maripoc test system

mariPOC® combi test plate
mariPOC® respi test plate
mariPOC® pharyn test plate
mariPOC® gastro test plate
mariPOC® gastro CDI combi test plate
mariPOC® analyzer AD7-020
ArcDiagnoser™ version 17.01 or later

# USER'S MANUAL

- mariPOC® is an automated multianalyte rapid test system for detection of acute infection pathogens from patient samples
- mariPOC® test plates are intended for use together with the computer controlled mariPOC® analyzer
- New samples can be added to the mariPOC® test system while the analysis of the previous samples is still in progress (i.e., so-called random access operation)
- mariPOC®+ mode of the measuring program is intended primarily for laboratories. It enables result interpretation and use of multiple test plates on the same analyzer

IVD CE

maripoc test system

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# 1 Intended Use

The mariPOC® test system is designed to be used for detection of pathogens from patients with acute infections. The mariPOC® test system enables the analysis of different pathogen combinations from patient samples (**Figure 1** and **Figure 2**). The combination is selected according to the clinical picture, clinical symptoms, and the age of the patient if appropriate. The product is intended for *in vitro* diagnostic professional use. Test system equipped with mariPOC®+ measuring program is intended primarily for laboratories. The manufacturer or manufacturer's representative will familiarize the user organization with the test system.

## 1.1 mariPOC® Respi and Pharyn Tests

The mariPOC® respi and pharyn tests are designed to be used for detection of respiratory tract infection pathogens from patients with acute infections. Sampling for the detection of viral pathogens should be done during viremia within 6 days from the onset of symptoms, preferably within 5 days. Viral loads decrease over time and virus antigens are not usually detectable after 6 to 7 days from the onset of symptoms.

The pharyn test is intended to be used mainly when there is clinical suspicion of pharyngitis, while the respi test is intended to be used mainly for other lower and upper respiratory tract infections. In the respi test, the analytes to be tested depend on the patient's age. Pneumococcus is not measured in small children due to the high frequency of asymptomatic carriers (the respi < 7 years old test). It is also possible to measure only group A streptococci (QuickStrepA test). Test selection is patient-specific and is made with the measuring program.

The user can freely select the multianalyte test that is most suitable for each patient by choosing the appropriate test type available on the test plate. The possible selections on the mariPOC® combi test plate are respi, respi < 7 years old, pharyn or QuickStrepA; on the mariPOC® respi test plate respi or respi < 7 years old; and on the mariPOC® pharyn test plate pharyn or QuickStrepA test.

Depending on the indication, the sample is collected either from the nasopharynx using a swab, aspirate or wash procedures, or from the pharynx using a swab procedure. Suitable flocked swabs are defined in **Table 6**.

| mariPOC® respi test from nasopharyngeal sample |
|---|
| Influenza A virus |
| Influenza B virus |
| Respiratory syncytial virus |
| Human metapneumovirus |
| Human coronavirus OC43 |
| Human bocavirus |
| Parainfluenza 1 virus |
| Parainfluenza 2 virus |
| Parainfluenza 3 virus |
| Adenovirus |
| *Streptococcus pneumoniae* |

| mariPOC® pharyn test from throat sample |
|---|
| Group A streptococci |
| Adenovirus |

| mariPOC® QuickStrepA test from throat sample |
|---|
| Group A streptococci |

**Figure 1.** Pathogens covered by the mariPOC® respi, pharyn and QuickStrepA tests.

### 1.2 mariPOC® Gastro and CDI Tests

The mariPOC® gastro and CDI tests are intended to be used for the detection of pathogens, causing gastroenteritis, from stool samples. The samples should be obtained from patients with symptoms of acute gastrointestinal infection, e.g. diarrhoea and/or vomiting.

Sampling for the detection of viral pathogens from a stool sample should be done within few days from the onset of symptoms. Viral loads decrease over time and virus antigens are not usually detectable after a week. Bacteria are more probable findings than viruses from a stool samples when the symptoms are prolonged.

The gastro test enables the analysis of five different pathogens (**Figure 2**) that cause similar symptoms at the onset of the gastrointestinal infection. The CDI test is intended to be used mainly when there is clinical suspicion of *Clostridium difficile* infection (CDI). The CDI test enables the analysis of CDI by detecting the presence of *C. difficile* GDH (*C. difficile* specific surface protein glutamate dehydrogenase) and *C. difficile* toxins A and B.

The user can select either full coverage gastro test, narrower coverage gastroVir test where only viruses are targeted, CDI test or CDI test together with either gastro or gastroVir tests (**Figure 2**).

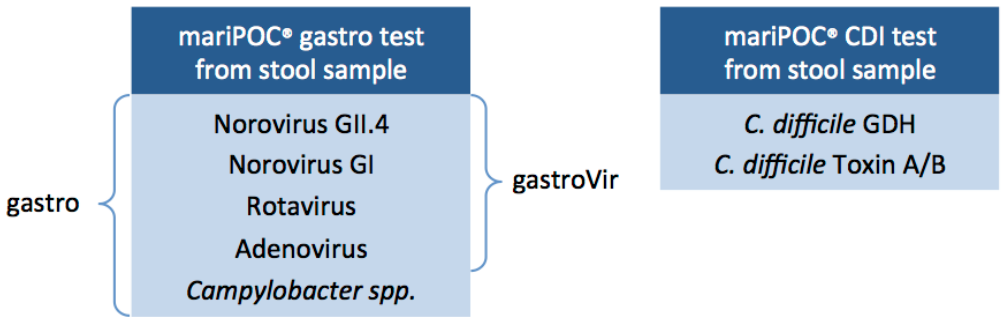


**Figure 2.** Pathogens and/or analytes covered by the mariPOC® gastro and CDI tests.

# 2 Test System Features

## 2.1 Test System Order Details

The mariPOC® test system consists of an analyzer package (**Table 1**) and consumables (**Table 2**).

**Table 1.** The content of the analyzer package.

| REF | Product name |
|---|---|
| AD7-020 | mariPOC® analyzer |
| A-21 | Analyzer power supply |
| A-22 | Computer with ArcDiagnoser™ measuring program |
| A-9 | Waste container (2.5 L) |
| A-11A, A-11B | Water bottles (2.0 L and 1.0 L bottles) |
| A-12 | Label printer |
| A-14 | Bottletop dispenser (dispensing volume 1.3 ml) |
| A-29 | Bottletop dispenser stand |
| A-16 | Vortex mixer (minimum speed 2700 rpm and orbit 6 mm) |
| A-18 | Sample tube rack |
| A-30 | Sample tube box |
| A-31 | Sample tube cap box |
| A-33 | USB flash drive |
| A-36 | 2 Ethernet cables |
| A-37 | Ethernet switch |
| A-28 | Uninterruptible power supply (UPS), optional |
| A-43 | Test plate storage rack |
| - | User´s manual |
| - | Rapid instructions |
| - | Material safety data sheets (MSDS) |

**Table 2.** Test system consumable's product numbers (REF), names and package sizes. If a consumable is marked with X, it is necessary to order with that test plate product.

| REF | Product name and package size | mariPOC® combi test plate: 1164M | mariPOC® respi test plate: 1154M | mariPOC® pharyn test plate: 1124M | mariPOC® gastro test plate: 2017M | mariPOC® gastro CDI combi test plate: 2027M |
|---|---|---|---|---|---|---|
| 1104MC | mariPOC® control samples (includes 1 negative and 1 positive control sample dried in a swab) | X | X | X | | |
| 1124MC | mariPOC® pharyn control samples (includes 1 negative and 1 positive control sample dried in a swab) | | | X | | |
| 2017MC | mariPOC® gastro control samples (includes 1 negative and 1 positive control sample) | | | | X | X |
| B02 | RTI Sample Buffer (0.5 L) | X | X | X | | |
| B03A | Extraction solution A for the pharyn test (15 ml) | X | | X | | |
| B03B | Extraction solution B for the pharyn test (15 ml) | X | | X | | |
| B04 | Wash solution (2.0 L) | X | X | X | X | X |
| B05 | System solution (1.0 L) | X | X | X | X | X |
| B06 | Gastro Sample Buffer (0.5 L) | | | | X | X |
| A-1 | Sample tubes (100 pcs) | X | X | X | X | X |
| A-2 | Sample tube caps (100 pcs) | X | X | X | X | X |
| A-13 | Label tape (1 pcs) | X | X | X | X | X |
| A-45 | Syringe (5 ml, 100 pcs) | | | | X | X |
| A-46 | Filter (150 pcs) | | | | X | X |
| A-47 | Pasteur pipette (400 pcs), optional | | | | X | X |
| A-48 | Swab in transport tube (100 pcs) | | | | X | X |

See more information about mariPOC® test plates in **Table 3**, **Table 4** and **Table 5**.

**Table 3.** mariPOC® test plates and amount of multianalyte tests in them.

| REF | Test plate name | Respi test | Pharyn test | Gastro test | CDI test |
|---|---|---|---|---|---|
| 1164M | mariPOC® combi test plate | 22 tests | 22 tests | - | - |
| 1154M | mariPOC® respi test plate | 22 tests | - | - | - |
| 1124M | mariPOC® pharyn test plate | - | 66 tests | - | - |
| 2017M | mariPOC® gastro test plate | - | - | 44 tests | - |
| 2027M | mariPOC® gastro CDI combi test plate | - | - | 44 tests | 44 tests |

**Table 4.** Target pathogen coverage of the mariPOC® test plates for respiratory tract infections.

| | | mariPOC® test plate name and REF | | |
|---|---|---|---|---|
| | Test type and pathogen coverage | combi 1164M | respi 1154M | pharyn 1124M |
| respi | Influenza A virus | + | + | - |
| | Influenza B virus | + | + | - |
| | Respiratory syncytial virus | + | + | - |
| | Human metapneumovirus | + | + | - |
| | Human bocavirus | + | + | - |
| | Human coronavirus OC43 | + | + | - |
| | Parainfluenza 1 virus | + | + | - |
| | Parainfluenza 2 virus | + | + | - |
| | Parainfluenza 3 virus | + | + | - |
| | Adenovirus | + | + | - |
| | *S. pneumoniae* | + | + | - |
| pharyn | Group A streptococci | + | - | + |
| | Adenovirus | + | - | + |

**Table 5.** Target pathogen coverage of the mariPOC® test plates for gastrointestinal infection.

| | | mariPOC® test plate name and REF | |
|---|---|---|---|
| | **Test type and pathogen coverage** | **gastro 2017M** | **gastro CDI combi 2027M** |
| gastro | Norovirus GII.4 | + | + |
| | Norovirus GI | + | + |
| | Rotavirus | + | + |
| | Adenovirus | + | + |
| | Campylobacter spp. | + | + |
| CDI | *C. difficile* GDH | - | + |
| | *C. difficile* Toxin A/B | - | + |

**Other mandatory equipment:**

Use only flocked swabs for swab sampling. So far Copan flocked swabs are the only ones that have been clinically validated to be used in combination with the mariPOC® respi and pharyn tests. The following Medical Wire´s (Puritan) flocked swabs have been shown to be technically compatible with the mariPOC® respi and pharyn tests, while their performance in clinical diagnostics has not yet been studied extensively.

**Table 6.** Recommended flocked swabs for sampling.

| Size | Description | Manufacturer | REF |
|---|---|---|---|
| Small | Pediatric flocked swab, nylon tip (shaft break point 100 mm), sterile | Copan | 516CS01 |
| Medium | Minitip flocked swab, nylon tip (shaft break point 80 mm), sterile | Copan | 501CS01 |
| | Flexible nasopharyngeal flocked swab, nylon tip (shaft break point 100 mm), sterile | Copan | 503CS01 |
| | PurFlock® Ultra Mini Tip Flexible Peel Pouch | Medical Wire | MW812 |
| | PurFlock® Ultra Ultrafine Flexible Peel Pouch | Medical Wire | MW813 |
| | HydraFlock® Ultrafine Flexible Peel Pouch | Medical Wire | MW819 |
| Large | Regular flocked swab, nylon tip (shaft break point 80 mm), sterile | Copan | 502CS01 |
| | Regular flocked swab, nylon tip (shaft break point 100 mm), sterile | Copan | 519CS01 |
| | Regular flocked swab, nylon tip (shaft break point 30 mm), sterile | Copan | 520CS01 |
| | PurFlock® Ultra Standard Tapered Peel Pouch | Medical Wire | MW810 |
| | PurFlock® Ultra Standard Flexible Peel Pouch | Medical Wire | MW811 |
| | HydraFlock® Standard Flexible Peel Pouch | Medical Wire | MW817 |

When handling a swab sample the following items are required that is not included in the test system:

- Scissors
- Disinfectant (70% ethanol or similar)

The nasopharyngeal aspirate or wash sampling procedures and the sample treatment require part of the following laboratory equipment that is not included in the test system:

- Nasopharyngeal aspirate collection kit
- Nasopharyngeal wash collection kit
- Pipette and tips (0.3 ml and 0.6 ml dispensing volume)
- Centrifuge (1000 g speed requirement) with a suitable adapter for the sample tubes (diameter 11 mm and height 65 mm)
- Centrifuge (14000 g speed requirement) and high force centrifugation tubes (minimum volume 1 ml).

Filtration unit rack (REF A-44, **Figure 27**) is required when handling a stool sample. Please note, that the stool sample collection container is not included in the mariPOC® gastro test consumables.

The test results may be printed with the user's printer if necessary.

## 2.2 Description of Test System Components

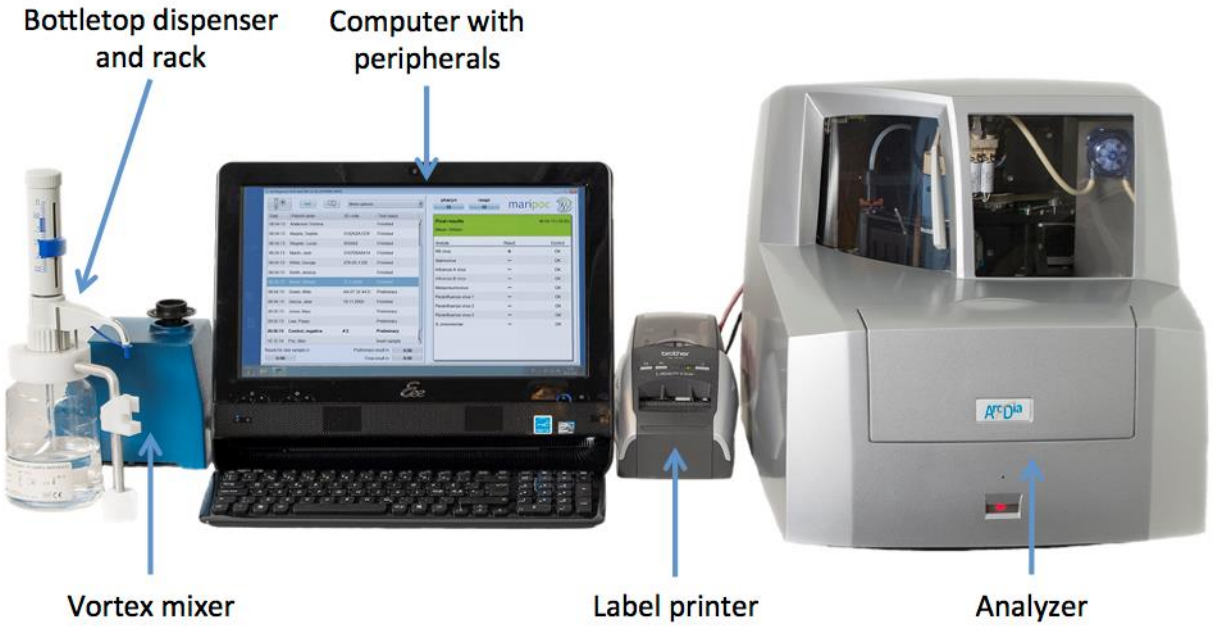


**Figure 3.** Analyzer, computer, label printer, bottletop dispenser with stand and other components.

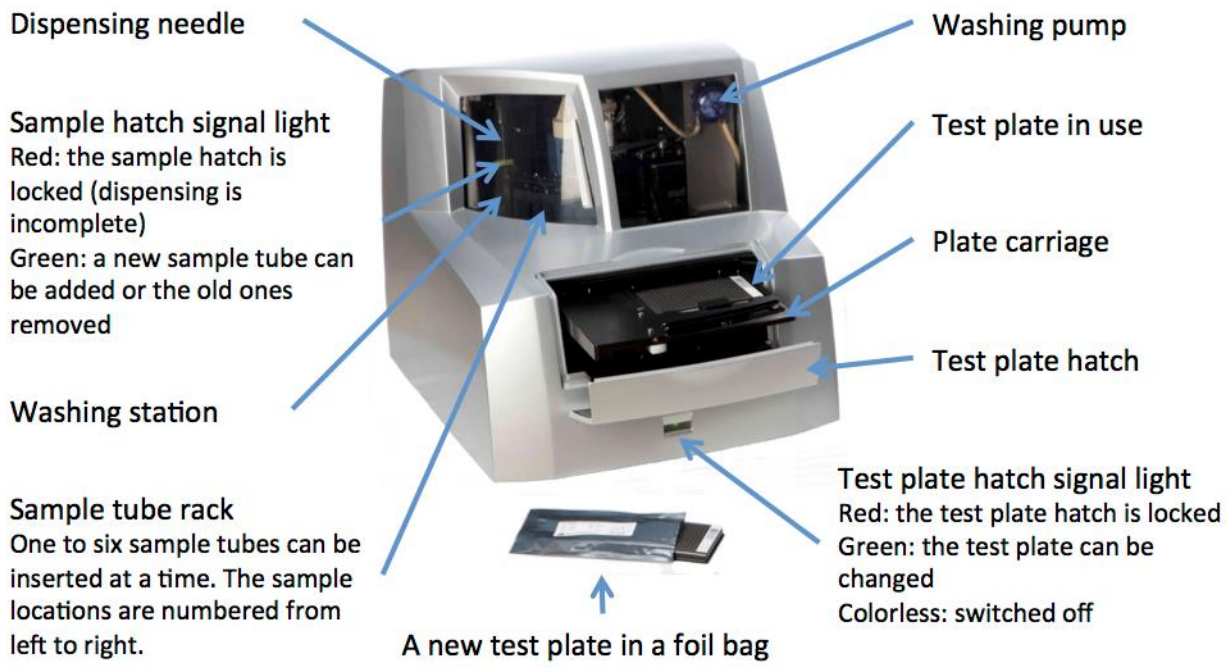


**Figure 4.** Front view of analyzer showing components.

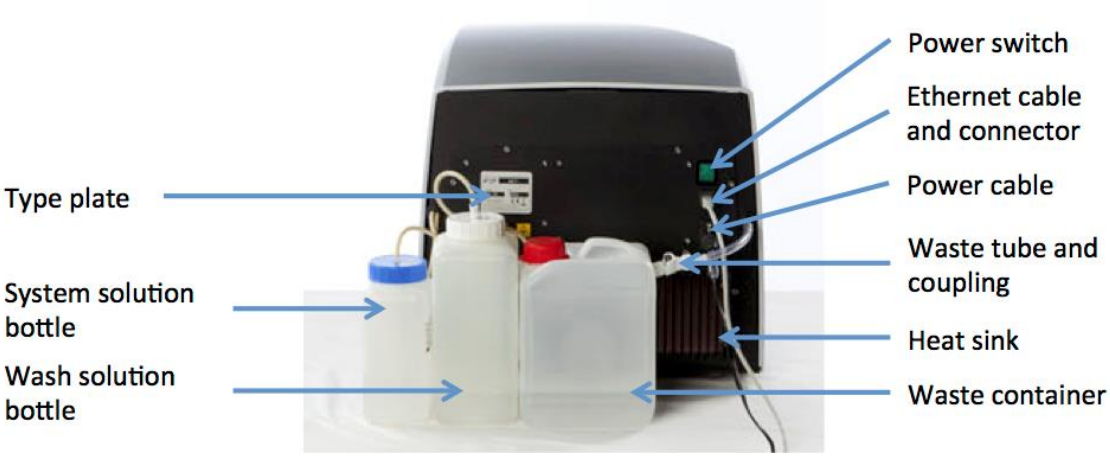


**Figure 5.** Back view of the analyzer.

### 2.3 Operating Conditions, Storage and Maintenance

The operating temperature range of the test system is +21±5°C. The expiration dates of the consumables are printed on the packages.

