8" TFT Color Display (160 x 128 pixel, 18-bit colors)
- 7 OSO Optical Speed Output LED
- 8 ODU connector for RPM output connections

5. Starting to use NID-1100

Before using the Rotor Speed Simulator NID-1100, delivered AAA (LR03) Batteries should be properly inserted in the batteries compartment (*See Figure 2*). Turn the NID-1100 to its front side. The two screws for fixing the batteries compartment cover are marked by two white arrows. Carefully unscrew these screws using an appropriate cross-shaped screwdriver and lift the compartment cover. Please insert the batteries with proper polarity as it is shown on the bottom of the compartment. After inserting the batteries, put the cover back on its place and fix it again with two screws.



Figure 2 - Inserting the AAA (LR03) Batteries






Pressing briefly the ON/OFF push button , located at the top left of the front panel (*Figure 1*), will switch the device ON, whereas longer pressing the ON/OFF push button will switch the device OFF. After switching the device ON, the next messages will appear on TFT display (*See Figure 3*):



Figure 3 - Welcome Messages

Selection of the operating modes is done using the keyboard located on the front panel. This keyboard consists of five sealed push buttons. Four push buttons in the middle of the keyboard are used for navigating through Menu system, choosing a desired function of the device and editing selected RPM values. The keys signed with Up arrow  and Down arrow  are used for moving through the menu system, as well as for changing the RPM output parameters values. The ENTER key  is used to confirm the chosen function and for entering/exiting the desired operating mode. The key signed with Start/Stop sign  is intended for Starting/Stopping the generation of the selected RPM output signal and to select the next digit of output value during the editing.

6. Menu System

The Main Menu consists of two items and each of them represents a specific operating mode. The items, as they appear in the Menu, are the following: **MANUAL** and **AUTOMATIC** (See Figure 4). This User Manual describes in details how to use these Operating modes to produce the desired RPM output.



Figure 4 - Main Menu Items





For navigating through this Menu, user should use the keys signed with Up arrow  and Down arrow . ENTER key  is used to confirm the chosen Operating mode. The selected Menu item is rounded with the bold red line . On the top right corner of the TFT display appears the battery symbol that informs the user about the remaining battery capacity (See Figure 5).



Figure 5 - Battery Status Indicator

As it is shown on Figure 5, the first slide represents 100% of battery capacity, second slide represents 75% of battery capacity and so on decreasing the battery capacity by 25%. The last slide shows the state of the battery when it is empty and should be replaced.

6.1 MANUAL Operating Mode

This operating mode (See Figure 6) enables the user to set various RPM parameters and generate the desired RPM output based on the programmed values. The first submenu will appear on the TFT display which allows the user to enter the Number of Teeth of Toothed Wheel (See Figure 7).

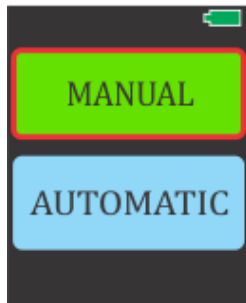


Figure 6 - Selecting Operating Mode

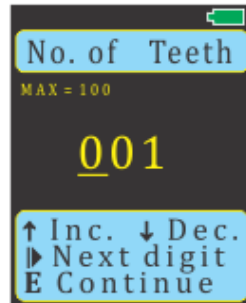






Figure 7- Number Of Teeth



Figure 8 - Confirmation menu

The Toothed Wheels serves for multiplying the RPM value for achieving the better RPM measurement resolution. This is interesting for the user who wants to simulate the real measurement system which uses the Toothed Wheel for multiplying the RPM. The Number of Teeth value is in the range from 1 to 100. The entered value of 1 (one) means that there is NO Toothed Wheels used (No RPM multiplying!) During this settings, help instruction about keys for navigation in this menu are displayed on the bottom of the screen. The Up arrow  and Down arrow  allows the user to Increase or Decrease the value of the selected underlined Digit. Key marked with the Start/Stop sign  is used for selecting the next digit for editing. After setting the desired value for this parameter, the ENTER key  is used to confirm it and enables to go a step forward.

After entering the Number of Teeth, a small confirmation menu will appear on display. Option **CONTINUE** allows the user to select the next parameter for editing, option **RETURN** allows correcting the previous parameter if it is entered by mistake and option **CANCEL** allows the user to return to the basic menu for selection of the operating mode (See Figure 8).

Selecting the option **CONTINUE** will open the submenu for editing the desired RPM output value (See Figure 9). For navigation trough this submenu, the user should use same keys as it was previously described.

Note: The real RPM signal which appears on the selected output during generation will be the result of multiplication of two parameters, Number of Teeth (selected in the previous menu) and adjusted RPM inside this submenu ($RPM_{OUT} = RPM \times \text{No. of Teeth}$). On the TFT display the user has also information regarding the maximum RPM value which can be entered and this maximum value depends on the entered Number of Teeth value.

