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Operating instructions for EASY-Nickel

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Version 2.2

Preface

We welcome you to the world-wide circle of content customers of SEIBOLD-Measurement Engineering and congratulate you on the purchase of your SEIBOLD Online-Analyser EASY-Nickel for precise and continuous measurement of Nickel (Ni) in your particular application!

Protection of our environment is an increasingly important factor of life, as awareness of the terrible effects of pollution grows, it has become essential to control and monitor all possible causes of pollution. In many enterprises and public institutions the required surveillance of polluting elements is still done manually, causing a tremendous expenditure of time and cost. The product line EASY of SEIBOLD Online-Analysers will have a lasting effect on your cost of measurement and in addition offers an efficient way of analysis and interpretation of all measurement reading.

SEIBOLD-Measurement Engineering develops, produces and distributes instruments of the highest quality that meet the highest demands of measurement and analysis of water and other liquids. Your SEIBOLD On-line-Analyser EASY-Nickel combines more than 75 years of experience in a-state-of-the-art product and will fulfil even your highest require-ments to your full satisfaction.

The product line EASY of SEIBOLD Online-Analysers was developed and designed to guarantee reliable operation with only minor maintenance at very low operational cost. Precise and reliable measurement of Nickel in the respective measuring range, easy handling and trouble-free operation are some of the benefits of the Online-Analyser you have decided for.

We wish you success and joy with your new equipment,

your SEIBOLD-Team

Note: For phrasing gender-related terms we choose male phrasing in support of simplicity and better legibility, but address both gender without any difference.

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1 Safety advice

1.1 Intended use

Please make sure to read the following safety advices carefully for your own safety!

This SEIBOLD Online-Analyser EASY-Nickel at hand is a system using a photometer for measurement and analysis of Nickel (Ni) in liquids. Utilisation different from the one described in these operating instructions is not intended by the manufacturer and could represent safety risks to persons in the environment of the equipment, the environment of the equipment and the equipment itself.

The manufacturer only accepts warranty for the utilisation of the equipment and its correct use, as described in this manual. The manufacturer is not responsible for any damage, neither direct nor indirect, that could be caused from inappropriate, unintended or careless use of the equipment.

1.2 Operational safety

The available equipment was developed and manufactured to current state of art standards, considering all known measures for the guarantee of security. Before being shipped, the analyser was submitted a strict quality control, tested in detail and examined by appropriate technical personnel.

The manufacturer guarantees that the equipment corresponded to all requirements of perfect condition regarding functionality and security at the time of dispatch.

1.3 Grounding

For safe operation the analyser´s connection with electrical current supply has to be implemented as three-core cable and must be attached correctly in order to ensure an appropriate grounding. Connections established in any other way are a possible dangerous cause of accident. The fact that the system operates properly does neither guarantee the equipment´s proper grounding, nor sufficient protection of the system.

Consult a professional electrician in case of any doubt of proper grounding of the current supply used. Make sure to read the instructions for operation and maintenance in the referring chapters in this manual carefully.

1.4 Operation

Any operation of the equipment available as being described in this manual must exclusively be performed by personnel with a proper training to operate the analyser. In general, training is provided together with installation or initial operation on site, but can be requested at any other time from the manufacturer or his authorised partners.

The manufacturer explicitly points out to possible dangers that might occur by operating the equipment appropriately and does not accept any responsibility or warranty for damages that are caused by inappropriate use of the equipment, whether directly or indirectly, unintended or through operator carelessness.

1.5 Securing measurement cabinet

For general safety the measurement cabinet is to be kept locked during and beyond common operation and shall be opened in exceptional cases only, e.g. performing cleaning or maintenance work. The key for locking the analyser is to be stored at an appropriate place and shall be handed over to personnel authorised by the operating company only.

1.6 Handling inside measurement cabinet

Before opening the measurement cabinet always make sure to check whether loose objects (components or parts) could fall from the inside the cabinet. If no danger from objects to fall outside is to be expected, the cabinet door can be unlocked and opened using the applicable cabinet key.

If appropriate, reagent containers are to be removed from their intended place at the bottom of the cabinet before separating the ground and center part of the measurement cabinet. The ground and center part of the measurement cabinet are to be kept locked at all times and shall be opened only for cleaning and maintenance purposes only.

1.7 Handling chemicals

Measurement and analysis of nickel (Ni) in liquids, as provided with this SEIBOLD Online-Analyser EASY-Nickel, is based on a chemical reaction resulting from adding defined solutions to the sample to be measured.

Make sure to use and handle all chemicals required for proper functionality of the analyser with necessary carefulness. All chemicals used with the equipment available are to be handled by authorised and respectively trained personnel only. International safety advice and guidelines for all chemicals are to be used with the analyser and can be found in the referring Safety Data Sheets in chapter 13, „Safety Data Sheets“, of this manual.

Please refer to this information for all questions that might arise when handling chemicals provided with the equipment available. The manufacturer explicitly points out to possible dangers that might be caused by handling chemicals provided with the analyser and does not accept any responsibility or warranty for damages that, directly or indirectly, might be caused by inappropriate, unintended or careless use of these chemicals.

1.8 Durability and storage of reagents

Durability of reagents in general can be expected up to six (6) months from opening the transport container or respectively filling reagents into the intended reagent container, if reagents have been stored at a temperature of up to 20°C at a maximum and at a dark place without interruption.

For further information on durability and storage of reagents used by the equipment available, please refer to the Safety Data Sheets in chapter 13, „Safety Data Sheets“, in this operating manual.

1.9 Cleaning and maintenance

To ensure proper operation of this SEIBOLD Online-Analyser EASY-Nickel, cleaning and maintenance work is required in defined intervals according to the detailed description in chapter 7 „Cleaning and Maintenance“ of this manual. Cleaning and maintenance work must only be performed by personnel who have been trained in performing cleaning and maintenance work and possess all required skills.

The manufacturer explicitly points out possible dangers that might arise by performing maintenance work and will not accept any responsibility or warranty for damages that, directly or indirectly, might be caused by inappropriate, unintended or careless execution of maintenance by the operator.

1.10 Disposal

The operating company using this SEIBOLD Online-Analyser EASY-Nickel has to ensure that all residues and waste material accumulated during operation and maintenance, e.g. chemicals and hoses, are disposed according to the rules and regulations of the country, where the equipment available is used.

The result of the chemical reaction requires specific disposal due to toxicity of waste material. Please refer to the Safety Data Sheets in chapter 13, „Safety Data Sheets“, in this operating manual for further information on chemicals used for measurement.

Note: Do not discharge any waste material into any watercourse!

All rules and regulations are to be applied for the equipment itself, if it is temporarily or definitely put out of operation and no further operation is taken into consideration within a certain period of time.

The manufacturer does not take over any responsibility or warranty for damages that directly or indirectly might be caused by inappropriate, not intended or careless disposal of the equipment available, parts of this equipment or operating supply items.

2 Introduction

2.1 Advantages of the system

First things first:
- *Robust design*
- *Minimal maintenance*
- *Easy handling*
- *Highest accuracy of measurement and reproducibility*
- *Low consumption of reagents*

This SEIBOLD Online-Analyser EASY-Nickel was designed for easy operation, minimum maintenance work to be performed and reliability and was optimised for best "total cost of ownership".

The robust design guarantees for minimum maintenance work and allows for simple and comfortable handling of the equipment. Operation of the equipment available can, after a short training period, be performed by any personnel who has a general awareness of generic technical appreciation.

Using standard measurement procedures only, the equipment available guarantees for highest accuracy of measurement and reproduction of measurement results. By optimising standard measurement procedures, this system is designed for less consumption of reagents. Due to less consumption of reagents the ongoing operation ensures cost-effective measurement and operation.

The analyser can easily be connected to external control systems, e.g. fieldbus systems!

Besides controlling the SEIBOLD Online-Analyser EASY-Nickel directly, the equipment available can be operated via external control systems or eventdriven.

Offering these state-of-the-art options the system fulfils all requirements of current environmental and process technology. Connecting the equipment to centralised systems for data logging, interpretation and visualisation of measurement results is available by means of all well established fieldbus systems. All options available can easily be upgraded at any time, if not included in the basic scope of delivery.

By using intelligent sensor technology not only external access and control of measurement is provided with the SEIBOLD Online-Analyser EASY-Nickel, but also ongoing surveillance of reagents and working conditions of the equipment.

2.2 Typical applications

Nickel (Ni) is a silvery-white metal, showing properties of both ferrous and nonferrous metals. Nickel is hard, malleable and ductile and is a good conductor of electricity and heat, but is not found as native metal in nature.

Nickel is primarily used for the production of austenitic stainless steel and other alloys, characterising strength, ductility, as well as resistance to corrosion and heat. Further nickel is used in electroplating solutions, in the production of catalysts, motor oil, lubricant additives and in various processes of the chemical industry.

2.2.1 Toxicity

For nickel the guideline value for chemicals that are of health siginificance in drinking water according to World Health Organisation is 0.02 milligramms/litre. In general water is only a minor contributor to nickel reception, that is primarily a consequence of concentrations of nickel contained in food.

The most common way of exposure to nickel and its salts is inhalation. According to several studies inhaled nickel compounds are possibly carcinogenic. People long-term exposed to high concentrations of nickel and its salts face a high risk of development of lung cancer or nose cancer.

People sensitive to nickel may react with typical skin effects („nickel itch“) even caused by minor quantities of nickel, as for example contained in various kinds of jewellery.

2.3 Measuring principle

Please read chapter 3.3, „Functional principle“, for further information!

The measuring principle used with this SEIBOLD Online-Analyser EASY-Nickel is based on colourimetric measurement of nickel ions, that form a pink to purple coloured complex when a specific reagent (BDAPAD) is added to the sample to be measured.

The chemical reagent is added to the sample during the measurement process in order to establish the appropriate concentration required for significant and sufficient colour reaction. This colour reaction reaches a sufficient intensity for measurement by the photometer unit after about two (2) minutes. The intensity of the colour reaction continues to develop after this period of time but can be calculated at sufficient accuracy.

The attenuation of light passing the sample is measured inside the photometer unit. The light used for measurement is of a specific wave-lenght (650 nm). The concentration of nickel ions in the sample can then be calculated from the measured intensity of the colour.

2.4 Scope of delivery

Do not put equipment into operation in case of partial delivery or damaged parts!

Please check, if the equipment delivered corresponds to your order.

Before unpacking please check the sound condition of packaging. Packaging materials used for shipping were selected for best protection against damage during transport, but partial damage can not be excluded. If packaging material shows heavy damaging at delivery, please contact your supplier immediately and do not put the equipment into operation!

Scope of delivery of your SEIBOLD Online-Analyser EASY-Nickel contains the following instruments, components and parts that should be carefully checked for completeness when unpacking.

Quant.	*Description*	*Checked*
1	SEIBOLD Online-Analyser EASY-Nickel	
1	Reagent container with liquid level gauge	
2	Reagent container without liquid level gauge	
4	Wall fastenings	
4	Screws M10	
3	High-strength cable glands M12x1.5 (installed)	
3	High-strength cable glands M16x1.5 (installed)	
2	Keys for front door of measurement cabinet	
1	Key for ground module of measurement cabinet	
1	Set of Nickel Reagent	
1	Set of Nickel Standard Solution	
1	Operating instructions	
1	Certificate and quality inspection	

Should the consignment, despite of comprehensive inspection and quality control, not be complete or parts of the consignment be damaged, please inform the manufacturer or the partner, who you have purchased the equipment from, immediately.

Note: Do not put this SEIBOLD Online-Analyser EASY-Nickel into operation in case of partial delivery or heavily damaged parts of consignment and inform the manufacturer or distributor immediately!

Note: Putting the equipment into operation should start no later than one month after delivery. Please keep in mind that reagents have only limited durability!

3 Technical Data

3.1 Overview

Product name	SEIBOLD Online-Analyser EASY-Nickel
Measuring application	Nickel (Ni)
Measuring range	0.08 .. 4.5 mg/l Ni
Accuracy	Better than +/- 3% (based on full scale)
Measuring method	Colourimetric
Measuring interval	Programmable, external start
Calibration	Automated, single-point-calibration
Cleaning	Automated
Environmental temperature	+15 °C .. +35°C, ambient temperature
Sample tempera-ture	+15°C .. +30°C (recommended 25°C, max. 40°C)
Humidity	Max. 70% RH, no condensation
Sample pressure	0 .. 0.5 bar
Sample Inlet	6/4 mm hose
Sample Drain	Unpressurised, free falling, 6/4 mm hose
Fresh water	6/4 mm hose
Cabinet size	746 x 600 x 373 mm (HxBxD)
Weight	App. 70 kg
Power supply	220 .. 230 V AC, 50 .. 60Hz (110 V AC or 24 V DC, optional)
Power consumption	50 VA max.
Input	Photometer
Output	Analog: 4 .. 20 mA (serial interface, RS232C, optional)
Switch contacts	2 switch contacts (min/max), 1 alarm contact 250VAC/60W, 125VAC/60W, 30VDC/2A
Controller	Independent proportional (P) controller (min, max) with adjustable time basis, setpoint W, prop. part Xp and hysteresis
Display	20-character alphanumerical LCD, 3 contact LEDs min/max/alarm, 2 operational lamps
Operation	Four button keyboard, main switch

3.2 Setup

3.2.1 Measurement cabinet

First things first:
- *3-part measurement cabinet incl. front door, ground and center part*
- *Slip-on flange for holding cables and hoses*
- *Instruments and fittings in 19-inch-rack*
- *Supported synthetic slab for reagent containers*

This SEIBOLD Online-Analyser EASY-Nickel is shipped in a measurement cabinet manufactured according to standard IP55 as per EN 60 529/10.101.

The front side of the measurement cabinet is covered by a front door made of glass. This front door can be locked using a specific key shipped together with the analyser. The measurement cabinet itself consists of a ground and a center part to be opened using a different key, also shipped together with the equipment. Before separating ground and center part, as required e.g. for installation and maintenance work, the front door has to be unlocked and opened.

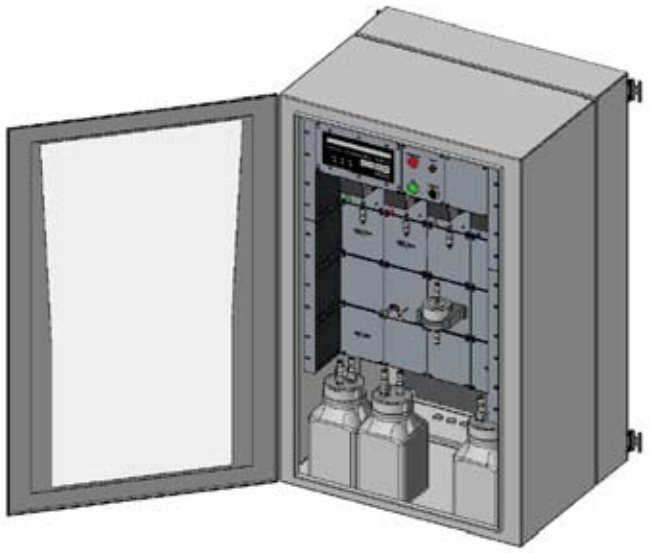


Figure 1 - Analyser set-up

Note: The measurement cabinet is not designed to operate outdoor! Please make sure to fulfil all requirements of environmental conditions at the place of installation! See chapter 4.1, „Prerequisites“, for further information.

All components and control elements required for measurement are located on the front side of the 19-inch-rack inside the measurement cabinet. All control and electronic elements for switching on and off the analyser and for ongoing operation are located in the upper area of the 19-inch-rack, all instruments and fittings, e.g. hose pumps, etc., are located in the area beneath this control area. The upper area of the 19-inch-rack is isolated from the lower part by an aluminium plate and is sufficiently protected from humidity by this plate.

Note: Please pay attention to the safety advice for reagents in these operating instructions when performing cleaning or maintenance work!

3.2.2 Instruments and fittings

All instruments and fittings for measurement used with this SEIBOLD Online-Analyser EASY-Nickel are mounted on sub-plates attached to the 19-inch-rack inside the measurement cabinet. Sub-plates are arranged in four (4) horizontal and vertical rows, as shown in figure 2, „Instruments and fittings“.

