Operator's Manual

NorDiag Arrow

NorDiag
Automated Solutions for Diagnostics

Related Documents

Reference	Document	Doc. ID
[1]	Installation Manual for NorDiag Arrow	SA001
[2]	Service Manual for NorDiag Arrow	SA003
[3]	Decontamination Declaration	SAF010
[4]	IQ and OQ form for placement of NorDiag Arrow	SAF002
[5]	PQ form Arrow	SAF001

Information provided in this document by NorDiag ASA is considered accurate and reliable. The information contained in this document is subject to change without notice. However, the operator is responsible for the correct use of the product.

If the operator does not follow the instructions given in this manual or if the operator uses the instrument for other than the intended purpose, NorDiag ASA accepts no responsibility for injury to laboratory personnel or damage to the equipment.

CE- Declaration of Conformity

The instrument is CE marked as an IVD device. The CE mark declares that the instrument conforms to the directive 98/79/EC of 27 October 1998 on *In Vitro Diagnostic* Medical Devices and the harmonised standards.

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Please check the NorDiag website for distributors in your country.

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Contents

1 INTRODUCTION

1.1 NorDiag Arrow automated extraction instrument

The NorDiag Arrow instrument is a fully automated liquid handling robot, designed for automation of routine laboratory tasks.

The NorDiag Arrow instrument can be unpacked and installed by a laboratory staff following the unpacking and installation procedures from NorDiag ASA. (NOTE: This is currently done by NorDiag trained staff)

Table 1: The NorDiag Arrow is available in one size.

Instrument Type	No. of robotic arms	No. of pipetting channels per arm
ARROW	1	12

The NorDiag Arrow instrument consists of the following basic components:

- Deck with embedded computing chip, and external power supply.
- Robotic arm with 12 pipetting units.
- Barcode reader for scanning barcodes on tubes.
- Heating block.
- UV lamp for decontamination.

1.1.1 Intended Use

The NorDiag Arrow pipetting instrument is intended to be used by laboratory personnel and scientists trained in molecular biology. It is designed to be used for purifying and concentrating DNA or RNA from biological material such as blood, tissue, stool, urine and epithelial cells. In particular, this applies to sample concentration intended to purify nucleic acids for further analysis with a CE IVD marked detection system for diagnostic use.

The operator is responsible for correct use of the NorDiag Arrow pipetting instrument according to all local, state and federal laws that may apply. All precautions must be followed to ensure safe operation of the product. (see “Safety” in sections 2 and 3).

1.2 About this Manual

Before using the NorDiag Arrow pipetting instrument, please read this manual in its entirety. The information here is crucial to the proper operation and maintenance of the product.

View the manual as part of the product and keep it somewhere easily accessible.

Operators must be able to consult the manual at any time. Information provided in this manual by NorDiag ASA is considered accurate and reliable. However, the operator is responsible for the correct use of the product. If the operator does not follow the instructions given in this manual, or if the operator uses the product for other than the intended purpose, NorDiag ASA accepts no responsibility for injury to laboratory personnel, damage to the equipment, or erroneous results.

NorDiag ASA has carefully reviewed this manual in order to avoid errors in text and figures. Information provided in this document by NorDiag is considered accurate and reliable at the time of writing. The information contained in this document is subject to change without notice. NorDiag ASA assumes no responsibility for any event that may occur due to errors in this manual. This manual is supplied with every instrument.

1.2.1 Purpose of the Operator’s Manual

The Operator’s Manual provides basic information for the use, operation and maintenance of the NorDiag Arrow instrument

This manual must be read and understood by all personnel working with a NorDiag Arrow instrument. It covers the basic information required to operate an instrument and is therefore a compulsory part of any NorDiag Arrow training.

1.2.2 Version Management and Related Documents

The version number of this manual can be found in the page footer of each page. Any updates of the manual will lead to an amendment of the document version number. The version management follows the regulations of NorDiag's quality management procedures.

1.2.3 Location of the Operator's Manual

All technical documentation delivered with the NorDiag Arrow instrument should be kept near the instrument. Operators and Service Technicians must be able to consult the manual at any time.

Always use latest version of technical documentation provided by NorDiag ASA.

1.2.4 Operator

To qualify for instrument operation you must have read this manual, and the related instructions for use for the kits to be used. In addition the installation manual should be part of the training prior to the use of the instrument (Installation is currently done by an operator trained by NorDiag). The safety rules and regulations described in the manual are of particular importance, and must be fully understood. If in doubt contact your local NorDiag representative.

A qualified operator refers to a trained person who uses the NorDiag Arrow instrument within the limits of its intended purpose:

- To prepare a run for a defined protocol.
- To start a protocol
- To perform daily preventive maintenance including minor corrective actions.

1.2.5 Service Technician

To qualify for instrument servicing you must attend a NorDiag Arrow Service Technician course and pass the final certification test.

The course covers the full content of this Operator's Manual, the NorDiag Arrow Installation Manual[1], and the NorDiag Arrow Service Manual[2], including all operational safety rules and regulations. The course is provided by a NorDiag Arrow approved Service Trainer.

The qualification Service Technician refers to a trained person responsible for:

- Instrument installation and calibration
- Instrument operating qualification.
- Periodic servicing including major corrective actions.
- Service and/or upgrade qualification.

Initial installation, annual servicing, and upgrades must only be performed by a NorDiag Arrow approved Service Technician.

1.3 Policy Statement

It is the policy of NorDiag ASA to continuously improve its products as new technology or components become available to better meet our customers' requirements. NorDiag ASA reserves the right to change specifications at any time.

Major changes to existing products will only be implemented after notification to customers.

1.4 Intended Audience

This manual is intended for trained medical personnel such as laboratory personnel and scientists.

1.5 Hazard Notices

The Warnings and Precautions section of this manual (see “Safety Instructions” section 2) contains important information about the safety of operators, third parties, and also the physical integrity of the equipment. This information is presented in the form of hazard notices. Read these hazard notices before using the NorDiag Arrow pipetting instrument, and follow the hazard precautions at all times.