After entering the desired RPM, the confirmation menu will also appear on display. Option **CONTINUE** allows the user to select the next parameter for editing, option **RETURN** allows correcting the previous parameter if it is entered by mistake and option **CANCEL** allows the user to return to the basic menu for selection of the operating mode (See Figure 10).



Figure 9 - Setting the RPM value



Figure 10 - Confirmation Menu

Selecting the option **CONTINUE** will open the submenu which allows the user to select the mode of output generation (See Figure 11). For navigation through this submenu, the user should use same keys as it was previously described. There are two Options: **ELECTRICAL** mode of the RPM generation and **OPTICAL** mode of the RPM generation.

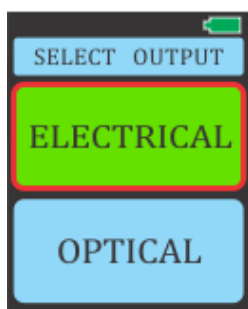


Figure 11 - Output Selection

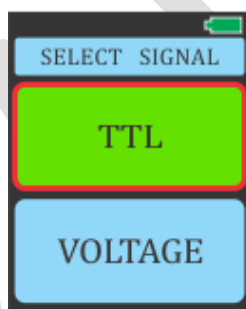


Figure 12 – TTL Signal Selection

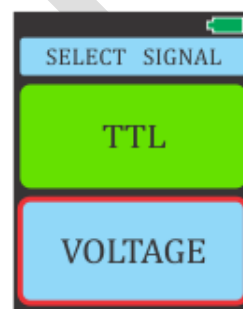


Figure 13 – VOLTAGE Signal Selection

Selecting the option **ELECTRICAL** will open the submenu for choosing the type of the RPM output signal: **TTL** (See Figure 12) or **VOLTAGE** (See Figure 13).

Short explanation of this options:

Option **TTL** includes the digital RPM sensors which on its outputs generates the signals according to the TTL Logic Level.

Option **VOLTAGE** includes two groups of RPM sensors:

RPM sensors that are powered by positive DC voltage supply in the range from +5VDC to +30VDC max. and produces the positive output signal (Digital Proximity Sensors powered by positive DC voltage supply)

RPM sensors that are powered by negative DC voltage supply in the range from -5VDC to -30VDC max. and produces the negative output signal (Proximity Probes with Drivers powered by negative DC voltage supply)

These RPM output signals are available through the ODU Connector which is located on the front panel (See Figure 1, ③).

Note: In case that the selected output signal is **TTL**, the simulator will generate the electric output signal on the 4-pole ODU Connector, while in case of selection the **VOLTAGE** output signal, to generate the electric output NID-1100 needs to be powered by external DC power supply (eg. from SCADA, DCS or VMS) with DC voltage polarity (positive or negative) depending of the selected Signal Type (Positive +5V to +30V or Negative -5V to -30V).

After selecting the option **TTL**, the next confirmation menu will appear on the display (See Figure 14). The user has two options: to continue further settings selecting the option **CONTINUE** or to return to the mode of output generation (TTL or VOLTAGE) by selecting the option **CHANGE**.

If the user selects the option **VOLTAGE**, the next submenu will appear on the display (See Figure 15). Now, the user has two options: to choose RPM Sensors powered by positive DC voltage supplies or to choose RPM Sensors powered by negative DC voltage supplies. After this selection, the next submenu will appear on the display which allows the user to continue further with settings or to return to change previous settings (See Figure 16).

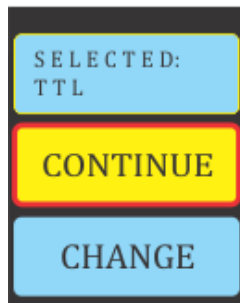


Figure 14 - TTL Confirmation Menu

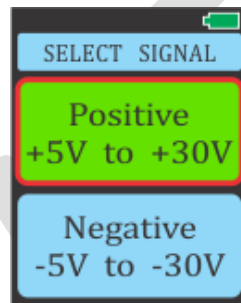


Figure 15 - VOLTAGE Signal Selection

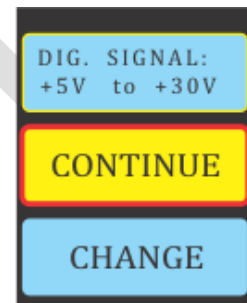





Figure 16 - Confirmation Menu

For navigating through these menus, the user can use the keys signed with Up arrow  and Down arrow . ENTER key  is used to confirm the selection. The selected Menu item is rounded with a thick red line.

The user can also select the option **OPTICAL** for the mode of output generation (See Figure 17). After this selection, the next confirmation menu will appear on the screen. It enables the user to continue entering further settings by selecting the option **CONTINUE** or to return to select the mode of output generation (ELECTRICAL or OPTICAL) by selecting the option **CHANGE** (See Figure 18).