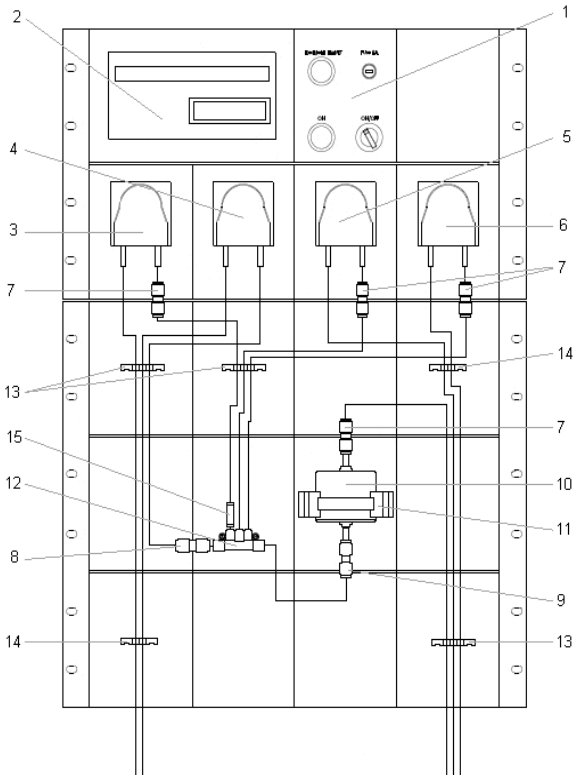


Figure 2 - Instruments and fittings

This SEIBOLD Online-Analyser EASY-Nickel comprises the following components, instruments and fittings to be used in the measurement process. The numbers in the list below refer to the corresponding number in figure 2, „Instruments and fittings“.

No.	*Instrument*	*Task*
1	Control element	Switch on and off, information about current status of operation
2	Micro-controller-unit MPLT	Display measuring results, change operational mode, edit configuration
3	Sample pump	Convey sample to measurement process
4	Cleaning pump	Rinse hose system
5	Standard pump	Convey standard for calibration
6	Reagent pump	Convey reagent to measurement process
7	Reduction fitting	Reduce diamater of hoses (6/4mm)
8	Nonreturn valve	Force direction of flow in process (6/6mm)
9	Connector	Connect cuvette to hose system (6/6mm)
10	Photometer	Hold cuvette for measurement, measure intensity of colour reaction
11	Photometer holder	Fix photometer
12	Manifold	Merge liquids for measurement and rinsing
13	Hose guide (3x)	Fix three (3) hoses horizontally for unobstructed flow of liquids
14	Hose guide (2x)	Fix two (2) hoses horizontally for unobstructed flow of liquids
15	Nonreturn valve	Force direction of flow in process (4/4mm)

All sub-plates of the analyser can easily be dismounted, if necessary, by loosening the four (4) screws in the corners on the sub-plate´s front side. Before removing a sub-plate, make sure that there are no cables connected to the control section of the analyser on the back side of the sub-plate.

Note: All services required in order to change sub-plates should be executed be adequate trained personnel only!

Please refer to chapter 7, „Cleaning and maintenance“, in these operating instructions for further information.

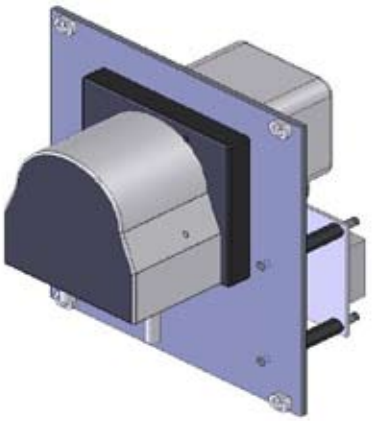


Figure 3 - Sub-plate (example)

Note: Due to the chemical reaction in preparation of the measurement process, which is also predefined by the length of hoses, the arrangement of sub-plates on the 19-inch-rack must not be changed!

3.2.3 Photometer unit

Measurement of the concentration of nickel in the sample with this SEIBOLD Online-Analyser EASY-Nickel is performed by the use of a photometer. The photometer was developed and designed by SEIBOLD-Measurement and Engineering and comprises various parts, i.e. a cuvette, a source of light and a detector inside the photometer.

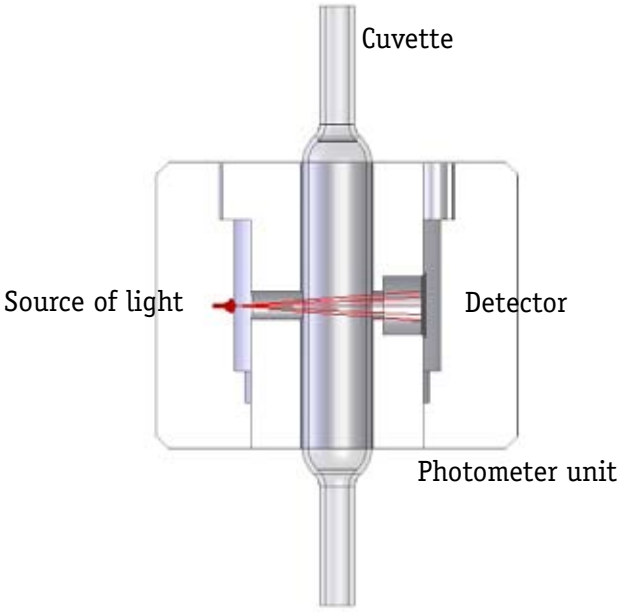


Figure 4 - Functional principal of photometer

A light beam of a specific wave-length is sent out by a source of light and sent through the cuvette inside the photometer, holding the sample to be measured. A detector opposite the source of light receives the alleviated light beam due to absorbance of the prepared sample. Figure 4, „Functional principal of photometer“, illustrates the basic functionality of a photometer as used with the analyser at hand.

The photometer is held by a specific unit (see figure 5, „Photometer unit“), also referred to as photometer holder, that is mounted on a seperate sub-plate on the 19-inch-rack inside the measurement cabinet.

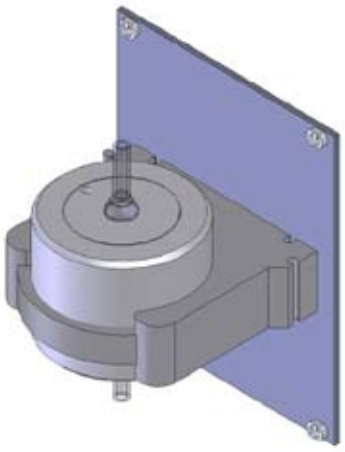


Figure 5 - Photometer unit

The photometer is connected to the control section of the analyser on the back side of the sub-plate.

The sample to be measured passes the photometer unit through a cuvette inside the photometer. The required hoses for conveying the sample is connected to the cuvette by means of two connection parts, one connector and a reduction fitting (see figure 2, „Instruments and fittings“).

3.2.4 Reagent containers

This SEIBOLD Online-Analyser EASY-Nickel is shipped with three (3) reagent containers for storing required reagents (reagent and standard solution) used for providing a colour reaction and water, used for rinsing the system.

Each reagent container consists of a lockable synthetic bottle, providing sufficient chemical resistance for the reagents stored in the containers. In the top cover of each reagent container two high-strength cable glands (PG-screw joints) of the size M12x1.5 and M16x1.5 are assembled. One (1) reagent container additionally has one more high-strength cable gland (PG-screw joint) of the size M20x1.5.

The screw joint of the size M16x1.5 fixes a synthetic pipe, holding the hose conveying the intended liquid from the reagent container to the measuring process. The hose is part of the hose system and connected to the synthetic pipe by means of a specific fitting. The second screw joint, size M12x1.5, provides air from inside the measurement cabinet to get into the reagent container. A nonreturn-valve allows the flow of air only in the direction into the container.

The connetion of hoses with the reagent container i.e. synthetic pipes is provided by specific fittings that allows for unobstructed flow of liquids.

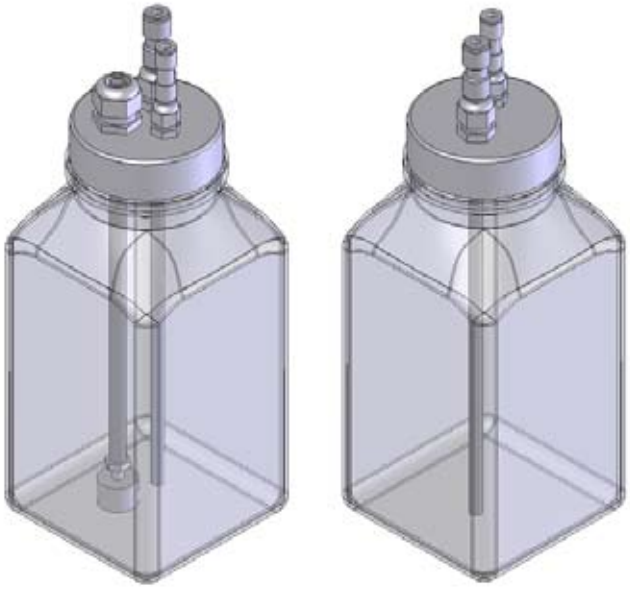


Figure 6 - Reagent containers

With one of the reagent containers shipped, a third screw joint (M20x1.5) is used to keep the liquid level gauge, monitoring availability of sufficient quantity of the required reagent.

In order to put the equipment into operation, the cable attached to the liquid level gauge is to be connected to the back of the control section located on the back side of the 19-inch-rack.

Note: Make sure to have the connection established by professionel or respectively trained personnel only. See chapter 4.6, „Terminal assignment" for further information on the connection of the liquid level gauge!

The reagent container with the liquid level gauge is intended to be used with the reagent, as consumption of this reagent is higher than of others liquids used with this analyser.

Use a fresh water supply for ongoing operation if possible!

We highly recommend providing a fresh water supply for ongoing operation. In case that no fresh water supply is available at the place of installation, an additional container should be provided outside the measurement cabinet, providing a sufficient quantity of water for periodically rinsing the hose system (see chapter 3.7, „Consumptions of reagents" for further information). Use a container with a least 25 litres of volume and make sure the container provides an outlet for holding the intended hose for conveying water to the measurement process. This hose is to be threaded through the corresponding opening in the flange plate at the bottom of the measuring cabinet (see figure 10, „Flange plate").

The third reagent container is to be used with water in exceptional cases only, as the required quantity of water can only be provided for a very short period of time. In this case we recommend changing the liquid level gauge for use with the reagent container for water.

Note: In case of using the (third) reagent container for water, please carefully check if all hoses convey the intended liquid before putting the analyser into operation!

If the analyser is connected to an external control system, a signal is sent to the receiving unit and communicates that there is an insufficient quantity of reagent available. If the analyser was delivered or additionally equipped with a data-logging unit, insufficient quantity of reagent is recorded accordingly and can be evaluated later on.

Note: Please make sure to carefully read chapter 5.2, „Filling reagent container", in this manual for important advice before handling with reagents!

3.3 Functional principle

This SEIBOLD Online-Analyser EASY-Nickel is based on the employment of a photometer unit for measuring the concentration of nickel in liquid sample. In preparation of the actual measurement and calculation of accuracy various steps have to be completed for providing comparable conditions with each measurement cycle. The functional principal can be illustrated as shown in figure 7, „Functional principal“.

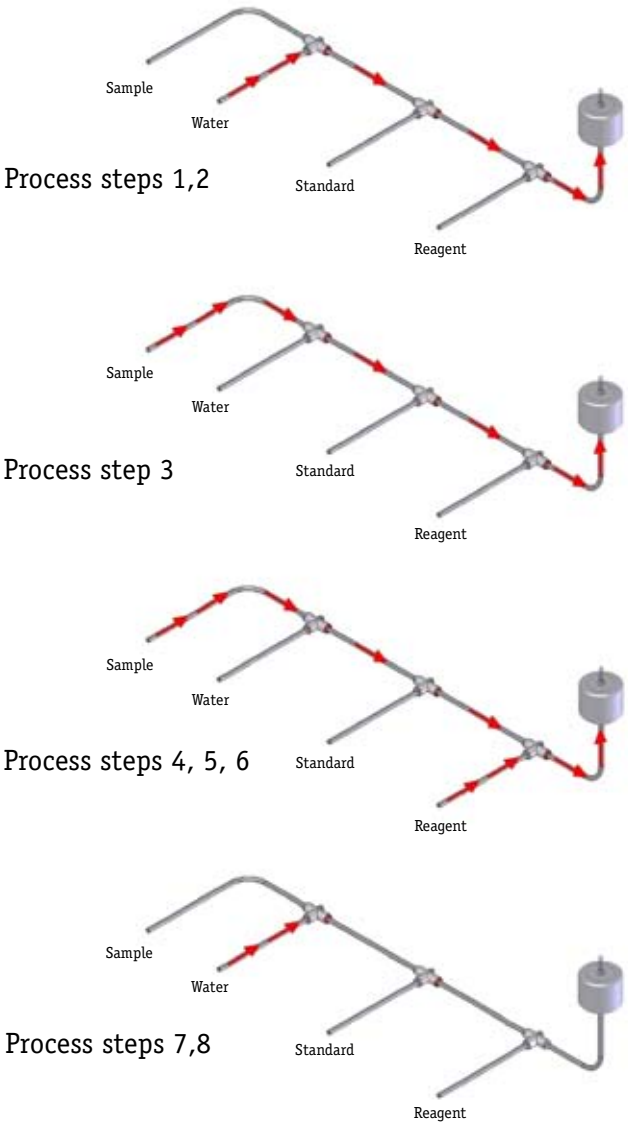


Figure 7 - Functional principle

3.4 Measurement process

See chapter 2.3, „Measuring principal“, for additional information!

For each measurement of the concentration of nickel in liquid sample this SEIBOLD Online-Analyser EASY-Nickel has to complete one (1) cycle of the whole measurement process. The constituent steps of the measurement process are listed below:

Process step	*Activities*
1	Rinse with water
2	Zero adjustment
3	Convey sample
4	Add reagent
5	Colour reaction
6	Measure
7	Rinse with water
8	Calculate and display result

At initiation of a measurement process water is conveyed into the hose system for rinsing hoses and the photometer unit. Possible residues from preceding measurements are removed from the inside surface of hoses and the cuvette in preparation of the new measurement cycle.

After rinsing the photometer unit, still with water in the cuvette, a so called zero adjustment is executed. A reference value by measuring only water is generated that is required for later comparison with actual measurement of sample. The intensity of light is adjusted in a way that a defined voltage of the photometer unit is established, equal to the maximum value of measurement. The reference value referring from this first measurement is then temporarily stored for further calculation.

Having a reference value available, sample is being conveyed into the hose system in order to establish required conditions for the measurement to follow. After conveying sample for shortly longer than one (1) minute the concentration inside the hose system will be stable, without any dilution caused by water.

When the hose system is filled with sample and stable conditions are established, a defined quantity of reagent added to the sample currently being conveyed.

The reagent added will cause the colour reaction for measurement by building a complex with nickel ions. The molecular structure will change and different absorbing properties will cause different refraction depending on the concentration of nickel ions in the sample. The resulting color can be from pink to purple .

Conveyance of both sample and reagent will be interrupted for about two (2) minutes. During this period of time the colour reaction will develop in the cuevette and then be measured inside the photometer unit.

Measurement of concentration of nickel in the sample is carried out by the photometer unit, sending out light of a specific wave-length (650 nm) and measuring actual attenuation of light when passing the sample. The concentration of nickel ions in the sample will then be calculated from the measured intensity of the colour and referenced to the temporarily stored value resulting from zero adjustment.

For completing the measurement cycle the hose system is rinsed by the use of water in order to remove residues of sample and reagents from the inside surface of hoses and the photometer unit.

Comparing the temporarily stored value and the reference value allows for calculating the actual concentration of nickel in the sample. The calculation is executed by the micro-controller-unit MPLT.

When eventually the result has been calculated and was checked for plausibility, it is shown on the display of the micro-controller-unit MPLT.

If the analyser is connected to an external control system, the measurement result is transferred to the receiving unit. If the analyser was delivered or additionally equipped with a data-logging unit, the measurement result is recorded accordingly and can be evaluated later on.

If at any time sample, reagent, standard solution or water is not available in the required quantity, the disturbance is identified and the measuring process interrupted until sufficient quantities of liquids are available again. If the analyser is connected to an external control system, a defined signal is sent to the receiving unit and communicates the disturbance. If the analyser was delivered or additionally equipped with a data-logging unit, the disturbance is recorded accordingly and can be evaluated later on.

3.5 Calibration process

In order to adjust the photometer unit to current conditions at the place of installation, a calibration cycle is performed in certain intervals.

Basically a calibration cycle is very similar to a measurement cycle but a specific nickel standard solution with a known concentration of nickel ions is used in stead of sample in this process.

The system is rinsed with water, standard solution is conveyed to the hose system, reagent added to the sample and measured when the colour reaction has developed. For a more detailed description of the process, please see chapter 3.4, „Measurement process“.

3.6 Accuracy

This SEIBOLD Online-Analyser EASY-Nickel supports measurement accuracy of +/- 3% based on full scale.

Applying the accuracy supported to the measuring range of 0.08 to 4.5 mg/l Ni all measured values are in the range of $-0.14+n < n < +0.14+n$ where n equals the actual concentration of nickel in sample.

