



Operating Manual

MPI-300

NCS-M Parameter Tool



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1 Application

Adapter for the universal programming of the NCS-M capacitive level sensor family. Level detection even for media with a low or no water content such as syrup, fruit concentrate, alcohols and oils with a dielectric constant ϵ_r (Dk) ≥ 2 .

The switching threshold, hysteresis and time delay parameters can be set for the sensor.

2 System Requirements

Computer

- Operating system: Win XP (ab SP3), Vista (ab SP1), Win 7, Win 8, Win 10
- Processor: min. 1 GHz CPU
- Free hard disk: min. 10 MB (with .NET already installed)
- Windows Installer: 3.1
- .NET-Version: 4.0 installed
- USB: free USB port USB 2.0
- Other: CD-ROM Drive for program installation
- Access rights: Administrator for installation

Sensor

- NCS-M with sensor firmware version 3.1 or later

3 Conformity with Standards

The basic safety and health requirements are met through fulfillment of:

- 2014/30/EU Electromagnetic Compatibility
- 1935/2004/EU Consumer Goods Ordinance
- Directive (EU) 10/2011 (Articles in Contact with Food)
- EN 61000-6-2:2005 (Interference Immunity)
- EN 61000-6-4:2007 + A1:2011 (Interference Emissions)

The electrical connections may only be performed by persons with the necessary technical skills and by persons with the necessary authorization from the operator. The power supply and the control circuit inputs and outputs must be professionally wired. The current state-of-the-art of electrical connections must be adhered to.

The following details must be noted in particular:

1. All persons involved with the setup, commissioning, operation, service and maintenance of the sensor must be suitably qualified.
2. This operating manual must be followed closely. The operator must ensure that the personnel has read and fully understood the operating manual.
3. All work must be performed with utmost care and may only be executed by authorized and trained personnel. The applicable national regulations regarding opening and repairing of devices must be complied with.
4. We recommend storing the operating manual near the measuring device in an easily accessible location.
5. The sensor must be de-energized prior to alterations and maintenance.
6. The working area of the operator must offer enough space to minimize the risk of injury.
7. The technical data specified in the operating manual and on the type label must be noted.

Warranty coverage shall not be granted for any damage that can be attributed to improper execution of work on the device.

4 NCS-M Capacitive Level Sensor

4.1 Application

Small, compact sensor for level detection even in media with a low or no water content such as syrup, fruit concentrate, alcohol, and oils with a dielectric constant ϵ_r (Dk) ≥ 2 . In combination with the MPI-300 programming adapter, this sensor can be individually adapted to the application used by the customer. In addition to setting the device to the appropriate medium, switching threshold, hysteresis and time delay can also be individually configured.

Application examples of the capacitive level sensor:

- Limit detection in vessels or pipes
- Product monitoring in pipes
- Pump/dry running protection
- Detection of syrup and fruit concentrate

4.2 Dimension and Electrical Connection

Dimensional Drawing NCS-M

Electrical Connection

M12-plug	High active	Low active
	1: +24 V DC 3: 0 V 4: Output	1: 0 V 3: +24 V DC 4: Output

4.3 Technical Data NCS-M

Process connection	Thread	G $\frac{1}{2}$ " CLEANadapt combined with Anderson-Negele weld-in sleeves, build-in systems and adapter sleeves
Tightening torque		Max. 10 Nm
Surface quality		$R_a \leq 0,8 \mu\text{m}$

Materials	Threaded connector	Stainless steel 1.4305
	Coupling part	PEEK (FDA approval: 21 CFR 177 2415)
Temperature ranges	Ambient	0...70 °C
	Process	-10...115 °C
	CIP / SIP	143 °C max. 120 min
Response time and delay	configurable	0,1...10 sec
Electrical connection	Cable connection	M12 connector, stainless steel 1.4305
	Supply voltage	16...32V DC
	Protection class	IP 69K
Output		PNP active 50 mA (short-circuit proof)
Measurement range	NCS-M-11	$Dk \geq 20$
	NCS-M-12	$Dk \geq 2$
Weight		100 g

5 MPI-300 Programming Adapter

5.1 Installation USB Driver

1. Insert the CD accompanying the MPI-300 into the CD drive.
2. Double-click the setup file in the directory "MPI-300 USB" to start the installation process for the driver.
3. Follow the instructions of the installation assistant.
4. After successful installation, the USB adapter is detected and an additional COM port appears in the system for communication.