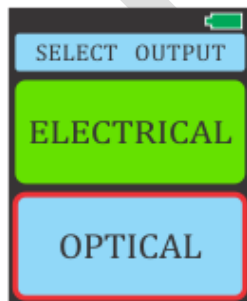


Figure 17 – OPTICAL RPM Signal Selection

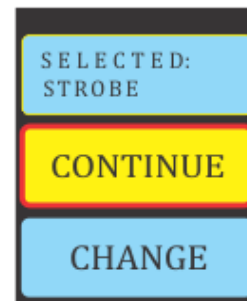


Figure 18 - Confirmation Menu

This RPM output signal is available through the OSO (Optical Speed Output) LED which is located on the front panel (See Figure 1, ⑦).



When the user sets all appropriate parameters for desired RPM Output, pressing the Enter key , while the option **CONTINUE** is selected, the final START/STOP menu will appear on the screen (See Figure 19). The first press of the Start/Stop key , will start the RPM simulation (the label **Running** appears on screen) while the next press of this key will stop the RPM Output generation (the label **Stopped** appears on screen) and so on (See Figure 20 and Figure 21).





Figure 19- START/STOP Menu



Figure 20 - RPM Simulation Started



Figure 21- RPM Simulation Stopped

When the RPM Output generation is Started, the user has great possibility to change the actually generated RPM value in the On-line Regime (Increase or Decrease the RPM) by pressing or holding pressed the Up  or Down  key.


When the RPM simulation is stopped, pressing the Enter key , the next submenu (See Figure 22) will be entered which allows the user to return to the first menu for selection of the operating modes - MANUAL or AUTOMATIC, selecting the option **YES**, while selecting the option **NO**, the user will returned to the previous menu - START/STOP Menu.



Figure 22 - Confirmation Menu

Application Notes: Instructions on how to use this NID-1100 operating mode can be found in Chapter 11, Application Notes, items 11.1 to 11.4, on Page 24 and 25.

6.2 AUTOMATIC Operating Mode

The AUTOMATIC operating mode (See Figure 23) allows the user to set various parameters and to generate the desired RPM output based on the programmed values. The first submenu will appear on TFT display which allows the user to enter the Number of Teeth of Toothed Wheel (See Figure 24).

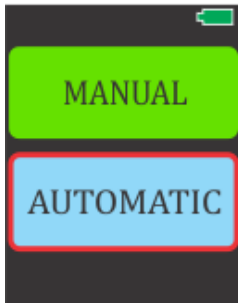


Figure 23 - Selecting Operating Mode

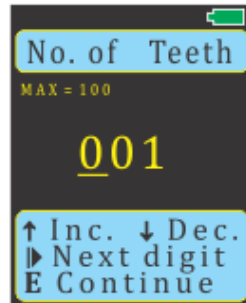






Figure 24- Number Of Teeth



Figure 25 - Confirmation menu

The Toothed Wheels serves for multiplying the RPM value for achieving the better RPM measurement resolution. This is interesting for the user who wants to simulate the real measurement system which uses the Toothed Wheel for multiplying the RPM. The Number of Teeth value is in the range from 1 to 100. The entered value of 1 (one) means that there is NO Toothed Wheels used (No RPM multiplying!) During this setting, help instruction about keys for navigation in this menu is displayed on the bottom of the screen. The Up arrow  and Down arrow  allows the user to Increase or Decrease the value of the selected underlined Digit. Key marked with the Start/Stop sign  is used for selecting the next digit for editing. After setting the desired value for this parameter, the ENTER key  is used to confirm it and enables to go a step forward.

After entering the Number of Teeth, a small confirmation menu will appear on display. Option **CONTINUE** allows the user to select the next parameter for editing, option **RETURN** allows correcting the previous parameter if it is entered by mistake and option **CANCEL** allows the user to return to the basic menu for selection of the operating mode (See Figure 25).

Selecting the option **CONTINUE** will open the submenu for editing the desired RPM output value (See Figure 26). For navigation trough this submenu, the user should use same keys as it was previously described.



Figure 26- Setting the RPM Value



Figure 27 - Confirmation Menu

Note: The real RPM signal which appears on the selected output during generation will be result of the multiplication of two parameters, Number of Teeth (selected in the previous menu) and the adjusted RPM inside this submenu ($RPM_{OUT} = RPM \times \text{No. of Teeth}$). On the TFT display the user has also information regarding the maximum RPM value which can be entered and this maximum value depends on the entered Number of Teeth value.

After entering the desired RPM, the confirmation menu will also appear on display. Option **CONTINUE** allows the user to select the next parameter for editing, option **RETURN** allows correcting the previous parameter if it is entered by mistake and option **CANCEL** allows the user to return to the basic menu for selection of the operating mode (See Figure 27).