Example: An actual concentration of 3 mg/l Ni in sample results in a value in the range of not less than 3.14 and not more than 2.87.

Note: Make sure to keep the front door of the measurement cabinet closed during measurement to provide any interference from external sources!

3.7 Consumption of reagents

With this SEIBOLD Online-Analyser EASY-Nickel three (3) kinds of liquids are used, namely reagent, standard solution and (fresh) water. The consumption of reagents is determined by the number of measurement cycles performed within a periode of time. Calibration cycles are performed after every 24th measurement cycle.

In general one (1) measurement cycle requires about seven (7) minutes and a calibration cycle about five (5) minutes.

Within each measurement cycle there are approximately 26 ml of sample, 7 ml of reagent and 34 ml of water required.

Within each calibration cycle there are approximately 26 ml of standard solution, 2 ml of reagent and 6 ml of water is required.

Consumption (in ml) in each cycle of	*Sample*	*Reagent*	*Water*	*Standard Solution*
Measurement	26	1.5	34	-
Calibration	-	1.5	6	26

Based on the consumption of millilitres of each reagent used in one (1) measurement cycle, calibration cycles calculated accordingly and the capacity of two (2) litres of the reagent container provided, you can assess the quantities of reagents required for your application as follows:

Measurement cycle performed every n minutes	*Reagent suffices n days*	*Standard suffices n days*	*Water suffices n days*
15	16.0	19.6	0.6
30	32.0	39.1	1.2
45	48.0	58.7	1.9
60*	64.0	78.3	2.5
90	96.0	117.4	3.7
120	128.0	156.6	5.0

* Default value, one measurement cycle hourly, calibration is performed once daily.

4 Installation

4.1 Prerequisites

First things first:
- *< 2m distance from sample taking to measurement cabinet*
- *0 bar - 0.5 bar pressure of sample*
- *Ambient temperature of 15°C to 35°C*
- *< 70% humidity RH, no condensation*
- *No outdoor operation*

This SEIBOLD Online-Analyser EASY-Nickel should be installed close to the place where the sample of liquid to be measured is taken. Ideally the distance from the place where the sample is taken to the measurement cabinet does not exceed two (2) meters. In case the distance exceeds the recommended two meters, conveyance of sample is to be established my means of applicable equipment to ensure, that the sample reaches the measurement cabinet matching the required conditions.

The sample to be measured should reach the measurement cabinet with a pressure from 0 bar to no more than 0.5 bar.

Mount the analyser at a place without incident solar radiation!

This SEIBOLD Online-Analyser EASY-Nickel should be installed and mounted at a place without incident solar radiation or other sources that might have heavy influence on the operating temperature of the measuring system. Measurement and analysis of the sample is based on a defined chemical reaction that might be considerably affected be a changing environmental temperature.

In case of changing temperature or running the analyser beyond the recommended range of environmental temperature a deviating measuring result can not be excluded.

The ideal environmental temperature for ongoing operation should be no less than 20°C and no more than 30°C at a constant humidity of no more than 70% RH.

The temperature of sample to be measured must not exceed 40°C.

4.2 Installation examples

4.2.1 Example: Fresh water supply available

If there is a fresh water supply available directly at the place of installation, we recommend the following setup of connections for conveying required liquids to and from the analyser.

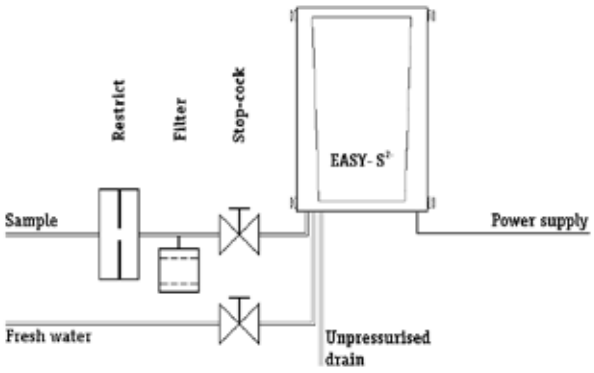


Figure 8 - Example: Fresh water supply available

Note: If a fresh water supply is available directly at the place of installation we recommend installing a stop-cock for making service and maintenance tasks to be performed easier!

4.2.2 Example: No fresh water supply available

In case of no fresh water supply being available directly at the place of installation, a liquid container of about 25 litres should be provided for storing fresh water required for the measurement process.

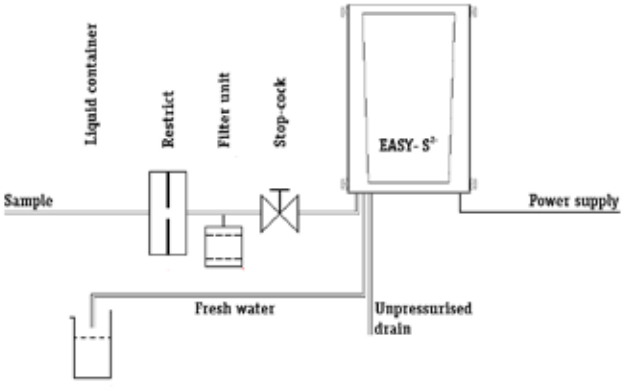


Figure 9 - Example: No fresh water supply available

4.3 Mounting

First things first:
- ☐ *Prepare cables and hoses before mounting the analyser*
- ☐ *Provide holes required for mounting the measurement cabinet*
- ☐ *Mount the measurement cabinet*

Before mounting this SEIBOLD Online-Analyser EASY-Nickel at the place of installation, make sure to have planned and carefully prepared all cables and hoses required for ongoing operation. Particularly with regard to hoses or pipes for conveyance of sample to and from the measuring cabinet ensure to match all prerequisites (see chapter 4.1, „Prerequisites“).

Note: Lines for inflow and drain are not included in the scope of delivery of the equipment available. Please implicitly use solid and persistent synthetic pipes or hoses! Liquids to be conveyed in these lines are products of chemical reactions and have to be treated with great precaution!

Cables and hoses required for operation are to be routed from the measurement cabinet to its referring external connection points and must be disposed through the intended openings in the flange plate at the bottom of the measurement cabinet (see figure 10, „Flange plate“).

Factory-made the flange plate is located at the bottom, by request it can be installed on the upper side of the measurement cabinet. In this case the flange plate at the bottom has to be exchanged with the standard plate on the upper side of the measurement cabinet.

Note: Before exchanging the flange plate and the standard plate make sure that all cables and hoses have been removed carefully. Please refer to the safety advice in this manual for further information!

The admissions on the flange plate are of high-strength cable glands (PG-screw joints) type for preventing liquids from unintentional intrusion into the measurement cabinet. This type of screw connection is implicitly to be used. Figure 10, „Flange plate“, shows the typical allocation on the flange plate, which outlet is intended to hold which cable or hose.

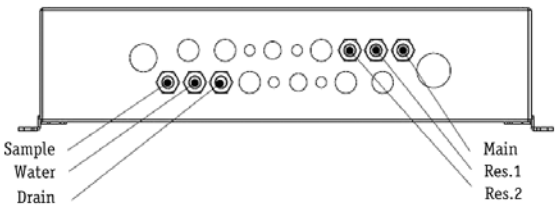


Figure 10 - Flange plate

Note: When performing cleaning and maintenance tasks do not change the allocation of cables and hoses on the flange plate!

Before mounting the measurement cabinet appropriate holes are to be provided for containing the required screws and dowels (if applicable). The measuring cabinet should be mounted at the place of installation using the four (4) screws (M10) included in the scope of delivery.

Make sure to mount the measuring cabinet at a supporting wall. Please refer to figure 11, „Distances for mounting“, for the distances required for mounting the measurement cabinet at the place of installation.

Note: The equipment available weighs approximately 70kg. Please make sure that the place of installation allows for the weight of the measurement cabinet and additional weight caused by operation and handling of the analyser! In case of any doubt, that the designated place of installation matches these requirements, please consult a relevant professional.

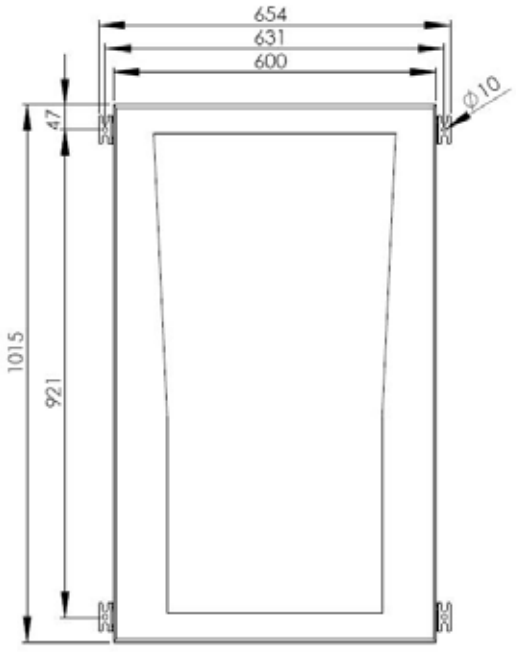


Figure 11 – Distances for mounting

4.4 Connections

First things first:
- ☐ *Establish hose connections inside the measurement cabinet*
- ☐ *Establish hose connections for sample and water*
- ☐ *Rewire photometer unit (if applicable)*
- ☐ *Rewire liquid level gauge (if applicable)*
- ☐ *Connect to external central control units (optional)*
- ☐ *Connect to power supply*

Note: For execution of all installation tasks the power supply must be disconnected from the measurement cabinet! For safety reasons and protection of personnel, equipment and environment of the equipment all installation work must be executed by authorised personnel only!

After mounting the measurement cabinet at the place of installation, all hose connections required for conveyance of sample and water from outside the measurement cabinet, as well as of reagent and standard solution inside the measurement cabinet are to be established.

All hose connections are to be provided in a way that leaking of liquids from any of the hoses during ongoing operation is prevented. Furthermore, all connections are to be established in a way that disconnection can only be achieved by operator effort and not by accident.

For sealing of hose connections there are various clamps, connectors and plugs available to be respectively used at the intended positions. Connections of hoses of different diameter have to be established by means of applicable adapters.

Note: Make sure that no air bubbles can get into any hoses intended to convey liquids or come into existence inside a hose! In case of air bubbles in any hose accuracy of measurement results can not be guaranteed!

4.4.1 Hose connections

As in typical applications a sufficient number of measurement results are received by means of discontinuous measurement, this is the preferred option for most installations and therefore the option, the analyser is originally shipped.

There should be no action required at the time of installation. Should the hose system, despite of comprehensive inspection and quality control, not match the set-up as shown in figure 12, „Hose system for discontinuous operation“, please correct minor variations resulting from transportation, or, in case of major discrepancies, inform the manufacturer or the partner, who you have purchased the equipment from.

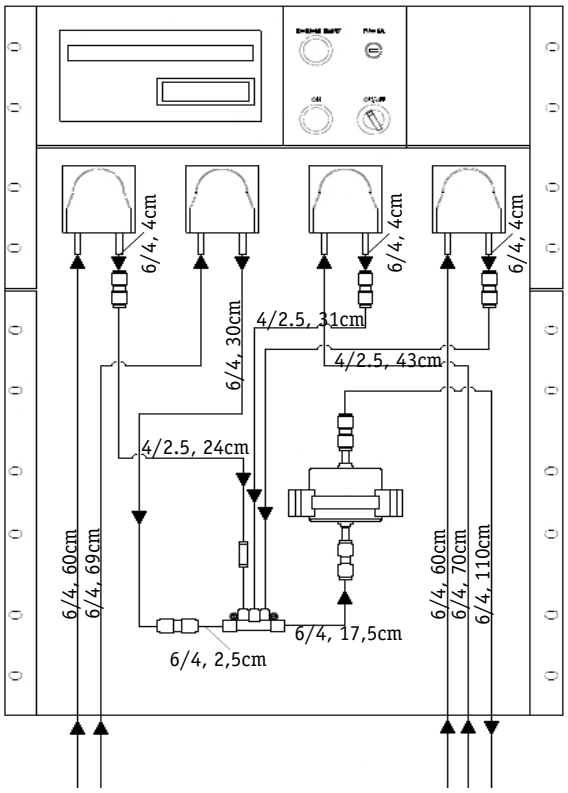


Figure 12 - Hose system

Note: See chapter 6.5.3, „Submenu Setup“, for a detailed information on how to define the interval of measurement cycles.

4.4.2 Sample Inlet

Use a stop-cock at the extraction point!

Sample inlet is provided for the use of a hose of 4 mm inner diameter. Pressure of sample conveyed must not exceed 0.5 bar and must not change with changing environmental conditions (see chapter 4.1, „Prerequisites“).

If the recommended pressure of 0.25 bar is not guaranteed continuously, the liquid sample is to be purified by the use of pressure reduction valves.

Note: We recommend providing a stop-cock directly at the extraction point. Execution of service and maintenance work is much easier having this tool in place!

4.4.3 Sample Drain

Sample drain is prepared for by using a hose of 6 mm inner diameter. To avoid flooding the measuring cabinet with liquid, the drain must be free of any debris or blockage un-pressurised drainage.

Note: Please refer to safety advice for handling chemicals (see chapter 1.7, „Handling chemicals“) and safety information for the reagents used with this analyser (see chapter 13, „Safety Data Sheets“)! Liquids being drained off is a result of a chemical reaction and has to be treated with precaution!

4.4.4 Water Supply

Use a stop-cock at the extraction point!

Fresh water is required for rinsing both the hose system and the photometer unit of this SEIBOLD Online-Analyser EASY-Nickel and should be provided from a fresh water supply directly at the place of installation or by the use of a liquid container placed next to the analyser.

In case you use a liquid container we recommend placing it right under the measurement cabinet keeping the conveyance of water to the shortest possible distance.

The third reagent container is to be used with water in exceptional cases only, as the required quantity of water can only be provided for a short period of time. In this case we recommend using the liquid level gauge with the reagent container for water. See chapter 3.7, „Consumption of reagents“ for further information.

Note: We recommend providing a stop-cock directly at the extraction point. Execution of service and maintenance work is much easier having this tool in place!

4.4.5 Power supply

Power supply is to be provided as a three-core cleading cable (e.g. 3 x 0.75) or an equivalent three-pole power cable of required length. The cable for power supply is to be held by the intended opening in the flange plate at the bottom if the measuring cabinet (see figure 10, „Flange plate“).

The measurement cabinet is connected to the power supply by means of the intended clamps. Please refer to chapter 4.6, „Terminal assignment“, for the detailed allocation of clamps.

4.4.6 Liquid level gauge

Please refer to chapter 3.2.4, „Reagent container“, for additional information.

The liquid level gauges attached to the reagent containers provide continuous monitoring of the quantity of reagents available for ongoing operation. The liquid level gauges are not hard-wired by the manufacturer at the time of delivery and have to be connected to the control section on the back side of the 19“-inch-rack.

Figure 13 – Liquid level gauge

Measuring the liquid level of a reagent is done by the use of a float switch located on the lower end of the synthetic pipe. The synthetic pipe is fixed to the top cover of the reagent container by the central high-strength cable gland (PG-screw joint). The contacts of the float switch are to be connected to the intended clamps on the back side of the 19-inch-rack as described in chapter 4.6, „Terminal assignment“.

Note: Make sure to have installation of liquid level gauges executed by respectively trained personnel only!

As soon as the remaining quantity of reagent in the reagent container does not support further measurement, the alarm signal in the control section in the upper area of the measurement cabinet lights up. The measurement process is interrupted until sufficient quantity of reagent is available again.

If the analyser is connected to an external control system, a signal is sent to the receiving unit and communicates insufficient quantity of reagent. If the analyser was delivered or additionally equipped with a data-logging unit, insufficient quantity of reagent is recorded accordingly and can be evaluated later on. For a detailed description of how to change reagent please refer to chapter 7.3, „Changing reagents“, in these operating instructions.

4.5 Connecting to external systems

This SEIBOLD Online-Analyser EASY-Nickel offers four (4) different options for the communication of the current operations status and continuous measurement results to external equipment and control units. Further, the analyser can be controlled externally, if supported by the external equipment used.

The four options available are:

No.	*Option*
1	3 potential free contacts for control of hose pumps or lamps
2	Analogue transmission of measurement values
3	Digital input for external start
4	Digital transmission using RS232- or fieldbus interface (optional)

Analogue transmission of measurement values is provided by connecting the intended contacts on the back side of the 19-inch-rack to external equipment e.g. control systems. The values transferred are transformed to a corrsponding signal of 4 to 20 mA. Please refer to chapter 4.6, „Terminal assignment“, for further information on wiring current output.