- The analyzer must be stored on a flat platform with the sample and test plate hatches closed. The analyzer must not be exposed to dust, high temperatures, strong vibrations, strong magnetic fields, chemicals or chemical vapors. The analyzer heat sink must not be covered. The waste container and the system and wash solution bottles must be placed so that there is at least 1 cm of free space around the heat sink. Liquids must not be sprayed directly inside or on the analyzer! See the analyzer cleaning instructions in chapter 6. The preventative

maintenance interval of the analyzer is 6 months. Only a person authorized by the manufacturer may carry out installation, maintenance or moving of the analyzer.

- The test plate, delivered in a foil bag, must be stored at +2 to +8°C. After the foil bag is opened, the test plate must immediately be placed inside the analyzer. The test plate may be handled only by grasping it on its outer edges, and it must not be placed on a dusty surface. Touching the base of the test plate is strictly prohibited (**Figure 6**)! The test plate may be stored inside the analyzer for 21 days after the foil bag is opened. The measuring program will report automatically if the test plate is out-of-date. If the test plate is not stored inside the analyzer, it must be placed in a special storage rack (see chapter 5.5). The test plate storage rack must not be exposed to temperatures over 60°C.

**Figure 6.** The right and wrong way to handle the test plate.

- The control samples (comprising one positive and one negative dried control sample in a foil bag) must be stored unopened at +2 to +8°C. Once opened, control samples must be used within 5 hours. Once diluted in the test specific sample buffer, they must be used within 2 hours. The control samples may be used only once.
- The RTI Sample Buffer must be stored at room temperature and protected from direct sunlight. It is important to handle the RTI Sample Buffer carefully and avoid direct skin contact. RTI Sample Buffer contains less than 0.1% microbicide sodium azide. When dispensing the buffer into a sample tube, care must be taken not to contaminate the dispensing head. For example, the sample tube must not touch the dispensing head of the bottletop dispenser. Use of the buffer must cease immediately if contamination is suspected, the buffer is cloudy or if there is sediment at the bottom of the bottle. In this case, the bottletop dispenser must be cleaned carefully before introducing a new solution bottle. See the cleaning instructions in chapter 8.3.
- The Gastro Sample Buffer must be stored at room temperature and protected from direct sunlight. It is important to handle the Gastro Sample Buffer carefully and avoid direct skin contact. Gastro Sample Buffer contains less than 0.1% microbicide sodium azide. When dispensing the buffer, care must be taken not to contaminate the dispensing head. For

example, the tube containing sample must not touch the dispensing head of the bottletop dispenser. Use of the buffer must cease immediately if contamination is suspected, the buffer is cloudy or if there is sediment at the bottom of the bottle. In this case, the bottletop dispenser must be cleaned carefully before introducing a new solution bottle. See the cleaning instructions in chapter 8.3. Please note, that the Gastro Sample Buffer may contain small amount of floating floccule that do not sediment at the bottom of the bottle. These floccules do not affect the use of the Gastro Sample Buffer.

- The wash solution must be stored at room temperature. The wash solution contains harmful substances (alkaline) that may irritate the eyes and skin, and therefore it is important to handle it carefully and avoid direct skin contact. Protective gloves must be used. Special care should be taken that the solution does not come into contact with the eyes. If this occurs, wash them immediately with water and seek medical attention.
- The system solution must be stored at room temperature and protected from direct sunlight. It is important to handle the system solution carefully and avoid direct skin contact because it contains microbicide, sodium azide (less than 0.1%). Use protective gloves.
- The extraction solutions A and B that are used in the pharyn test must be stored at room temperature and protected from direct sunlight.
- Flocked swab and unused flocked swab in transport tube must be stored in accordance with the swab manufacturer's instructions.
- Plastic consumables must be stored appropriately to protect them from dust and within the temperature limits of the test system unless otherwise instructed by their manufacturers.
- The bottletop dispenser must be checked and calibrated when needed, at least every 3 months or in accordance with the manufacturer's instructions. The set volume is 1.3 ml. The average volume of 10 dosages must be 1.225-1.375 ml. The precision (coefficient of variation; CV) of 10 dosages must be ≤2.0%. The density of RTI and Gastro Sample Buffer is 1.0 g/ml.
- The filtration unit rack must be stored within the temperature limits of the test system. Filtration unit rack can be cleaned mechanically by brushing with a detergent solution. The rack can be disinfected with chlorine solution (e.g. 1000 ppm) and/or Ultraviolet C (UV-C) light. After cleaning, remember to properly rinse the rack with water or/and 70% ethanol (or similar). Please note, that the filtration unit rack´s material does not tolerate temperatures over 60°C such as in dishwasher or autoclave.

## 3 Test Principle

Performing mariPOC® tests consists of the following steps: sampling, entering the patient's information into the user interface, sample pretreatment, inserting the sample into the analyzer, and automatic analysis at one or two time points (for respi, gastro and CDI tests at 20 minutes and at 2 hours; for pharyn test at 15 and at 55 minutes and for QuickStrepA test at 15 minutes). From the start-up settings preliminary results can be omitted by the manufacturer or field service. At the preliminary results, the test identifies and reports strong and moderately positive samples. At the final results, the test identifies and reports low positive samples and negative test results.

Analyte specific identification reactions are based on specific identification of viral or bacterial antigens with monoclonal antibodies (immunometric detection). The fluorescence signal measured by the test system from an analyte specific reaction correlates positively with the antigen content of the sample. The test system compares the signal received from the test to the cut off values set by the manufacturer for positive test results. Based on this comparison, the sample is reported as positive (+) or negative (–). For *S. pneumoniae* a positive result is reported semi-quantitatively as + (very low), ++ (low), +++ (medium), or ++++ (high). For group A streptococci in the Pharyn test a positive result is reported semi-quantitatively as + (very low), ++ (low), or +++ (high) at 55 minute time point. At 15 minute time point only high positive (+++) results are reported. In QuickStrepA test a positive (+) or a negative (-) result is reported at 15 minute time point.

For detailed guidance, see chapter "5.3.6 Reading and Reporting of the Results". The test system is equipped with an internal autoverification system, which estimates the technical quality and success of the analysis. If the criteria for a reliable test result are not met, the result is not reported (i.e., the analysis is failed). A failed measurement is indicated in red on the patient information list. Internal test result verification of the measuring program utilizes predetermined parameters. This ensures the reliability of a result.

# 4 Test Performance

In the mariPOC® test system, several pathogens are measured from one patient sample using separate biochemical identification reactions. The imprecision of the assay signal (coefficient of variation) is 5–10% for respi and pharyn test and 4–14% for gastro test, according to the quantitative tests carried out by the manufacturer.

## 4.1 mariPOC® Respi and Pharyn Tests

**Table 7.** Analytical sensitivities of the mariPOC® respi and pharyn tests for standard samples.

| Analyte | Analytical sensitivity |
|---|---|
| Influenza A virus | 2 ng/ml purified inactivated virus H1N1 (A/New Caledonia/20/99) |
| Influenza B virus | 15 ng/ml purified inactivated virus (B/Qingdao/102/91) |
| Respiratory syncytial virus | 200 ng/ml purified inactivated virus |
| Human metapneumovirus | 250 ng/L purified antigen |
| Human bocavirus | 10 ng/ml recombinant antigen |
| Human coronavirus OC43 | 1.3 ng/ml recombinant antigen |
| Parainfluenza 1 virus | 150 ng/ml purified inactivated virus (Sendai) |
| Parainfluenza 2 virus | 200 ng/ml (according to the preparation) purified inactivated virus |
| Parainfluenza 3 virus | 1000 ng/ml (according to the preparation) purified inactivated virus |
| S. pneumoniae | 30 ng/L purified antigen, 400 CFU/ml |
| Adenovirus | 10 pM purified antigen |
| Group A streptococci | 3000–9900 bacteria/ml, 200–600 CFU/ml |

**Table 8.** Performance of the mariPOC® respi and pharyn tests compared to laboratory methods. The sensitivities of the tests marked with a star (*) are defined by antigen dilution series in the reference study (TR-FIA). This is because of the low incidence of positive clinical samples for those pathogens. See chapter "12 Literature". Clinical sensitivity marked with two stars (**) depends on the applied reporting sensitivity level (see **Table 9** and chapter "5.3.6 Reading and Reporting of the Results").

| Analyte | Sensitivity | Specificity | N | Reference test |
|---|---|---|---|---|
| Influenza A virus | >100% | 100% | 198 | Lateral flow test |
| Influenza B virus | 88% | 100% | 192 | PCR |
| Respiratory syncytial virus | 100% | 100% | 94 | TR-FIA |
| Human metapneumovirus | 78% | 100% | 74 | PCR |
| Human bocavirus | 76.5% | 100% | 632 | mRNA PCR |
| Human coronavirus OC43 | NA | 99.4% | 160 | PCR |
| Parainfluenza 1 virus | Similar* | 100% | 55 | TR-FIA |
| Parainfluenza 2 virus | Similar* | 99% | 55 | TR-FIA |
| Parainfluenza 3 virus | Similar* | 100% | 55 | TR-FIA |
| S. pneumoniae | Similar | No cross-reactions | NA | Binax Now® rapid test |
| Adenovirus | 92% | 100% | 95 | TR-FIA |
| Group A streptococci | 100–150% | ~100% | 328 | Culture |

The analytical specificity of mariPOC® multianalyte tests in 20 minutes is ≥99.977% compared to results reported in 2 hours.

**Table 9.** Results reported for group A streptococci in the Pharyn test and corresponding clinical sensitivities compared to culture.

| Results | Wording | Explanation | Sensitivity compared to culture |
|---|---|---|---|
| +++ | High positive | Likely culture positive | ~100% |
| ++ | Low positive | Likely culture negative | ~120% |
| + | Very low positive | Very likely culture negative but analytically true positive | ~150% |

**Table 10.** Cross-reaction and recognition spectrum data. The analyzed microbial strains and pathogen preparations are listed on the left and the analyte specific tests against which the sample has been analyzed are listed on the right. A positive result is indicated by + (identifies/cross-reacts); a negative result is indicated by - (does not identify/cross-react); and NA signifies a combination that has not been studied.

| | **Test method** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analyzed sample** | Influenza A virus | Influenza B virus | Respiratory syncytial virus | Human metapneumovirus | Human bocavirus | Human coronavirus OC43 | Parainfluenza 1 virus | Parainfluenza 2 virus | Parainfluenza 3 virus | *Streptococcus pneumoniae* | Adenovirus | Group A streptococci |
| Influenza A virus (purified virus preparation):<br>H1N1: A/New Caledonia/20/99<br>H3N2: A/Panama/2007/99<br>H3N2: A/Victoria/361/11<br>H3N2: A/Texas/50/12 | + | - | - | - | - | - | - | - | - | - | - | - |
| Influenza A virus (purified virus preparation):<br>H3N2: seasonal 2011-2012, Finland<br>H3N2: A/New York/55/04 | NA | - | - | - | NA | NA | - | - | - | - | - | NA |
| Influenza A virus (purified virus preparation):<br>H7N3: A/Mallard/Netherlands/12/00 | + | - | - | - | - | - | - | - | - | - | - | NA |
| Influenza A virus (crude allantoic fluid):<br>H7N9: A/Shanghai/2/2013 | + | - | - | - | NA | NA | - | - | - | - | - | NA |
| Influenza A virus (purified virus preparation):<br>H1N1: A/California/07/09pdm<br>H2N2: A/Singapore/1/57<br>H3N2: A/Hongkong/1/68/164<br>H9N2: A/Hongkong/1093/99 | + | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Influenza A virus (so-called avian flu, supernatant of virus culture):<br>H5N1: A/rg/duck/HUMAN/795/02 | + | - | - | - | - | - | - | - | - | - | - | - |
| Influenza A virus (so-called avian flu, supernatant of virus culture):<br>H5N1: A/Vietnam/1194/2004 ”NIBRG-14” | + | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Influenza A virus (so-called swine flu, supernatant of virus culture):<br>H1N1v: A/FIN/554/09 | + | - | - | - | - | - | - | - | - | - | - | - |
| Influenza B virus (purified virus preparation):<br>B/Hong Kong 5/72<br>B/Victoria/504/00 | - | + | - | - | - | - | - | - | - | - | - | - |

| | Test method | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analyzed sample** | Influenza A virus | Influenza B virus | Respiratory syncytial virus | Human metapneumovirus | Human bocavirus | Human coronavirus OC43 | Parainfluenza 1 virus | Parainfluenza 2 virus | Parainfluenza 3 virus | *Streptococcus pneumoniae* | Adenovirus | Group A streptococci |
| Influenza B virus (purified virus preparation): B/Qingdao/102/91 B/Florida/04/06 | NA | + | - | - | NA | NA | - | - | - | - | - | NA |
| Respiratory syncytial virus (purified virus preparation): Type A / Long | - | - | + | - | - | - | - | - | - | - | - | - |
| Respiratory syncytial virus (purified virus preparation): Type B / clinical strain (Labquality round 1, 2017) | - | - | + | - | - | - | - | - | - | - | - | - |
| Human metapneumovirus A and B (supernatant of virus culture) | NA | - | - | + | NA | NA | - | - | - | - | - | NA |
| Human metapneumovirus (supernatant of virus culture) | - | - | - | + | - | - | - | - | - | - | - | - |
| Human bocavirus (recombinant VP2 antigen) | - | - | - | - | + | - | - | - | - | - | - | - |
| Human bocavirus (clinical specimen) | - | - | - | - | + | - | - | - | - | - | - | - |
| Human coronavirus (purified virus preparation or clinical sample) | - | - | - | - | - | + | - | - | - | - | - | - |
| Parainfluenza 1 virus (purified virus preparation): Sendai | - | - | - | - | - | - | + | - | - | - | - | - |
| Parainfluenza 2 virus (purified virus preparation) | - | - | - | - | - | - | - | + | - | - | - | - |
| Parainfluenza 3 virus (purified virus preparation): Washington/1957 C243 | - | - | - | - | - | - | - | - | + | - | - | - |
| *Streptococcus pneumoniae* (purified antigen preparation) | - | - | - | - | - | - | - | - | - | + | - | - |
| *Streptococcus pneumoniae* strain 4 (bacterial culture suspension inactivated by heating) | - | - | - | - | - | - | - | - | - | + | - | - |
| *Streptococcus pneumoniae* strains 1, 3, 6B, 7F, 9V, 14, 15, 18C, 19A, 19F, 23F (bacterial culture suspension inactivated by heating) | NA | NA | NA | NA | NA | NA | NA | NA | NA | + | NA | NA |
| Adenovirus antigen preparation (hexon protein) | - | - | - | - | - | - | - | - | - | - | + | - |
| Adenovirus strains 1-8, 14, 19, 21 (inactivated cell culture suspension or clinical sample) | NA | - | - | - | NA | NA | - | - | - | - | + | NA |

| | Test method | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analyzed sample** | Influenza A virus | Influenza B virus | Respiratory syncytial virus | Human metapneumovirus | Human bocavirus | Human coronavirus OC43 | Parainfluenza 1 virus | Parainfluenza 2 virus | Parainfluenza 3 virus | *Streptococcus pneumoniae* | Adenovirus | Group A streptococci |
| Adenovirus strain 6 (inactivated cell culture suspension) | - | - | - | - | - | - | - | - | - | - | + | - |
| Adenovirus strain 40 (inactivated cell culture suspension) | NA | - | - | - | - | NA | - | - | - | - | + | NA |
| Group A streptococci / *S. pyogenes* (inactivated and enriched bacterial preparation) | - | - | - | - | - | - | - | - | - | - | - | + |
| Group A streptococci / *S. pyogenes* (bacterial culture suspension inactivated by heating): ATCC 19615 | - | - | - | - | - | - | - | - | - | - | - | + |
| Group C streptococci (bacterial culture suspension) | - | NA | NA | NA | NA | - | NA | NA | NA | NA | NA | - |
| Group G streptococci (bacterial culture suspension) | - | - | - | - | - | - | - | - | - | - | - | - |
| *Staph. aureus* (bacterial culture suspension inactivated by heating): ATCC 29213 | - | - | - | - | - | - | - | - | - | - | - | - |
| *Staph. epidermidis* (bacterial culture suspension inactivated by heating) | - | - | - | - | - | - | - | - | - | - | - | - |
| *S. mitis* (bacterial culture suspension inactivated by heating) | - | - | - | - | - | - | - | - | - | - | - | - |
| *S. mutans* (bacterial culture suspension inactivated by heating): ATCC 25175 | - | - | - | - | - | - | - | - | - | - | - | - |
| *S. agalactiae* (bacterial culture suspension inactivated by heating): ATCC 13813 | - | - | - | - | - | - | - | - | - | - | - | - |
| *S. bovis* (bacterial culture suspension inactivated by heating): ATCC 9809 | - | - | - | - | - | - | - | - | - | - | - | - |
| *S. sanguinis* (bacterial culture suspension inactivated by heating) | - | - | - | - | - | - | - | - | - | - | - | - |
| *S. anginosus* species: *S. anginosus* (209, 1019, 3113, 3387, 4015, 5011, 7561, 7765, 8073), *S. constellatus* (3792, 5690, 5691) and *S. intermedius* (1343, 5380, 5643, 6194, 6418, 7404) (bacterial culture suspension inactivated by heating) | NA | - | - | - | NA | NA | - | - | - | - | - | - |
| *S. anginosus* species: *S. anginosus* (209), *S. constellatus* (5690) and *S. intermedius* (1343) (bacterial culture suspension inactivated by heating) | - | - | - | - | - | - | - | - | - | - | - | - |

| | Test method | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analyzed sample** | Influenza A virus | Influenza B virus | Respiratory syncytial virus | Human metapneumovirus | Human bocavirus | Human coronavirus OC43 | Parainfluenza 1 virus | Parainfluenza 2 virus | Parainfluenza 3 virus | *Streptococcus pneumoniae* | Adenovirus | Group A streptococci |
| *H. influenzae* (bacterial culture suspension inactivated by heating): ATCC 33391 | - | - | - | - | - | - | - | - | - | - | - | - |
| *H. parainfluenzae* (bacterial culture suspension inactivated by heating): ATCC 33392 | - | - | - | - | - | - | - | - | - | - | - | - |

According to the literature, about 5% of isolates of the *Streptococcus anginosus* species express Lancefield group A surface antigen, which is measured in the antigen detection test for *Streptococcus pyogenes*. Consequently, a sample containing *S. anginosus* bacterium may occasionally give false positive results in a test for group A streptococci. The frequency of *S. anginosus* carriage in respiratory epithelia is not reported in the literature. This, however rarely results in a false clinical diagnosis.