1.6 Text Formats

The following is a list of text formats found in the operator’s manual:

Text Format	Definition
<Bold within brackets>	Button labels on the touch screen

1.7 Terms and Definitions

The following is a list of terms and their definitions, in alphabetical order, used throughout the manual:

Term	Definition
Accessories:	Supplementary items used on the instrument, such as magnet plate, pipettes, racks, cartridges, eppendorf tubes.
Adapter	These are used for proper fitting of different sample input tubes.
Cartridge:	A disposable accessory for the instrument. It is a pre-filled sealed container with separate wells for each solution/buffer. This is provided in the kits sold by NorDiag
Eluate:	The processed output ready for further analysis.
Elution position:	The position on the rack for the elution tube.
Heating block:	A device that heats up the wells in the incubation positions to a given temperature. Incubation positions: The positions in which heating can take place. The NorDiag Arrow pipetting instrument has two incubation positions. One that is integrated for use with disposable cartridges and another that can hold a standard eppendorf tube.
Instrument:	The product without accessories.
Magnet plate:	An accessory on the instrument that is used to position magnets. The magnet plate can be moved against and away from the cartridge wells by the instrument.
Magnet position:	The position in the disposable cartridge where the magnet can be attached. The magnet is used to attract beads in a solution.
Pipette:	A disposable accessory for the instrument. It consists of two parts, the pipette and the bellows pump.
Platform:	The area on the instrument on which the rack rests.
Process chamber:	The area on the instrument that holds the rack, pipetting arm, heating block etc.
Protocol:	A script that defines a sequence of tasks (mainly movements, heating, timers and pipettings) for the instrument.
Rack:	An accessory on the instrument that can hold one or more disposable cartridges, sample tubes and elution tubes.
Run:	The execution of a protocol, can be performed with 1-12 cartridges.
Sample position:	The position on the rack for the primary sample tube.
Well:	The container for liquids in the disposable cartridges.

2 SAFETY INSTRUCTIONS

2.1 Introduction

This chapter contains information to ensure safe operation of the NorDiag Arrow instrument . Detailed instructions regarding safety are provided throughout this manual, marked with warning and caution symbols as described in section 2.3.

2.2 Safety regulations

This chapter addresses Operators and Service Technicians, to protect both personnel and laboratory equipment. All precautions must be taken to ensure safe operation of the NorDiag Arrow instrument.

The Operator (Section 1.2.4) is responsible for the correct use of the NorDiag Arrow instrument, following the instructions given in this manual and in full accordance with all local, state and federal laws that may apply.

The NorDiag Arrow instrument must only be operated at optimal operating conditions (Section 5.2.1). Maintenance procedures (Section 5.6) must be performed prior to using the instrument. Failure to maintain the NorDiag Arrow instrument according to the instructions given in this manual may result in operating disruptions and potentially incorrect results.

Liability is lost if the NorDiag Arrow instrument is implemented into other systems or modified other than described in this manual, by untrained personnel.

In the case of safety-relevant defects of either the equipment or related documentation, all operators are obliged to immediately inform NorDiag via customer support channels (Section 13).

2.3 Symbols

Below is an illustrated glossary of the symbols that are used on the NorDiag Arrow pipetting instrument and in the manual. Every time one of the symbols appear the user should consult the manual for an explanation of the potential hazard, and the actions that need to be taken in order to minimize the hazard. The interpretation of the symbols and actions to be taken reads as follows:

WARNING: Yellow triangles indicate general warnings. Warnings include risk of injury to the operator or damage to the equipment. Consult the manual for further instructions and proceed with caution.

WARNING: This symbol indicates risk of loss of life or severe injury to the operator due to high voltage. Consult the manual for further instructions and proceed with caution.

WARNING: This symbol indicates risk of injury to the operator due to hot surfaces. Consult the manual for further instructions and proceed with caution.

WARNING: This symbol indicates risk of loss of life, severe injury to the operator, or equipment damage due to bio-hazardous material.

WASTE INFO: The crossed-out wheelie bin symbol indicates separate collection for electrical and electronic equipment. The bar under the crossed-out wheelie bin symbol indicates that a product was placed on the market after the 13th of August 2005.

CAUTION:	**This symbol indicates the risk of equipment damage or loss of data if instructions in the manual are not followed precisely. It is therefore strongly recommended that the operator consult the corresponding chapters in related documentation.**

NOTE:	**This symbol indicates important information about the NorDiag Arrow instrument and its recommended operation. Please read these instructions carefully.**

3 SAFETY HAZARDS

3.1 Introduction

The NorDiag Arrow pipetting instrument is designed to meet stringent safety standards. As all medical equipment, the instrument requires proper installation, operation, and maintenance to function.

It is vital that operators read, understand and strictly observe all safety instructions in this chapter and throughout the manual to help ensure the safety of operators and third parties.

3.2 Warnings and Precautions

Hazard warnings are posted throughout this manual to notify users of possible hazards. This section provides general warnings and precautions for safe and effective operation of the NorDiag Arrow pipetting instrument. It also gives more detailed information about hazards and instructions on how to avoid them. For more information about the warning symbols and how they should be interpreted, see Symbols in section 2.3.

3.3 Electrical Hazards

The instrument must be supplied with +24V DC. Only use the recommended power supply unit, this is supplied with the instrument. Check the power supply unit for cracks, splits or any visible damage before use. **Do not** place the power supply unit near wet areas or small non-vented compartments.

3.4 EMC (Electro Magnetic Compatibility)

The instrument is designed to comply with the EMC-requirements according to the Standard IEC 61326-2-6:2006. Never use the instrument near strong electromagnetic fields. Always connect the power supply unit to outlets equipped with protective ground.

3.5 Heating Block

The instrument is equipped with a heating block, with temperatures of up to 100°C (212°F). The cooling down process is slow, so, even though the instrument may be finished with its run, **do not** touch or clean the heating block or the area surrounding it for at least 30 minutes after a run is finished. The instrument is also equipped with an overheating sensor, this sensor is released at 128°C (262,4°F) and will cut the power to the heating block.

3.6 UV Lamp

The instrument is equipped with a UV Lamp for decontamination, Osram HNS-S-9W 2G7. The lamp can only be activated from the <user menu>, choosing a decontamination protocol. The protocol will not start if the door is not properly closed, or if the instrument is in service mode. To avoid skin burns and damage to the eyes, never attempt to override the door-sensor. The UV-light source does not generate Ozone. The UV Lamp is mounted on the back side of the pipetting arm and should be changed after 8000hrs of running. This should be done by personnel trained in the operation. Never touch the surface of the lamp with bare hands, use gloves. Always disconnect the instrument from the power contact before working inside the instrument.

3.7 Barcode Reader

The instrument is equipped with a barcode reader. The barcode reader for the NorDiag Arrow pipetting instrument operates automatically and emits laser beam at 650nm (CDRH Class II, IEC Class 2).
Do not look into the laser beam as it could potentially cause damage to the eyes.