The digital input for external start allows for receiving an applicable signal from external equipment and (re-)start the analyser. Please refer to chapter 4.6, „Terminal assignment“, for further information.

Using the RS232- or fieldbus interface option with this analyser provides transmission of measuring and status values. Both RS232 and fieldbus interface option can easily be upgraded at any time if not included in the basic scope of delivery.

4.6 Terminal assignment

All clamps for connections are located inside the measurement cabinet on the back side of the 19-inch-rack. For any change or addition to the assignment of clamps the measurement cabinet is to be opened carefully between ground and center part by the use of the intended key included in the scope of delivery.

Note: Make sure to put the analyser out of operation before starting any work inside the measurement cabinet and disconnect from power supply for your own safety! All activities associated with setting up or changing of wiring must be executed by authorised personnel only!

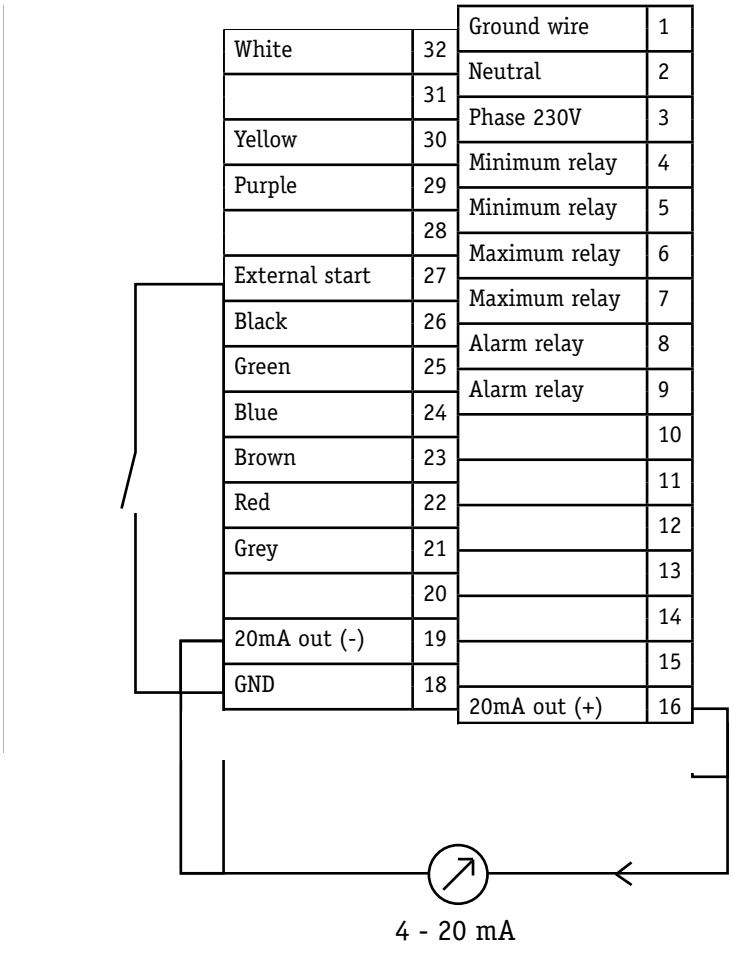


Figure 14 - Terminal assignment

No.	*Function*
1	Ground wire
2	Neutral
3	Phase 230V (110V AC optional)
4,5	Minimum relay
6,7	Maximum relay
8,9	Alarm relay
16	20mA out (+) (=V+)
18	GND
19	20mA out (-)
27	External start
	For service use only:
21	Grey
22	Red
23	Brown
24	Blue
25	Green
26	Black
29	Purple
30	Yellow
32	White

4.5 Operating manual

For evidence of inspections, specific operating statuses and performed cleaning and maintenance activities keeping minutes in an operating manual on site is highly recommended. Even if the equipment is connected to an external control system or equipped with the data logging unit available, various facts and actions should be registered, that are not supported by electronic signals and values, for keeping track of all events and environmental conditions in connection with this SEIBOLD Online-Analyser EASY-Nickel. An operating manual should at least comprise the following information:

Column	*Content*
Date	Date of entry
Time	Time of entry
Name	Name of executing personnel
Status	Brief description of the operating status of the analyser
Concentration	Actual concentration of nickel in sample
Reagent	Sufficient quantity of reagent available
Standard	Sufficient quantity of standard available
Water	Sufficient quantity of water available
Comments / Actions	Comments on specific environmental conditions and activities performed

Figure 15, „Operating manual“, shows a screenshot of the operating manual available from the manufacturer:

Figure 15 - Operating manual

5 Putting into operation

5.1 Before switch-on

First things first:
- ☐ *Installation and mounting must be completed*
- ☐ *Inspection of cables and hoses*
- ☐ *Go through the checklist*

Do not put the analyser into operation in case of any shortcoming, malfunction or damage assessed during this check!

After finishing installation of this SEIBOLD Online-Analyser EASY-Nickel according to the guidelines in these operating instructions at the place of installation, you can start putting the analyser into operation. Putting into operation makes the equipment ready for ongoing operation of continuous measurement of nickel.

Before putting the analyser into operation please implicitly check that all cables and hoses are connected in proper style and are not damaged.

Note: In case of assessing any shortcoming, malfunction or damage of the equipment or installation DO NOT put the analyser into operation by no means! Contact the manufacturer or distributor immediately!

Please go through the checklist below and note any changes you might have added to the system during installation:

Step	*Action*	*Checked*
1	Measurement cabinet is securely mounted.	
2	Analyser is connected to power supply correctly.	
3	Sample inlet is connected to the measurement cabinet according to installation requirements.	
4	Sample drain is connected to the measurement cabinet according to installation requirements.	
5	Fuse for protecting electronical parts is in place.	
6	Lamp for indicating operational status is in place.	
7	Lamp for indicating alarm is in place.	
8	Liquid level gauge is connected correctly.	
9	Connection to external system is established (optional).	

5.2 Filling reagent containers

First things first:
- ☐ *Prepare reagent containers*
- ☐ *Fill reagents into reagent containers*
- ☐ *Check free conveyance of reagents to the process*

See chapter 3.6 „Consumption of reagents“ for choosing the right reagent containers!

This SEIBOLD Online-Analyser EASY-Nickel is shipped with tree (3) reagent containers for storing reagent, standard solution and water.

Depending on the interval of measurement cycles, we recommend using an alternative container for water (see chapter 3.2.4, „Reagent containers“, and chapter 3.7, „Consumption of reagents“). The reagent container for water is only to be used, if the analyser can not be directly connected to a fresh water supply.

For filling reagents into its intended reagent containers you have to unlock and open the front door of the measurement cabinet. Before opening the measuring cabinet please check for any loose parts inside the cabinet that might fall out when opening. Unlock and open the front door of the measuring cabinet carefully and make sure the font door can not close by itself while handling inside the cabinet.

Carefully unscrew the top cover from each reagent container. Try not to move the top cover but rotate the container instead for keeping the attached hose in its position. Keep all top covers inside the measuring cabinet, as hoses and the liquid level gauge are attached to other components of the analyser.

Take out the open reagent containers from the measurement cabinet and place them on an even, easy to clean plane outside the measuring cabinet.

Open the set of reagent and fill the content of the bottle into an open reagent container. If applicable, use a clean and resistant funnel for filling the reagent container and prevent spillage of huge quantities of reagent. Place the reagent container filled with reagent back on the intended place inside the measuring cabinet and carefully screw up the top cover with the liquid level gauge attached. Make sure that all hoses do not hinder further conveyance of reagent.

Continue with filling the reagent container for standard solution as described before. Proceed with filling the reagent container for water, if the analyser is not directly connected to a fresh water supply and no liquid container outside the measurement cabinet is used.

Before continuing with the next step, please make sure that all reagent containers are placed on their intended position, as shown in figure 99, „Position of reagent containers“.

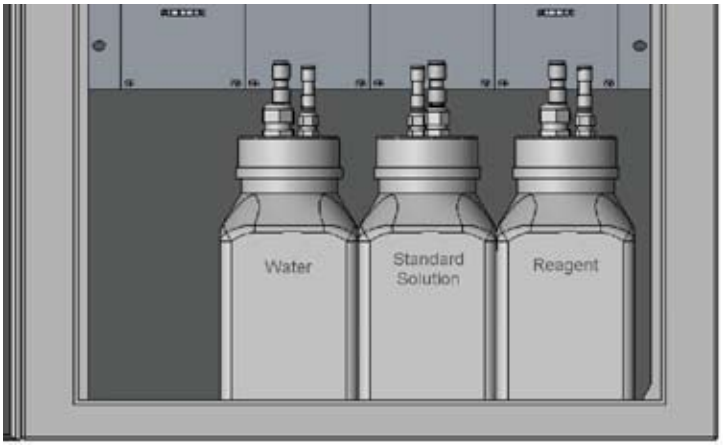


Figure 16- Position of reagent containers

Note: Please carefully read the safety advice in chapter 1.7, „Handling chemicals“, before filling standard solution and reagent into the intended reagent container!

5.3 Switch-on

If inspection of the system (see chapter 5.1, „Before switch-on“) allows for a safe engaging, turn the main switch located in the area of operating elements in the upper area of the analyser to the position marked „ON“. The control lamp left to the main switch has to glow green before continuing with the subsequent steps of putting the SEIBOLD Online-Analyser EASY-Nickel into operation.

At start-up this SEIBOLD Online-Analyser EASY-Nickel runs in operational mode „Measure“. The version number of the software can be displayed by once pressing the increment key [▲]. As the analyser has not performed any measurement so far, pressing the shift key [▶] shows „no measurement“.

5.4 Filling hose system

After powering on the SEIBOLD Online-Analyser EASY-Nickel, all hoses have to be filled with their intended liquids. For conveying sample, reagents, standard solution and water into the intended hoses, change the analyser to operational mode „Service“ and call submenu „Convey“ (see chapter 6.5.2, „Submenu Convey“).

Note: Make sure to carefully watch the liquids being conveyed for not containing any air bubbles inside the hose. Do not continue with putting the analyser into operation if any leakage is detected!

Please check to have filled all hoses with their intended liquids and no air bubbles are existent in any hoses before starting ongoing operation.

Complete the steps of putting the analyser into operation with a final inspection as described in the subsequent chapter, before starting ongoing operation.

5.5 Inspection

Having completed all steps and procedures described in previous chapters now allows for continuous measurement and ongoing operation.

Please go through the following checklist to make sure all steps have been considered and required actions taken.

Step	*Activity*	*Checked*
1	The analyser is switched on.	
2	The control lamp for operating status glows green.	
3	The photometer unit is installed correctly.	
4	The reagent containers have been installed correctly.	
5	Reagent, standard solution and water (optional) are stored in their intended reagent containers.	
6	Reagent containers are connected to the hose system and liquid level gauge correctly.	
7	Sample inlet and fresh water supply are connected correctly.	
8	Sample drain is established as recommended.	
9	All hoses allow for unrestricted conveyance of liquids.	
10	All hoses are filled with their intended liquids.	
11	No leakage can be detected.	

6 Operation

6.1 Operating elements

The basic operating elements of this SEIBOLD Online-Analyser EASY-Nickel are located on a sub-plate in the upper right area of the 19-inch-rack. Operating elements include the main switch, a control lamp (green), an alarm light (red) and a device fuse as shown in figure 17, „Operating elements“.

Figure 17 - Operating elements

Use the main switch to power on and off the analyser by bringing the switch into the desired position.

The control lamp left to the main switch is used to indicate ongoing operation and glows green during common operation. The light extinguishes when powering off the analyser.

The alarm lamp located above the control lamp is used to indicate alarm and glows red in case of insufficient quantity of reagent. Please refer to chapter 4.4.6, „Liquid level gauge“, for additional information on monitoring availability of reagents.

Right to the alarm lamp the fitting for a fuse is located, used for protection of all electronic components of the equipment. This SEIBOLD Online-Analyser EASY-Nickel uses a 2 Ampere fuse, commercially obtainable. See chapter 10.11, „Fuse“, for order information of the corresponding spare part.

6.2 Micro-controller-unit MPLT

The central unit for parameterisation, calculation and indication of measurement is the micro-controller-unit MPLT. The micro-controller-unit MPLT is located in the upper left area of the 19-inch-rack inside the measurement cabinet.

The micro-controller-unit MPLT comprises a display panel, a four button keyboard and three signal lamps for alarm and threshold indication, as shown in figure 18, „Micro-controller-unit MPLT“.

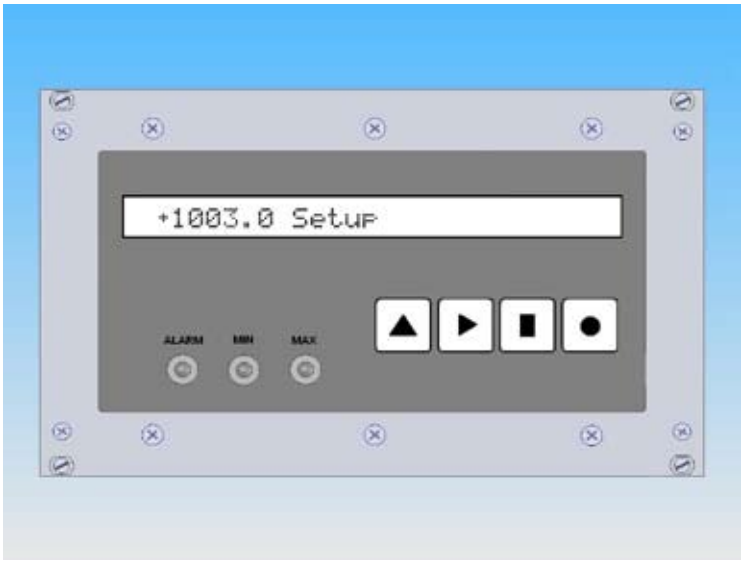


Figure 18 - Micro-controller-unit MPLT

6.2.1 Display panel

Indication of current measurement results and operations status is provided by a 20-digit display located in the upper area of the micro-controller-unit MPLT. Besides indication of measurement results and operations status the display supports communication with the operator when editing various parameters of the system´s setup.

Figure 19 - Display panel

The display panel comprises an input field, located on the left side of the display panel and information related to the values shown in the input field right aside. When running in operational mode „Service“, an arrow displayed on the display indicates availability of further submenus (see chapter 6.3, „Setting values“, and chapter 6.5, „Settings“).

6.2.2 Displayed values

During ongoing measurement, the display panel shows the measurement result of the previous measurement cycle. The example in figure 20, „Display of measurement result“, shows a concentration of 0.25 milligram nickel in the sample.

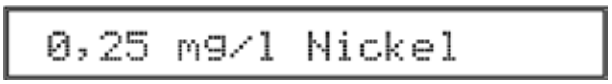


Figure 20 - Display of measurement result

If the concentration of nickel in the sample according to the last measurement result is less (more) than provided by the measurement range of this SEIBOLD Online-Analyser EASY-Nickel, a „smaller than“ („greater than“) sign at the first position of the display panel indicates that the measured value is out of range.

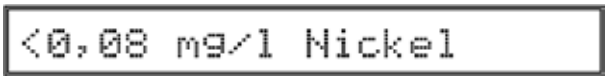


Figure 21 - Out of range

6.2.3 System Messages

The following system messages can be displayed on the display panel of the micro-controller-unit MPLT

No.	*Message*	*Description*
0	No measurement	The analyser was powered on or a reset to default values has been performed.
1	Normal	The last measurement cycle was finished correctly, no disturbances were detected.
6	Measuring error	A measurement error was detected when performing measurement; possible reasons: no reagent or standard solution is available; malfunction of the photometer unit.

6.2.4 Keyboard

The keyboard is used for entering commands for controlling operation and setup of the analyser. The keyboard is made up of four (4) buttons as shown in figure 22, „Keyboard“.

Figure 22 - Keyboard

During operation the four buttons can be used for initiating the following control functionality:

Key	*Name*	*Basic functionality*
[▲]	Increment	Raise the number at cursor position by one
[▶]	Shift	Shift the cursor one position to the right
[■]	Enter	Select and enter
[●]	Cancel	Escape, exit subprogram, interrupt measuring cycle

Please see chapter 6.3, „Setting values“, for a detailed description of how to edit specific values in case a change of settings is required.

6.2.5 Alarm- and threshold signal

The three signal lamps located in the lower left area of the micro-controller-unit MPLT indicate the current condition of switching contacts and controller (see figure 18 - „Micro-controller-unit MPLT“).

The signal lamp marked „Alarm“ lamp will flash in case of exceeding one of the alarm limits defined in the setup of the analyser or in case of malfunction of analysis.

The signal lamp marked „MIN“ (Minimum) will flash in case of measurement falling below the minimum value for concentration of nickel, as defined in the setup of the system (see chapter 6.5.4, „Submenu Control“). In this case contact and controller for minimum value is active.