### 4.2 mariPOC® Gastro and CDI Tests

**Table 11.** Analytical sensitivities of the mariPOC® gastro and CDI tests for standard samples.

| Analyte | Analytical sensitivity |
|---|---|
| Norovirus GII.4 | 5 ng/ml recombinant antigen |
| Norovirus GI | 6 ng/ml recombinant antigen |
| Rotavirus | 0.5 ng/ml recombinant antigen |
| Adenovirus | 7 ng/ml purified antigen |
| Campylobacter spp. | 0.3 ng/ml purified antigen |
| *C. difficile* GDH | 0.7 ng/ml recombinant antigen |
| *C. difficile* Toxin A | 0.1 ng/ml purified toxin A when *C. difficile* GDH test is positive<br>1.5 ng/ml purified toxin A when *C. difficile* GDH test is negative |
| *C. difficile* Toxin B | 0.1 ng/ml purified toxoid B when *C. difficile* GDH test is positive<br>1.2 ng/ml purified toxoid B when *C. difficile* GDH test is negative |

*Note! The analytical sensitivity of C. difficile Toxin A/B test is depended on the result in C. difficile GDH test.*

**Table 12.** Performance of the mariPOC® gastro and CDI tests with stool samples compared to other laboratory methods. PCR was used to resolve discrepant results.

| Analyte | Sensitivity | Specificity | N | Reference test |
|---|---|---|---|---|
| Norovirus GII.4 | 100% | 99.5% | 428 | Lateral flow test |
| Norovirus GI | NA | 99.5% | 428 | Lateral flow test |
| Rotavirus | 100% | 99.8% | 651 | Lateral flow test |
| Adenovirus | 100% | 99.5% | 651 | Lateral flow test |
| Campylobacter spp. | >100% to LF<br>91% to culture | 97.5% | 352 | Lateral flow (LF) test<br>and culture |
| *C. difficile* GDH | 100% | 98.8% | 188 | Membrane enzyme immunoassay |
| *C. difficile* Toxin A/B | >100% | 100% | 188 | Membrane enzyme immunoassay |

**Table 13.** Cross-reaction and recognition spectrum data. The analyzed microbial strains and pathogen preparations are listed on the left and the analyte specific tests against which the sample has been analyzed are listed on the right. A positive result is indicated by + (identifies/cross-reacts); a negative result is indicated by - (does not identify/cross-react); and NA signifies a combination that has not been studied.

| | **Test method** | | | | | | |
|---|---|---|---|---|---|---|---|
| **Analyzed sample** | Norovirus GII.4 | Norovirus GI | Rotavirus | Adenovirus | Campylobacter spp. | *C. difficile* GDH | *C. difficile* Toxin A/B |
| Norovirus GII.4 (stool sample) | + | - | - | - | - | - | - |
| Norovirus GI.1 (recombinant virus-like particle) | - | + | - | - | - | NA | NA |
| Norovirus GI.3 (stool sample) | - | + | NA | NA | - | NA | NA |
| Norovirus GI.4 (stool sample) | NA | + | NA | NA | NA | NA | NA |
| Norovirus GI.6 (stool sample) | - | + | - | - | - | NA | NA |
| Rotavirus A, serotype G1, G2, G4 and G9 (stool samples) | - | - | + | - | - | NA | NA |
| Rotavirus A, serotype G3 (stool samples) | - | - | + | - | - | - | - |
| Adenovirus (stool sample) | - | - | - | + | - | - | - |
| *Campylobacter coli* (cultured bacterial suspension) | - | - | - | - | + | - | - |
| *Campylobacter hyoilei* (cultured bacterial suspension) | - | - | - | - | + | - | - |
| *Campylobacter jejuni* (cultured bacterial suspension) | - | - | - | - | + | - | - |
| *Campylobacter upsaliensis* (cultured bacterial suspension) | - | - | - | - | + | NA | NA |
| *Clostridium difficile* (cultured bacterial suspension)<br>Toxin production: Negative or only binary toxin<br>Ribotype: 010, 033 | - | - | - | - | - | + | - |
| *Clostridium difficile* (cultured bacterial suspension)<br>Toxin production: Toxin A and/or B<br>Ribotype: 016, 017, 019, 023, 027, 053, 056, 078, 107, 126, 176, 251 | NA | NA | NA | NA | NA | + | + |
| *Clostridium sordellii* (cultured bacterial suspension) | NA | NA | NA | NA | NA | - | + |
| Astrovirus type 1 (inactivated cell lysate) | - | - | - | - | - | NA | NA |
| *Aeromonas hydrophila* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Bacillus cereus* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Bacillus subtilis* (cultured bacterial suspension) | - | - | - | - | - | NA | NA |

| | Test method | | | | | | |
|---|---|---|---|---|---|---|---|
| **Analyzed sample** | Norovirus GII.4 | Norovirus GI | Rotavirus | Adenovirus | Campylobacter spp. | *C. difficile* GDH | *C. difficile* Toxin A/B |
| *Campylobacter fetus ss. fetus* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Campylobacter lari* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Clostridium bifermentans* (cultured bacterial suspension) | NA | NA | NA | NA | NA | - | - |
| *Clostridium innocuum* (cultured bacterial suspension) | NA | NA | NA | NA | NA | - | - |
| *Clostridium novyi* type A (cultured bacterial suspension) | NA | NA | NA | NA | NA | - | - |
| *Clostridium perfringens* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Clostridium septicum* (cultured bacterial suspension) | NA | NA | NA | NA | NA | - | - |
| *Clostridium sporogenes* (cultured bacterial suspension) | NA | NA | NA | NA | NA | - | - |
| *Escherichia coli* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Helicobacter pylori* (cultured bacterial suspension, stool sample) | - | - | - | - | - | - | - |
| *Salmonella enteritidis* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Salmonella* group B (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Salmonella* group C (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Salmonella typhi* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Salmonella typhimurium* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Shigella dysenteriae* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Staphylococcus aureus* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Staphylococcus epidermidis* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Streptococcus agalactiae* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Streptococcus anginosus* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Streptococcus bovis* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Streptococcus constellatus* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Streptococcus intermedius* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Streptococcus mitis* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Streptococcus mutans* (cultured bacterial suspension) | - | - | - | - | - | - | - |

| | Test method | | | | | | |
|---|---|---|---|---|---|---|---|
| **Analyzed sample** | Norovirus GII.4 | Norovirus GI | Rotavirus | Adenovirus | Campylobacter spp. | *C. difficile* GDH | *C. difficile* Toxin A/B |
| *Streptococcus pyogenes* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Streptococcus sanguinis* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Yersinia enterocolitica avirul.* (cultured bacterial suspension) | - | - | - | - | - | - | - |
| *Yersinia enterocolitica O:3* (cultured bacterial suspension) | - | - | - | - | - | - | - |

*Clostridium sordellii* produces haemorrhagic toxin (HT) and lethal toxin (LT) which have a high homology with *Clostridium difficile* toxin A and toxin B, respectively. *C. sordellii* is a bacterium which may cause infections with a very high mortality rate. *C. sordellii* infections (caused by HT and LT) are rare but may occur after an injury, surgical procedure, drug injection, childbirth or medically induced abortions. Symptoms of *C. sordellii* infection are pain, nausea, vomiting and diarrhea. Cross-reaction with *C. sordellii* toxins is a known property of the mariPOC® toxin A/B test and some other commercially available *C. difficile* toxin tests. However, mariPOC® GDH test does not detect *C. sordellii*. Both the mariPOC® GDH and the Toxin A/B tests must be positive to confirm the positivity for CDI. See chapters 5.3.6 and 8.3 for more information about the results.

# 5 Using the Test System

## 5.1 Deployment of the Test System

The installation of the test system is carried out by the manufacturer´s representative. The test system and the measuring program must be kept switched on to enable automatic rinsing.

## 5.2 ArcDiagnoser™ Measuring Program

The main window of the ArcDiagnoser™ measuring program (i.e., the user interface) is explained in **Figure 7**. Letters in the image indicate the main features of the main window. The measuring program is divided into the patient information section and the report section. The function buttons (**A, B** and **C**) and a drop-down menu (**D**) are along the top of the measuring program's left pane. Below these the patient information lines, which may be selected one at a time, are displayed. The selected line is indicated by a dark blue highlight (**E**) whereas the unselected lines are light-colored (**F**). If a patient information line is bold, its results have not yet been viewed. The results for the selected patient are shown in the report section (right pane).

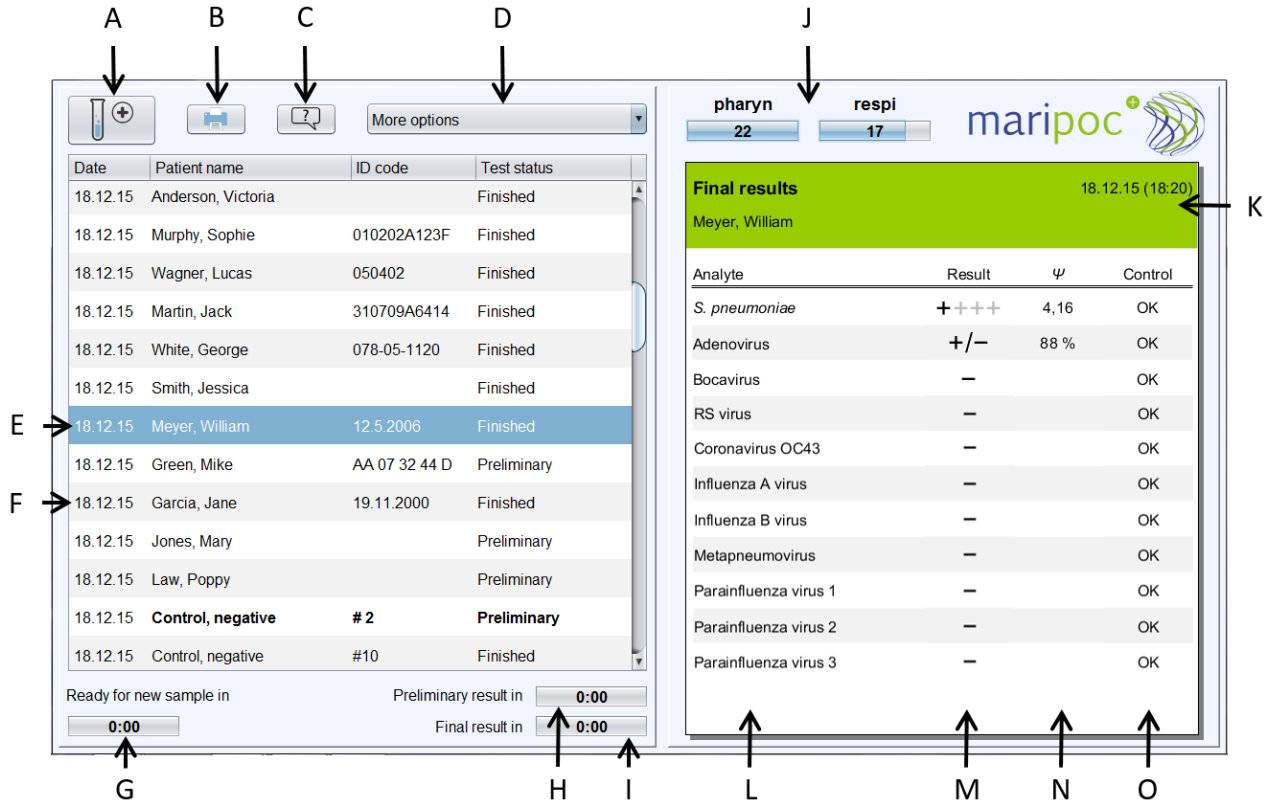


**Figure 7.** Main window of the ArcDiagnoser™ mariPOC®+ measuring program with its features marked by letter.

The new sample button (**A**) is pressed to open the "Patient information" window for entry of a new patient's information (**Figure 8**). In order to identify the patient, at least one of the following fields must be filled: "First name", "Last name", or "ID code". The identification code field is free-form. The test type is selected from the "Test type" drop-down menu. The test types to be selected in the mariPOC® combi test plates are described in **Figure 8**. The ArcDiagnoser™ measuring program shows

only those tests that can be selected from the test plate in use. The “Rapid instruction” drop-down menu allows the selection of the rapid instruction displayed on-screen. This selection, however, is only instructional and does not affect the analysis. If not selected, the default setting is without rapid instruction display. Additional information such as symptoms may be entered in the “Other information” field. The information is shown only in the printed results report and when the patient information line is double clicked to open “Patient information” window.

The “Read code” button is active only when the test system has been connected to a laboratory information system (LIS). In a test system connected to a LIS, patient information and the type of test ordered will be automatically filled once the sample referral bar code has been read with a separate reader.

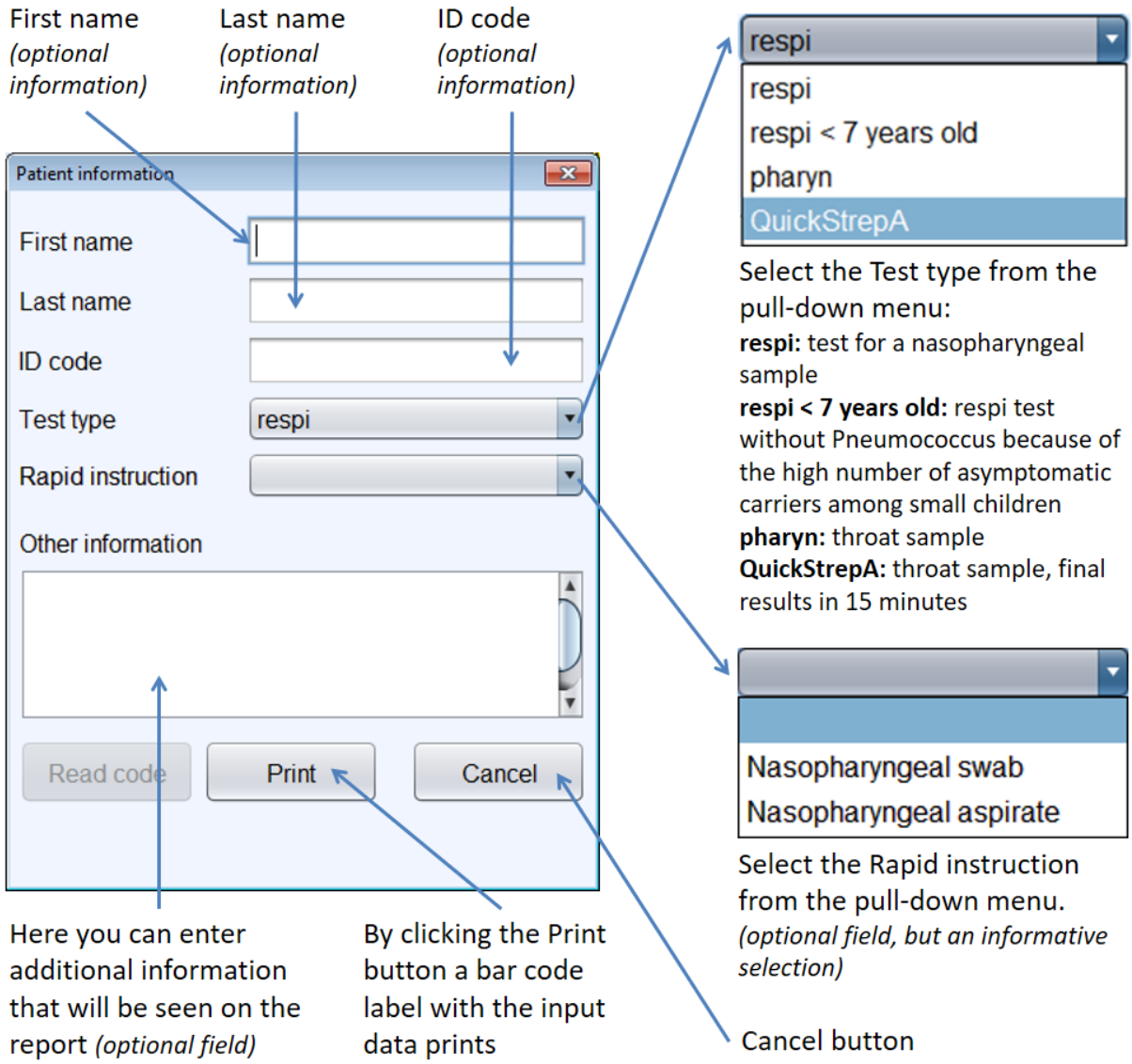


**Figure 8.** “Patient information” window that opens when the new sample button is clicked (example from mariPOC® combi test plate in use). The shown test types are depended on the test plate in use.

Newly entered patient information can be deleted by clicking the “Cancel” button. When the patient information has been entered, an individual bar code label is printed by clicking the “Print” button.

A new patient information line is then created in the bottom of the patient information section of the ArcDiagnoser™ measuring program. When the new patient information line has been selected a rapid instruction appears on the right side of the measuring program.

Information on control samples does not need to be entered separately because their factory installed bar code labels are read automatically once inserted into the analyzer. The information is automatically transferred to the measuring program.