3.8 Moving Parts

The instrument is equipped with a moving pipetting arm, as well as a sensor which detects if the door of the instrument is opened or closed. The door **must be** properly closed before any protocol can be started. If the door is opened during a run, the run will abort, and the instrument will stop immediately. **Do not** attempt to override the sensor and **do not** place your hands inside the instrument near mechanical moving parts. For safety reasons, disconnect the instrument from the power contact before working inside the instrument.

In order to safely access the process chamber during a run the instrument needs to be Paused and safely parked before opening the door. The door needs to be properly closed again before continuation is possible.

3.9 External connections to the Ethernet port

The external computing devices connected to the Ethernet interface connector of the product must comply with the standards, UL 60950 for US, CAN/CSA-C22.2 No. 60950 for Canada and IEC60950-1 for other countries. The Ethernet interface connector shall only be connected to SELV circuits.

3.10 Chemical Resistance

The NorDiag Arrow pipetting instrument is designed to handle the most commonly used chemicals:

Never use acetone or petrol solutions inside (process chamber) or on the surface of the instrument.

Warning: Patient safety
The product must not be used in any way other than the intended use and must be used according to the operator's manual. Failure to do so could result in compromised patient safety and/or result in insufficient result.

Warning: Poor safety due to missing operator's manual
If the instrument is transferred to a different location, always enclose an operator's manual.
If the operator's manual is lost, request a replacement.

Warning: Clothing
Always wear protective clothing (lab coat, protective gloves, safety glasses) according to laboratory regulations to minimize exposure to potentially infectious material and hazardous chemicals.

Warning: Risk to health from contaminated instrument
Perform decontamination before storing or after using the instrument and/or its accessories.
For more information, see "Cleaning and Decontamination" in section 5.6.

Warning: Liquid handling
Potential hazards to personnel may exist as a result of the liquid handling aspects of the instrument. The "hands-off" operating features of the system minimize exposure to these agents. However; the potential for hazardous exposure still exists.

- All liquid and solid material must be considered a biohazard and therefore handled using universal laboratory precautions.
- All clinical samples must be considered potentially infectious.
- Toxic and/or corrosive chemical substances may be present.

4 UNPACKING, PACKING AND TRANSPORTATION

4.1 Unpacking Packing and transportation

Read the following instructions carefully before unpacking the instrument

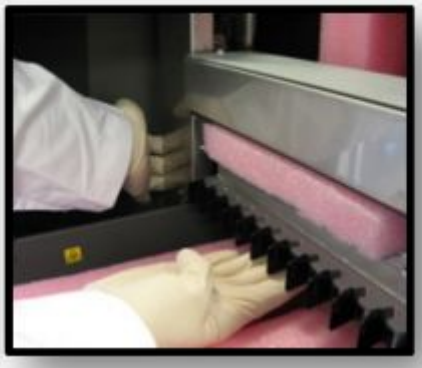
PLEASE STORE ALL PACKAGING MATERIAL, AS YOU MIGHT NEED IT FOR REPACKING THE INSTRUMENT

- Open the lid on top of the instrument box. Remove items from the sides of the instrument.

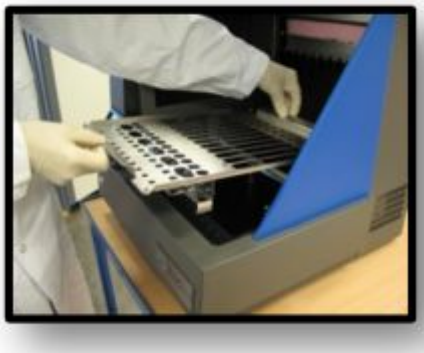
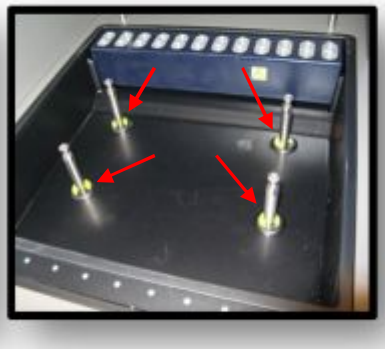
- The power adapter, cable, magnet plate, tube adapter (two sets), tools and plastic for calibration and a USB with protocols come with the instrument. Placed on the sides upon arrival.

- Lift up the instrument and place it on a table. Remove the outer styrofoam.

- Remove the styrofoam from the inside of the instrument (3 pieces), begin with the middle piece.
- There is an arm release lever on the left side of the arm, lift the lever and the arm simultaneously and place the arm in the top middle position.
- Then carefully, slide out the Styrofoam piece that is under and behind the arm. Release the lever again and move the arm to its parking position (up to the back).
- Finally remove the small Styrofoam piece in the pump section of the arm.



- Take out the Arrow rack. Remove the yellow transportation protection devices from the four magnet pins (see arrows).
- Place the magnet in the instrument so that it rests on top of the four magnet pins.
- Place the Arrow rack back into the instrument, correct positioning is ensured by the two location pins in the back.

- Plug power adapter with cable into the instrument and into the wall socket. The adapter can be used from 110V-240V.
- Turn the instrument on with the On/Off switch at the back of the instrument.
- Close the door on the instrument and turn it on at the front left side.
- Push **<continue>** to initialize the instrument. The arm will move to its parking position if it is not there already.

The instrument is now ready for Installation; please refer to the Operator's manual for Arrow and Instructions for Use for each Arrow kit for further information.

REPACKING IS DONE IN A SIMILAR WAY BUT IN THE REVERSE ORDER. NOTE THAT ALL THE ACCESSORIES SHOULD BE PACKED IN BUBBLE WRAP.
ANY DEVIATIONS FROM THESE INSTRUCTIONS MIGHT CAUSE SEVERE DAMAGE TO THE INSTRUMENT.
WARRANTY CANNOT BE CLAIMED FOR DAMAGE DUE TO INAPPROPRIATE PACKING

Use the original material for repacking only. This material has been specially designed to prevent damage to the instrument under normal shipping conditions. Follow the above unpacking instructions in reverse prior to shipping the instrument

CAUTION: For any transport of the instrument, even for very short distances, the robotic arm must be placed and fixed in the middle of the instrument (see point 4 in section 4.1).

Any deviations from these instructions may cause severe damage to the instrument.

NOTE: Warranty cannot be claimed for damage due to inappropriate packing if the Arrow is not correctly packed prior to transportation. Contact your NorDiag representative for assistance.

4.2 Moving the Arrow instrument within the lab

If the Arrow instrument is to be moved within the laboratory, the following points MUST be followed.