The signal lamp marked „MAX“ (Maximum) will flash in case of measurement exceeding the maximum value for concentration of nickel, as defined in the setup of the system (see chapter 6.5.4, „Submenu Control“). In this case contact and controller for maximum value is active.

6.3 Setting values

Parameterisation of the system is provided by entering values for specific functionality. Values are to be entered using the keyboard located in the lower right area of the micro-controller-unit MPLT (see chapter 6.2.4, „Keyboard“, and figure 18, „Micro-controller-unit MPLT“). All values entered are being displayed in the display panel as shown in figure 19, „Display panel“.

The input field is located on the left side of the display panel. Right of the input field additional information on the parameter to be edited is being displayed. The value displayed in the input field is to be edited, the additional information to the parameter can not be changed.

The input field (+0000.0) consists of a leading sign on the first position, a value of six (6) characters to be edited, whereof the last but one position is reserved for the decimal point and the cursor indicating the current position by blinking over the character (digit) at the respective position.

The cursor is moved one position to the right from its current position by pressing the shift key [▶] once at any time the analyser operates in editing mode. If the cursor is placed on the last position of the input field, pressing the shift key [▶] moves the cursor to the first position of the input field.

The value at the position marked by the cursor can be raised by one (1) by pressing the increment key [▲] once. Pressing the increment key [▲] when digit nine (9) is displayed, the referring value will change to zero (0).

Pressing the increment key [▲] when the cursor highlights the decimal point, all positions of the input field are reset to zero (0). When placed on the position of the leading sign, the leading sign changes from „+“ to „-“ and vice versa.

Press the enter key [■] at any time the desired value is displayed for proceeding with the subsequent functionality in the submenu selected.

Modified values are only temporarily stored until the enter key [■] is pressed after the last parameter of the current submenu and the message „STORE“ is displayed on the display panel. „STORE“ indicates that all changed values are stored permanently.

You can cancel editing and continue with values stored previously by pressing the cancel key [●] at any time, until the message „STORE“ is displayed. The analyser automatically changes to operational mode „Measure“ in case of editing being cancelled.

6.4 Operational modes

This SEIBOLD Online-Analyser EASY-Nickel operates at two different operational modes, namely „Measure“ and „Service“. Specific tasks performed in each mode are described in the subsequent chapters in detail.

The operational modes can be altered by pressing the enter key [■] for about three (3) seconds. Release the key when the desired operational mode is displayed.

If no key is pressed for about ten (10) seconds, the analyser automatically changes to operational mode „Measure“.

6.4.1 Operational mode „Measure“

Operational mode „Measure“ is the basic mode of the analyser. After power-on or reset of the equipment, this SEIBOLD Online-Analyser EASY-Nickel automatically operates in operational mode „Measure“.

A measuring cycle is started when initiated by the intermittent control of the micro-controller-unit MPLT or manually by pressing the enter key [■]. For setting up the measuring interval please refer to chapter 6.5.3, „Submenu Setup“.

The measurement cycle is being processed as described in chapter 3.3, „Functional principal“, and comprises the following process steps:

Step	*Activity*
Rinse with water	Hose system and photometer unit is rinsed with water
Zero adjustment	Reference value is generated
Convey sample	Sample is conveyed to the hose system
Add reagent	Reagent is added to the process for colour reaction
Colour reaction	Maturing and stablilising colour reaction
Measure	Compound is measured by photometer
Rinse with water	Compound is pumped out of hose system
Calculate	Measurement result is calculated and displayed

After passing all the steps described above, one measuring cycle is completed and the result of the measurement is shown on the display of the micro-controller-unit MPLT.

If the analyser is connected to an external control system (e.g. by the use of the fieldbus interface available optional) the measurement result is transferred to the receiving system. If the analyser was delivered or additionally equipped with a data-logging unit, the measurement result is recorded and can be evaluated later on.

6.4.2 Operational mode „Service“

Operational mode „Service” allows for various service tasks to be performed directly at the analyser and setting of individual values that might need to be configured due to specific requirements of the local application or the place of installation.

Typically the analyser runs in operational mode „Measure” for ongoing measuring concentration of the sample. Press the enter key [■] located on the keyboard of the micro-controller-unit MPLT for about three (3) seconds at any time to change to the operational mode „Service“.

Whenever „SERVICE” is shown on the display you can use the submenus listed below for control and change of settings. A detailed description of all functions available in each submenu can be found in the referring chapters in these operating instructions as denoted in the following table:

Submenu	*Area of control*	*Chapter*
Calibration	Manual calibration	6.5.1
Convey	Start all hose pumps	6.5.2
Setup	Setting measurement interval	6.5.3
Control	Adjusting controller and contacts	6.5.4
System	Setting device specific values	6.5.5
Time	Setting durations and time settings	6.5.6
Test	Test components of the system	6.5.7
Reset	Reset all values to default values	6.5.8

6.5 Settings

Settings of this SEIBOLD Online-Analyser EASY-Nickel can be changed by editing the corresponding values for various parameters, as described in detail in the subsequent chapters. Values are edited by entering defined sequences of commands to the keyboard of the micro-controller-unit MPLT, located in the upper right are area of the 19-inch-rack. Please refer to chapter 6.3, „Setting values“, for a reference of how to enter values using the four button keyboard (see figure 22, „Keyboard“).

Note: Changes to the set-up of the system can result in incorrect measurement results. Make sure to have changes applied to the system by accordingly trained personnel only!

6.5.1 Submenu Calibration

Call this submenu for initiating (manual) calibration of this SEIBOLD Online-Analyser EASY-Nickel. As automated calibration is periodically executed after every 24 measurement processes, this option should be called in exceptional cases only, e.g. changing standard solution.

Note: Make sure to have sufficient quantity of standard solution available when initiating manual calibration! Measurement results of preceding measurement will only be accurate, if the calibration process is performed correctly.

Both manual and automated calibration comprise a complete measurement cycle using standard solution. After finishing the measurement cycle, the measured reference values will be transferred to the micro-controller-unit MPLT and a new calibration curve is being calculated, stored for subsequent measurement and taken as basic for calculation of measurement results until the next calibration is performed.

Display	*Function*
+0005.0	Standard solution

Run the analyser in operational mode „Service“ and enter code „+1001.0“ into the input field of the micro-controller-unit MPLT for starting calibration manually.

6.5.2 Submenu Convey

Call this submenu for starting all hose pumps simultaneously used with this SEIBOLD Online-Analyser EASY-Nickel. You may use the functionality provided by this submenu in order to fill hoses with their intended liquids or perform cleaning tasks.

Run the analyser in operational mode „Service“ and enter code „+1002.0“ into the input field of the micro-controller-unit MPLT for starting all hose pumps and convey the intended liquids to the hose system.

You may cancel the process at any time by pressing the cancel key [●] in case of disturbances. Make sure to restart and have the process finished correctly after interruption.

6.5.3 Submenu Setup

Call this submenu for adjusting intervals of the measurement cycles in order to measure the concentration of Nickel in the sample. For changing settings in submenu SETUP the analyser has to run in operational mode „Service”.

Enter code „+1003.0” on the keyboard of the micro-controller-unit MPLT for calling the submenu for setup. Change the values displayed according to your needs while stepping through all parameters available for this submenu.

Display	*Function*
+0060.0 int. meas.	Interval between two measurement cycles (min)

The example shown in the table defines initiation of measurement cycles every sixty (60) minutes, equivallent to one (1) measurement per hour.

By pressing the cancel key [●] at any time, changed values are ignored and the analyser continuous with previously stored values.

Changed values will be stored when STORE is indicated on the display. After storing changed values or on cancellation of the submenu SETUP the analyser automatically changes to operational mode “Measure”.

Note: For a detailed description of how to enter values, please refer to chapter 6.3, „Setting values“, in this operating instruction manual.

6.5.4 Submenu Control

Call this submenu for adjusting all values for setting parameters of controller and regulators used with this SEIBOLD Online-Analyser EASY-Nickel. For changing settings in submenu CONTROL the analyser has to run in operational mode „Service“.

Enter code „+2001.0” on the keyboard of the micro-controller-unit MPLT for calling the submenu for control. Change the values displayed according to your needs while stepping through all parameters available in this submenu.

Display	*Function*
-0000.1 min con.	Set point minimum controller (e.g. 0.0 mg/l Ni)
+0030.0 max con.	Set point maximum controller (e.g.: 30 mg/l Ni)
+0000.0 < alarm	Alarm level minimum (e.g.: 0.0 mg/l Ni)
+0050.0 > alarm	Alarm level maximum (e.g.: 50 mg/l Ni)

By pressing the cancel key [●] at any time, changed values are ignored and the analyser continuous with previously stored values.

Changed values will be stored when STORE is indicated on the display. After storing changed values or on cancellation of the submenu CONTROL the analyser automatically changes to operational mode „Measure”.

Note: For a detailed description of how to enter values, please refer to chapter 6.3, „Setting values“, in this operating instruction manual.

6.5.5 Submenu System

Run this submenu in exceptional cases only!

Call this submenu for changing basic settings of this SEIBOLD Online-Analyser EASY-Nickel. For changing settings in submenu SYSTEM the analyser has to run in operational mode „Service“.

Enter code „+2002.0” on the keyboard of the micro-controller-unit MPLT for calling the submenu for system. Change the values displayed according to your needs while stepping through all parameters available for this submenu,

Note: Changing any parameter of submenu SYSTEM to a value different from the one required by the local operating conditions could cause severe problems and incorrect performance of the system! Setting parameters of this submenu must be executed by authorised personnel only.

Display	*Function*
+0205.5 lim 1 mA	Factor for current output 1
+0001.0 K-factor%	Factor for measuring (%)
+0020.0 filter	Measuring filter
+3000.0 zero mV	Zero factor mV input (mV)

By pressing the cancel key [●] at any time, changed values are ignored and the analyser continuous with previously stored values.

Changed values will be stored when STORE is indicated on the display. After storing changed values or on cancellation of the submenu SYSTEM the analyser automatically changes to operational mode „Measure”.

Note: For a detailed description of how to enter values, please refer to chapter 6.3, „Setting values“, in this operating instruction manual.

6.5.6 Submenu Time

Run this submenu in exceptional cases only!

Call this submenu for adjusting the timing of the measurement cycle used with this SEIBOLD Online-Analyser EASY-Nickel. For changing settings in submenu TIME the analyser has to run in operational mode „Service“.

Enter code „+2003.0” on the keyboard of the micro-controller-unit MPLT for calling the submenu for timing. Change the values displayed according to your needs while stepping through all parameters available for this submenu.

Note: Changing any parameter of submenu TIME to a value different from the one required by the local operating conditions could cause severe problems and incorrect performance of the system! Setting parameters of this submenu must be executed by authorised personnel only.

Display	*Function*
+0001.0 sampling	Duration of sampling (sec)
+0005.0 pause	Duration of interruption (sec)
+0035.0 zero	Duration of zero adjustment (sec)
+0060.0 reagent 1	Duration of adding reagent 1 (sec)
+0001.0 wait 1	Duration of interruption (sec)
+0060.0 reagent 2	Duration of adding reagent 2 (sec)
+0001.0 wait 2	Duration of interruption (sec)
+0060.0 reagent 3	Duration of adding reagent 3 (sec)
+0001.0 wait 3	Duration of interruption (sec)
+0120.0 measure	Time of measurement (sec)
+0020.0 rinse	Duration of rinsing (sec)

By pressing the cancel key [●] at any time, changed values are ignored and the analyser continuous with previously stored values.

Changed values will be stored when STORE is indicated on the display. After storing changed values or on cancellation of the submenu TIME the analyser automatically changes to operational mode „Measure”.

Note: For a detailed description of how to enter values, please refer to chapter 6.3, „Setting values“, in this operating instruction manual.

6.5.7 Submenu Test

Call this submenu for testing all components of this SEIBOLD Online-Analyser EASY-Nickel. For using the functionality of submenu TEST, the analyser has to run in operational mode „Service“.

Enter code „+2004.0” on the keyboard of the micro-controller-unit MPLT for calling the submenu for testing. All components will be started as their name is shown on the display. The current component will remain active until you call the subsequent component by pressing the enter key [■].

Display	*Function*
Test R1	Reagent hose pump switched on
Test R2	Standard solution pump switched on
Test R3	N.C.
Test Sample	Sample hose pump switched on
Test water	Water pump switched on

After leaving the last function of submenu TEST the analyser automatically changes to operational mode „Measure”.

6.5.8 Submenu Reset

Run this submenu in exceptional cases only! All individual settings will be lost!

Call this submenu for resetting all parameters of this SEIBOLD Online-Analyser EASY-Nickel to default values, as provided at the time of dispatch. For changing settings in submenu OUTPUT the analyser has to run in operational mode „Service“.

Note: All values changed according to the local application and installation conditions will be lost! Make sure to have the current setup registered before resetting to default values (see chapter 11, „Memo sheet for settings“). Call this submenu in exceptional cases only!

Enter code „+6001.0” on the keyboard of the micro-controller-unit MPLT for calling the submenu for reset.

6.6 Putting out of operation

In case of this SEIBOLD Online-Analyser EASY-Nickel to be moved to a different place of installation or discontinuing measurement for a longer period of time, the equipment has to be put out of operation.

Carefully follow all steps of the following list for safely putting the equipment out of operation:

Step	*Action*	*Checked*
1	Turn off and disconnect feeding pipes	
2	Remove hoses from reagent containers	
3	Rinse all hoses with distilled, deionised water (not required for fresh water hose)	
4	Drain off all liquids from hoses	
5	Power off the analyser	
6	Switch off input lead	
7	Disconnect equipment from power supply	
8	Keep the measuring cabinet closed and locked	
9	Store the analyser at a dry place	
10	Dispose residues of chemicals according to the relevant rules and regulations	

Note: In case no further use of the equipment is planned at all, make sure to dispose all components and parts according to the rules and regulations to be applied in the country, where the equipment available was used. Disposal must be carried out by authorised personnel only!

7 Cleaning and maintenance

This SEIBOLD Online-Analyser EASY-Nickel comprises various moving mechanical parts and works with liquids inside the measuring cabinet. Periodical cleaning and performing maintenance tasks for the protection of instruments and fittings used is essential for proper functionality of the system.

Cleaning and maintenance for this SEIBOLD Online-Analyser EASY-Nickel comprises periodical cleaning of measurement cabinet and hose system and change of various components and parts that will show attrition after a certain period of exertion.

For proper and unobstructed operation all tasks listed below are to be performed periodically, at least in the recommended intervals. Subject to specific environmental conditions at the place of installation and particular compound of the liquid sample to be measured, the interval for performing cleaning and maintenance tasks might to be shortened accordingly.

Note: Please make sure to have cleaning and maintenance work performed by authorised personnel only! Implicitly follow the safety advice when executing cleaning and maintenance tasks (see chapter 1, „Safety advice“)!

Component	*Interval*
Clean measurement cabinet	4 weeks
Clean hose system (including photometer unit)	4 weeks
Change reagent	4 weeks
Change standard solution	4 weeks
Refill fresh water (optional)	4 weeks
Change hoses	6 months

Note: Changing or refilling reagent 1 and reagent 2 depends on the interval of measurement cycles defined in the set-up of the analyser or if measurement is perfomed continuously respectively. See chapter 6.5.3, „Submenu Setup“ and chapter 3.7, „Consumption of reagents“, for further information.

7.1 Cleaning measurement cabinet

The measuring cabinet is to be cleaned after a period of no longer than four (4) weeks in order to remove dust and possible disposal.

Before opening the measuring cabinet please make sure that no items or parts will fall out from inside the measurement cabinet when being opened. Unlock the front door and then carefully open the measurement cabinet. Ensure that the front door can not close by itself while handling inside the cabinet.

Carefully clean the interior of the measurement cabinet by the use of a wet rag. If applicable, use any common detergent. Do not use any aggressive liquids for cleaning!

Close the front door after cleaning the measurement cabinet and lock the analyser to prevent unauthorised access.

Note: By adding reagent to the sample dangerous chemical compounds could come into existence. Please act with caution and make sure to have recommended implements for treatment of injuries caused by the reagents used within reach! Ensure to strictly follow the safety advice given (see chapter 1, „Safety advice“ and chapter 13, „Safety Data Sheet“)!

7.2 Cleaning hose system (including photometer unit)

First things first:
- ☐ *Prepare 0.5 litre of distilled, deionised water*
- ☐ *Close stop-cocks of sample and fresh water supply (optional)*
- ☐ *Drain off liquids from all hoses*

All hoses are to be cleaned after a period of no longer than four (4) weeks in order to ensure proper functionality of this SEIBOLD Online-Analyser EASY-Nickel and accuracy of measurement results.