**Table 14.** Terms and explanations illustrating analysis (test) status shown in the measuring program.

| Test status | Explanation |
|---|---|
| Insert sample | The sample information has been entered and the bar code label printed. The sample treatment protocol is shown in the report section. The analyzer is waiting for a sample tube. |
| Processing | The analyzer is dispensing a new sample or is waiting for the result from the first time point. |
| Pending | Dispensing has not started yet because either several patient samples were inserted at the same time, and/or the test plate is full, and there is not enough space for all the samples on the same test plate. |
| Preliminary | The preliminary analysis (first measurement) result is ready. Only the positive results are reported. |
| Finished | The analysis is complete. Negative results are also reported if the analysis is allowed to continue until the final results. |
| "Preliminary" or "Finished" text in red | Analysis has failed. There has been a failure during one of the phases of the analysis, which hinders reporting of the results for one or more analytes. |

There are three time bars on the bottom of the patient information section (**Figure 7**). The time remaining for inserting next sample(s) is indicated in the "Ready for new sample in" time bar (**G**). This time bar changes into "Ready for new test plate in" when there is an opportunity to change the test plate. The time remaining before the results are ready can be seen for each patient by selecting the patient line in question. Then the "Preliminary result in" time bar (**H**) on the bottom of the measuring program's main window indicates the remaining time for the completion of the preliminary results and, correspondingly, the "Final result in" time bar (**I**) indicates the remaining time for the final results.

The top part of the report section (on the right) shows the number of remaining multianalyte tests on the current test plate either by test type or by total amount of remaining multianalyte tests on the whole (**J**). The analysis status and identity information of the selected patient´s (marked with a dark blue line in the patient information section) is indicated by a yellow or green bar **(K)**. Yellow indicates Preliminary results and green Final results. The analysis results are shown below. The analytes tested are listed in the column **L**. If the analysis qualitative result in column **M** is positive, it is shown first. Rarely after obtaining the final results, a red exclamation mark (!) appears next to the negative result in the column **M**. It indicates that a positive preliminary result has changed into negative final result. The column $\Psi$ (psi, indicated with **N** in **Figure 7**) provides additional quantitative information about the pathogen levels in the sample (see chapter 5.3.6). $\Psi$ feature is optional. The last column (**O**) displays the result of the internal quality controls (autoverification) indicating the technical success of the analysis (OK/Failed). The analysis report for the selected patient (**E**; indicated

with dark blue background) can be printed on an external printer by clicking the print results button (**B**). The report for customer support (**C**), created in case of malfunction or for invoicing, includes anonymized results, the system log file, the full results of failed samples and control samples from the last 60 days, and the amount of tests performed.

In the patient information section (left pane) under the "More options" drop-down menu (**D**) are the following options: Maintenance wizard, Control data, Reports, About mariPOC and Change test plate. The "Maintenance wizard" guides the maintenance operations by giving instructions on how to empty the waste container, to change the wash and system solution container and to shut down the analyzer. The "Control data" report allows monitoring results from single analytes in the positive and negative control samples. The report will be shown automatically in the web browser. The purpose of the report is to demonstrate the performance of the analyzer and the tests in order to track possible trends. A blue dot means that the measurement has been successful. A red dot indicates either an unsuccessful measurement or a result that is contrary to the expected value (+ or –). The quantitative results (Y-axis, signal) of the control samples are plotted in the order of analysis (X-axis, date or week). "Reports" opens a report creation pop-up window where Epidemiological report, Tests day by day and/or mariPOC results (summary reports) can be created. The selected report will be shown automatically in the web browser. See chapter 5.3.6 for more information about the reports. "About mariPOC" includes information about the manufacturer. "Change test plate" allows test plate change at any time (see chapter 5.5).

The test system is equipped with a self-diagnostic error-reporting system. Thus, the system automatically reports most of the possible errors to the screen. The report may contain a possible reason for failure and possible actions for restoring the function of the test system. It is recommended to always notify customer support about any errors.

## 5.3 Performing the Test and Reading the Results

The clinical suspicion (indication) determines the sampling location, the selected test type, and the pretreatment of the sample. The test plate in use determines the target pathogen coverage of the test (see **Table 4** and **Table 5**).

### 5.3.1 Sampling Location

For the **respi** or **respi < 7 years old tests**, the sample is taken from the mucosa of the respiratory tract, preferably from the nasopharynx, by rubbing with a swab or collecting a standard nasopharyngeal aspirate. The swab sampling must be done using flocked swabs defined in the User´s manual (see **Table 6**). It is beneficial to use as large a swab as possible, considering patient size, because the sample volume directly affects test performance. Nasopharyngeal wash samples are not recommended because they are dilute. The manufacturer disclaims any responsibility if any other sample materials are used in the mariPOC® test system.

For the **pharyn** or **QuickStrepA tests**, the sample is typically taken from the throat. The sampling must be done using flocked swabs defined in the User´s manual (see **Table 6**). For adults a rigid large swab is recommended to be used because the sampling volume has a direct effect on test performance.

For the **gastro** and **CDI tests**, the sample material is stool (feces) from patients with symptoms of acute gastroenteritis. Stool sample should be collected to a clean container.

### 5.3.2 Storage of Samples

Refrigerated storage of the samples for several days, or freeze-thaw cycles, are known to have a deleterious effect on the sensitivity of all antigen detection tests. It is recommended, therefore, that the sample is analyzed as soon as possible following sampling. See **Table 15** for manufacturer´s recommendations for storage temperatures and times. The sample tube must be frozen in upright position with parafilm sealing the cap to prevent any leakage. Thaw the stool sample totally before pretreatment.

**Table 15.** Storage temperatures and times of samples.

| Phase | Storage |
|---|---|
| Transport | Refrigerated |
| Before analysis | +2 to +8°C up to 2 days/<br>-20 to -80°C over 2 days |
| Leftover samples | +2 to +8°C up to 2 days/<br>-20 to -80°C over 2 days |

### 5.3.3 Respi and Respi < 7 Years Old Tests

The pretreatment of the swab, aspirate and wash samples differs and in this manual they are referred to as A (swab), B (aspirate), C (wash, concentration protocol) and D (wash). Each sample type´s pretreatment procedures are described separately in this chapter in between creating the sample bar code and inserting the pretreated sample into the analyzer.

#### Creating Bar Code

Click the new sample button in the top left corner of the ArcDiagnoser™ measuring program. The “Patient information” pop-up window (**Figure 9**) opens. Enter patient information into at least one of the following fields: First name, Last name, and ID code (identifier). The default test type is the respi test. Because of the high frequency of Pneumococcus carriage in children under 7 years, the manufacturer recommends selecting the respi < 7 years old test from the “Test type” drop-down menu. This is a respi test without Pneumococcus. The user may select the rapid instruction appearing on-screen in the “Rapid instruction” drop-down menu (informative selection, no effect on analysis) and enter any notes or symptoms in the separate “Other information” field. Both fields are for information only and do not affect the test.

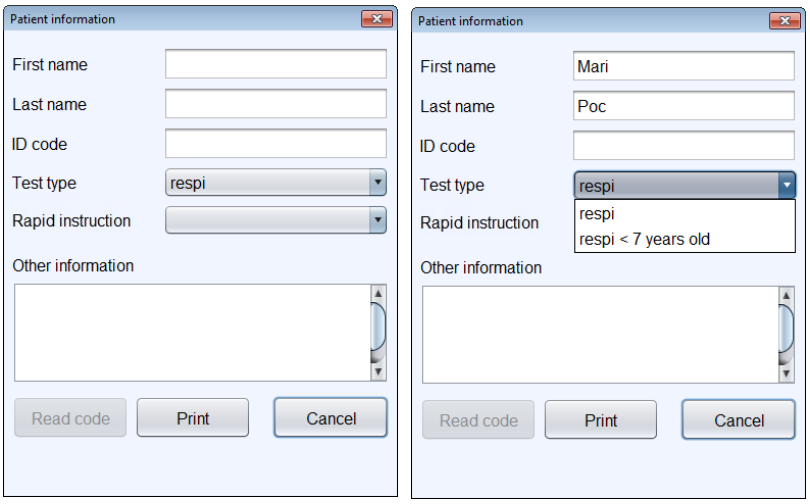


**Figure 9.** "Patient information" pop-up window before and after entering patient information.

Print the bar code label for the sample tube by clicking the "Print" button. Attach the bar code label to the sample tube so that the text on the bar code label is parallel with the length of the sample tube (**Figure 10**).


**Figure 10.** Photograph showing how bar code labels may be attached to a sample tube.

A new line for a new patient's information has been created. The progress of the test for each patient can be followed in the "Test status" section. The test status is now in the "Insert sample" phase.

*Note! The patient information cannot be changed after the bar code label is printed. If there is a problem in attaching the printed bar code label to the sample tube, for example if the label is wrinkled or defaced in some way, a new bar code label may be printed by double-clicking the patient information line and then clicking the "Print" button.*

**A. Swab Sample Collection and Pretreatment**

1. To take a nasopharyngeal swab sample, insert a swab to a depth of about 8–12 cm in adults and 4–8 cm in children inside the nostril (according to the patient age and size) and rub the nasopharyngeal mucosa with a rotational motion so that cells from the mucosa adhere to the swab. It is recommended that the patient blow their nose before the nasopharyngeal swab is collected. More information about the nasopharyngeal swab sampling is in the Sampling Guide.

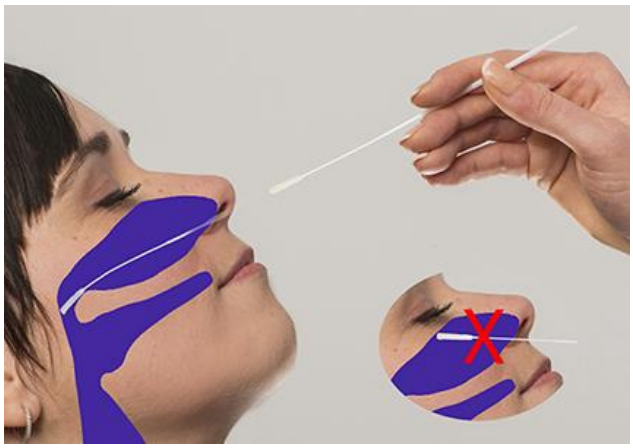

**Figure 11.** Swab sampling.

*Note! Always use the swabs defined in the User's manual (**Table 6**).*

*Note! If two swab samples collected from the patient, one from the nasopharynx and one from the throat, are to be run in a single test, the samples must be collected using two swabs, and only a single swab may be a large throat swab. Inserting two large swabs into a single sample tube may lead to analyzer malfunction.*

2. Cut the swab shaft with scissors at about 1–2 cm from the nylon fiber head of the shaft into the sample tube as shown in **Figure 12**. Ensure that the patient information on the bar code label of the sample tube is for the correct patient.

**Figure 12.** Cutting off a swab into a sample tube.

*Note! Clean the scissors carefully between each sampling using 70% ethanol or similar. Wipe them with disposable paper.*

3. Place diagonally the bottom of the sample tube to the bottletop dispenser´s stand below of the dispensing head and push the tube between clips. Add 1.3 ml of RTI Sample Buffer to the sample tube by lifting the bottletop dispenser top up and down once (**Figure 13**). After dispensing, draw the tube horizontally away from the stand´s clips. Seal the sample tube with a cap.

**Figure 13.** Dispensing with the bottletop dispenser.

*Note! The bottletop dispenser´s stand is provided to minimize the contamination of the dispensing head and for ease of use. The sample tube should not be lifted upwards when using the stand.*

*Note! If the bottletop dispenser has not been used for a long time or its protective cap has been left open, dispense into a waste container a few times to expel the air from the dispensing head.*

*Note! Avoid touching the dispensing head with the sample tube or spilling any solution on bare skin, eyes, or mucous membranes (see the cleaning instructions for the dispensing head in chapter 8.3). If any solution spills on the skin or eyes, wash with plenty of water and consult a doctor if necessary. Take the User´s manual and MSDSs with you.*

4. Mix the sample tube with a vortex mixer for about 10–15 seconds (**Figure 14**).

**Figure 14.** Mixing the sample tube.

*Note! Press firmly on the top of the sample tube cap during mixing (**Figure 14**) so that a vortex forms inside the sample tube. The purpose of mixing is to release the sample from the swab or mucus into the sample solution. Mixing that does not last long enough or is not strong enough (i.e., no vortex forms) leads to an incomplete release of the sample from the swab or mucus and thus less sensitive test results.*

**B. Aspirate Sample Collection and Pretreatment**

1. The tubing of the aspirate collection system (for example syringe with tubing) is inserted through the nose into the nasopharynx and mucus is aspirated from both nostrils.

2. Dispense approximately 0.3 ml of the native nasopharyngeal aspirate (i.e., untreated) into the mariPOC® sample tube.

3. Place diagonally the bottom of the sample tube to the bottletop dispenser´s stand below of the dispensing head and push the tube between clips. Add 1.3 ml of RTI Sample Buffer to the sample tube by lifting the bottletop dispenser top up and down once (**Figure 13**). After dispensing, draw the tube horizontally away from the stand´s clips. Seal the sample tube with a cap.

4. Mix the sample tube with a vortex mixer for about 30 seconds (**Figure 14**). Let the sample settle for 2–10 minutes.

5. Mix the sample tube with a vortex mixer again for about 10 seconds. Centrifuge the sample tube at 1000 g for 5 minutes. Do not allow the pellet to be mixed or swayed again in order to avoid the dispenser needle aspirating the pelleted mucus.

   *Note! The mariPOC® sample tube does not withstand higher g-forces than 1000 g.*

**C. Wash Sample Collection and Pretreatment with Concentration Protocol**

Nasopharyngeal wash sample is not preferred sample material. It should only be used for patients who can be sampled within 5 days from the onset of respiratory infection symptoms. For wash sample pretreatment use the concentration protocol (C) if possible. The performance specifications stated by the manufacturer in terms of analytical and clinical sensitivity are valid for samples obtained using flocked swabs or by aspiration without saline. If the observed performance with nasopharyngeal wash samples does not match with the specifications of the manufacturer or the results reported in the literature, please use nasopharyngeal swabs and/or aspirates (no saline addition), which are primarily recommended by the manufacturer.

1. The tubing of the wash collection system (for example syringe with tubing) is inserted through the nose into the nasopharynx. Use preferably about 1–2 ml of saline to collect the sample. No viral transport media is allowed. Aspirate mucus from both nostrils and dispense the sample into a high force centrifugation tube.

2. Centrifuge entire wash sample (minimum of 0.6 ml) for 5 min 14000 g in high force centrifugation tube. Discard supernatant so that approximately 0.3–0.4 ml of the sample is left.

   *Note! The mariPOC® sample tube does not withstand higher g-forces than 1000 g.*

3. Add 1.3 ml of RTI Sample Buffer diagonally to the sample tube by lifting the bottletop dispenser top up and down once (**Figure 13**). Be careful not to contaminate the dispensing head.

4. Mix the sample tube with a vortex mixer for about 30 seconds (**Figure 14**). Transfer the sample to a mariPOC® sample tube. Seal the sample tube with a cap. Let the sample settle for 2–10 min.

5. Mix the sample tube with a vortex mixer again for about 10 seconds. Centrifuge the sample tube at 1000 g for 5 minutes. Do not allow the pellet to be mixed or swayed again in order to avoid the dispenser needle aspirating the pelleted mucus.

**D. Wash Sample Collection and Pretreatment**

Nasopharyngeal wash sample is not preferred sample material. It should only be used for patients who can be sampled within 5 days from the onset of respiratory infection symptoms. For wash sample pretreatment use the concentration protocol (C) if possible. The performance specifications stated by the manufacturer in terms of analytical and clinical sensitivity are valid for samples obtained using flocked swabs or by aspiration without saline. If the observed performance with nasopharyngeal wash samples does not match with the specifications of the manufacturer or the results reported in the literature, please use nasopharyngeal swabs and/or aspirates (no saline addition), which are primarily recommended by the manufacturer.

1. The tubing of the wash collection system (for example syringe with tubing) is inserted through the nose into the nasopharynx. Use preferably about 1–2 ml of saline to collect the sample. No viral transport media is allowed. Aspirate mucus from both nostrils and dispense the sample into a tube.

2. Dispense approximately 0.6 ml of the nasopharyngeal wash sample into the mariPOC® sample tube.

3. Place diagonally the bottom of the sample tube to the bottletop dispenser´s stand below of the dispensing head and push the tube between clips. Add 1.3 ml of RTI Sample Buffer to the sample tube by lifting the bottletop dispenser top up and down once (**Figure 13**). After dispensing, draw the tube horizontally away from the stand´s clips. Seal the sample tube with a cap.

4. Mix the sample tube with a vortex mixer for about 30 seconds (**Figure 14**). Let the sample settle for 2–10 minutes.

5. Mix the sample tube with a vortex mixer again for about 10 seconds. Centrifuge the sample tube at 1000 g for 5 minutes. Do not allow the pellet to be mixed or swayed again in order to avoid the dispenser needle aspirating the pelleted mucus.

   *Note! The mariPOC® sample tube does not withstand higher g-forces than 1000 g.*

**Inserting Sample into Analyzer**

When the sample hatch's LED light is green, the analyzer is ready for a new sample. Open the sample hatch, remove the old sample tubes, and insert a new sample tube into the rack. The patient information on the bar code label should face the user (**Figure 15**) so that the analyzer is able to read the bar code from behind. The analyzer automatically starts processing the sample after the sample hatch is closed. The hatch becomes locked for a few minutes per sample while dispensing. Already dispensed samples can be removed before the analysis results are ready. If required, samples can be stored according to instructions in chapter "5.3.2 Storage of Samples".

**Figure 15.** Proper position of the sample tube in the sample tube rack.

*Note! In most cases the sample hatch locks immediately after the hatch is closed. If, however, the analyzer is in the process of measuring a sample, there can be a delay of about 30 seconds before the hatch locks.*

*Note! The sample tube rack can hold 1–6 sample tubes at a time. Old samples that have been already processed do not need to be removed each time the sample hatch is opened. However, the measuring program notifies that position of the sample tube rack where there already is a dispensed sample. Position number 1 is on the left edge of the rack.*

### 5.3.4 Pharyn and QuickStrepA Tests

#### Creating Bar Code

Click the new sample button in the top left corner of the ArcDiagnoser™ measuring program. The "Patient information" pop-up window (**Figure 16**) opens. Enter patient information into at least one of the following fields; First name, Last name, and ID code (identifier). Select the pharyn or QuickStrepA test. QuickStrepA test identifies only group A streptococci and the results are reported in 15 minutes. Instead, pharyn test reports preliminary results in 15 minutes and final results in 55 minutes. The user may select the rapid instruction appearing on-screen in the "Rapid instruction" drop-down menu and enter any notes or symptoms in the separate "Other information" field. Both fields are for information only and do not affect the test.