Selecting the option **CONTINUE** will open the submenu for editing the desired **Acceleration Time** value (See Figure 28). During this time the RPM output signal will be increased to reach the programmed RPM value in previous step, starting from the zero speed. The Acceleration Time interval is in the range from 0 sec to 999.5 sec.


After entering the desired Acceleration Time value and confirming by pressing the Enter key , the confirmation menu will also appear on display. Option **CONTINUE** in this menu allows the user to select the next parameter for editing, option **RETURN** allows correcting the previous parameter if it is entered by mistake and option **CANCEL** allows the user to return to the basic menu for selection of the operating mode (See Figure 29).



Figure 28- Setting the Acceleration Time



Figure 29 - Confirmation Menu

Selecting the option **CONTINUE** will open the submenu for editing the desired **Steady State Time** value (See Figure 30). During this time, there is no change of the RPM output signal and it is equal to the programmed value for the RPM (See Figure 26). The Steady State Time interval is in the range from 0 sec to 999.5 sec.



Figure 30 - Setting Steady State Time



Figure 31 - Confirmation Menu

After entering the desired Steady State Time value and confirmation by pressing the Enter key **E**, the confirmation menu will also appear on display. Option **CONTINUE** in this menu allows the user to select the next parameter for editing, option **RETURN** allows correcting the previous parameter if it is entered by mistake and option **CANCEL** allows the user to return to the basic menu for selection of the operating mode (See Figure 31).

Selecting the option **CONTINUE** will open the submenu for editing the desired **Deceleration Time** value (See Figure 32). During this time, the RPM output signal will be decreased from the programmed RPM value (See Figure 26) to the zero speed. The Deceleration Time interval is in the range from 0 sec to 999.5 sec.



Figure 32 - Setting Deceleration Time



Figure 33 - Confirmation Menu

After entering the desired Steady State Time value and confirmation by pressing the Enter key **E**, the confirmation menu will also appear on display. Option **CONTINUE** in this menu allows the user to select the next parameter for editing, option **RETURN** allows correcting the previous parameter if it is entered by mistake and option **CANCEL** allows the user to return to the basic menu for selection of the operating mode (See Figure 33).

Selecting the option **CONTINUE** will open the reminder screen which reminds the user about the programmed RPM parameters values of NID-1100 (See Figure 34).

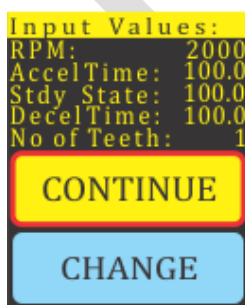


Figure 34 - Reminder Screen

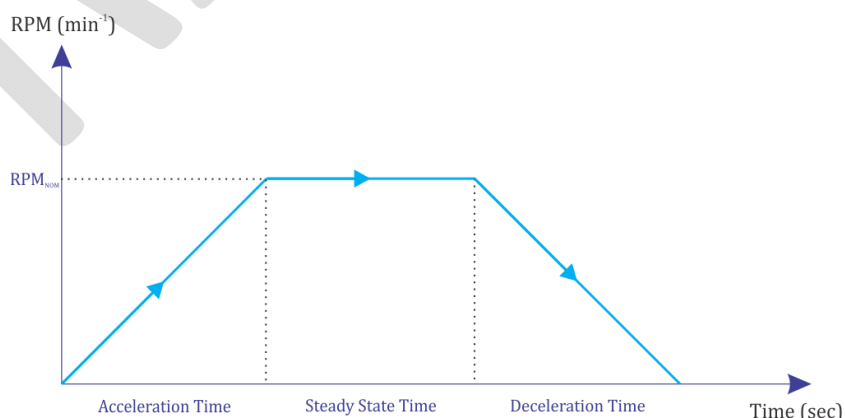


Figure 35- Automatic Mode - RPM Changes

The diagram which is shown on the Figure 35 represent the typical change of RPM output signal regarding the programmed Acceleration Time, Steady State Time and Deceleration Time. Selecting the option **CHANGE** will return to the entering the Number of Teeth value.

Selecting the option **CONTINUE** will open the submenu which allows the user to select the mode of output generation (See Figure 36). For navigation through this submenu, the user should use same keys as it was previously described. There are two Options: **ELECTRICAL** mode of the RPM generation and **OPTICAL** mode of the RPM generation.