1. Power down the instrument and remove the power cord from the Arrow instrument
2. Remove any cartridges, sample tubes, pumps, or elution tubes from the instrument.
3. Remove the magnet from the instrument, and replace the Arrow Rack in the instrument.
4. Lift the arm out of its parking position and insert the original polystyrene packing materials into the Arrow instrument. See step 4 of the above unpacking instructions.
5. The instrument should be lifted by the gray ledge that goes around the sides and front of the instrument, never lift the instrument by its front door handle. Always keep the instrument level when moving, and NEVER attempt to lift or move the instrument alone.
6. Once moved, remove all packaging and test the instrument in accordance with the Installation manual prior to use.

5 PRODUCT DESCRIPTION

5.1 Introduction

This chapter gives an overview of the instrument layout and its features. It also covers information regarding maintenance as well as final disposal of the instrument and its accessories The NorDiag Arrow pipetting instrument is precision designed for automating pipetting tasks in laboratories. The instrument is able to process 1-12 samples in parallel.

5.1.1 Product identification and labeling

Product identification details and applicable conformity approvals can be found on the type plate at the back of every Arrow instrument.

Information provided on the type plate is specific for the NorDiag Arrow instrument manufactured according to the order configuration sheet.

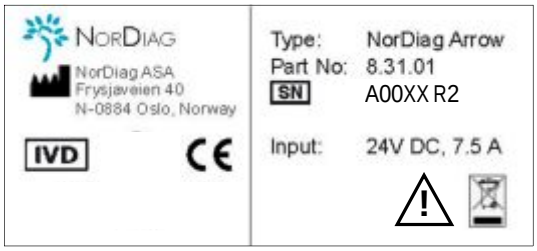


Figure 1. Example of a NorDiag Arrow type plate

The product number together with the serial number serves as a reference to identify any given NorDiag Arrow instrument. The numbers will be noted in the IQ and OQ form[4] by a trained technician at installation.

5.2 Operational Requirements

5.2.1 Environmental Requirements

The NorDiag Arrow pipetting instrument is intended for indoor operation and indoor storage only.
The table below summarizes the major environmental parameters for operation and storage.

Table 2. Environmental requirements

Parameter	Operation	Transport &Storage
Temperature	15 -32°C (59 – 90°F)	-15 -70°C (5 – 158°F)
Relative Humidity at 30°C / 86°F	30-80% non-condensing	30-80% non-condensing
Pollution Degree EN60950	2	--
Over Voltage Category	II	--
Altitude	Under 2000 m	--

5.2.2 Electrical Supply

The Arrow instrument is equipped with an external power adaptor with the following specifications: Manufacturer: FSP group Inc. FSP180-AAAN1, Specification EN/(IEC) 61326-1:2006. The mains supply cord shall comply with national regulation, please see table 14 for details.

NOTE: The mains supply cord shall be used for disconnection of mains supply. Please make sure it is not hidden and can easily be operated at all times.

Table 3. Electrical supply (see also section 14 Technical Data)

Parameter	NorDiag Arrow
Line Voltage (VAC)	100-240
Frequency (Hz)	50/60
DC output	24V, 7,5A
Fuse (A)	T6.3A/min 24VDC

5.3 Instrument Layout and connectors

The following illustration gives an overview of the instrument:

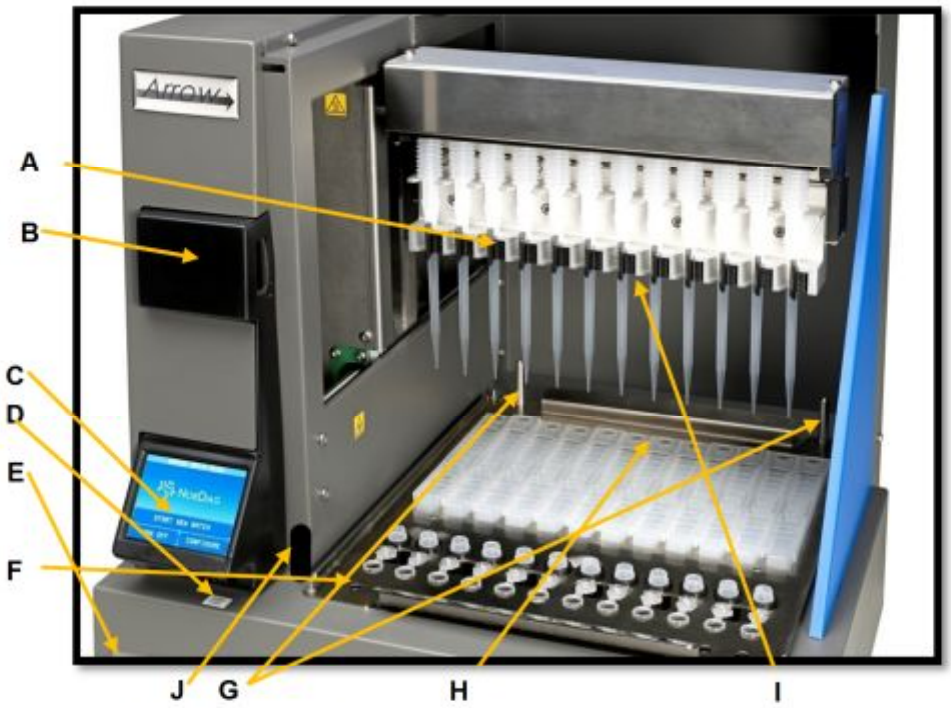


Figure 2. Instrument Layout

A	Holder for the disposable pipettes
B	Barcode reader
C	Touch screen with the USB connector underneath (not visible)
D	USB connector (underneath screen)
E	ON button
F	Light markings on the platform for guiding the user to the correct track
G	Arrow Rack resting on the Platform. Two location pins help position the rack
H	Heating block
I	UV lamp, situated under the arm
J	Door lock switch