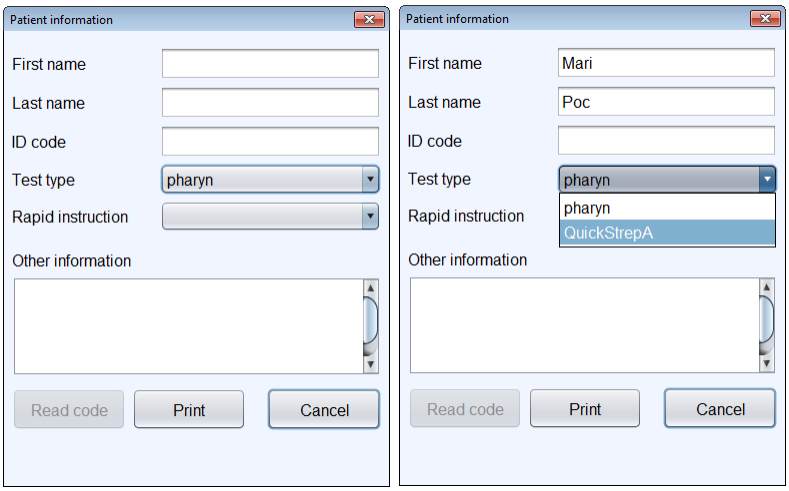


**Figure 16.** "Patient information" pop-up window: before and after entering patient information.

Print the bar code label for the sample tube by clicking the "Print" button.

Attach the bar code label for the sample on the sample tube so that the text on the bar code label is parallel with the sample tube (**Figure 17**).


**Figure 17.** Photograph showing how bar code labels may be attached to a sample tube.

A new line for a new patient's information has been created. The progress of the test for each patient can be followed in the "Test status" section. The test status is now in the "Insert sample" phase.

*Note! The patient information cannot be changed after the bar code label is printed. If there is a problem in attaching the printed bar code label to the sample tube, for example if the label is wrinkled or defaced in some way, a new bar code label may be printed by double-clicking the patient information line and then clicking the "Print" button.*

**Throat Swab Collection and Pretreatment**

1. The patient's tongue is pressed downwards with a spatula or held with fingers and gauze. Vigorously rub the tonsils and the posterior wall with a swab so that cells are collected on the swab (**Figure 18**). Avoid contacting the mucous of the cheek or the tongue in order to collect as much sample from the throat as possible.

**Figure 18.** Throat sampling and cutting off a swab into a sample tube.

*Note! Eating and drinking just before sampling may reduce the sensitivity of the analysis. Accordingly, it is recommended that the patient does not drink for at least one hour before the throat swab is collected. In addition, the use of antiseptic throat tablets and mouthwashes for relieving the symptoms of mouth and throat inflammation should be avoided before sampling.*

*Note! Always use the swabs specified in the User's manual (**Table 6**).*

*Note! Always use large swabs for adults. If two swab samples collected from the patient, one from the nasopharynx and one from the throat, are to be run in a single test, the samples must be collected using two swabs and only a single swab may be large throat swab. Inserting two large swabs into a single sample tube may lead to analyzer malfunction.*

2. Cut the swab shaft with scissors at about 1–2 cm from the nylon fiber head of the shaft into the sample tube as shown in **Figure 18**.

*Note! Clean the scissors carefully between samples using 70% ethanol or similar. Wipe them with disposable paper.*

3. Add 6 drops of the two extraction solutions, A and B, to the sample tube (**Figure 19**). Seal the sample tube with a cap.

**Figure 19.** Adding the extraction solutions.

*Note! Do not combine the extraction solutions A and B beforehand.*

*Note! Extraction solution A is light sensitive.*

4. Mix the sample tube with the vortex mixer for about 10–15 seconds (**Figure 20**). Let the tube stand for 2–10 minutes for the extraction to take place.

**Figure 20.** Mixing the sample tube.

*Note! Press firmly on the top of the sample tube cap during mixing (**Figure 20**) so that a vortex forms inside the sample tube. The purpose of mixing is to release the sample from the swab into the extraction solution. Mixing that does not last long enough or is not strong enough (i.e., no vortex forms) leads to an incomplete release of the sample from the swab and incomplete extraction and thus less sensitive test results.*

*Note! The maximum standing time under the influence of the extraction solution is 30 minutes. Adding the RTI Sample Buffer terminates the extraction reaction.*

5. Remove the cap and place diagonally the bottom of the sample tube to the bottletop dispenser´s stand below of the dispensing head and push the tube between clips. Add 1.3 ml of RTI Sample Buffer to the sample tube by lifting the bottletop dispenser top up and down once (**Figure 21**). After dispensing, draw the tube horizontally away from the stand´s clips. Seal the sample tube with a cap.

**Figure 21.** Dispensing with the bottletop dispenser.

*Note! The bottletop dispenser´s stand is provided to minimize the contamination of the dispensing head and for ease of use. The sample tube should not be lifted upwards when using the stand.*

*Note! If the bottletop dispenser has not been used for a long time or its protective cap has been left open, dispense into a waste container a few times to expel the air from the dispensing head.*

*Note! Avoid touching the dispensing head with the sample tube or spilling any solution on bare skin, eyes, or mucous membranes (see the cleaning instructions for the dispensing head in chapter 8.3). If any solution spills on the skin or eyes, wash with plenty of water and consult a doctor if necessary. Take the User´s manual and MSDSs with you.*

6. Mix the sample tube with the vortex mixer for about 10–15 seconds (**Figure 20**).

*Note! Press firmly on the top of the sample tube cap during mixing so that a vortex forms inside the sample tube.*

**Inserting Sample into Analyzer**

When the sample hatch´s LED light is green, the analyzer is ready for a new sample. Open the sample hatch, remove the old sample tubes, and insert a new sample tube into the rack. The patient information on the bar code label should face the user (**Figure 22**) so that the analyzer is able to read the bar code from behind. The analyzer automatically starts processing the sample after the sample hatch is closed. The hatch becomes locked for few minutes per sample while dispensing. Already dispensed samples can be removed before the analysis results are ready. If required, samples can be stored according to instructions in chapter “5.3.2 Storage of Samples”.

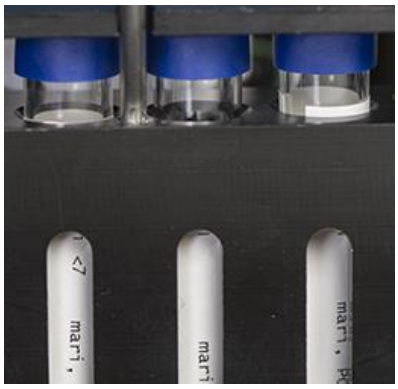

**Figure 22.** Proper orientation of the sample tubes in the sample tube rack.

*Note! In most cases the sample hatch locks immediately after the hatch is closed. If, however, the analyzer is in the process of measuring a sample, there can be a delay of about 30 seconds before the hatch locks.*

*Note! The sample tube rack can hold 1–6 sample tubes at a time. Old samples that have been already processed do not need to be removed each time the sample hatch is opened. However, the measuring program notifies that position of the sample tube rack where there already is a dispensed sample. Position number 1 is on the left edge of the rack.*

### 5.3.5 Gastro and CDI Tests

#### Creating Bar Code

Click the new sample button in the top left corner of the ArcDiagnoser™ measuring program. The "Patient information" pop-up window opens (**Figure 23**). Enter sample information into at least one of the following fields; First name, Last name, and/or ID code (identifier). Select the desired test (described in **Figure 2Figure 2** and **Table 5**). Gastro or gastroVir (without *Campylobacter spp.*) are available for mariPOC® gastro test plate (2017M) and gastro + CDI, gastroVir + CDI, gastro, gastroVir or CDI for mariPOC® gastro CDI combi test plate (2027M). The default test type is gastro in mariPOC® gastro test plate and gastro + CDI in mariPOC® gastro CDI combi test plate. The user may select the rapid instruction to appear on-screen from the "Rapid instruction" drop-down menu and enter any notes in the separate "Other information" field. The last two fields are for information only and do not affect the test. Their default values are empty.

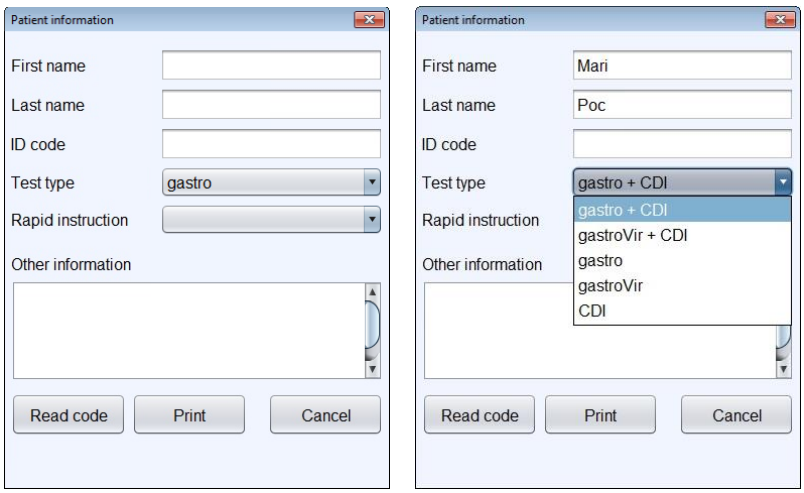


**Figure 23.** "Patient information" pop-up window before and after entering patient information.

Print the bar code label for the sample tube by clicking the “Print” button. Attach the bar code label to the sample tube so that the text on the bar code label is parallel with the length of the sample tube (**Figure 24**). Seal the sample tube with a cap.


**Figure 24.** Photograph showing how bar code labels may be attached to a sample tube.

A new line for new sample´s information has been created. The progress of the test for each sample can be followed in the “Test status” section. The test status is now in the “Insert sample” phase.

*Note! The patient information cannot be changed after the bar code label is printed. If there is a problem in attaching the printed bar code label to the sample tube, for example if the label is wrinkled or defaced in some way, a new bar code label may be printed by double-clicking the patient information line and then clicking the “Print” button.*

**Sample Collection and Pretreatment**

1. Remove flocked swab from transport tube. Add 2 volumes of Gastro Sample Buffer to the transport tube by lifting the bottletop dispenser top up and down twice (**Figure 25**). The total volume is 2.6 ml.

**Figure 25.** Dispensing with the bottletop dispenser.

*Note! Wear sufficient protective clothing and gloves when handling stool samples.*

*Note! If the swab already contains stool sample, be careful not to contaminate the dispensing head of the bottletop dispenser and proceed directly to the step 3.*

2. Dip the dry flocked swab into the stool and move it rigorously for 5–10 seconds (**Figure 26**).

**Figure 26.** Optimum amount of stool in the swab.

*Note! Typically the stool samples that are tested for the presence of gastrointestinal pathogens should take the shape of a container. If the sample is not watery diarrhea swirl the swab in 4 different spots of the firm stool in order to have a representative sample.*

3. Insert the swab with sample to the transport tube with Gastro Sample Buffer and close. Vortex the transport tube for 10–15 seconds to release the sample from the swab into the sample solution.

*Note! Mixing that does not last long enough leads to an incomplete release of the sample from the swab and thus less sensitive test results.*

4. Assemble the filtration unit (**Figure 27**). Remove the piston from the syringe. Attach the filter to the syringe. Attach the bar coded mariPOC® sample tube with a cap to the filter´s other end. Place the filtration unit to the rack.

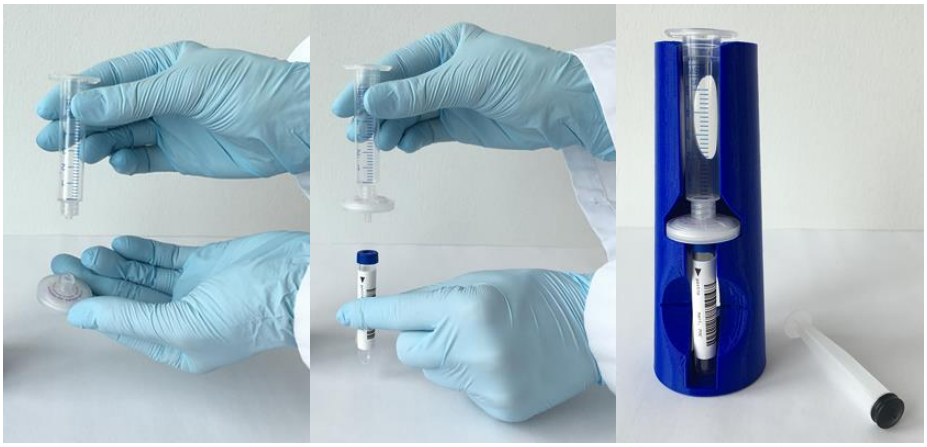

**Figure 27.** Assembly of the filtration unit.

5. Remove the swab from the transport tube. Transfer the supernatant of the sample (appr. 2.3 ml) with a Pasteur pipette to the syringe (**Figure 28**). Avoid disturbing the pellet of solid material if such has formed by settling. Alternatively, connect the syringe to the transport tube and pour the sample (**Figure 29**). Pouring may result more often in filter becoming blocked by the solids of the sample.

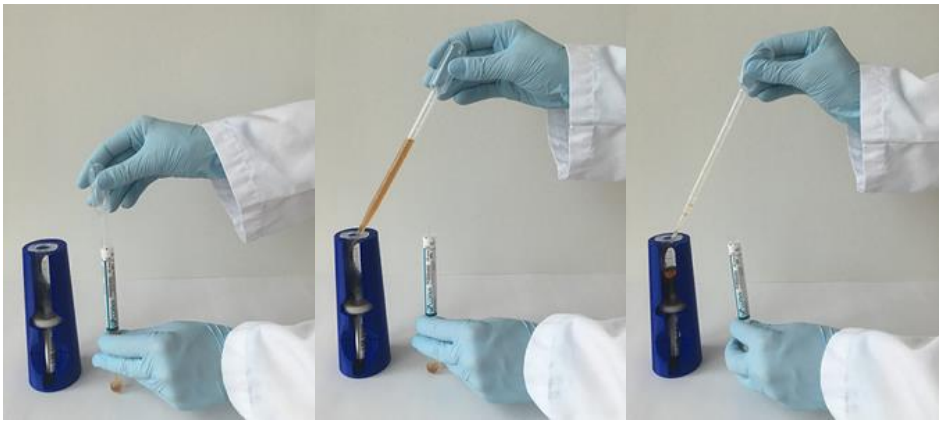

**Figure 28.** Pipetting the sample to the syringe.

**Figure 29.** Pouring the sample to the syringe.

*Note! When the swab is removed from the transport tube, the mouth of the transport tube can be pressed to drain the swab. This will maximize the amount of sample and reduces the possibility of contaminating the workstation.*

*Note! Sample transfer with Pasteur pipette can be done in two phases. In this way the sufficient sample volume is easier to obtain and it is less likely to disturb the pellet and transfer solids to the filtration unit.*

6. Attach the piston to the syringe and filter the sample to the mariPOC® sample tube. The solution level should meet the 1.3 ml minimum volume mark in the filtration unit rack (**Figure 30**).

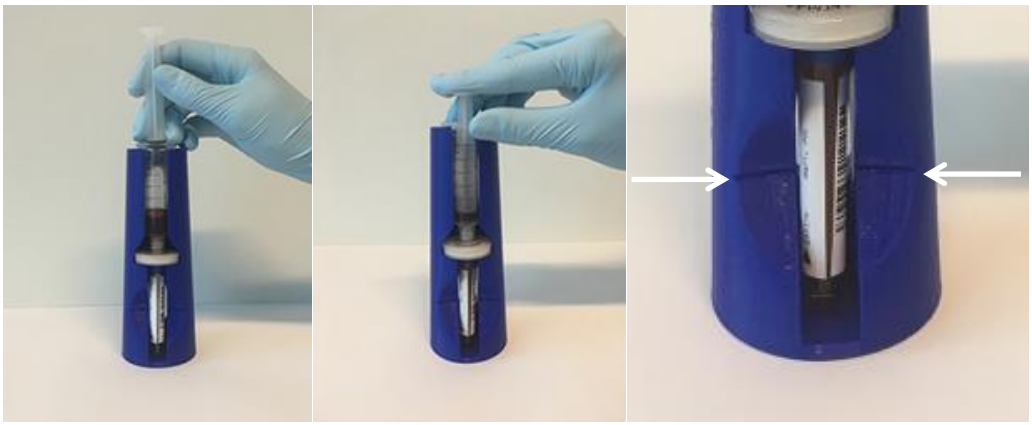

**Figure 30.** Filtration and minimum volume mark in the filtration unit rack.

*Note! In case of foam forming on top of filtrated sample, stop the filtering as soon as the minimum volume mark is met. If the volume mark is not met, wait for the foam to settle and continue filtration carefully in order to prevent foam extruding from the sample tube through the cap.*

*Note! After filtering, the piston can be lifted upwards to avoid contaminating the sample tube or workspace with drops leaking from the filter.*

7. Remove the filtration unit carefully from the rack and detach the mariPOC® sample tube.

**Inserting Sample into Analyzer**

When the sample hatch´s LED light is green, the analyzer is ready for a new sample. Open the sample hatch, remove the old sample tubes, and insert a new sample tube into the rack. The sample information on the bar code label should face the user so that the analyzer is able to read the bar code from behind. **Figure 17** The analyzer automatically starts processing the sample after the sample hatch is closed. The hatch becomes locked for few minutes per sample while dispensing. Already dispensed samples can be removed before the analysis results are ready. If required, samples can be stored according to instructions in chapter “5.3.2 Storage of Samples”.

*Note! In most cases the sample hatch locks immediately after the hatch is closed. If, however, the analyzer is in the process of measuring a sample, there can be a delay of about 30 seconds before the hatch locks.*

### 5.3.6 Reading and Reporting of the Results

The test reactions are automatically measured at one or two time points (**Table 16**) unless the preliminary time point has been omitted. At the preliminary results, the test identifies and reports strong and moderately positive samples. At the final results, the test identifies and reports low positive samples and negative test results. The result is reported with a positive (+) or negative (-) symbol. For *S. pneumoniae* a positive result is reported semi-quantitatively as + (very low), ++ (low), +++ (medium), or ++++ (high). In the Pharyn test, group A streptococci positive result is reported semi-quantitatively as + (very low), ++ (low), or +++ (high) (see chapter “4 Test Performance”; **Table 9**). Optionally, reporting of + (very low) can be selected out when the test system is installed. The sensitivity of QuickStrepA test or preliminary result phase of group A streptococci test corresponds approximately standard culture.