The hose system includes as well those parts of hoses, that are being installed in the hose pumps. As with the intended flow of liquids the photometer unit is passed through a cuvette located inside the photometer unit, this component will automatically be cleaned in line with the hose system and does not need to be cleaned separately.

Hoses are to be cleaned by pumping distilled, deionised water through the whole length of the hoses for about fifteen (15) minutes as described later in this chapter.

Make sure to close the stop-cock at the sample inlet and fresh water supply, if applicable.

Before opening the measuring cabinet please make sure that no items or parts will fall out from inside the measurement cabinet when being opened. Unlock the front door and then carefully open the measurement cabinet. Ensure that the front door can not close by itself while handling inside the cabinet.

Note: Do not remove the cuvette from the photometer unit when cleaning the hose system to prevent liquids from draining off into the measurement cabinet from the photometer unit.

Provide about half (0.5) a litre of distilled, deionised water in an open jar for cleaning the hose system and the photometer unit.

Start cleaning the hose system by removing all liquids from the hose system. Open the roller bands of all hose pumps by carefully turning the clamp located on the bottom side of the hose pump to the right. When loosening the roller band located on the upper side of the hose pump, all liquids will drain off into their intended reagent containers. Prevent huge quantities of liquids from running into the measuring cabinet for protection of the cabinet and less cleaning work. Possible residues inside the hoses will not affect the cleaning of the hose system and can remain in the hoses.

Next, check the condition of all hoses making up the hose system. Beside the hoses held by the intended fittings, the hose system comprises hoses that are located inside the roller bands of the hose pumps just opened. Make sure to carefully check these hoses, too. In case of attrition make sure to have hoses changed according to the description in chapter 7.5, „Changing hoses“.

If all liquids have drained off into their intended reagent containers and the hose system is in proper condition and does not need to be changed, fix the roller bands to their previous position again. Make sure that both ends of the hose are placed into their intended fittings and fix the position of the rolling band by turning the clamp to the left.

Disconnect all hoses to be cleaned from their reagent containers and from inlets respectively, by pressing the holder the hose is inserted to, in direction of the connector. Hoses are to be removed without any exertion.

Do not disconnect the hose from outlet to enable discharge of distilled, deionised water during the cleaning proccess. Make sure that there is enough room inside the measurement cabinet for holding the open jar filled with distilled, deionised water, if the outlet of the analyser is provided by the use of a container.

Note: Remove all reagent containers from inside the measurement cabinet in case that there is not enough room for placing the open jar filled with the destilled, deionised water inside the measurement cabinet. The cleaning process will take about fifteen (15) minutes.

Submerge all open ends of hoses (sample, water, reagent and standard solution) into the open jar filled with distilled, deionised water. Change the analyser to operational mode „Service“ and start pumping the distilled, deionised water through all hoses by calling Submenu „Conveyance“ (see chapter 6.5.2, „Submenu Convey“, for a detailed description of starting the hose pumps).

All hose pumps will simultaneously start with pumping the distilled, deionised water through the hose system at their defined speed. Cleaning will take about fifteen (15) minutes and is calculated based on the required quantity of liquid to be conveyed by each hose pump. In case of any disturbance during the cleaning process, press the cancel key [●] at any time. All hose pumps will stop immediately. In this case, the cleaning process has to be restarted after correcting the disturbance.

Wait until the cleaning process has finished correctly. Repeat the cleaning process, in case that there is any obvious impurity in the hose system. Make sure to provide enough destilled, deionised water in this case.

After successfully cleaning the hose system and the photometer unit, let the remaining distilled, deionised water drain off the hoses into the open jar used. Open the roller bands of all hose pumps by carefully turning the clamp located on the bottom side of the hose pump to the right. When loosening the roller band located on the upper side of the hose pump, all liquids will drain off. Prevent huge quantities of liquids from running into the measuring cabinet for protection of the cabinet and less cleaning work. Remove the hoses from the open jar and take out the open jar from the measurement cabinet. Fix the roller bands to their previous position again. Make sure that both ends of the hose are placed into their intended fittings and fix the position of the rolling band by turning the clamp to the left.

If you have removed the reagent containers from the measurement cabinet, place them back to their intended positions. Connect all hoses to their intended reagent containers and inlets respectively. Open the stopcock at sample inlet and fresh water supply, if applicable.

Finish the cleaning process by filling all hoses with their intended liquids (sample, reagent, standard solution and water) after cleaning the hose system and the photometer unit and before continuing with ongoing operation. See chapter 5.5, „Filling hose system“, for further information.

Close the front door after cleaning the measurement cabinet and lock the analyser to prevent unauthorised access.

7.3 Changing reagents

First things first:
- *Change both reagent and standard solution at the same time*
- *Have new reagents at hand*
- *Provide about 0.5 litres of destilled, deionised water*
- *You do not need to power-off the analyser*
- *Drain off liquids from all hoses*
- *Use distilled water for cleaning reagent containers*
- *Avoid mixing old and new liquids*
- *Dispose residues according to rules and regulations*

Operating in default set-up, the reagents should be changed respectively refilled after a period of about one (1) week in order to maintain accuracy of measurement results. This may differ depending on the interval of measurement was set up or, more frequently, if the analyser is set up for continuous measurement (see chapter 3.7, „Consumption of reagents“ for further information).

Additionally, the alarm lamp, located at the operating elements in the upper right area of the measuring cabinet, shining red indicates, that the system is about to run out of reagent. This might be the case in a period of less than one (1) week, due to the defined interval of measurement cycles, specific conditions at the place of installation and the special compound of the sample to be measured. Make sure to change reagents immediately as the case may be.

The alarm for insufficient reagent available is generated by the liquid level gauge attached to the reagent container for the reagent. Typically the consumption of reagent is higher than the one of standard solution. In respect of keeping maintenance work low, we recommend changing respectively refilling both reagents at the same time.

If this SEIBOLD Online-Analyser EASY-Nickel is connected to an external control system, an equivalent signal is sent to this external system for notification on insufficient quantity of reagent available. If the analyser was delivered or additionally equipped with a data-logging unit, insufficient quantity of reagent is recorded accordingly and can be evaluated later on.

Note: Do not forget to register the dates of changing reagent and standard solution in the operating manual of the analyser. By registering these dates you can gather useful information and provide additional control of consumption of reagents in your specific application!

Interrupt the ongoing measurement process for changing reagents you can, but you do not need to power-off the analyser.

Before opening the measuring cabinet please check for any loose parts inside the cabinet that might fall out when opening. Unlock and open the front door of the measuring cabinet carefully and make sure the font door can not close by itself while handling inside the cabinet. Please carefully check the guideways of cables and hoses connected to the reagent containers before taking out the reagent containers from the measurement cabinet for your own safety!

Start changing reagent and standard solution by removing both liquids from their intended hoses in the hose system (see figure 2, „Instruments and fittings“). Open the roller bands of the hose pumps conveying reagent and standard solution by carefully turning the clamp located on the bottom side of the hose pump to the right. When loosening the roller band located on the upper side of the hose pump, the liquids will drain off into their intended reagent containers. Prevent huge quantities of liquids from running into the measuring cabinet for protection of the cabinet and less cleaning work.

Note: If you use alternative containers for holding the reagents, make sure to follow the process as described in this chapter as close as possible, but change procedures according to your local needs.

When reagents have drained off into their intended reagent containers, fix the roller bands to their previous position again. Make sure that both ends of the hose are placed into their intended fittings and fix the position of the rolling band by turning the clamp to the left.

Carefully unscrew the top cover from each reagent container. Try not to move the top cover but turn the container instead for keeping the attached hose (and cable) in its positions. Keep the top covers inside the measuring cabinet, as hoses and the liquid level gauge are attached to the 19-inch-rack inside the measurement cabinet.

Take out the open reagent containers from the measurement cabinet and place them on an even, easy to clean plane outside the measuring cabinet.

Remove any residues of reagent and standard solution that might be in the reagent containers and make sure to dispose it according to the instructions for disposal of chemicals. Please see chapter 1.10, „Disposal“ and chapter 13, „Safety Data Sheets“, for further information.

After removing residues from the reagent containers you should thoroughly clean the reagent containers by the use of distilled, deionised water. Make sure to dispose the compound resulting from cleaning as described before.

Note: Do not mix old and new reagents under no circumstances! Quality of reagent and standard solution originated that way can derogate operation of the equipment seriously and negatively influence accuracy of measurement results!

Open the set of reagent and fill the content of the bottle into the intended reagent container. Use a clean and resistant funnel for transfilling and prevent spillage of hughe quantities of the buffer solution, if applicable.

Place the container filled with reagent back to the intended place inside the measuring cabinet and carefully screw up the top cover holding the liquid level gauge. Try not to move the top cover but turn the container instead for keeping the attached hose (and cable) in its positions. Ensure that cables and hoses do not hinder further conveyance of reagent.

Make sure to have all liquids conveyed by their corresponding hose pumps!

Continue with filling standard solution into the reagent container as described previously. Fill all hoses with their intended liquid (reagent and standard solution) after changing the reagents before continuing with ongoing operation. See chapter 5.5, „Filling hose system“, for further information.

Close the front door of the measurement cabinet after changing reagents and lock the analyser to prevent unauthorised access.

7.4 Refilling fresh water

If there is no fresh water supply available directly at the place of installation, (fresh) water is to be provided by the use of an applicable liquid container. Make sure to change or refill water each time you change one or both reagents.

Disconnect the intended hose for conveying water from the liquid container and drain off water into the liquid container.

Remove possible residues of previously filled water from the liquid container and refill fresh water.

Connect the intended hose with the liquid container and make sure further conveyance of water is not hindered.

7.5 Changing hoses

First things first:
- *Change all hoses at the same time*
- *Only use hoses with required resistence*
- *Make sure to change the hoses used in hose pumps*
- *Make sure that neither sample nor water is being conveyed*
- *Drain off liquids from all hoses*
- *Provide about 0.5 litres of destilled, deionised water*
- *Clean connections and clamps by the use of distilled water*
- *Refill hoses with their intended liquids before ongoing operation*

With this SEIBOLD Online-Analyser EASY-Nickel all hoses for conveying liquids are located on the 19-inch-rack inside the measurement cabinet, except the two hoses for sample inlet and drain with connection to outside the measurement cabinet. Although various hoses have different times of duration, we recommend changing all hoses at the same time for keeping maintenance work a minimum.

Note: If your setup requires alternative container for various liquids, make sure to follow the process described in this chapter as close as possible but change procedures according to your local needs.

Make sure to exclusively use hoses of required resistance, or better use the set of hoses available as a spare part (see chapter 10.1, „Set of hoses“). Do not use other than the intended hoses for the pump hoses when changing referring hoses (see chapter 10.3, „Hose connection set“).

Note: For changing hoses we highly recommend powering-off the analyser for your own safety. Make sure to have safety advice for handling chemicals in mind when changing hoses. Please refer to chapter 1.7, „Handling chemicals“, for further information.

Before opening the measuring cabinet please check for any loose parts inside the cabinet that might fall out when opening. Unlock and open the front door of the measuring cabinet carefully and make sure the font door can not close by itself while handling inside the cabinet. Make sure to close the stop-cock at the sample inlet and fresh water supply.

Start changing hoses by removing all liquids from the hose system. Open the roller bands of all hose pumps by carefully turning the clamp located on the bottom side of the hose pump to the right. When loosening the roller band located on the upper side of the hose pump, all liquids will drain off into their intended reagent containers. Prevent huge quantities of liquids from running into the measuring cabinet for protection of the cabinet and less cleaning work.

Carefully remove all hoses inside the measurement cabinet from their intended connections and fittings. Continue with removing all hose connections and clamps accordingly. Hoses should be removable with only fair effort. In case a hose is stuck to its fitting, try dilating the hose carefully by heating up the hose. If the hose still is not to be removed with normal effort you have to dismantle the referring component and use additional tools for removing the hose.

If you plan to reuse connection parts and clamps, make sure to clean them thoroughly by the use of distilled, deionised water and store them together for having them at hand when reassembling, otherwise dispose the connection parts and clamps.

Note: Try not to get in touch with possibly remaining liquids that could be the result of a chemical reaction! See chapter 1.7, „Handling chemicals“, for further information.

Proceed with removing hoses from sample inlet and sample drain according to the requirements of your local installation. Having removed all hoses from their intended fittings, you should thoroughly clean the fittings by the use of distilled, deionised water and then dry the fittings before applying new hoses.

Next you should change the hoses of hose pumps. Hoses are installed inside the rolling band you opened for draining off liquids. Remove the hoses from the roller band by taking out the fitting at both ends of the hose from the intended position in the roller band. Insert the new hoses into the rolling band at the same position you have removed the old hose before. Make sure that both ends of the hose are placed into their intended fittings. Attach the rolling band to the pump hose top down and insert the rolling band into the intended openings located on the bottom edge of the hose pump. Fix the position of the rolling band by turning the clamp to the left.

Continue with applying new hoses to their intended connections and fittings and then reinstall connection parts and clamps for sealing the hoses in succession of removal. Make sure that no liquid can leak from the new hoses and pass off to inside the measurement cabinet.

Make sure to have all liquids conveyed by their corresponding hose pumps!

Proceed with applying hoses for sample inlet and sample drain according to the requirements of your local installation. Finally connect all hoses to its intended containers and power-on the analyser again. Reopen the stop-cock at sample inlet, if applicable. Fill all hoses with their intended liquids (sample, reagent, standard solution and water) after changing hoses, before continuing with ongoing operation. See chapter 5.5, „Filling hose system“, for further information. Close the front door of the measurement cabinet after changing standard solution and buffer solution and lock the analyser to prevent unauthorised access.

8 Trouble shooting

This SEIBOLD Online-Analyser EASY-Nickel was submitted a strict quality control, tested in detail and examined by appropriate technical personnel prior to dispatch. Even though, operational faults can occur as a consequence of transport or, in exceptional cases, during ongoing operation. If a malfunction can not be repaired, the equipment is to be put out of operation immediately. For your own safety no further measurement should be performed by the analyser out of order until malfunction is repaired and proper operation is re-established.

For finding out possible reasons of disturbance we recommend going through the checklist provided (see chapter 8.1, „Checklist for trouble shooting“) step by step for identifying the reason for any disturbance.

The checklist should be carefully gone through in any case of disturbance as all important components are considered in a certain order for narrowing possible causes of disturbance.

Having identified the problem causing the current disturbance and solved it according to the instructions given, you should run at least one complete measurement cycle for testing accuracy of measurement before continuing with ongoing measurement.

Note: Make sure to start with the first topic of the checklist and do not skip any point until the problem causing the current disturbance is identified! For safety reasons have this process executed by authorised and trained personnel only!

Note: Have this checklist carefully filled out available when contacting the service line of the manufacturer or one of his authorised partners! Having the information contained in this checklist at hand will shorten the time until receiving support!