5.3.1 Connectors on the Arrow instrument

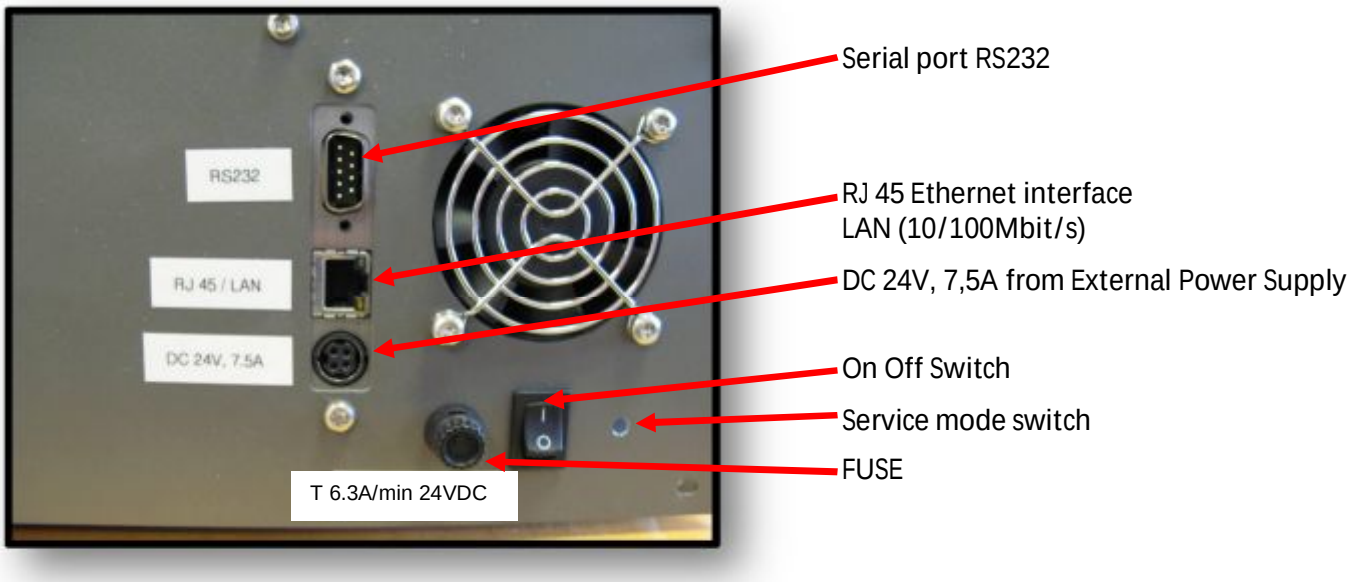


Figure 3: Display of the connectors in the back

Figure 4. On switch at the front of instrument

The Arrow instrument is equipped with an ON/OFF power switch at the back of the instrument. This needs to be on before starting the instrument with the ON button at the front. The ON/OFF switch at the back can be used as an emergency stop switch; it will cut the power to the instrument. The computer is switched off via the software on the touch screen, and should always be switched off prior to using the ON/OFF switch at the back for normal shut down of the instrument. The ON/OFF switch must at all times be available to the user, and should not be blocked in any way.

Figure 5: USB connectors under the Arrow touch screen

5.4 Product Features

The NorDiag Arrow pipetting instrument is designed to minimize the mix-up of primary sample tubes or cartridges. To enable this, the following features have been implemented:

- The loading of sample tubes, cartridges and pipettes is performed directly onto the instrument.
- An integrated barcode reader minimizes the distance and time between scanning and placing samples and cartridges.
- The instrument guides the operator through the loading process by simple and clear instructions on the touch screen, and also by the aid of light markings on the platform.

Additional features:

- The instrument has a unique mechanism for fitting the magnets under the cartridge wells.
- All components in contact with liquids (that is cartridges, pipette tips, pipette pumps and primary sample tubes) are disposable.
- The heating unit makes it possible to increase the temperature in the incubation positions to a specific temperature.
- The barcode reader can read one dimensional codes.
- USB connectivity for uploading new protocols / retrieving log files from the instrument
- RJ 45 Ethernet interface port
- RS232 Serial port.
- The integrated UV light provides efficient decontamination by illuminating the surface from different angles and from a short distance.

Arrow Accessories:

The NorDiag Arrow pipetting instrument is delivered as a stand-alone product and includes the following accessories:

- Arrow rack
- Magnet plate
- Adapters
- Power adaptor

Tips, Cartridges and bellow pumps are supplied in the NorDiag kits (see www.nordiag.com)

5.5 Accessories

The following illustrations show the accessory layout:

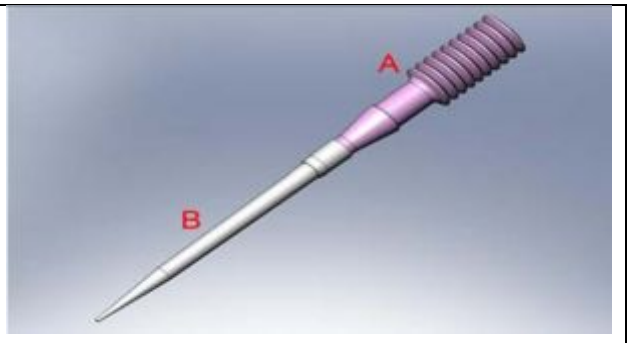
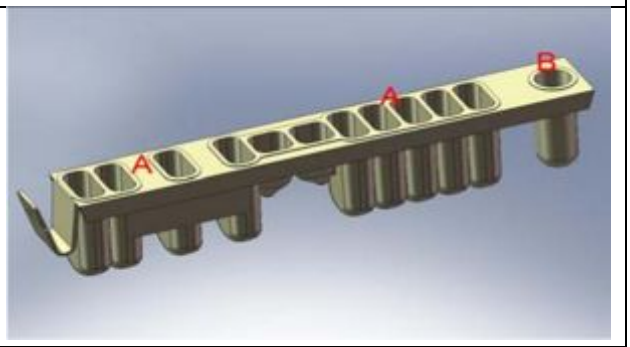
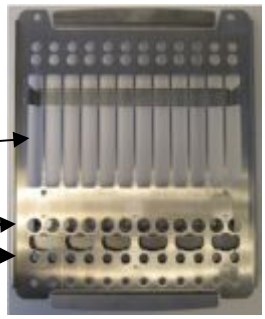
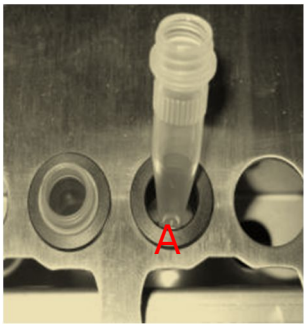
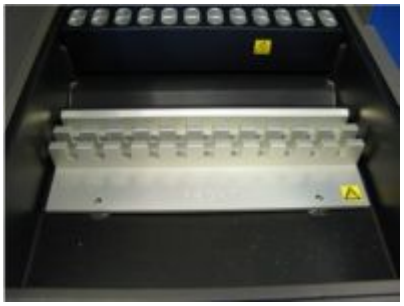
Disposable pipette in size small includes: **A** = Pump **B** = Tip	
Cartridge in size small includes: **A** = Wells **B** = Incubation position	
Arrow rack with 12 samples and cartridge positions includes: **A** = Holder for cartridges **B** = Holder for primary sample and eluate eppendorf tubes	
Adapters These are used for proper fitting of different sample input tubes **A** = Adapter	 
Magnet plate in instrument	