A red exclamation mark (!) next to the negative result in the column is indicating that a positive preliminary result has changed into negative final result. A sound signal is played from the computer when preliminary results or QuickStrepA results become available. The sound can be muted from computer sound settings.

Additional quantitative information (see instructions from **Table 18**) about the pathogen levels in the sample can be provided next to the qualitative result in column *Ψ*, psi in the measuring program. *Ψ* feature is optional. Samples obtained from mucosa are by their nature semi-quantitative and are subject to variability in sampling. However, in some cases the result quantification may still be useful in clinical practice. If reporting of *Ψ* values is in use, the preliminary phase identifies strong and moderately positive samples and reports them with a positive (+) symbol or with a borderline (+/–) symbol in case the assay signal is slightly below the cut off. The final result is reported with a positive (+), borderline (+/–) or negative (–) symbol. Borderline result (+/–) should always be considered by default as negative unless result interpretation is used (see **Table 18**). For *S. pneumoniae* the borderline (+/–) result is reported only with the preliminary result. For Group A streptococcus, Gastro and CDI tests borderline (+/–) results are not reported. Qualitative reporting of the results is summarized in **Table 16**.

**Table 16.** Qualitative result reporting.

| Test | Preliminary results | Final results |
|---|---|---|
| Respi test viruses | 20 min: (+/-,) + | 2 h: -, (+/-,) + |
| Respi test S. pneumoniae | 20 min: (+/-,) +, ++, +++, ++++ | 2 h: -, +, ++, +++, ++++ |
| Pharyn test adenovirus | 15 min: (+/-,) + | 55 min: -, (+/-,) + |
| Pharyn test group A streptococci | 15 min: +++ | 55 min: -, (+,) ++, +++ |
| QuickStrepA test | | 15 min: -, + |
| Gastro test | 20 min: + | 2 h: -, + |
| CDI test | 20 min: + | 2 h: -, + |

In the mariPOC® CDI test, GDH and Toxin A/B test results form together the result for presence or absence of CDI (**Table 17**). GDH positivity indicates the presence of *C. difficile* bacteria in the sample. Simultaneous Toxin A/B positivity indicates the presence of *C. difficile* toxins causing the disease.

**Table 17.** Interpretation of the results in CDI test.

| GDH test | Toxin A/B test | Interpretation of the results |
|---|---|---|
| - | - | *C. difficile* or its toxins A and/or B are not present in the sample. The disease is very unlikely caused by *C. difficile.* |
| + | + | Toxins A and/or B producing *C. difficile* is present in the sample. The disease is likely caused by *C. difficile.* |
| + | - | Non-toxigenic *C. difficile* strain is present in the sample or the amount of produced toxins A and/or B is below the detection limit of the assay. The disease is unlikely caused by *C. difficile.*<br>Optionally, molecular testing of toxin gene (e.g., PCR) or toxigenic culture can be used to determine the toxigenicity of the *C. difficile* strain. |
| - | + | Invalid result. The sample should be reanalyzed from the naïve stool sample. If the results persist after retesting, consider using other methods to confirm the results.<br>In rare cases, the infection may be caused by highly pathogenic *C. sordellii* (see chapters 4.2 and 8.3). |

**Table 18.** Qualitative analysis results and their interpretation using additional quantitative information (*Ψ*, psi) combined with clinical evidence.

| Result | Consider as | Situation and/or prerequisite |
|---|---|---|
| – | Negative (–) | The analysis signal is well below the cut off value of the test. No *Ψ* (psi) value is reported. |
| +/– | Negative (–) | The analysis signal is slightly below the cut off value of the test and there is no other evidence to support the positivity. |
| +/– | Positive (+) | The analysis signal is slightly below the cut off value of the test but the *Ψ* (psi) value which describes probability (%) of a analytically true positive finding is high and there is significant other clinical, laboratory and/or epidemiological information supporting the change of the default value (–). |
| + | Positive (+) | The analysis signal is above the cut off value. The *Ψ* (psi) value is a signal multiple to cut off. |

Quantification for the positive (+) and borderline (+/–) results is presented in different units because the probability of a true positive result around the cut off changes non-linearly.

Analysis result with a borderline symbol (+/–) should be reported by default as negative to ensure high specificity. In case the user has other significant evidence, such as other laboratory, epidemiological, and/or clinical information that strongly supports the decision to report the result as positive, the negative (–) default result may be considered to be changed to positive (+). Depending on the clinical need, samples with +/– result may be confirmed with an amplification based method to rule in the diagnostic result or the patient may be re-sampled after 12–24 hours in case the infection has just started and the microbial loads are still very low.

From quantitative value (a signal multiple to cut off) of a positive analysis result, the user may evaluate the accuracy of a positive finding in case of epidemiological situation, other laboratory test results, and/or clinical findings do not match. The user should take into account that the preset cut offs have been set so that the specificity of the assay (**Table 8** and **Table 12**) is very high when using the default reporting. Depending on the method, cut offs may be different in preliminary and final result reporting phases. Therefore, i) sometimes (with certain antigen concentrations) the Ψ (psi) value obtained in preliminary phase can be higher than the psi value obtained in the final phase, and ii) Ψ (psi) values obtained in preliminary and final phases cannot always be compared quantitatively.

The sensitivity and specificity stated by the manufacturer are derived from the default positive and negative results, which are based on the preset cut offs. The default results should only be changed upon joint decision of the laboratory and medical doctor responsible of the patient. Such decision shall be based on other significant evidence, such as other laboratory, epidemiological, and/or clinical information to increase the accuracy of the test result. Otherwise accuracy will suffer.

The “Test status” field for each patient reports the status of the analysis (see chapter “5.2 ArcDiagnoser™ Measuring Program”; **Table 14**). The selected patient information line is highlighted in dark blue and a line in bold letters indicates that the results have not been looked at. The patient information line remains bold for 3 seconds after its selection.

The test system includes internal quality control of results, i.e. autoverification, which estimates the reliability of the measurement and technical success of the analysis. When the measurement is unsuccessful, the test result is not stated. Instead, in such cases “Failed” appears in the result field and the test status in question is marked red in the patient information list. In that case a new patient sample can be collected or the old sample can be reanalyzed (see chapter 8.3). Interfering matrix substances may rarely give falsely high fluorescent signals for negative samples despite the implemented result autoverification.

The test results of a single sample may be printed with the user’s printer if necessary using the “Print” button. Report creation pop-up window (**Figure 31**) offers more possibilities for the result reporting: Epidemiological report, Tests day by day and mariPOC results (summary reports). Report creation is accessed from the More options pull-down menu by selecting Reports. Select the report type and then start and end dates if applicable. The report creation will take some time. When completed, the selected report will be shown automatically in the web browser. The report in the web browser can be saved or printed with the user’s printer.

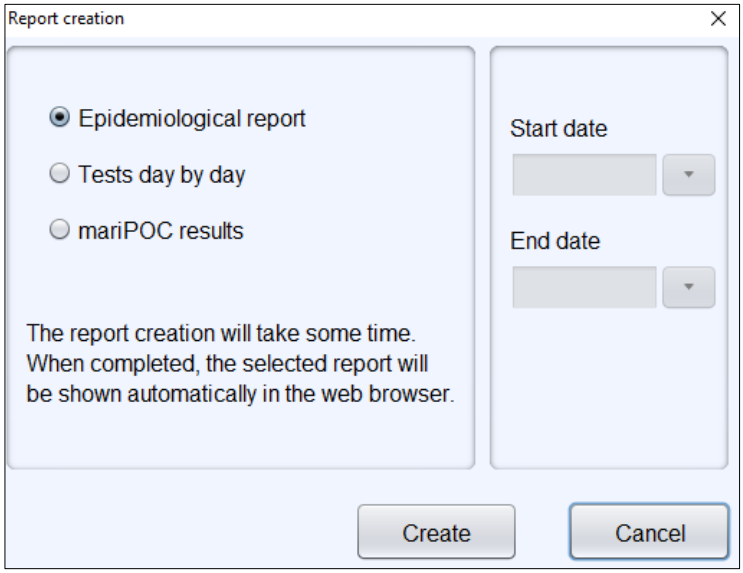


**Figure 31.** Report creation pop-up window.

"Epidemiological report" is automatically created for 6 month time period from the report creating date and consists of results obtained from the respi test (Figures 1-4) and gastro test (Figures 5-7). Figure 1 of the report is the weekly proportion (%) of positive samples from all tested respi tests. The large variation between consecutive weeks may be due to small number of analyzed samples. The intensity of epidemiological situation can be evaluated by comparing the graph with the number of weekly positive findings in report´s Figures 2 and 3. In case of multiple positive findings are obtained from the same sample, each finding is taken into account. In Figure 2, the positive findings of influenza A virus (IAV), influenza B virus (IBV) and respiratory syncytial virus (RSV), are shown. Other viruses of the respi test are grouped together. In Figure 3 the other viruses (grouped in Figure 2; adenovirus (AdV), human bocavirus (hBoV), human coronavirus OC43 (hCoV), human metapneumovirus (hMPV), parainfluenza virus 1 (PIV1), parainfluenza virus 2 (PIV2) and parainfluenza virus 3 (PIV3)), and *S. pneumoniae* (Pnc) are shown. In report´s Figure 4 the proportion of positive preliminary results of respi test compared to the final positive results is presented. During the epidemiological season over 50% (typically 60-80%) of virus positive samples are, on average, positive at the preliminary phase. However, this requires that the sample collection has been timed correctly and performed according to the instructions provided by the manufacturer. If the proportion of positive results is continuously lower than 50%, it is recommended that the sample collection routines, including sampling and time from the onset of symptoms, should be paid attention to. Figure 5 of the report is the weekly proportion (%) of positive samples from all tested gastro tests. The large variation between consecutive weeks may be due to small number of analyzed samples. The intensity of epidemiological situation can be evaluated by comparing the graph with the number of weekly positive findings in report´s Figure 6. In case of multiple positive findings are obtained from the same sample, each finding is taken into account. In report´s Figure 7 the proportion of positive preliminary results compared to the final positive results of gastro test is presented.

"Tests day by day" can be created for any time span by freely selecting the start and end dates. The report consists of the following tables: successful tests, failed tests and customer support tests. The

daily test amounts are divided based on the test or control types. The sum of daily tests is shown in the green column. The sum of tests per test type is shown in the green row.

“mariPOC results” is a summary report of all performed tests including the controls. It can be created for any time span by freely selecting the start and end dates. Positive findings and pathogen specific tests with failed and/or changed test results (between preliminary and final result phases) are listed in separate columns. The report is available also in the computer´s desktop (mariPOC.csv) and can be processed in a spreadsheet application (e.g. Excel). Information in First name, Last name and ID code fields are repeated as such. Note that a new report will automatically replace the previous one on the desktop.

### 5.4 Control Samples

The functioning of the test system is also monitored by a weekly analysis of the multianalyte control samples provided by the manufacturer (positive and negative). Control samples are not used to calibrate the system. One control sample foil bag includes both positive and negative control samples dried in factory bar coded sample tubes. One positive control sample includes all analytes for the provided test plate type. The measuring program gives an automatic pop-up reminder when one week has passed since the last run of control samples for the corresponding test plate type. The reminder includes instructions on handling a control sample (**Figure 32**). If the reminder has been closed without analyzing the control samples, it will appear again until both controls are run.

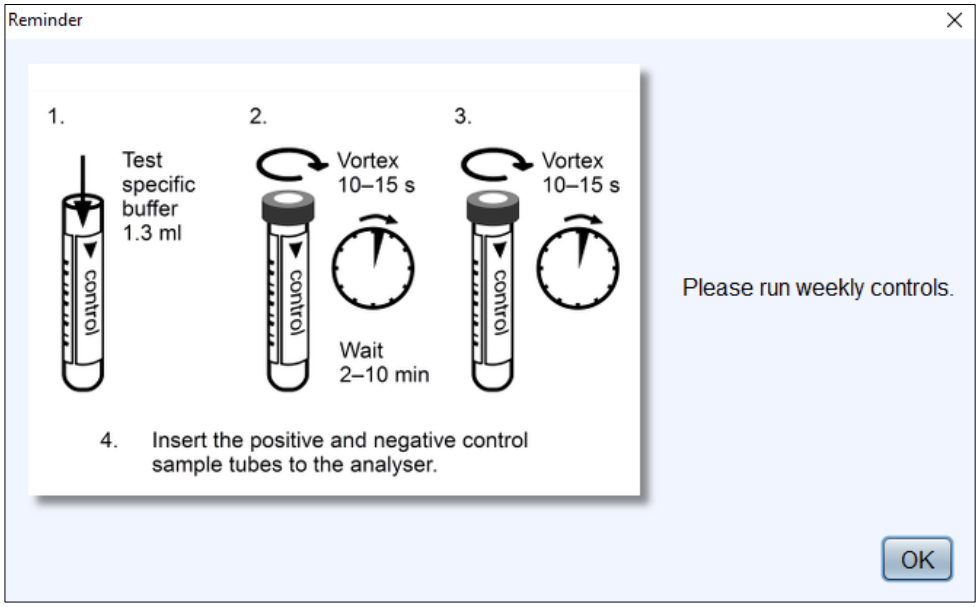


**Figure 32.** Control sample reminder.

**Analyzing the Control Samples:**

a. Open the control samples foil bag (including both the positive and the negative control sample tubes). Remove the caps of the control sample tubes. Add 1.3 ml of test specific sample buffer to each tube by lifting the bottletop dispenser top up and down once (**Figure 33**). Be careful that the positive control does not contaminate the dispensing head. Replace the caps on the original sample tubes. Be careful that the caps do not get mixed. The pink cap belongs to the positive control sample and the colorless cap to the negative control sample.

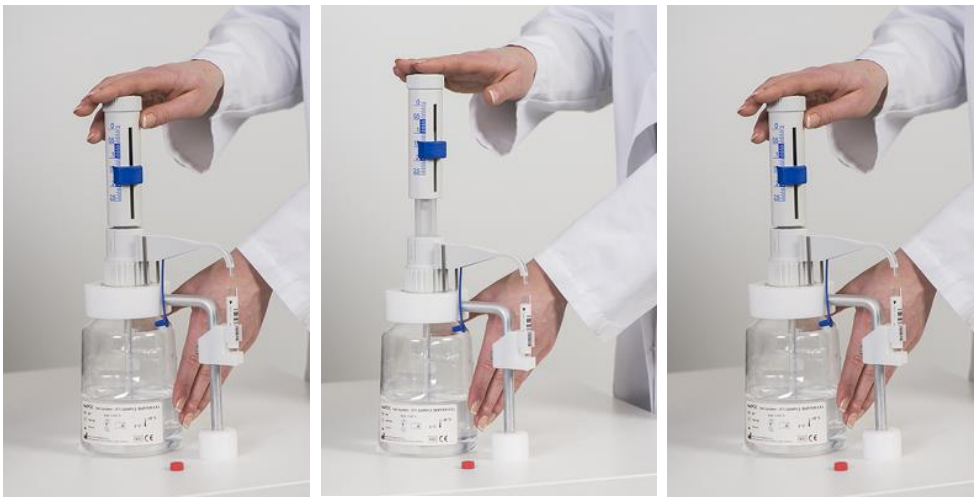

**Figure 33.** Adding the test specific sample buffer to the positive control sample tube.

b. Mix the control sample tubes separately with the vortex mixer for 10–15 seconds (**Figure 34**).

c. Let the control samples dissolve by leaving them to stand at room temperature for 2–10 minutes (**Figure 34**).


**Figure 34.** Mixing and leaving to stand of control sample tubes.

d. Mix the control sample tubes again for 10–15 seconds with the vortex mixer.

e. Open the sample hatch, place the control sample tubes in the sample tube rack and close the sample hatch. The analyzer begins to automatically process the control samples.

*Note! The dissolved control samples remain usable at room temperature for two hours.*

*Note! The positive control sample is potentially infectious so it must be handled and disposed of in the same way as clinical patient samples.*

*Note! Controls prepared by other organizations than the manufacturer may not be technically suitable or optimal for the mariPOC® test system.*

**Reporting the Results:**

The results for control samples are reported automatically in the same way as for clinical patient samples. When using mariPOC® combi test plates, the control sample results will be available for the all respi and pharyn test analytes. When using mariPOC® gastro CDI combi test plates, the control sample results will be available for the all gastro and CDI test analytes. The results of the positive control sample analytes should all be positive at the preliminary results. The negative control sample

should always give negative test results at the final result, however, at the preliminary result the results are not yet reported. It is recommended that the user observes the preliminary results for the control samples and reports any possible anomalies to customer support.

If the result given by the control sample is inconsistent with the control sample type (for example, the negative control sample gives a positive result) and the analysis was technically successful (OK), appears the Test status (Preliminary or Finished) in red in the measuring program´s patient information list (see chapter “8 Possible Problem Situations and Potential Solutions” in the User’s manual). If no result is reported for an analyte at the final results and “Failed” appears in the autoverification field, the test in question has failed for that analyte. The other analyses for this control sample have been technically successful if OK appears in the other autoverification fields.

The results of the control samples, their trends, and the functionality of the analyzer can be followed in the “Control data” window that can be accessed from the “More options” drop-down menu. If there are several divergent results seen among the results, customer support should be contacted.

### 5.5 Running Out of Tests and Changing the Test Plate

The user can change the test plate at any time by selecting “Change test plate” in the “More options” drop-down menu. In this case, the results for unfinished samples will not be reported and the test status is changed to Finished. Otherwise the measuring program automatically guides the process of running out of tests and changing the test plate. When new samples have been inserted into the analyzer, it automatically dispenses the samples to the test plate or prompts the user to change the test plate. If the user does not react to the measuring program’s notification to change the test plate, the test system automatically continues to dispense samples after 5 minutes.

The user can monitor the number of remaining multianalyte tests from the top right corner of the measuring program. The user can monitor the valid test plates by selecting “List test plates” in the “More options” drop-down menu. In the new window all test plates in use are listed and the test plate inside the analyzer is highlighted. The listing includes product, lot and serial numbers, number of remaining tests and days to expiry.

The test plates must be stored in a special storage rack (**Figure 35**). If the test plate change notification is given after all final results have been reported, the user is able to change the test plate directly through the notification window. In combi plates where tests, respi and pharyn or gastro and CDI, are consumed independently, it is possible to continue using the test plate even if one of the test types has been used up. If the test plate is not changed and there is not enough tests left

for all inserted samples, the test system begins to dispense all possible samples, typically from left to right. Remaining samples will stay as pending until the test plate has been changed.