8.1 Checklist for trouble shooting

Step No.	*Check / Action*	*Option*	*Continue with no.*
1.0	The control lamp is glowing green.	Yes No	2.0 1.1
1.1	Check supply voltage.	OK Not OK	1.3 1.2
1.2	Have supply voltage repaired.		9.0
1.3	Check cutout of input lead.	OK Not OK	1.5 1.4
1.4	Have cutout of input feed repaired.		9.0
1.5	Check device fuse.	OK Not OK	1.7 1.6
1.6	Change device fuse.		1.0
1.7	Check control lamp.	OK Not OK	1.9 1.8
1.8	Change control lamp.	OK Not OK	1.0 1.9
1.9	Have electronic module changed.		10.0
2.0	Display and keyboard work properly.	Yes No	3.0 2.1
2.1	Check supply voltage.	OK Not OK	2.3 2.2
2.2	Have supply voltage repaired.		9.0
2.3	Check supply voltage at the back side of the 19-inch-rack inside the measurement cabinet by the use of a measuring instrument.	OK Not OK	2.5 2.4
2.4	Have electronic module changed.		10.0
2.5	Check cutout of input lead.	OK Not OK	2.7 2.6
2.6	Have cutout of input lead repaired.		9.0
2.7	Power off the analyser and switch it on after about five (5) minutes. Allow enough time for all capaciters being discharged.	OK Not OK	2.8 2.10
2.8	Check device fuse.	OK Not OK	2.10 2.9
2.9	Change device fuse.	OK Not OK	1.0 2.10
2.10	Have electronic module changed.		10.0

Step No.	*Check / Action*	*Option*	*Continue with no.*
3.0	Hose pumps are turning.	Yes No	3.1 3.2
3.1	Hose pumps are turning continuously.	Yes No	3.2 4.0
3.2	Check wiring on the back side of the 19-inch-rack inside the measurement cabinet.	OK Not OK	3.4 3.3
3.3	Have wiring repaired.		10.0
3.4	Have hose pump(s) out of order changed.	OK Not OK	1.0 3.5
3.5	Have electronic module changed		10.0
4.0	Sample and water is being conveyed correctly.	Yes No	5.0 4.1
4.1	Routing of hoses allows for unobjectionable conveyance between inlet and drain.	Yes No	4.4 4.2
4.2	Free hoses for unobjectionable conveyance.	OK Not OK	4.0 4.3
4.3	Have hose system changed.		10.0
4.4	Pressure at inlet and drain is according to the prerequisites for installation.	Yes No	4.6 4.5
4.5	Have pressure at inlet and drain established according to the prerequisites of installation.		9.0
4.6	All hoses are leak-proof and no leakage is being detected.	Yes No	4.10 4.7
4.7	Seal all leaky hoses.	OK Not OK	4.0 4.8
4.8	Replace all leaky hoses.	OK Not OK	4.0 4.9
4.9	Have hose system changed.		10.0
4.10	All hose connections are leak-proof and no leakage is being detected.	Yes No	4.14 4.11
4.11	Seal all leaky hose connections.	OK Not OK	4.0 4.12
4.12	Replace all leaky hose connections.	OK Not OK	4.0 4.13
4.13	Have hose system changed.		10.0
4.14	Conveyance of liquid is not blocked by any contamination or residues.	Yes No	4.16 4.15

Step No.	*Check / Action*	*Option*	*Continue with no.*
4.15	Remove blockage from inside hoses.	OK Not OK	4.0 4.16
4.16	Have hose system changed.		10.0
5.0	Reagent and standard solution is being conveyed correctly.	Yes No	6.0 5.1
5.1	All hoses are leak-proof and no leakage is being detected.	Yes No	5.5 5.2
5.2	Seal all leaky hoses.	OK Not OK	5.0 5.3
5.3	Replace all leaky hoses.	OK Not OK	5.0 5.4
5.4	Have hose system changed.		10
5.5	All hose connections are leak-proof and no leakage is being detected.	Yes No	5.9 5.6
5.6	Seal all leaky hose connections.	OK Not OK	5.0 5.7
5,7	Replace all leaky hose connections.	OK Not OK	5.0 5.8
5.8	Have hose system changed.		10
5.9	Conveyance of liquid is not blocked by any contamination or residues.	Yes No	5.11 5.10
5.10	Remove blockage from inside hoses.	OK Not OK	5.0 5.11
5.11	Have hose system changed.		10.0
6.0	„Check Photometer“ is indicated on the display.	Yes No	6.1 7.0
6.1	Remove photometer from the photometer holder and check for damages.	OK Not OK	6.4 6.2
6.2	Replace photometer unit.	OK Not OK	6.0 6.3
6.3	Have analyser serviced.		10.0
6.4	Clean photoeter unit.	OK Not OK	7.0 6.3
7.0	Measurement values are plausible.	Yes No	8.0 7.1

Step No.	*Check / Action*	*Option*	*Continue with no.*
7.1	Have concentration of nickel analysed by an authorised laboratory and check the reference value.	OK Not OK	7.0 7.2
7.2	Environmental conditions are according to prerequisites for proper operation.	Yes No	7.4 7.3
7.3	Establish environmental conditions according to prerequisites of proper operations.	OK Not OK	7.2 7.4
7.4	All hoses are leak-proof and no leakage is being detected.	Yes No	7.8 7.5
7.5	Seal all leaky hoses.	OK Not OK	7.0 7.6
7.6	Replace all leaky hoses.	OK Not OK	7.0 7.7
7.7	Have hose system changed.		10.0
7.8	All hose connections are leak-proof and no leakage is being detected.	Yes No	7.11 7.9
7.9	Seal all leaky hose connections.	OK Not OK	7.0 7.10
7.10	Replace all leaky hose connections.	OK Not OK	7.0 7.7
7.11	Conveyance of liquid is not blocked by any contamination or residues.	Yes No	7.13 7.12
7.12	Remove blockage from inside hoses.	OK Not OK	7.0 7.7
7.13	Change standard solution and reagent.	OK Not OK	7.14 7.7
7.14	Perform at least one (1) measurement cycle.	OK Not OK	13.0 7.7
8.0	Measuring results are transferred to external system.	Yes No	8.1 8.2
8.1	Measuring results are transferred to external system correctly.	Yes No	11.0 8.2
8.2	Have electronic module changed.		10.0

Step No.	*Check / Action*	*Option*	*Continue with no.*
9.0	Have all repair work executed by authorised personnel only. Put the equipment out of operation until repair work is completed. Follow the instructions for putting this SEIBOLD Online-Analyser EASY-Nickel into operation, see chapter 5, „Putting into operation“.	OK Not OK	11.0 10.0
10.0	Contact the manufacturer or the authorised partner you received the analyser from. Provide all information gathered by going through this checklist and ask for immediate support. Do not continue operation until the reason for the current disturbance was identified and the problem solved!		
11.0	Perform at least one (1) measurement cycle.	OK Not OK	12.0 10.0
12.0	Continue ongoing measurement.		

8.2 Support options

Do not hesitate to contact the manufacturer or the authorised partner you have received this SEIBOLS Online-Analyser EASY-Nickel from in case of any questions or if ongoing operation is interrupted.

Before contacting the manufacturer or authorised partner make sure to have the following information available to shorten response time:

Product name	SEIBOLD Online-Analyser EASY-Nickel
Date of purchase	
Purchased from	
Serial No.	
Application	
Environmental conditions	
Description of disturbance	
Checklist information	

Note: Make sure to have contact information of the authorised partner and all information received from the authorised partner at hand when contacting the manufacturer.

9 Consumable material

A list of all available consumable material for this SEIBOLD Online-Analyser EASY-Nickel is shown below. For prices please refer to the pricelist in effect or contact the manufacturer or one of his authorised partners.

Note: All pictures in the list of spare parts are intended to give an impression of the part listed and are not real images!

9.1 Nickel Reagent

Reagent for this SEIBOLD Online-Analyser EASY-Nickel is forming the colour reaction during measurement. The reagent is shipped in a bottle of one (1) litre and can be stored up to six (6) months according to the recommended storage conditions.

Partno. C00109

9.2 Nickel Standard Solution

Standard solution used with this SEIBOLD Online-Analyser EASY-Nickel is used for calibration of the system. Standard solution is shipped in a bottle of one (1) litre and can be stored up to six (6) months according to recommended storage conditions.

Partno. C00110

9.3 Set of hoses

The set of hoses for this SEIBOLD Online-Analyser EASY-Nickel includes all hoses for complete piping of the analyser. All hoses are provided in required quantity, length and resistance for conveying the intended liquids. Note: Hoses for sample inlet, sample drain, hose connections and clamps are not included in the scope of delivery!

Partno. K00104

9.4 Set of pump hoses

The set of pump hoses for this SEIBOLD Online-Analyser EASY-Nickel includes four (4) specific hoses intended to convey liquids in the pump hoses used. Hoses are of a certain resistance and convey a defined quantity in a period of time. Hoses are also included in the scope of delivery of the referring pump hoses.

Partno. P00088

10 Accessories

A description of all accessories available for this SEIBOLD Online-Analyser EASY-Nickel is listed below. For prices please refer to the pricelist in effect or contact the manufacturer or one of his authorised partners.

Note: All pictures in the list of spare parts are intended to give an impression of the part listed and are not real images!

10.1 Filter unit

This filter unit is designed to prevent coarse particles from damaging the hose system. Coarse particles of smaller than approximately 1mm diameter are removed from the flow of sample. The filter unit typically is installed before the stop-cock at sample inlet.

Partno. K00044

10.2 Data-logging unit

For continuously recording measurement values and operating statuses directly at the place of installation, this SEIBOLD Online-Analyser EASY-Nickel can be equipped with a data-logging unit. The data-logging unit receives relevant information from the micro-controller-unit MPLT and stores up to 999.999 values that can be transferred to any computer by the use of a RS-232 interface. The data-logging unit is mounted on two (2) subplates and is shipped with all cables required for wiring.

Note: The data-logging unit can be remotely controlled and data uploaded to external databases by the use of the remote access kit available. See chapter 9.5, „Remote access kit“, for further information.

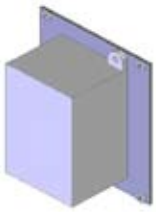
Partno. K00017

10.3 Remote access kit

The remote access kit allows for connecting to this SEIBOLD Online-Analyser EASY-Nickel by the use of a GSM modem for remotely control and download information from the data-logging unit. This accessory is to be used together with the data-logging unit only (see chapter 10.2, „Data-logging unit“).

Partno. K00047

10.4 Heating



If changing ambient temperature might cause condensation inside the measuring cabinet at the place of installation, this heating option allows for avoiding condensation and keeping up a definable minimum temperature. The heating option is mounted on a specific sub-plate and is controlled by the use of a thermostat (included in the scope of delivery).

Note: This heating option is not a general climate control unit! Environmental conditions required by this SEIBOLD Online-Analyser EASY-Nickel are to be adhered to!

Partno. K00041

10.5 Fieldbus interface

The Fieldbus interface allows for connecting this SEIBOLD Online-Analyser EASY-Nickel to any of the well established systems available. The interface is to be installed to the micro-controller-unit MPLT and is shipped with a detailed installation manual.

Partno. K00049

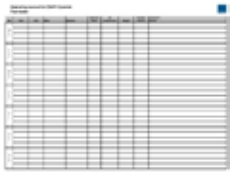
10.6 Liquid container

A liquid container is to be used in case there is no fresh water supply available at the place of installation. The liquid container is shipped with a top cover, a high-strength cable gland (M12x1.5), a synthetic pipe, a hose connection and a hose for connection with the SEIBOLD Online-Analyser EASY-Nickel.

25l ... Partno. C00052

50l ... Partno. C00053

10.7 Operating manual (optional)



The operating manual is designed for providing evidence of inspections, specific operating statuses and performed cleaning and maintenance activities. The manual is of the layout as shown in figure 15, „Operating manual“ and comprises 52 pages, one for each calendar week.

Partno. B00007

11 Spare parts

A description of all spare parts available for this SEIBOLD Online-Analyser EASY-Nickel is listed below. For prices please refer to the pricelist in effect or contact the manufacturer or one of his authorised partners.

Note: All pictures in the list of spare parts are intended to give an impression of the part listed and are not real images!

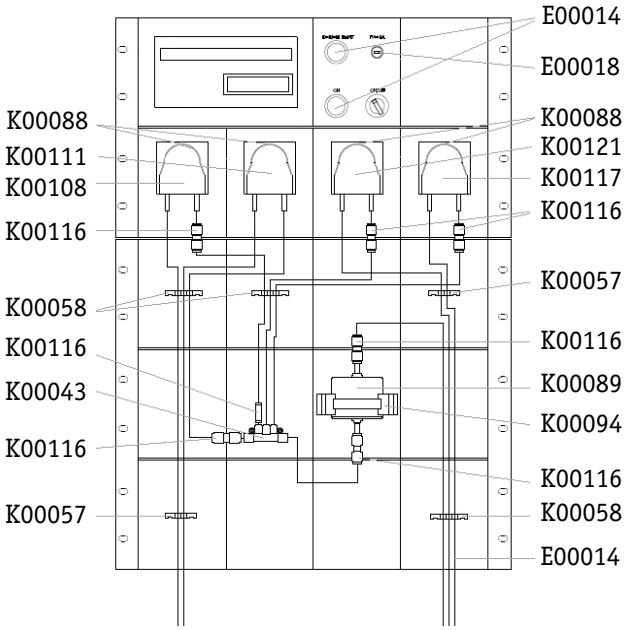


Figure 23 - Spare parts overview

11.1 Hose pumps

For conveying liquids to the measurement process this SEIBOLD Online-Analyser EASY-Nickel uses three (3) different types of hose pumps. A hose pump is mounted on a sub-plate and has to be connected to the corresponding clamps on the back side of the 19-inch-rack. Screws for mounting the sub-plate to the 19-inch-rack are included in the scope of delivery. Please refer to figure 23, „Spare parts overview“, to see which type is required for replacement.

For reagent ... Partno. K00117
For standard solution ... Partno. K00121
For sample ... Partno. K00108
For water ... Partno. K00111

11.2 Hose connection set

Hose connections and clamps are used to prevent leakage from hoses conveying liquids. The hose connection set for this SEIBOLD Online-Analyser EASY-Nickel includes all hose connections and clamps required for supporting a complete piping of the analyser.

Note: The hose connection set does not include any hoses required for piping!

Partno. K00116

11.3 Hose guide (for vertical flow)

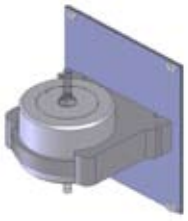
Hose guides are used to hold hoses at a certain position in the hose system for ensuring unrestricted vertical flow of liquids within the hose system. There are two (2) different hose guides for vertical flow used with this SEIBOLD Online-Analyser EASY-Nickel, namely for 2 and 3 hoses. Please refer to figure 23, „Spare parts overview“, to find the appropriate hose guide for your needs.

For two (2) hoses ... Partno. K00057

For three (3) hoses ... Partno. K00058

For four (4) hoses ... Partno. K00059

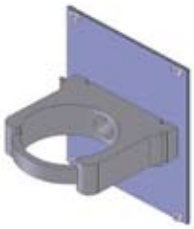
11.4 Photometer unit, complete



The photometer unit comprises the photometer (including source of light and detector), the cuvette inside the photometer and the photometer holder mounted on a sub-plate. The cable for transferring the measured signal to the micro-controller-unit MPLT is attached to the photometer and included in the scope of delivery.

Partno. K00089

11.5 Photometer holder



The photometer holder is intended to fix the photometer on the sub-plate. Screws for mounting the sub-plate to the 19-inch-rack are included in the scope of delivery.

Partno. K00094

11.6 Manifold

The manifold is used to bring together different liquids in preparation of actual measurement. The manifold is a synthetic component with five (5) apertures, whereof two (2) apertures allow for straight flow of a liquid and three (3) are intended to add other liquids. The manifold is mounted on a sub-plate, screws for mounting the sub-plate on the 19-inch-rack are included in the scope of delivery.

Partno. K00043

11.7 Lamps

Lamps are used for indication of the operating status and availability of sufficient quantity of reagent. There are two lamps located on the sub-plate for operating elements. The lamps used are of the type 2W / 24-28V / E10, commercially available.

Partno. E00014

11.8 Fuse

A fuse is used to protect all electronic parts from electronic shortcuts. This SEIBOLD Online-Analyser EASY-Nickel uses a fuse commercially available. The type of the fuse is F 2A / 250VAC / 20mm / d=5mm.

Partno. E00018

11.9 Reagent container (including liquid level gauge)

The reagent container (including liquid level gauge) consists of a lockable synthetic bottle and a top cover, to which three (3) high-strength cable glands (M12x1.5, M16x1.5, M20x1.5) are attached. A liquid level gauge for monitoring availability of liquid in the reagent container incl. the cable for wiring, a synthetic pipe for conveying liquid from the reagent container and a valve for providing air are included in the scope of delivery.

Partno. K00024

11.10 Reagent container (excluding liquid level gauge)

The reagent container (excluding liquid level gauge) consists of a lockable synthetic bottle and a top cover to which two (2) high-strength cable glands (M12x1.5, M16x1.5) are attached. A synthetic pipe for conveying liquid from the reagent container and a valve for providing air are included in the scope of delivery.

Partno. K00025

11.11 Measurement cabinet

The measurement cabinet (746x600x373) consists of a ground and a center part and is covered by a lockable front door made of glass. The cabinet is manufactured according to standard IP55 as per EN 60 529 / 10.101. The cabinet is not designed to operate outdoor. Included with the measurement cabinet are keys for opening ground and center part and for locking the front door.

Partno. G00019

11.12 Wall fastening for measurement cabinet

Wall fastening is required for securely mounting the measurement cabinet on a supporting wall. The wall fastening comprises four (4) pairs of fastenings, screws (M8x100) and shims (dowels are not included).

Partno. G00018

11.13 Key for measurement cabinet

The key for measurement cabinet is used to open the ground and center part of the cabinet.

Partno. G00032

11.14 Front door

The front door is intended for use with the measurement cabinet (Partno. G00019) only and is included in the scope of delivery. In case of breaking the glass, the front door can be ordered separately. The bolts for fixing the front door to the measurement cabinet are included.

Partno. G00035

11.15 Flange plate

For routing cables and hoses from external sources to the inside of the measurement cabinet a flange plate can be mounted at the top or bottom of the measurement cabinet. Screws for fixing the flange plate are part of the measurement cabinet and therefore not required with the flange plate.