Figure 6. Instrument Accessories

5.5.1 Recommended Test Tubes

The following test tubes are recommended to be used with the NorDiag Arrow pipetting instrument:

Table 4. Recommended tubes

Recommended Test Tubes for Primary Sample	Recommended Test Tubes for Eluate	Test Tubes for Incubation
▪ Eppendorf micro tube 1.5 mL Sarstedt cat. no. 72.692 ▪ Eppendorf micro tube 2.0 mL Sarstedt cat. no. 72.693 ▪ Eppendorf micro tube 2.0 mL with skirted base. Sarstedt cat. no. 72.694 All without the screw cap attached.	▪ Eppendorf micro tube 1.5 mL safety cap Sarstedt cat. no. 72.690 ▪ Eppendorf safe seal micro tube 2 mL Sarstedt cat. no. 72.695	The following test tubes are recommended for use in the separate incubation positions, together with the cartridge: ▪ Eppendorf micro tube 1.5 mL Sarstedt cat. no. 72.692 ▪ Eppendorf micro tube 2.0 mL Sarstedt cat. no. 72.693 ▪ Eppendorf micro tube 2.0 mL with skirted base. Sarstedt cat. no. 72.694

5.6 Cleaning and Decontamination

All components in contact with liquids (that is cartridges, pipette tips, pipette pumps, and test tubes for primary samples and incubation) are disposable. This reduces the need for cleaning and decontamination. However, the instrument must be decontaminated according to standard laboratory regulations. Be aware of any spillage during operation. If the operator suspects that fluid has entered the mechanisms or electronics of the instrument, notify a NorDiag service engineer for advice.

Primary Maintenance

The primary maintenance requirement for the instrument is to keep the rack, the heating block, magnet plate, the black plastic trough and the inside of the process chamber clean. The UV protocol can be used for additional contamination control of the instrument.

Upon completion of each run perform the following:
First, wipe the surfaces with 70% ethanol to inactivate microorganisms and to avoid residue buildup.
If necessary, wipe the surfaces with water or a mild detergent to clean the process chamber.

The following components can be lifted or removed from the instrument to facilitate cleaning:

- Rack
- Magnet plate
- Heating block

Warning: Damage and corrosion from spilled liquid
Disconnect the power plug if a large quantity of liquid is involved. Mop up spilled liquid immediately.

Warning: Liquid on the touch screen
Do not allow the Instrument's touch screen to get wet as permanent damage may occur.

Warning: Cleaning agents
The use of cleaning agents other than those stipulated in the cleaning instructions may cause damage to the equipment. Strong detergents may dissolve racks and instrument surface coatings.

Warning: UV light protocol
The use of the UV light protocol must be carried out with the door of the instrument closed.

For further assistance on cleaning and decontamination, ask your NorDiag Arrow distributor for advice.

5.7 Final Disposal of Instrument and Accessories

The term ‘final disposal’ refers to the disposal of the instrument, or any component of it, in such a way that the instrument or part can no longer be used for its intended purpose(s). Disposal must always be executed in an environmentally safe manner that complies with all local and international regulations and laws. Materials hazardous to human health and the environment must be removed separately and disposed through competent, licensed facilities. The remaining material may be recycled where facilities and local regulations permit.

The crossed-out wheelie bin symbol indicates separate collection for electrical and electronic equipment. The bar under the crossed-out wheelie bin symbol indicates that a product was placed on the market after the 13th of August 2005.

Consumers will be able to return their instrument free of charge through a dedicated recycling company that the producers or distributors will be registered with. For details on what recycling company applies for each country/region for the recycling of your NorDiag Arrow instrument, please contact your local NorDiag representative.

6 STARTING UP THE INSTRUMENT

6.1 Introduction

This chapter provides information on the procedures necessary for starting the NorDiag Arrow pipetting instrument. Read the entire Operators Manual and particularly this section carefully before unpacking and starting the NorDiag Arrow pipetting instrument.

6.2 Installation and calibration

To install the NorDiag Arrow pipetting instrument, please use the Installation Manual[1] (Currently performed by NorDiag trained personnel.)

Unpacking and Placement

Follow the unpacking instructions in section 4. Make sure that the surface is large enough to fit the instrument, and that there is enough free space above the instrument for the door to open freely. Never use the handle on the door for moving or lifting the instrument.

Warning: Damage due to unstable work surface
Make sure that the work surface is stable, level and sturdy so it can hold the instrument's weight. Use a spirit level to check that the table is level and adjust the table feet if required/possible.

Warning: Distance from other medical devices
The instrument may disturb the operation of other medical devices. In order to minimize this, a distance of at least 1 meter (3 feet) from the instrument, including cables is recommended.

Warning: Damage due to overheating
Overheating can lead to eluate of low quality and also damage to the equipment.

- Do not place the instrument close to sources of heat (e.g. radiator or drying cabinet).
- Do not expose the device to direct sunlight.
- Allow air to circulate freely by leaving at least 6 centimeters (0,18 feet) to adjoining devices or to the nearest wall.

Warning: The instrument must be fed with 24V DC with ESD earth. Only use the transformer supplied with the instrument or one that has been recommended by NorDiag.

1. To start the instrument press the ON/OFF switch at the back of the instrument first, then press the ON button situated in the bottom left corner on the front side (see section 5.3).

Warning: Electric shock from damage to power cord
Do not switch the instrument on if the power cord is damaged.

2. Wait about 30 seconds while the operating system starts. The touch screen shows the **Initializing menu.**
3. Make sure the door is closed and that NO pumps are loaded, press <**CONTINUE**> to let the motors find their home positions.

Figure 7. The initialize menu

4. When the initialization is finalized, the touch screen will show the **Main Menu**. The instrument is now ready for use. From the **Main Menu** the following can be performed:

   - Press <**START NEW BATCH**> to run a loading process in preparation for a protocol.

   - Press <**CONFIGURE**> to show the configuration options. For more information, see **The Configure Menu** section 11.

Figure 8. Main Menu

7 LOADING THE INSTRUMENT WITH PLASTIC DISPOSABLES

7.1 Pump-tip assembly

Hold the pump and press it down into the tip while the tip is in the tip box, press down until the pump and tip are well connected and sealed.