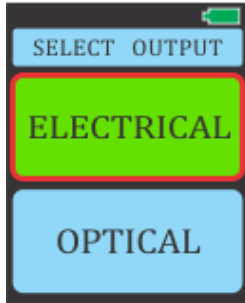


Figure 36 - Output Selection

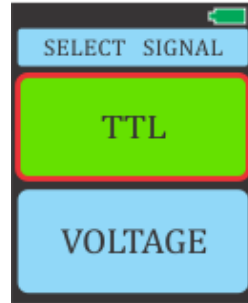


Figure 37- TTL Signal Selection

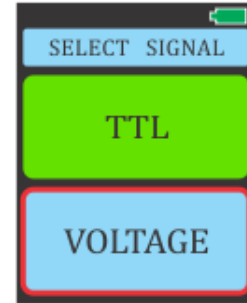


Figure 38 - VOLTAGE Signal Selection

Selecting the option **ELECTRICAL** will open the submenu for choosing the type of the RPM output signal: **TTL** (See Figure 37) or **VOLTAGE** (See Figure 38).

Short explanation of this options:

Option **TTL** includes the digital RPM sensors which on its outputs generates the signals according to the TTL Logic Level.

Option **VOLTAGE** includes two groups of RPM sensors:

RPM sensors which are powered by positive DC voltage supply in the range from +5V DC to +30V DC max. and produces the positive output signal (Digital Proximity Sensors powered by positive DC voltage supply)

RPM sensors which are powered by negative DC voltage supply in the range from -5V DC to -30V DC max. and produces the negative output signal (Proximity Probes with Drivers powered by negative DC voltage supply)

These RPM output signals are available through the ODU Connector which is located on the front panel (See Figure 1, ③).

Note: In case that selected output signal is **TTL**, simulator will generate the electric output signal on the 4-pole ODU Connector, while in case of selection the **VOLTAGE** output signal, to generate the electric output NID-1100 needs to be powered by external DC power supply (eg. from SCADA, DCS or VMS) with DC voltage polarity (positive or negative) depending on the selected Signal Type (Positive +5V to +30V DC or Negative -5V to -30V DC).

After selection the option **TTL**, the next confirmation menu will appear on the display (See Figure 39). The user has two options: to continue further settings selecting the option **CONTINUE** or to return to select the mode of output generation (TTL or VOLTAGE) by selecting the option **CHANGE**.

If user selection was the option **VOLTAGE**, the next submenu will appear on the display (See Figure 40). Now, the user has two options: to choose the RPM Sensors powered by positive DC voltage supplies or to choose the RPM Sensors powered by negative DC voltage supplies. After this selection, the next submenu

will appear on the display which allows the user to continue further with settings or simulator or to return to change previous settings (See Figure 41).

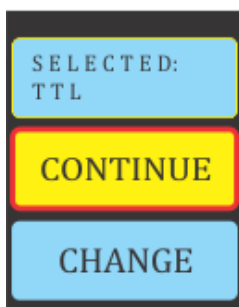


Figure 39 - TTL Confirmation Menu

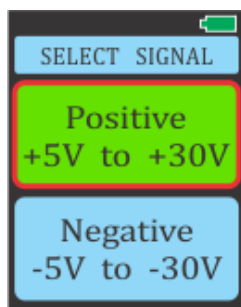


Figure 40 - VOLTAGE Signal Selection

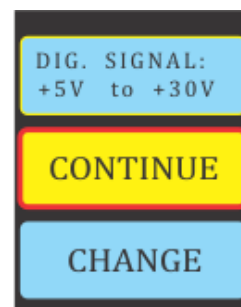





Figure 41 - Confirmation Menu

For navigating through this menus, the user can use the keys marked with Up arrow  and Down arrow . ENTER key  is used to confirm the selection. The selected Menu item is rounded with the bold red line.

The user can also select the option **OPTICAL** for the mode of output generation (See Figure 42). After this selection, the next confirmation menu will appear on the screen. Its enables user to continue further settings by selecting the option **CONTINUE** or to return to select the mode of output generation (ELECTRICAL or OPTICAL) by selecting the option **CHANGE** (See Figure 43).

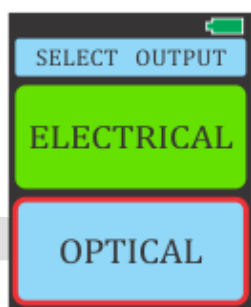


Figure 42 – OPTICAL RPM Signal Selection

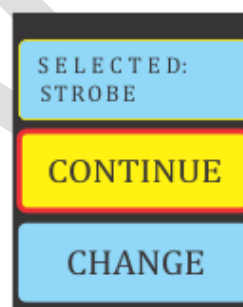


Figure 43 - Confirmation Menu

This RPM output signal is available through the OSO (Optical Speed Output) LED which is located on the front panel (See Figure 1, ⑦).




When the user sets all appropriate parameters for desired RPM Output, pressing the Enter key , while the option **CONTINUE** is selected, the final START/STOP menu will appear on the screen (See Figure 44). By pressing the Start/Stop key , the user will start the RPM simulation and the label **Running** appears on the screen (See Figure 45) while the next press of this key will stop the RPM Output simulation and the label **Stopped** appears on the screen (See Figure 48). Next press the Start/Stop key , will start the RPM simulation again and so on.