5.2 Preparation of Parameter Tool

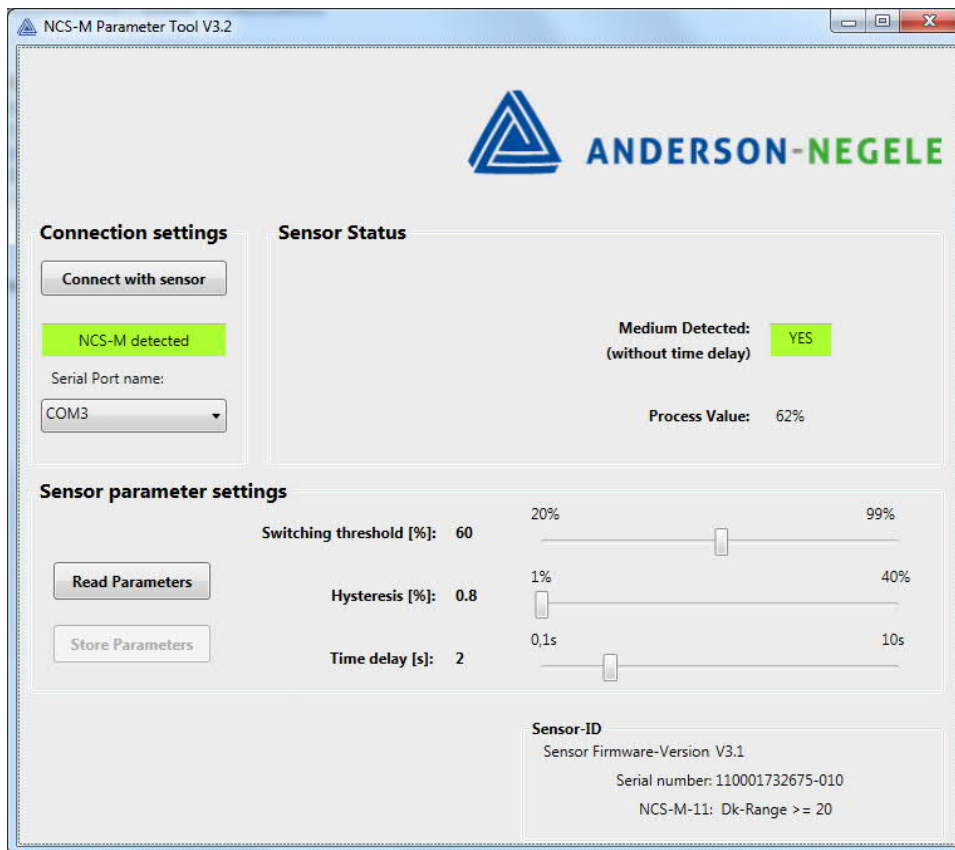
1. Insert the CD accompanying the MPI-300 into the CD drive.
2. The executable file in the "Parameter Tool" directory does not require any installation and can be copied to any location.

6 NCS-M Parameter Tool

After successful installation of the driver for the MPI-300 programming adapter, it can be connected to the computer. This is done via the USB port of the programming adapter. The sensor, which is to be parameterized, must be connected to the programming adapter via the M12 connector. The NCS-M parameter tool can then be started by double-clicking.

6.1 General Information on the User Interface

After the application is started, the start screen of the graphic user interface appears as shown below. Parameters of the NCS-M sensor can be changed by the customer in accordance with the customer's applications.



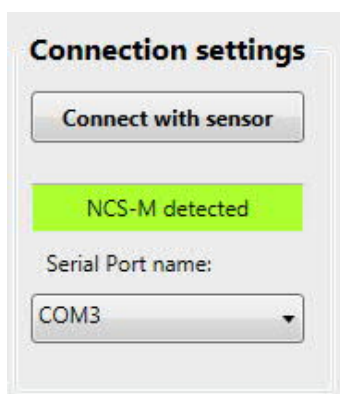
With the software, it is possible to set the switching threshold, the hysteresis, and the time delay of 0.1 ... 10 secs of the capacitive limit sensor.

The step-by-step operation of the tool for setting the parameters is shown below.

6.2 Operation of the Parameter Tool

6.2.1 Starting the Application and Connection with the Sensor

If the sensor is already connected before starting the program using the programming adapter, the virtual COM ports of the USB adapter are included in the selection. Then the sensor can be connected with the "Connect with sensor" button.



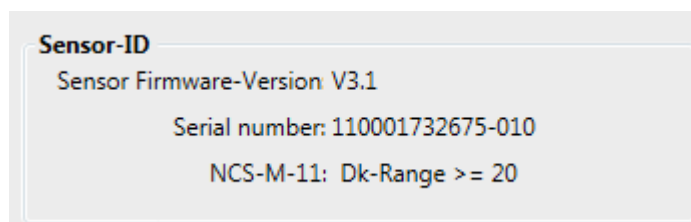
If the sensor is detected, the message "NCS-M detected" appears and the current parameter settings of the sensor are read out and displayed. The sensor then measures continuously and the current measured value is displayed.

If the sensor is not recognized correctly, the message "No NCS-M found" is displayed.

With the button "Connect with sensor" a new connection attempt can be made.