Partno. G00021

11.16 High-strength cable gland (PG-screw joint)

High-strength cable glands (PG-screw joints) are used for holding cables and hoses attached to the flange plate, being led to the inside of the measurement cabinet. Screw joints are available in three different sizes, M12x1.5, M16x1.5 and M20x1.5. Please state the number of screw joints of each size with your order.

Size M12x1.5 ... Partno. F00067
Size M16x1.5 ... Partno. F00071
Size M20x1.5 ... Partno. F00053

12 Memo sheet for settings

When putting the analyser into operation, all settings of the equipment available are based on default values for typical applications provided by the manufacturer. Some of these basic values can be adjusted according to given environmental or process related conditions. A detailed description of all possible adjustments is provided in chapter 6, „Operation“.

This SEIBOLD Online-Analyser EASY-Nickel is protected against various interferences, e.g. excess voltage, according to the relevant rules and regulations and provides sufficient safety for personnel, environment of the equipment and the equipment itself.

In some exceptional cases unforseen incidents could cause loss of individual settings and reset the analyser to the default values provided by the manufacturer. For this reason we strongly recommend registering your individual settings to the memo sheet on the following pages thoroughly. Please keep a copy of the memo sheet at a safe place as a backup for being able to set up all individual settings as soon as possible if required.

If changes to your individual settings should be required during ongoing operation, please find a copy of the memo sheet for your SEIBOLD Online-Analyser EASY-Nickel for download at the manufacturer´s homepage under www.seiboldme.com.

Memo sheet for settings of SEIBOLD Online-Analyser EASY-Nickel

Function	*Display*	*Entity*	*Default*	*Setting*
CALIBRATION	Code +1001.0			
Standard Solution	Standard S		+0005.0	
CONVEY	Code +1002.0			
SETUP	Code +1003.0			
Measuring interval	int. meas.	min	+0060.0	
CONTROL	Code +2001.0			
Set point for min-controller	w min con.	mg/l	-0000.1	
Set point for max-controller	W max con.	mg/l	+0030.0	
Alarm low limit	< alarm	mg/l	+0000.0	
Alarm high limit	> alarm	mg/l	+0050.0	
SYSTEM	Code +2002.0			
Factor for current output 1	lim1 mA	mA	+0205.5	
K-Factor for measuring	K – factor 1e2	%	+0001.0	
Measuring filter	filter		+0020.0	
Zero factor mV-input	zero mV	mV	+3000.0	
TIME	Code +2003.0			
Sampling time	sampling	sec.	+0001.0	
Pause	pause	sec.	+0005.0	
Zero Adjustment	zero	sec.	+0035.0	
Dosing time reagent 1	reagent 1	sec.	+0060.0	
Pause	wait 1	sec.	+0001.0	
Dosing time reagent 2	reagent 2	sec.	+0060.0	
Pause	wait 2	sec.	+0001.0	
Dosing reagent 3	reagent 3	sec.	+0060.0	
Pause	wait 3	sec.	+00001.0	
Measuring time	measure	sec.	+0120.0	
Rinsing time	rinse	sec.	+0060.0	

13 Safety Data Sheets

(Material) Safety Data Sheets (MSDS) are standardised, international acknowledged descriptions for handling, treatment and usage of dangerous chemicals. The safety data sheets for the standard solution and the buffer solution used with this SEIBOLD Online-Analyser EASY-Nickel can be found on the subsequent pages of these operating instructions.

A (Material) Safety Data Sheet typically comprises the following chapters:

Chapter	*Content*
1	Substance/Preparation and Company Identification
2	Information on Ingredients
3	Health Hazard Information
4	First Aid
5	Fire-fighting Measures
6	Accidental Release Measures
7	Handling and Storage
8	Exposure Controls and Personal Protection
9	Physical and Chemical Properties
10	Stability and Reactivity
11	Toxicological Information
12	Ecological Information
13	Spill and Disposal
14	Transport Information
15	Regulatory Information
16	Other Information

Note: The information published in the following Safety Data Sheets is present state of our knowledge and has been compiled from data in various technical publications. The information contained in the following Safety Data Sheets does not represent a guarantee of the properties of the products mentioned. It is the user's responsibility to determine the suitability of this information for adoption of necessary safety precautions.

13.1 MSDS for Nickel Reagent

1 - Substance/Preparation and Company Identification	
Product Name	Nickel Reagent (C00109)
Product Type	Analytical reagent
Manufacturer	SEIBOLD Messtechnik und Projektentwicklung GmbH
Address	A-1110 Wien, Grillgasse 51
Call for Information	+43 (1) 332 00 60
Call for Emergencies	+43 (1) 406 43 43

2 - Information on Ingredients	
Appearance	Aqueous solution.
Hazardous Ingredients	
2-(5-BROMO-2-PYRIDYLAZO)-5-(DIETHYLAMINO)-PHENOL, 97% solution (Br-PADAP)	CAS-No: 67-42-5 EG-Index-No.: 007-001-01-2 EG-No.: 215-647-6 Dangerous Goods Class: O, C, N, H; S22-24/25;
ETHYLENE GLYCOL-BIS(B-AMINOETHYL ETHER)N,N,N′,N′-TETRAACETIC ACID FREE ACID salt (EGTA)	CAS-No: 67-42-5 EG-Index-No.: 200-651-2 Dangerous Goods Class: O, Xn; R 8-22-36/37/38-42/43; WGK : 2;
IMBENTIN-N/63	CAS-No.: 9016-45-9 EG-No.: None Dangerous Goods Class: C, O, H, X; R:37-41; WGK: 2;
HYDROXYAMINE HYDROCH	CAS-No.: 5470-11-1 EG-No.: 2267982 Dangerous Goods Class: H, C, N, O, Cl, Xn, N; R: 22-36/38-43-48/22-50; S: 22-24-37-61; WGK: 3;
TRIETHANOLAMINE	CAS-No.: 64-19-7 EG-No.: 2005807 Dangerous Goods Class: O, C , N, H; R: 10-35; S: 23-26-45; WGK: 1
SODIUM ACETATE ANHYDROUS	CAS-No.: 127-09-32048238 EG-No.: 2048238 Dangerous Goods Class: Na, C, O, H; S: 22-24/25; WGK: 1;
ETHANOL ABSOLUTE	CAS-No.: 64-17-5 EG-No.: 2005786 Dangerous Goods Class: C, O H; R: 11; S:7-16; WGK: 1;

3 - Health Hazard Information
Toxicity to aquatic organisms is possible but it is not well-investigated. Harmful if swallowed. Irritating to eyes, respiratory system and skin. May cause sensitization by inhalation and skin contact.

4 - First Aid	
Swallowed	Make victim drink plenty of water (if necessary several litres), avoid vomiting (risk of perforation!). Immediately call physician.
Eye	Rinse with plenty of water for at least 10 minutes with eyelid held wide open. Call in ophthalmologist if necessary.
Skin	Wash with plenty of water. Immediately remove contaminated clothings.
Inhaled	Fresh air, call physician.

5 - Fire-fighting Measures	
Speacial Risks	Ambient fire may liberate hazardous vapours. Fire-promoting. Keep away from combustible materials. Development of hazardous combustion gases or vapours possible in the event of fire.
Extinguishing Media	In adaption to materials stored in the immediate neighbourhood.
Special Protective Equipment	Do not stay in dangerous zone without suitable chemical protection clothing and self-contained breathing apparatus.
Other Information	Contain escaping vapours with water. Prevent fire-fighting water from entering surface water or groundwater.

6 - Accidental Release Measures	
Person-related Precautionary Measures	Do not inhale vapours/aerosols. Avoid generation of dusts; do not inhale dusts. Avoid substance contact. Ensure supply of fresh air in enclosed rooms.
Environmental Protection Measures	Do not allow to enter sewerage system.
Procedures for Cleaning and Absorption	Take up with liquid-absorbent material. Forward for disposal. Clean up affected area.
Additional notes	Not available.

7 - Handling and Storage	
Handling	Substance may react with container during storage, resulting in a slight increase in nonvolatile matter.
Storage	Tightly closed. In a well-ventilated place. Below +8°C. (Temperature may be exceeded to up to +20°C for a period of max. 48 hours). Ensure supply of fresh air in enclosed rooms.

8 - Exposure Controls and Personal Protection	
Personal protection	Protective clothing should be selected specifically for the working place, depending on concentration and quantity of the hazardous substances handled.
Respiratory Protection	Required.
Eye Protection	Required.
Hand Protection	Required.
Industrial Hygiene	Change contaminated clothing. Application of skin- protective barrier cream recommended. Wash hands after working with substance.

9 - Physical and Chemical Properties	
Form	Liquid.
Colour	Red.

10 - Stability and Reactivity	
Conditions to be avoided	Heating, strong oxidising agent.
Substances to be avoided	Carbon dioxide, carbon monoxide, nitrogen oxides, hydrogen bromide.
Further information	Not available.

11 - Toxicological Information	
Further information	Toxicity to aquatic organisms is possible but it is not well-investigated.

12 - Ecological Information	
Ecotoxical Impact	Not available.
Further Information	Not available.

13 - Spill and Disposal	
Product	Chemicals must be disposed of in compliance with the respective national regulations.
Packaging	Product packaging must be disposed of in compliance with the respective national regulations.

14 - Transport Information	
ADR/RID	UN-No.: 2923; Classification: 8; PG: II; Sub-Risk: 6.1; Name: Corrosive solid, toxic, n.o.s.
IMDG, GGVSee	UN-No.: 2923; Classification: 8; PG: II; Sub-Risk: 6.1; Proper Shipping Name: Corrosive solid, toxic, n.o.s. Marine Pollutant: No Severe Marine Pollutant: No
ICAO, IATA	UN-No.: 2923; Classification: 8; PG: II; Sub-Risk: 6.1; Proper Shipping Name: Corrosive solid, toxic, n.o.s.

15 - Regulatory Information	
Symbol	T (Toxic); N (Dangerous for the environment); O (Oxidising); Xn (Harmful);
R-Phrases	34-50 8-22-36/37/38-42/43 (Causes burns. Very toxic to aquatic organisms. Contact with combustible material may cause fire. Harmful if swallowed. Irritating to eyes, respiratory system and skin. May cause sensitization by inhalation and skin contact)
S-Phrases	26-36/37/39-45-61 (In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately, show the label where possible). Avoid release to the environment. Refer to special instructions/Safety data sheets.)
Water pollution class	2 polluting substance VwVwS
Storage class VCI	8 B
Data sheet of the Chemical	M004 (Irritant substances/corrosive substances) M051 (Dangerous chemical substances)

16 - Other Information
Not available.

13.2 MSDS for Nickel Standard Solution

1 - Substance/Preparation and Company Identification	
Product Name	Nickel Standard Solution (C00110)
Product Type	Analytical solution
Manufacturer	SEIBOLD Messtechnik und Projektentwicklung GmbH
Address	A-1110 Wien, Grillgasse 51
Call for Information	+43 (1) 332 00 60
Call for Emergencies	+43 (1) 406 43 43

2 - Information on Ingredients	
Appearance	Aqueous solution.
Hazardous Ingredients	Nickel (II) chloride
CAS-No.	7718-54-9
EG-No.	231-743-0
Dangerous Goods Class	N, T; R25,43;50/53

3 - Health Hazard Information
Harmful if swallowed. May cause sensitisation by skin contact. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

4 - First Aid	
Swallowed	Make victim drink plenty of water, call physician if necessary.
Eye	Rinse with plenty of water for at least 10 minutes with eyelid held wide open.
Skin	Wash with plenty of water. Immediately remove contaminated clothing.
Inhaled	Fresh air.

5 - Fire-fighting Measures	
Speacial Risks	Non-combustible. Ambient fire may liberate hazardous vapours.
Extinguishing Media	In adaption to materials stored in the immediate neighbourhood.
Special Protective Equipment	Do not stay in dangerous zone without suitable chemical protection clothing and self-contained breathing apparatus. In order to avoid contact with skin, keep a safety distance an wear suitable protective clothing.
Other Information	Prevent fire-fighting water from entering surface or ground water.

6 - Accidental Release Measures	
Person-related Precautionary Measures	Avoid substance contact. Do not inhale vapours/aerosols. Ensure supply of fresh air in enclosed rooms.
Environmental Protection Measures	Do not allow to enter sewerage system.
Procedures for Cleaning and Absorption	Take up with liquid-absorbent material. Forward for disposal. Clean up affected area.
Additional notes	Not available.

7 - Handling and Storage	
Handling	Not applicable.
Storage	Tightly closed. Storage temperature: no restrictions.

8 - Exposure Controls and Personal Protection	
Personal protection	Protective clothing should be selected specifically for the working place, depending on concentration and quantity of the hazardous substances handled. The resistance of the protective clothing to chemicals should be ascertained with the respective supplier.
Respiratory Protection	Required when vapours/aerosols are generated.
Eye Protection	Required.
Hand Protection	Required.
Industrial Hygiene	Change contaminated clothing. Application of skin- protective barrier cream recommended. Wash hands after working with substance.

9 - Physical and Chemical Properties	
Form	Liquid.
Colour	Light green.
Odour	Odourless.
pH value	~ 4.4 (20°C)
Solubility in water	Soluble.

10 - Stability and Reactivity	
Conditions to be avoided	Not available.
Substances to be avoided	The generally known reaction partners of water.
Further information	Not available.

11 - Toxicological Information	
Further information	Property must be anticipated on the basis from the compounds of the preparation: After skin contact: Risk of skin sensitization. After swallowing: irritations of mucous membranes in the mouth, pharynx, oesophagus and gastrointestinal tract. absorbtion.

12 - Ecological Information	
Ecotoxical Impact	Not available.
Further Information	The following applies to nickel salts in general: biological affects: dissolved nickel toxic for aquatic organisms. Do not allow to enter waters, waste water or soil.

13 - Spill and Disposal	
Product	Chemicals must be disposed of in compliance with the respective national regulations.
Packaging	Product packaging must be disposed of in compliance with the respective national regulations.

14 - Transport Information	
ADR/RID	UN-No.: 3082; Classification: 9; PG: III; Name: Environmentally hazardous substance, liquid, n.o.s. Nickel(II)-chloride solution
IMDG, GGVSee	UN-No.: 3082; Classification: 9; PG: III; Name: Environmentally hazardous substance, liquid, n.o.s. Nickel(II)-chloride solution
ICAO, IATA	UN-No.: 3082; Classification: 9; PG: III; Name: Environmentally hazardous substance, liquid, n.o.s. Nickel(II)-chloride solution

15 - Regulatory Information	
Symbol	Xn (Harmful); N (Dangerous for the environment);
R-Phrases	22-43-51/53 (Harmful if swalloed. May cause sensitization by skin contact. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment).
S-Phrases	24-37-61 (Avoid contact with skin. Wear suitable gloves. Avoid release to the environment).

16 - Other Information
Not available.

14 Frequently Asked Questions

The measurement result is probably wrong. Can the measuring range be changed?

The measuring range of this SEIBOLD Online-Analyser EASY-Nickel can not be changed as it was designed and optimised for the default measurement range. Measuring ranges different from the default one require a different setup and measuring results would not be accurate using default settings of the equipment available.

How can I change minimum and maximum values for alarm?

Minimum and maximum values for the concentration of nickel in sample can be defined for indication of falling below or exceeding the required measuring range of your application. Please refer to chapter 6.5.4, „Submenu Control“, for a detailed description of how to set parameters for minimum and maximum alarm values.

How can I see that insufficient reagent is available?

All analyser of the series SEIBOLD Online-Analyser EASY are shipped with a liquid level gauge for the liquid with highest consumption under common conditions. For this SEIBOLD Online-Analyser EASY-Nickel this liquid is reagent.

In case of insufficient quantity of reagent available the alarm light located on the sub-plate of operating elements in the upper right area of the 19-inch-rack will flash red and indicate the disturbance. If the analyser is connected to an external control system, a signal is sent to the receiving unit and communicates insufficient quantity of reagent. If the analyser was delivered or additionally equipped with a data-logging unit, insufficient quantity of reagent is recorded accordingly and can be evaluated later on.

How and how long is reagent to be stored?

In general durability of reagents as the ones used with this equipment can be assumed up to six (6) months from opening the reagent sets, if reagents have been stored at recommended conditions (see chapter 1.9, „Durability and storage of reagents“). Please keep on mind that quality of reagents, together with condition of ion selective electrode, highly influences accuracy of measurement results!

What is the typical consumption of liquids being used?

Consumption of liquids is calculated for being inline with the intervals of cleaning and maintenance work to be performed, as far as possible. The capacity of reagent containers is two (2) litres, which in general and for typical operation will allow measurement for one (1) month. Depending on the actual interval of measurement cycles, the conditions at the place of installation and the specific compound of the sample to be measured the actual consumption of reagents can vary. Please see chapter 3.7, „Consumption of reagents“ for further information.