Figure 44- START/STOP Menu



Figure 45 - RPM Output Acceleration Time



Figure 46- RPM Output Steady State



Figure 47- RPM Output Deceleration Time



Figure 48 - RPM Simulation Stopped

The user is also informed about the phase in which is the currently generation of RPM output signal (arrow symbols next to the label **Running**): Acceleration Phase ↗ (See Figure 45), Steady State Phase → (See Figure 46) or Deceleration Phase ↘ (See Figure 47). After the RPM simulation is finished or stopped, this symbol disappears from the screen (See Figure 48).

When the RPM simulation finished or stopped, pressing the Enter key **E**, the next submenu (See Figure 49) will be shown which allows the user to return to the first menu for selection of the operating modes - MANUAL or AUTOMATIC, selecting the option **YES** while selecting the option **NO**, the user will returned to the previous menu - START/STOP Menu.



Figure 49 - Confirmation Menu

Application Notes: Instructions on how to use this NID-1100 operating mode can be found in Chapter 11, Application Notes, items 11.1 to 11.4, on Page 24 to 25.

7. Electrical and Optical Outputs

The electrical RPM output signals are available through the ODU Connector located on the front panel (See Figure 50, ②) using the connection cable which is included with the simulator (See Figure 51). To connect this cable plug successfully to the ODU Connector, please observe that two **RED** Spots • (on the plug and connector) are in-line during the connection.

The RPM Optical Speed Output (OSO) signal is available through the LED (Light Emitting Diode), which is also located on the front panel of the NID-1100 and functioning as a Stroboscope (See Figure 50, ①).



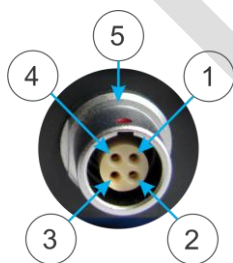
Figure 50 - NID-1100 Front Pannel



Figure 51 - Connection Cable

The ODU Connector layout can be seen on the Figure 52. The connection cable is ending with five wires, grouping into the two groups (See Figure 53):

- first group of two wires for TTL Output (yellow and black)
- second group of three wires for VOLTAGE Outputs (green, blue and black)



- | | |
|---|-----------------------|
| ① | TTL Output Signal |
| ② | VOLTAGE Common |
| ③ | VOLTAGE Power Supply |
| ④ | VOLTAGE Output Signal |
| ⑤ | TTL Common |

Figure 52 - ODU 4-Pole Connector Layout



Figure 53 - Connecting Cable Ending

The pictures bellow shows the wiring diagrams (See Figure 54) and output signal diagram (See Figure 55) for **TTL** RPM Output, at the end of the connection cable (first group of wires).



Figure 54 - Connection Cable - TTL RPM Output (first group)

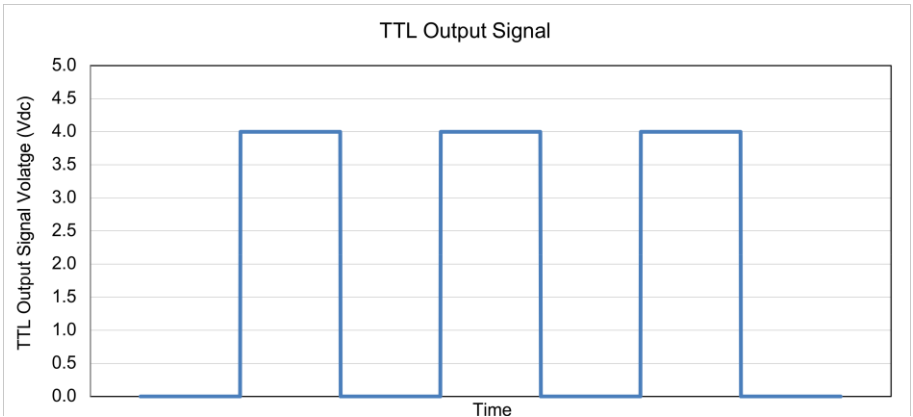


Figure 55 - TTL RPM Output Signal Diagram

Note: To generate the **TTL** RPM Output, the TTL output does not require to be powered from any external DC Power Supply. For this purpose NID-1100 uses the internal batteries and produces the electric output voltage (See Figure 55), so please **DO NOT** short connect the TTL output wires (Yellow and Black wire in the first group)!

The next pictures shows the wiring diagrams (See Figure 56) and output signal diagram (See Figure 57) for **VOLTAGE** RPM Signal Output with Positive Polarity Pulses, at the end of connection cable (second group of wires).