6.2.2 Display of Sensor Data

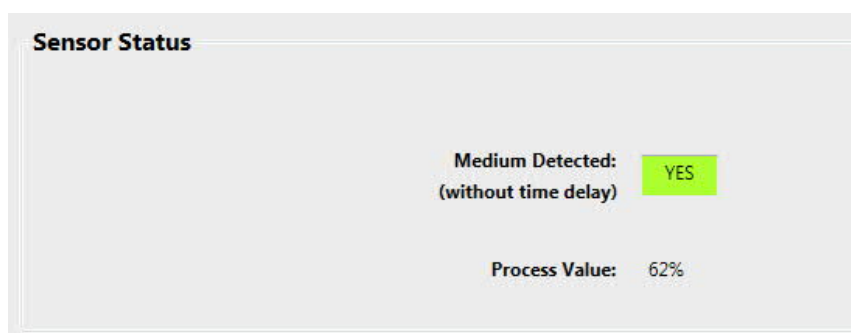
Immediately after the connection process, the sensor data are read out and displayed automatically.



The sensor ID box contain the firmware version, serial number and type of the sensor. If the connection is not successful, the # symbol only appears. The NCS-M sensor can only be configured using a firmware version 3.1 or higher. If the sensor contains an older firmware version, it cannot be configured and a corresponding error message is displayed.

6.2.3 Sensor Status

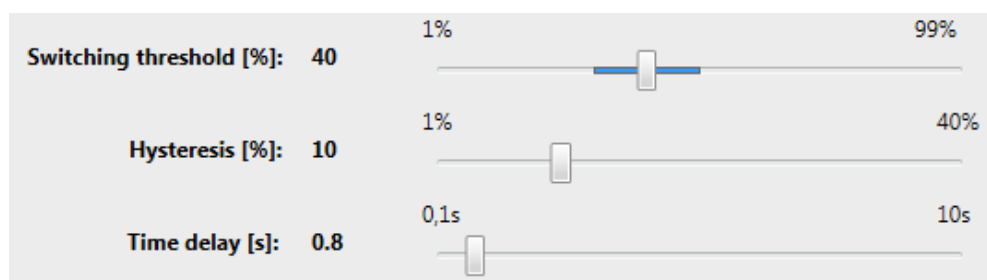
As long as the sensor is connected, it is performing a periodically measurement and the current measurement result and the switching signal are displayed.



The state of the switching output is displayed activated in green ("yes") or deactivated in red ("no"). In addition, the process value of the measurement is displayed in percent. As long as the programming adapter is connected to the sensor, the evaluation takes place immediately. A time delay set in the sensor is ignored for the PC application.

6.2.4 Configuration of Sensor

The detection of the medium can be configured with the sliders at the bottom of the program.



The required conditions for activating the switching output are:

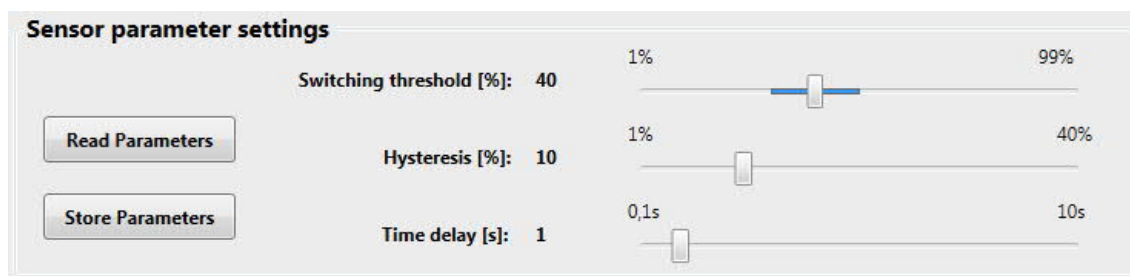
1. **Switching threshold:** This setting defines the basic threshold at which value the medium is detected. According to the use NCS-M type, the lowest threshold value of the NCS-M-12 is 1 % and for the NCS-M-11 is 20 %.
2. **Hysteresis:** The measured value of the medium must exceed the set value of the hysteresis in addition to the switching threshold.
3. **Delay time:** The switching signal is delayed by the set time and the switching threshold and the hysteresis must be exceeded for this time. A time delay set in the sensor is ignored for the PC application.

If a switching signal is indicated, this remains active until the switching threshold minus the hysteresis is fallen below. After the time delay the switching signal is switched off again.

To use any changed values for further test results, they must be stored into the sensor.

6.2.5 Read and Store a Configuration

With a connected sensor, the set configuration values can be read out using the "Read Parameters" button. The corresponding values are displayed with the sliders.



After setting the switching threshold, hysteresis and response time, the displayed configuration values can be stored in the sensor by pressing the "Store Parameters" button. The previous values in the sensor are thus overwritten.

6.2.6 Disconnect Sensor

The PC application should be closed before disconnecting the sensor of the MPI-300 programming adapter.



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