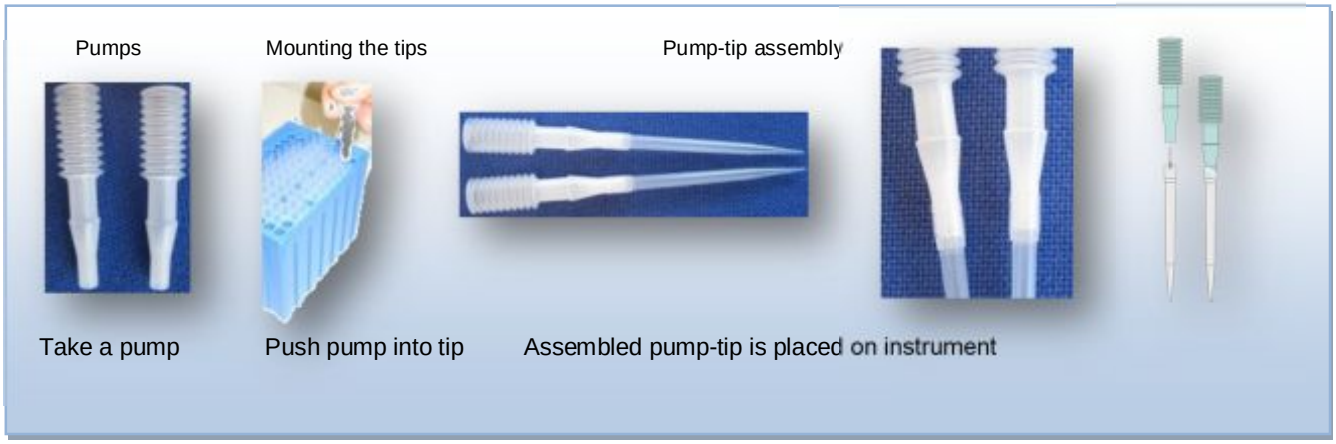


Figure 9.Pump-tip assembly

7.2 Mounting of pump-tip onto the instrument:

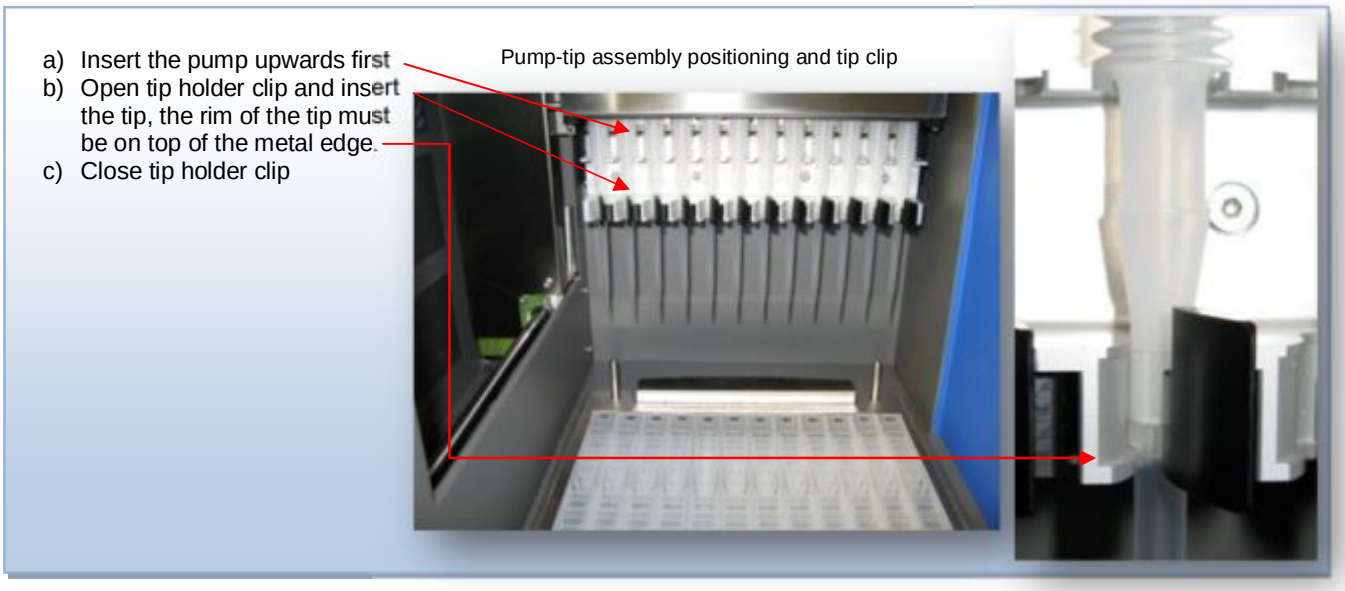


Figure 10. Mounting pump-tip into instrument

8 PLACING CARTRIDGES ONTO THE INSTRUMENT

Place the Cartridge onto the Arrow rack (see section 5.5) and make sure that the front is secured by the plastic lock on the Cartridge prior to peeling the foil on the cartridge. Note! The foil on the cartridges MUST be peeled off prior to starting a run.