Figure 56- Connection Cable - VOLTAGE RPM Output (Positive Polarity Pulses, second group)

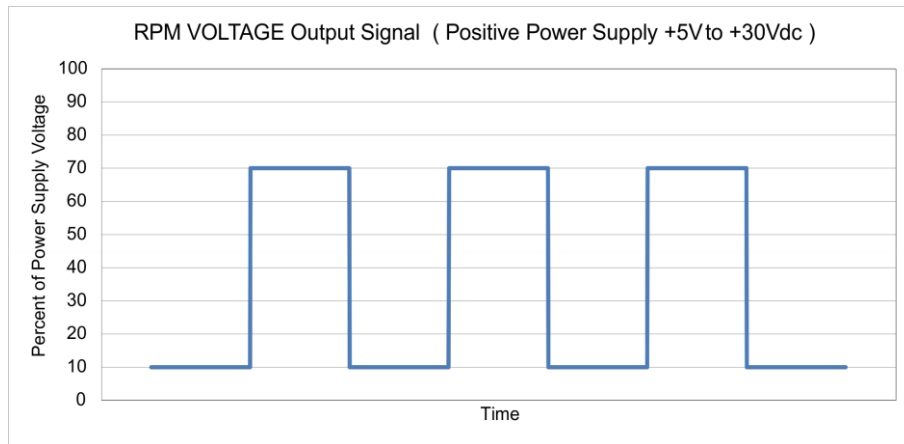


Figure 57 - VOLTAGE RPM Output Signal Diagram with Positive Polarity Pulses

Note: To generate the **VOLTAGE** RPM signal output with Positive Polarity Pulses, the VOLTAGE output needs to be powered by external DC power supply (eg. from SCADA, DCS or VMS), with POSITIVE Voltage polarity against the Common, in the range from +5V DC to +30V DC!

The pictures bellow shows the wiring diagrams (See Figure 58) and output signal diagram (See Figure 59) for VOLTAGE RPM Signal Output with Negative Polarity Pulses, at the end of connection cable (second group of wires).



Figure 58 - Connection Cable - VOLTAGE RPM Output (Negative Polarity Pulses, second group)

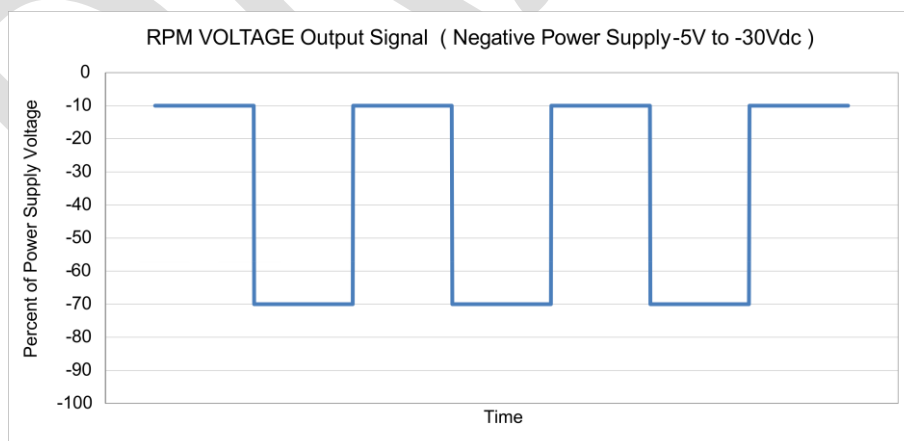


Figure 59 - VOLTAGE RPM Output Signal Diagram with Negative Polarity Pulses

Note: To generate the **VOLTAGE** RPM signal output with Negative Polarity Pulses, the VOLTAGE output needs to be powered by external DC power supply (eg. from SCADA, DCS or VMS), with NEGATIVE Voltage polarity against the Common, in the range from -5V DC to -30V DC!

8. Replacing Batteries

When the batteries go low, the next message will appear on the screen which warning the user to replace the empty batteries (*See Figure 60*). Turn the NID-1100 to its front side. The two screws for fixing the batteries compartment cover are marked by white arrows. Carefully unscrew these screws using an appropriate cross-shaped screwdriver and lift the compartment cover. Please remove the empty batteries and insert the new batteries with proper polarity as it is shown on the bottom of the compartment. After inserting the batteries, put the cover back on its place and fix it again with two screws (*See Figure 61*).



Figure 60 - Battery Low Warning



Figure 61 - Battery Replacement

9. Accessories

For the proper use of the NID-1100 Rotor Speed Simulator and also to obtain the stated output electrical characteristics, it is necessary to use only the Accessories which are originally supplied with the simulator.