**Figure 35.** Storage rack for the test plates and its use.

**Deployment and Storage of the Test Plate**

a. The ArcDiagnoser™ measuring program will automatically prompt the user when the test plate is almost full, full, or out of date. Change the test plate from a notification on screen or at any time “Change test plate” in the “More options” drop-down menu. A new notification will appear if any results would be lost.

b. Open the test plate hatch located on the front side of the analyzer when the signal light is green. Move the white button to the left to release the lock and simultaneously pull the plate carriage out. Remove the test plate from the analyzer. Test plates in use must be stored in a special storage rack (**Figure 35**) or disposed of appropriately (see chapter “6 Cleaning and Waste Disposal”). The test plate must be placed directly to the storage rack and preferably in such way that the bar code faces the user.

c. Unused test plates should be stored in a refrigerator in their original foil bag. When taking out a new test plate for use, check that the test plate foil bag is undamaged. Cut the bag open with scissors. Remove the test plate from the foil bag grasping it on the edges with the fingers (**Figure 36**). When removing the test plate from the storage rack, push the test plate to front from the gap on the backside of the rack and grasp it on the edges with the fingers. Check that the plastic edges and the bottom of the test plate are undamaged. Avoid touching the bottom of the test plate. The test plate bottom should be dust free and unscratched. A test plate from a damaged bag or one that is broken or scratched must not be used.

**Figure 36.** Removing the test plate from the foil bag.

d. Place the test plate at an angle into the plate carriage (back edge first, **Figure 37**). Note that the bar code side of the test plate faces up and the bar code label is on the right viewed from the front. Push the plate carriage all the way back inside and ensure that the plate carriage is locked. Close the test plate hatch.

**Figure 37.** Placing the test plate in the plate carriage.

*Note! When the signal light is red the test plate hatch cannot be opened.*

*Note! The measuring program cannot read the bar code if the test plate hatch is still open or the test plate is placed in the plate carriage against the instructions.*

e. The test system will recognize each test plate individually based on the bar code. The test plate is usable for 21 days from the opening of the foil bag and its insertion into the analyzer.

### 5.6 Changing and Emptying the Solution Containers

Monitoring of the consumption of the test system's wash and system solutions and waste container capacity is based on a calculation of the dispensing volumes. The measuring program automatically prompts when a solution bottle needs to be replaced or the waste container emptied. It is of utmost importance that this measuring program notification is followed so that the solutions consumption level calculator will recognize the correct solution levels. Not following this notification will result in depletion of the wash and/or system solution. This can cause the analysis to fail and/or result in erroneous results due to a failed wash. If the notification to empty is not followed, the waste container can become too full and overflow causing the fluid to flood inside the analyzer. This may lead to analyzer malfunction and contamination with infectious waste.

The measuring program remembers the calculated solution amounts, even if the analyzer has been accidentally switched off. Accordingly, the solution amounts in the bottles should not be changed. If needed, the wash and system solution bottles can be replaced and the waste container emptied by using the "Maintenance wizard" accessed through the "More options" drop-down menu and selecting the desired function.

a) **Emptying the waste container:** Always empty the waste container when notified by the measuring program. After the notification, the measuring program gives detailed instructions on how to empty the waste container. The waste container is located either on the left or the back of the analyzer. The tube leading to the waste container is transparent and about 1 cm in diameter. When emptying the waste container, always wear protective gloves because it contains both the system and wash solution as well as patient samples.

Detach the rapid-connect fitting coupled to the waste container by pressing the metallic coupling. Wipe off any solution potentially dripping out from the tube using disposable paper. Because there is risk of back flow, lift the waste container only after detaching the tube. Because the cap has an air hole, do not tilt the waste container to avoid spills. Unscrew the cap, empty the waste container and discard the contents appropriately. Avoid spilling any fluid on clothing, skin, eyes, or other surfaces. The waste container must not be autoclaved but it can be rinsed or washed with detergent. Screw the cap back on and return the waste container to the left side or back of the analyzer. Couple the rapid-connect fitting by pressing the mouthpiece firmly against its counterpart until there is a “clicking” sound.

b) **Replacing the wash solution bottle:** Always replace the wash solution bottle (2 L) when notified by the measuring program. Following the notification, the measuring program will give detailed instructions on how to replace the wash solution bottle. The wash solution bottle is located on right side of the back of the analyzer next to the system solution bottle. The tube leading to the wash solution bottle is yellowish and about 5 mm in diameter. When changing the bottle, always use protective gloves because the wash solution is very alkaline.

   To facilitate work, the wash solution bottle can be moved nearer to the table edge as far as the tube length allows. Remove the outer and inner caps of the new wash solution bottle. Open the cap of the empty wash solution bottle and lift it out of the bottle with its tube and support rack. Be careful not to allow the cap (or the tube attached to it) to touch any potentially dirty surfaces. Lift the nearly empty bottle out, and replace it with a full wash solution bottle. Place the cap (with its tube carefully in place) on the bottle and close the cap. The remaining wash solution can be poured into the drain, taking into account the relevant legislation. Ensure that the label on the new wash solution bottle corresponds to the label on the replaced wash solution bottle.

c) **Replacing the system solution bottle:** Always replace the system solution bottle (1 L) when notified by the measuring program. After the notification, the measuring program gives detailed instructions on how to replace the system solution bottle. The system solution bottle is located on the right side of the back of the analyzer next to the wash solution bottle. The tube leading to the wash solution bottle is yellowish and about 5 mm in diameter. When changing the bottle, use protective gloves because the system solution contains surface-active substances and a low concentration (< 0.1%) of sodium azide.

   To facilitate work, the system solution bottle can be moved nearer to the table edge as far as the tube length allows. Remove the outer and inner caps of the new system solution bottle. Open the cap of the empty system solution bottle and lift it out of the bottle with its tube and support rack. Be careful not to allow the cap (or the tube attached to it) to touch any potentially dirty surfaces. Lift the nearly empty bottle out, and replace it with a full system solution bottle. Place the cap (with its tube carefully in place) on the bottle and close the cap. The remaining system solution can be poured into the drain taking into account the relevant legislation. Ensure that the label of the new system solution bottle corresponds to the label of the replaced solution bottle.

### 5.7 Creating Customer Support Report

In case of a test system malfunction, a request from customer support or for invoicing purposes a customer support report should be created. The short-cut icon for creating the report is located

between print results button and “More options” drop-down menu. The measuring program gives detailed instructions on how to do it. ArcDiaReport zip-folder will be created to the computer´s desktop. Transfer the ArcDiaReport from the desktop to a USB flash drive (USB ports can be found on the left side of the computer). Note that the previous report will automatically be replaced by a new one on the desktop but not on the USB flash drive. Send the ArcDiaReport to the customer support as an email attachment.

### 5.8 Switching the Analyzer Off and On

Both the analyzer and the measuring program must be kept switched on because of the automatic rinsing of the test system. If the test system will not be used for long period of time (i.e., more than one week), it can be shut down in a controlled manner. This is done by selecting “Shutdown analyzer” from the “Maintenance wizard”, which is accessed through the “More options” drop-down menu of the ArcDiagnoser™ measuring program. Follow the instructions. Remember to empty the waste container and change both the wash and the system solution bottles with caps (and tubes) into water bottles pre-filled with deionized or distilled water. Finally the program instructs the analyzer to switch off via the power switch on its back panel (top left corner). After that, the measuring program prompts the user to click the “Finish” button. The measuring program will then close automatically. The test plate can then be changed or removed from the analyzer. Next, the label printer, the computer and the analyzer should also be switched off. When the test system is used again first switch on the analyzer and then the computer and label printer. Open the measuring program from the short-cut icon on the desktop (**Figure 38**) and follow the on-screen instructions. Note that the water bottles must to be replaced with new wash and system solution bottles. Empty and store the used water bottles until their next use.

**Figure 38.** Analyzer short-cut icon.

The analyzer must never be switched off without a controlled shutdown (Maintenance wizard: Shutdown analyzer) unless there is a serious failure. Only then should the analyzer be switched off from the power switch on the top left corner of the back panel. A serious failure such as an overflow or a similar event could damage the analyzer. If there is a serious failure, do not restart the analyzer; instead contact customer support. In any other case, wait approximately for 5 seconds before switching the power on again. The ArcDiagnoser™ measuring program will give an error notification about a connection break within 30 seconds of analyzer restart. After the notification, the measuring program can be closed and then reopened from the short-cut icon on the desktop (**Figure 38**). Note that this switch off procedure is to be used only in error situations and, accordingly, the measuring program will not prompt the user how to restart the analyzer. Further, the solution bottles should not be replaced.

Clearing the computer and measuring program´s memory, or deleting patient information, can only be done by the manufacturer or its representative.

# 6 Cleaning and Waste Disposal

**Cleaning**

If surfaces get contaminated with respiratory sample or test system solutions, the cover of the analyzer and other surfaces can be wiped with a cloth moistened with water or a mild cleaning solution. The cover and other surfaces can be disinfected with a disposable cloth moistened with 70% ethanol or similar when needed.

If surfaces get contaminated with stool sample, wipe the visible stain with disposable paper and clean the area first with a disposable paper moistened with detergent. Then clean the area with chlorine solution (preferably 1000 ppm) because several fecal pathogens (e.g. norovirus) tolerate cleaning with ethanol. For the final cleaning use water or/and 70% ethanol (or similar) to remove chlorine residues. Additionally Ultraviolet C (UV-C) light can be used.

If solution from e.g. sample tube or wash station has leaked inside the analyzer, please contact the customer support. Visible stains in the analyzer inside or cover can be cleaned as instructed above. This cleaning recommendation applies also to the other electric devices (e.g. vortex) unless otherwise stated in their User´s manual. Liquids must not be sprayed directly inside or on the analyzer or other electric devices.

Filtration unit and test plate storage rack can be cleaned mechanically by brushing with a detergent solution. The rack can be disinfected with chlorine solution (e.g. 1000 ppm) and/or Ultraviolet C (UV-C) light. Remember to properly rinse the rack after cleaning with water or/and 70% ethanol (or similar). Please note, that both rack´s material does not tolerate temperatures over 60°C such as in dishwasher or autoclave.

**Waste Disposal**

The plastic consumables used to carry out tests, such as used test plates, sampling swabs, swabs in transport tube, syringe, filter, Pasteur pipette, sample tubes and caps may contain infectious materials. They must be disposed of appropriately. An unused test plate can be disposed with normal waste. The foil bag is suitable for metal recycling. The used or expired RTI or Gastro Sample Buffer, system and wash solutions, Extraction solution B and the contents of the waste container and water bottles can be poured into the drain taking into account the local legislation and the precautions mentioned in the User's manual and material safety data sheets. When disposing the used or expired Extraction solution A, take into account local legislation and the precautions for the disposal of sodium nitrite. Empty storage containers (except the water bottles), unused plastic components, silica gel bags, and protective wraps can be disposed with normal waste or recycled according to their material. The manufacturer is responsible for the appropriate disposal of the analyzer components.

## 7 Remarks

The patient's clinical information must be taken into account when interpreting the results. The diagnosis of the patient's disease must always be done by a health care professional with a sufficient level of education. The function of the test is to assist the professional making the diagnosis by providing limited information on the microbiological content of the sample.

Those samples that give a negative result may be verified using gene amplification tests (e.g., PCR). This is recommended especially for critically ill patients, and it is advised that also positive results from such are verified using an independent method. Those samples that give positive test results can be further typed using, for example, gene amplification tests or immunodiagnostic tests. The methodological suitability of using a leftover sample from the mariPOC® test system in another test, and the stability of the sample, must be validated appropriately. For swab sampling, only the swabs defined in the **Table 6** must be used. The nasopharyngeal aspirate and stool sample must be untreated (i.e., native or naïve). Nasopharyngeal wash sample is not a preferred sample material.

The results are reliable only if the sampling and pretreatment have been appropriate and the test is used in accordance with the instructions given in this User´s manual. Correct and careful sampling is of utmost importance for test success. Swab and aspirate sampling for the detection of viral pathogens should be done during viremia within 6 days from the onset of symptoms, preferably within 5 days. Nasopharyngeal wash sampling should be done during viremia within 5 days from the onset of symptoms. Viral loads decrease over time and virus antigens are not usually detectable after 6 to 7 days from the onset of symptoms.

The performance specifications stated by the manufacturer in terms of analytical and clinical sensitivity are valid for samples obtained using flocked swabs or by aspiration without saline. If the observed performance with nasopharyngeal wash samples does not match with the specifications of the manufacturer or the results reported in the literature, please use nasopharyngeal swabs and/or aspirates (no saline addition), which are primarily recommended by the manufacturer.

Recently administered oral rotavirus vaccine may give a positive result in the rotavirus test.

mariPOC® toxin A/B method of the CDI test cross-reacts with toxins produced by *C. sordellii*. Cross-reaction with *C. sordellii* toxins is a known property of the mariPOC® toxin A/B test and some other commercially available *C. difficile* toxin A/B tests. However, mariPOC® GDH test does not cross-react with *C. sordellii*. See chapters 4.2 and 8.3 for more information.

mariPOC®+ measuring program is primarily intended for laboratories. Along with qualitative results, it provides quantitative information about the microbe levels in the sample (indicated in the measuring program´s results column $\Psi$, psi). Mucosal samples are by their nature semi-quantitative at best with respect to microbial load in the tissue. Therefore, the results are subject to variability in sampling. Optionally, reporting of $\Psi$ values can be selected out when the test system is installed.

The sensitivity and specificity stated by the manufacturer are derived from the default positive and negative results, which are based on the preset cut offs. The default results should only be changed upon joint decision of the laboratory and medical doctor responsible of the patient. Such decision shall be based on other significant evidence, such as other laboratory, epidemiological, and/or clinical information to increase the accuracy of the test result. Otherwise accuracy will suffer.

The test system uses a strong laser light (Class 1 laser product EN 60825-1:2014, Third Edition; specifications in **Table 19**) and mechanical movement for analyzing samples. For this reason no foreign bodies or body parts may be inserted into the analyzer. The analyzer casing, other than the test plate hatch and the plate carriage and the sample hatch, must not be opened. User exposure to laser radiation in normal use is negligible. No user serviceable parts inside.

**Table 19.** Laser radiation characteristics.

| | |
|---|---|
| Maximum accessible power | < 1.95 mW |
| Pulse duration | 0.5 ns |
| Emitted wavelength | 1064 nm |


**Figure 39.** Laser class label mounted on the back of the analyzer.

Analyzer is basic electromagnetic equipment (class A; CISPR 11:2009, 5:3). The system is intended to be used in light-industrial locations such as laboratories.

If more than one test system is being used in the same department, care must be taken not to mix the test plates and the sample tubes between the test systems. The analyzer identifies the sample tube by its bar code label and does not allow it to be reused: i.e., the used bar codes are both analyzer and measuring program-specific. A sample tube bar code created by another test system will not be recognized and thus the sample will not be analyzed. Additionally, one analyzer will not identify test plates partially or completely used by another analyzer, so that inserting the used test plate in another analyzer will with high probability give wrong results.

The manufacturer has designed the test system so that cross-contamination from one sample or test to another is rare. Carelessness in sample pretreatment can, however, lead to cross-contamination and therefore the interpretation of results must be carefully reviewed in relation to the patient information.

Each test marked as RUO is intended for research use only. Results from such tests with RUO status should not be used for clinical diagnostics. The manufacturer or its representative provides separately more information about RUO tests.

# 8 Possible Problem Situations and Potential Solutions

## 8.1 When to Contact Customer Support

The test system malfunction is typically indicated with an error notification in the dialogue window. Contact customer support immediately if the fault diagnosis and repair instructions presented in the chapters below do not result in a functioning test system. Examples of issues requiring immediate customer support are:

- The analyzer, or the measuring program, is unresponsive.
- Recurrent failed results.
- Unexpected results for the control samples.
- A flooded washing station caused, for example by a flooding waste container or a blockage in the washing station or its tube.
- A bent or detached dispensing needle.
- Faulty operation of the sample tube rack, the sample hatch, the plate carriage or the test plate hatch.
- Abnormal sounds.
- Foreign bodies inside the analyzer.