The included accessories are:

- Connection Cable for electric RPM output with ODU Connector (*See Figure 62*)
- Alkaline AAA (LR03) Batteries (*See Figure 63*)



Figure 62 - Connection Cable



Figure 63 - AAA Alkaline Batteries

10. Dimensions



Figure 64 - Dimensions in mm



Figure 65 - Dimensions in inch

10. Application Notes

10.1 Using RPM TTL Output

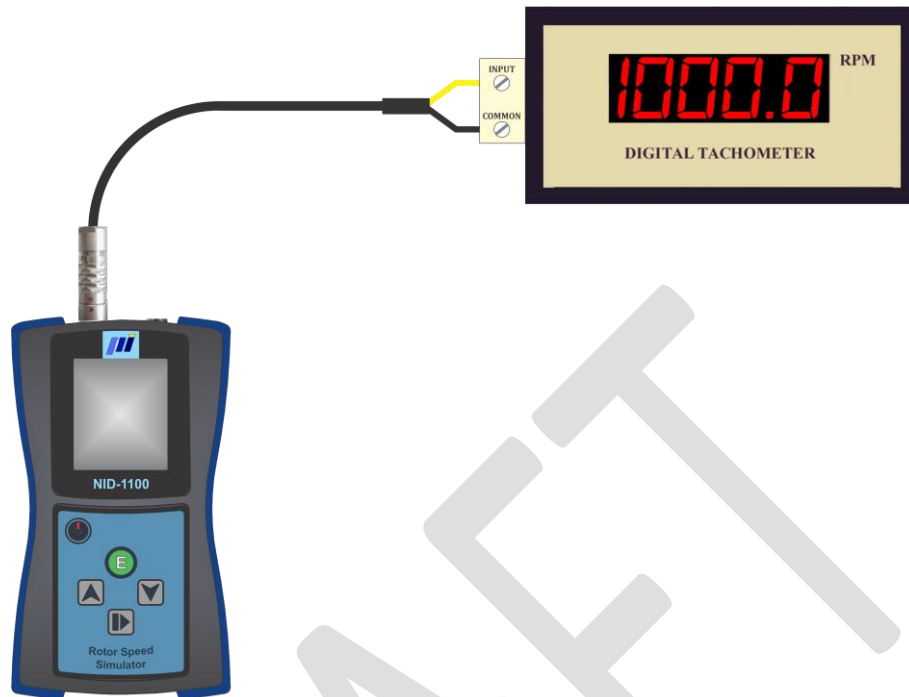


Figure 66 - Using RPM TTL Output

10.2 Using RPM Voltage Output (Positive DC Power Supply)



Figure 67 - Using RPM Voltage Output (Positive DC Power Supply)

10.3 Using RPM Voltage Output (Negative DC Power Supply)

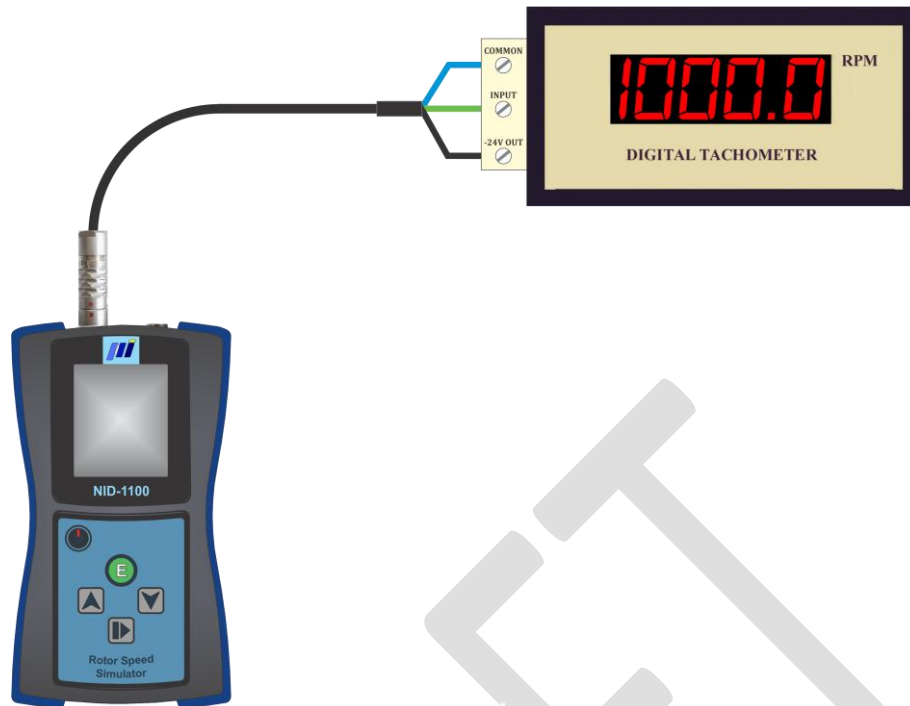


Figure 68 - Using RPM Voltage Output (Negative DC Power Supply)

10.4 Using RPM OSO Output (Optical Speed Output)



Figure 69 - Using RPM OSO Output

11. Notes