## 8.2 Problems when Using the Test System

**Problem:** The analyzer does not respond to the commands given in the measuring program. The results are not completed.

| Reason for the problem | Solution / Action |
|---|---|
| The connection between the computer and the analyzer is disturbed or has disconnected. | Check that the analyzer power is switched on and that the Ethernet cables between the analyzer and the computer are connected. Make sure the Ethernet switch is turned on.<br>Try to close the measuring program by clicking on the cross in the top right corner of the main window. If the measuring program closes, start it again from the short-cut icon on the desktop. If the problem persists, contact customer support. |

**Problem:** The bar code reader does not recognize a sample tube.

| Reason for the problem | Solution / Action |
|---|---|
| The sample tube bar code is the wrong way round or is at the wrong height, or the bar code label has been attached diagonally or crosswise, or is wrinkled. | Rotate the sample tube so that the patient's name is visible through the gap in the sample tube rack and then close the sample hatch. If this does not help, double-click the patient information line to open the "Patient information" window and print a new bar code label. Insert the sample tube into the sample tube rack gently to prevent it from getting stuck. |
| Please note message: "Too old sample tube at pos." (i.e., bar code has been printed over 24 hours ago), or Warning messages: "Already dispensed sample tube at pos." (i.e. the sample has already been dispensed) or "Unknown sample tube at pos." (i.e., the bar code label is not recognized. | Reenter the patient information and print a new bar code label. The old bar code label may need to be detached. Make sure that the sample solution has not expired (storage instructions are found in chapter 5.3.2). If the sample has expired, a new sample should be taken from the patient. Insert the sample tube gently into the sample tube rack to prevent it from getting stuck. |
| The operation of the bar code reader or measuring program has slowed down or ended. The bar code reader is broken. | Contact customer support. |

**Problem:** The analyzer does not accept the control samples.

| Reason for the problem | Solution / Action |
|---|---|
| The control sample has expired or its processing in the analyzer has not begun within two (2) hours of reading the bar code. | Make sure that the control sample expiry has not passed. In the case that the control sample has been pending for more than two (2) hours, for example due to a test plate change, the measuring program will automatically reject it. Repeat the test using new control samples. |

**Problem:** Analyzer does not accept the positive control.

| Reason for the problem | Solution / Action |
|---|---|
| Control samples were inserted into the analyzer but the positive control was rejected (notification prompted). Negative control was analyzed. | Analyze new control samples and make sure the package is for correct test: REF 1104MC for mariPOC® respi test, REF 1104MC or 1124MC for mariPOC® pharyn test and REF 2017MC for mariPOC® gastro and CDI tests. Contact customer support if the problem continues. |
| Control samples were inserted into the analyzer but the positive control was rejected without a notification. Negative control was analyzed. | Rotate the positive control tube so that the text is visible through the gap in the sample tube rack and then close the sample hatch. Contact customer support if the problem continues. |

**Problem:** The sample hatch will not lock.

| Reason for the problem | Solution / Action |
|---|---|
| A measurement is in progress. | Wait 30 seconds. The sample hatch should lock after the measurement is finished. |
| The sample hatch has not been closed properly. | Open the sample hatch slightly and close it again. Make sure that the sample hatch is fully closed. Contact customer support if the problem persists. |

**Problem:** The system solution has run out.

| Reason for the problem | Solution / Measure Solution / Action |
|---|---|
| The notification to change system solution bottle has been ignored. The test performance may have impeded by wash solution residues. | Change the system solution bottle in accordance with the “Change system solution container” instruction found on the “Maintenance wizard”, which can be opened from the drop-down menu “More options”. |

**Problem:** The wash solution has run out.

| Reason for the problem | Solution / Measure Solution / Action |
|---|---|
| The notification to change wash solution bottle has been ignored. Possible cross-contamination between samples. | Change the wash solution bottle in accordance with the “Change wash solution container” instruction found on the “Maintenance wizard”, which can be opened from the drop-down menu “More options”. Interpret the results with caution. |

**Problem:** The use of extraction solutions in the pharyn test has been forgotten.

| Reason for the problem | Solution / Action |
|---|---|
| Sample processing contrary to the instructions. | If the Streptococcus group A analysis gives a negative result, this should be reported with caution. If necessary, take a new patient sample and process it in accordance with the instructions. The extraction solutions significantly enhance the analytic sensitivity of the Streptococcus group A analysis. |

**Problem:** There is white powder or dirt on the dispensing needle or the top surface of the washing station.

| Reason for the problem | Solution / Action |
|---|---|
| Some solution components, such as salt or washing agent, have dried. | Carefully rub the material with a swab moistened with purified water. Avoid bending the dispensing needle. If this does not help, contact customer support. |

**Problem:** The bar code label does not get printed.

| Reason for the problem | Solution / Action |
|---|---|
| The label tape has run out. | Change to a new label tape cartridge. If the bar code label does not print automatically after the repair measures, double-click the patient information line to reopen the “Patient information” window. The bar code label can be printed again, but the information entered cannot be changed. |
| The computer is not communicating with the label printer. | Check whether the label printer power is on (indicated by a green light is on the front) and that it is connected to the computer with a cable. Turn the label printer back on again.<br>If the bar code label does not print automatically after the repair measures, double-click the patient information line to reopen the “Patient information” window. The bar code label can be printed again, but the information entered cannot be changed. |
| Error notification: “Label printer does not recognize the label tape”. | Switch the label printer off and turn it back on again. If this does not help, try to put the label tape cartridge back in the printer. The bar code label can be printed again by double-clicking the patient information line to open the "Patient information” window. |

### 8.3 Problems with Results

**Problem:** The status of the analysis (Test status) is indicated in red text. One or more analysis has failed (i.e. no result is obtained and the text “Failed” appears after the analyte in the results).

| Reason for the problem | Solution / Action |
|---|---|
| The total sample volume is too small (pretreatment has failed); the analyzer cannot aspirate enough of the sample in the dispensing system. | Check that the adjusted volume in the bottletop dispenser is 1.3 ml. Make sure that the bottletop dispenser piston is lifted to the top position. Reanalyze the sample. Add approximately 0.5 ml of the RTI Sample Buffer to the failed respiratory sample, and vortex the sample tube for 10–15 seconds. The solution level should be about half way of the sample tube height. Reenter the patient information and print a new bar code label. Insert the sample tube gently into the sample tube rack to prevent it from getting stuck. Aspirate sample to be reanalyzed after addition of RTI Sample Buffer must be vortexed for 10–15 sec and centrifuged before inserting it into the analyzer. For a failed stool sample repeat the sample pretreatment. Check that the stool sample (flocked swab) was diluted into two volumes of the sample buffer (2x 1.3 ml) and that the pretreated sample solution volume in the gastro sample tube is at or above the volume mark pointed in the filtration unit rack. |

| Reason for the problem | Solution / Action |
|---|---|
| Dispensing has failed. Difficult sample material. The filter was faulty. | The sample solution may be too viscous (mucous) or contain particular material. Reanalyze the sample. Add approximately 1 ml of the RTI Sample Buffer to the failed sample, and vortex the sample tube for 10–15 seconds. The solution level should be about 2/3 of the sample tube height. Reenter the patient information and print a new bar code label. Insert the sample tube into the sample tube rack gently to prevent it from getting stuck. Aspirate sample to be reanalyzed after addition of RTI Sample Buffer must be vortexed for 10–15 sec and centrifuged before inserting it into the analyzer. Check that the stool sample was pretreated (filtered) as instructed. Make the pretreatment again from the naïve stool sample if there is sample left. If there is no naïve sample left, re-filter the pretreated sample. Before re-filtering, add Gastro Sample Buffer (if needed) until the total sample volume is approximately 2.3 ml to ensure enough (1.3 ml) flow-through after the second filtration. However, please note that dilution may have a significant effect on the test sensitivity. |
| The dilution of the pharyn test (done automatically on the test plate) has failed because the system solution has run out. | Change to a new system solution bottle immediately using the Maintenance wizard. The sample must be reanalyzed. Reenter the patient information and print a new bar code label. Addition of RTI Sample Buffer to sample tube is not needed. Insert the sample tube into the sample tube rack gently to prevent it from getting stuck. Vortex the sample tube for 10–15 seconds.<br>The measuring program calculates consumption of system solution and will not work correctly if a user changes the bottle before a notification is given by the measuring program or if a notification is ignored. |
| The stool sample contains medicinal charcoal, which prohibits the analysis. | Do not repeat sample analyses. A new stool sample can be obtained once all charcoal has been excreted from the body. |
| Control samples were inserted to the analyzer without addition of test specific sample buffer and vortexing. | Analyze a new set of control samples and make the pretreatment as instructed in chapter 5.4. |

**Problem:** The results give a reason to suspect that the samples are cross-contaminated. For example, a negative control sample gives a positive result or a borderline result (+/–) in two or more consecutive control runs.

| Reason for the problem | Solution / Action |
|---|---|
| The RTI Sample Buffer or the dispensing head of the bottletop dispenser is contaminated (cross-contamination). | Clean the outside of the bottletop dispenser by wiping with 70% ethanol or similar. Dispense 10 times into the drain to rinse the dispensing head. Change to a new RTI Sample Buffer bottle and dispense 10 times into the drain again. If required the bottletop dispenser can be autoclaved by following the manufacturer´s instructions. Remember to recalibrate the dispenser after autoclaving. |
| The Gastro Sample Buffer or the dispensing head of the bottletop dispenser is contaminated (cross-contamination suspicion). | Clean the outside of the bottletop dispenser by wiping the visible stain with disposable paper and then with disposable paper moistened with detergent. Then clean the outside with chlorine solution (preferably 1000 ppm) because several fecal pathogens (e.g. norovirus) tolerate cleaning with ethanol. For the final cleaning use water or/and 70% ethanol (or similar) to remove chlorine residues from the dispensing head. Dispense 10 times into the drain to rinse the dispensing head. Additionally Ultraviolet C (UV-C) light or autoclave can be used. Remember to follow the manufacturer´s instructions and recalibrate the dispenser after autoclaving. Change to a new Gastro Sample Buffer bottle and dispense 10 times into the drain. |
| Between samples, the scissors have not been adequately cleaned. | Check the procedure for cleaning the scissors. Clean the scissors carefully between samples using 70% ethanol or similar and then wiping them with disposable paper. |
| The wash solution has run out. | Change a new wash solution bottle immediately. Select “Change wash solution container” from the “Maintenance wizard” that can be opened from the drop-down menu “More options”. Interpret the results with caution.<br>The measuring program calculates consumption of wash solution and will not work correctly if a user changes the bottle before a notification is given by the measuring program or if a notification is ignored. |

**Problem:** The result for a negative control sample is reported with a borderline symbol +/–.

| Reason for the problem | Solution / Action |
|---|---|
| The analysis signal of negative samples or negative controls can occasionally be close to the cut off due to statistical reasons. Nevertheless, borderline result is lower than the clinical cut off set by the manufacturer for reporting of positive findings. | Result for a negative control with a borderline symbol (+/–) should be considered by default as negative. |

**Problem:** The result for a positive control sample is negative.

| Reason for the problem | Solution / Action |
|---|---|
| The test reagents or the control sample have been spoiled or the control sample treatment instructions, for example mixing and/or settling, have not been followed. | Make sure that the test plate or the control sample have not been stored contrary to the instructions and that the control sample pretreatment length has been in accordance with the instructions. The control sample must not be treated with the extraction solutions intended for the pharyn test. Repeat the test using a new control sample. If the negative result recurs, contact customer support. |

**Problem:** 3 or more positive virus results from a single patient sample.

| Reason for the problem | Solution / Action |
|---|---|
| HAMA (human anti-mouse antibody) response or other interfering agent causes unspecific binding in the antigen detection reaction. There are multiple pathogens (e.g. sewer water based illness). | Consider the results with caution and compare the results to existing clinical and epidemiological data. If possible, resample the patient. Reanalyzing the respiratory sample can reduce the amount of interference and increase the reliability of analysis. However, there is a risk that some false positives still remain and this complicates the use of the result in clinical decision-making. If you decide to reanalyze the sample, add approximately 1 ml of the RTI Sample Buffer to the failed sample, and vortex the sample tube for 10–15 seconds. The solution level should be about 2/3 of the sample tube height. Reenter the patient information and print a new bar code label. Insert the sample tube into the sample tube rack gently to prevent it from getting stuck. Aspirate sample to be reanalyzed after addition of RTI Sample Buffer must be vortexed for 10–15 sec and centrifuged before inserting it into the analyzer.<br>For stool sample, repeat the sample pretreatment or resample the patient if possible. Reanalyzing the stool sample after freeze-thaw treatment may reduce the amount of interference and increase the reliability of analysis. However, there is a possibility that some false positives still remain and this complicates the use of the result in clinical decision-making. Consider using other methods to confirm the results. Note, however, that the interfering agent may also affect the reliability of other methods. |

**Problem:** *C. difficile* GDH test gives a negative while Toxin A/B test gives a positive result.

| Reason for the problem | Solution / Action |
|---|---|
| *C. difficile* GDH negative but Toxin A/B positive result is caused by cross-reaction with *C. sordellii* toxins. | Negative GDH but positive toxin A/B result should be considered invalid by default. Make the pretreatment again from the naïve stool sample if there is sample left. If there is no naïve sample left, re-filter the pretreated sample. Before re-filtering, add Gastro Sample Buffer (if needed) until the total sample volume is approximately 2.3 ml to ensure enough (1.3 ml) flow-through after the second filtration. However, please note that dilution may have a significant effect on the test sensitivity.<br>Cross-reaction with *C. sordellii* toxins is a known property of the mariPOC® Toxin A/B test and some other commercially available *C. difficile* toxin tests. *C. sordellii* toxins are homologous to toxins produced by *C. difficile*. *C. sordellii* is a pathogen with clinical relevance. Therefore, if the results persist after re-analysis, *C. sordellii* should be suspected and further tested with other methods. |

**Problem:** Not enough sample solution in the gastro sample tube after filtration.

| Reason for the problem | Solution / Action |
|---|---|
| Too little Gastro Sample Buffer was used to suspend the sample, filter was blocked, there was too much of stool in the swab or the stool was too firm. | Make the pretreatment again from the naïve stool sample if there is sample left. Pay attention to the Gastro Sample Buffer amount. If the sample volume is still not sufficient (≥1.3 ml) after filtration, combine the two pretreated samples.<br>If there is no naïve sample left, re-filter the pretreated sample. Add Gastro Sample Buffer until the total sample volume is approximately 2.3 ml to ensure enough (1.3 ml) flow-through after the second filtration. However, please note that dilution may have a significant effect on the test sensitivity. |

**Problem:** There is a red exclamation mark (!) next to the negative result.

| Reason for the problem | Solution / Action |
|---|---|
| A positive preliminary result was changed into a negative result in the final analysis. Incorrect positive preliminary result may be due to an interfering substance present in the sample. The substance is most often is inactivated during the incubation. | Report the result as a negative finding. The final result is more specific than the rapid preliminary result. |

## 9 Test System Technical Data

**Analyzer**

- Dimensions: 41 x 50 x 41cm
- Weight: 32 kg
- Serial and type numbers: see the type plate located on the backside the analyzer
- Voltage: mains electricity supply 230 V, 50 Hz
- Input power: 25 W
- Accessories (application dependent): ArcDiagnoser™ measuring program, Ethernet switch and cables, power supply, computer with display, keyboard, mouse, label printer, label tape cartridge, bottletop dispenser with stand, vortex mixer, sample tube rack, sample tube box, sample tube cap box, filtration unit rack, test plate storage rack, User's manual, rapid instructions and material safety data sheets
- Plastic consumables (application dependent): sample tube, sample tube cap, swab in transport tube, syringe, filter and Pasteur pipette

**Chemical Composition**

- Test plates: pathogen specific biochemical reagents (immunoglobulins) and buffer components (under 0.1% $NaN_3$) dried on a test plate and covered hermetically
- Negative RTI control samples: buffer components (under 0.1% $NaN_3$)
- Negative gastro control samples: no notifiable chemical components
- Positive control samples: inactivated and possibly infectious viral and bacterial preparations, recombinant proteins and buffer components (under 0.1% $NaN_3$)
- RTI Sample Buffer: buffer components, surface active agents, bovine serum albumin (BSA) and $NaN_3$ (under 0.1%)
- Gastro Sample Buffer: buffer components, surface active agents, bovine serum albumin (BSA) and $NaN_3$ (under 0.1%)
- Wash solution: alkaline (pH 12) non-foaming wash solution
- System solution: buffer components, surface active agents and $NaN_3$ (under 0.1%)
- Extraction solution A: sodium nitrite (Warning: Acute Tox. 4, Harmful if swallowed)
- Extraction solution B: buffer components, acidic solution

For more information about chemical composition, H-statements and R-phrases, please see the material safety data sheets (MSDS).

## 10 Symbols Description

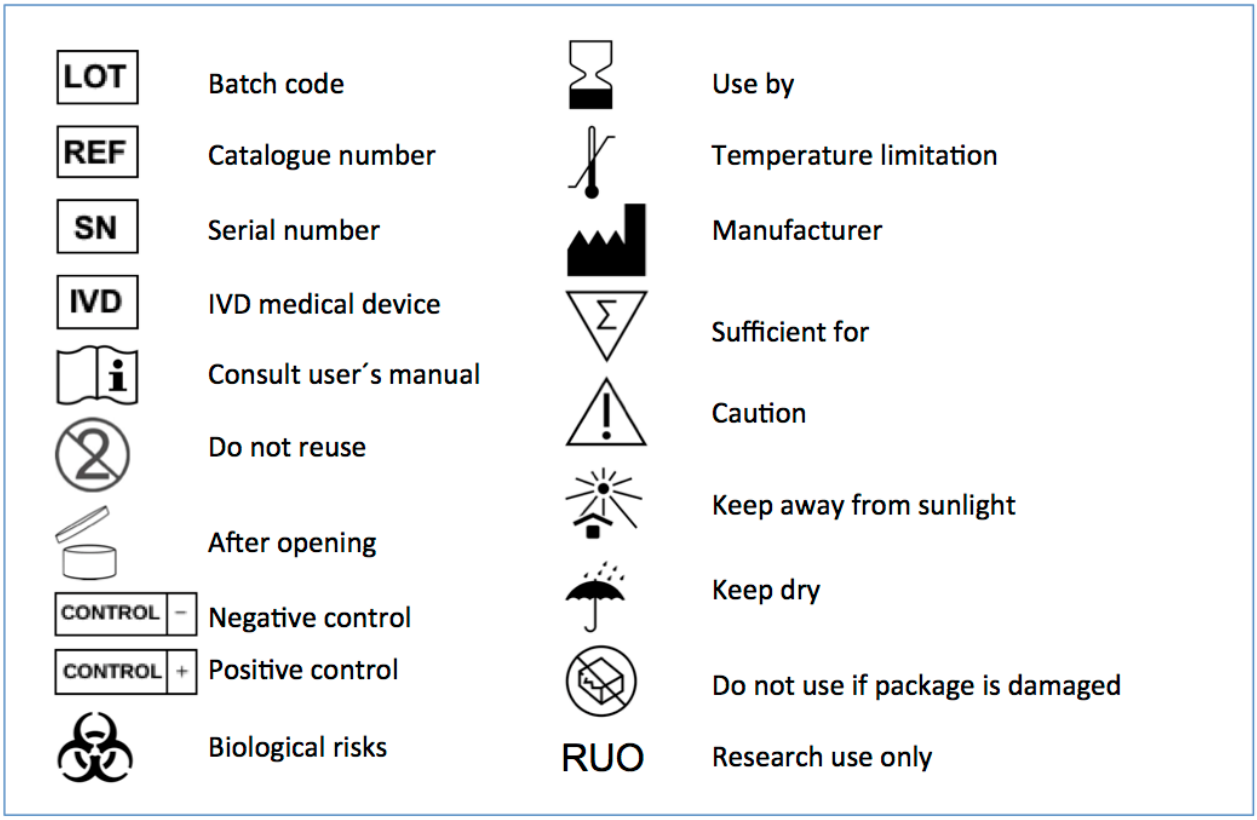


**Figure 40.** Description of the symbols in the User's manual and on labels.

## 11 Warranty

The mariPOC® test system has a 12 month warranty. The warranty begins when installation is accepted by the User. The warranty does not cover damage caused by use contrary to the Manufacturer's instructions.

The warranty on the test's consumables only covers defects in manufacture process and damage during transportation. The Manufacturer guarantees the reliability of the tests until their use-by date, which is stated on package. The User is responsible for storing each component in the condition defined in the User's manual.

Repairs, adjustments and other changes to the test system may only be performed by persons authorized by ArcDia International Oy Ltd. If you suspect that the test system is faulty contact the aforementioned entities immediately.

## 12 Literature

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No Cross-Reactions Detected by mariPOC® Group A Streptococci Antigen Test with Streptococcus anginosus. Antikainen P, et al. GAS Infections 2013, Rome, Italy. Abstract and poster.

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Rapid Method for Detection of Influenza A and B Virus Antigens by Use of a Two-Photon Excitation Assay Technique and Dry-Chemistry Reagents. Koskinen JO, et al. J Clin Microbiol. (2007) 45(11): 3581-8.

A New Microvolume Technique for Bioaffinity Assays Using Two-Photon Excitation. Hänninen P, et al. Nat Biotechnol. (2000) 18(5):548-50.

## 13 Manufacturer´s Contact Details



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FOR IN VITRO DIAGNOSTICS

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