Example of prefilled and sealed cartridge

Figure 11. Prefilled and sealed cartridge

Example of prefilled and sealed cartridge

Figure 12. Sealed Cartridge

Example of Prefilled and peeled cartridge

Figure 13. Peeled Cartridge

Peeling of cartridge seal

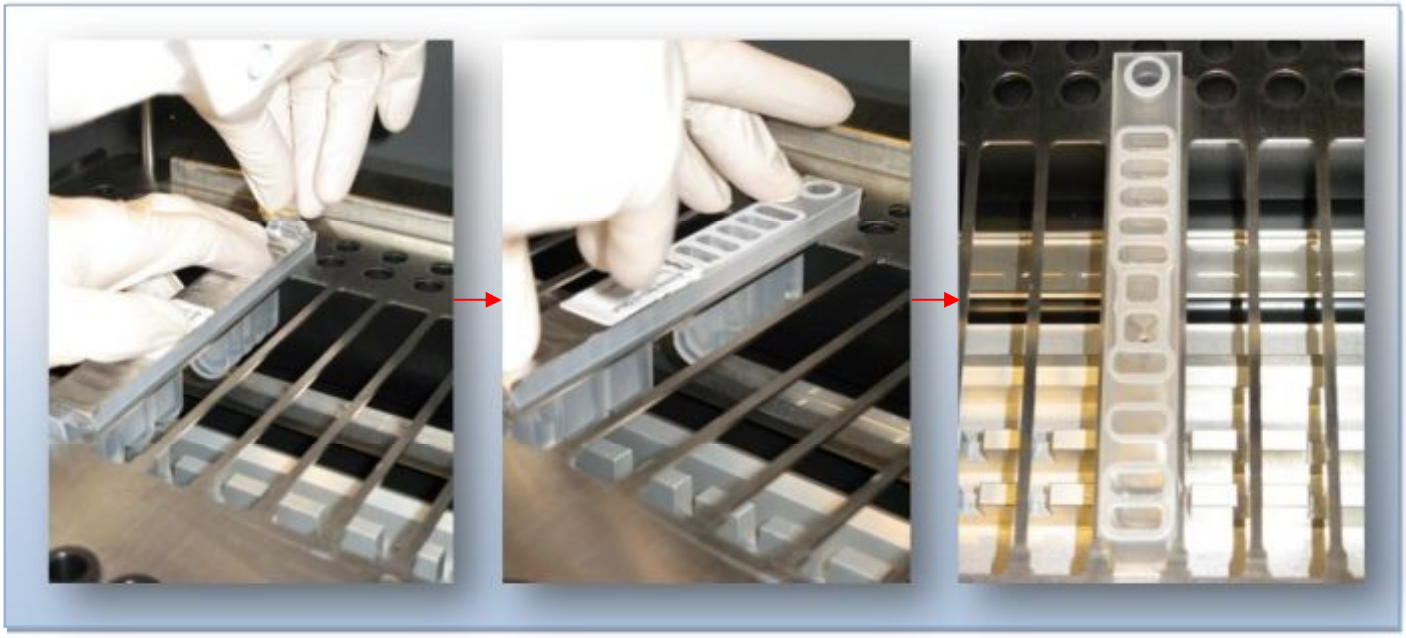


Figure 14. Peeling cartridge seal

The pictures below show a loaded Arrow rack, with flip top cap holder

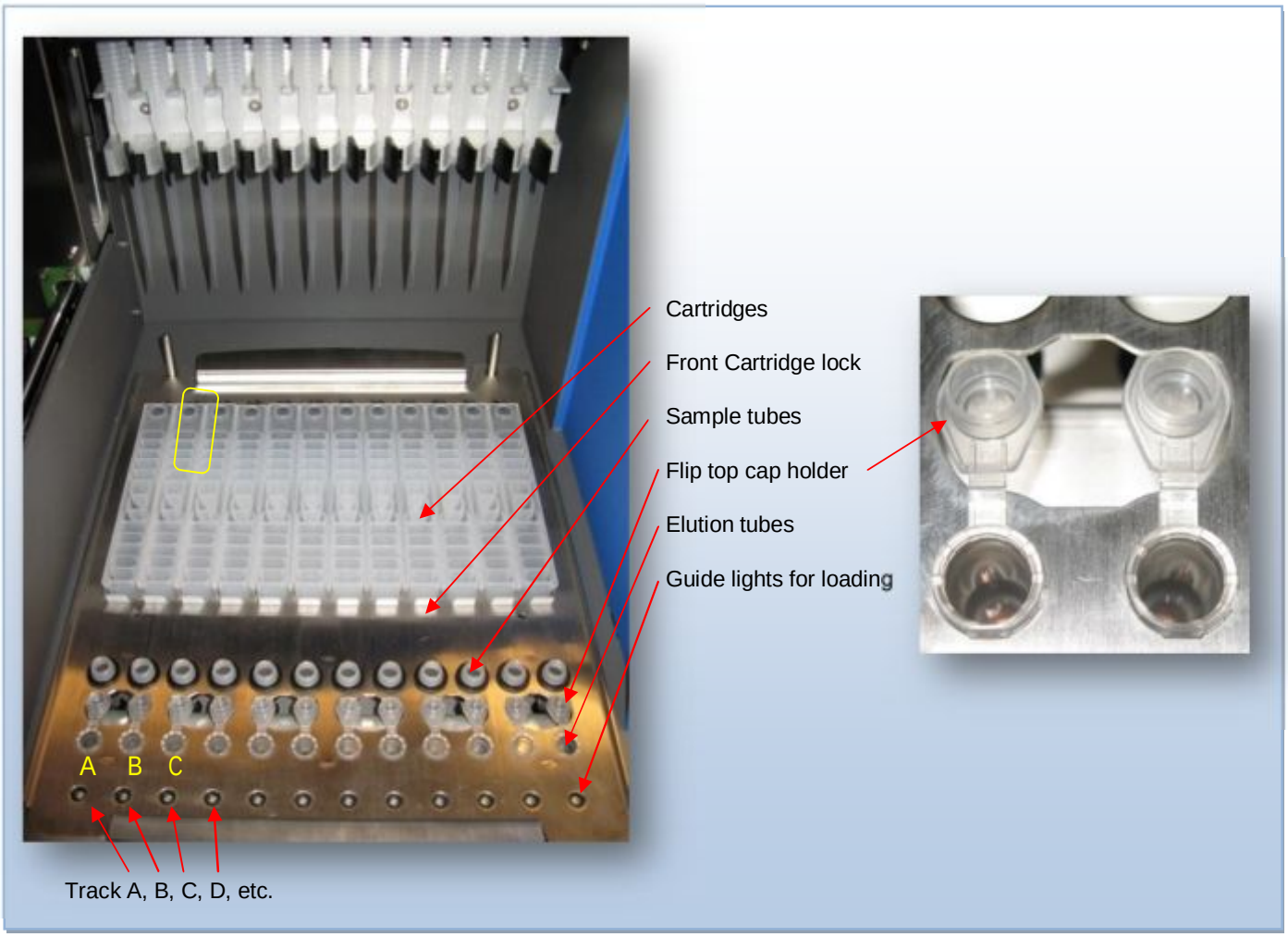


Figure 15. Loaded Arrow rack and flip top cap holder

9 OPERATING THE ARROW USING BARCODES

9.1 Introduction

This chapter provides information required to operate the NorDiag Arrow pipetting instrument using barcodes, which is a way of using the product where safety has been given top priority.

9.2 Operating the NorDiag Arrow Pipetting Instrument with Barcodes

To start the loading process on the NorDiag Arrow pipetting instrument using barcodes perform the following steps:

1. Make sure that the instrument is switched on. The main power button is located at the back of the instrument , and the ON button at the front lower left corner. (see section 5.3).

Main Menu

2. On the **Main menu**, press <**START NEW BATCH**> to initiate the process.

Figure 16. Main Menu

Select Protocol

3. On the **Select Protocol** menu, select the protocol to be run. The list shows all available protocols. To scroll up and down the list, press the arrow keys on the right.

Figure 17. Select protocol

4. If the selected protocol requires that the primary sample volume is specified, enter the volume in micro liters (µL) using the numeric pad on the touch screen. Press <**OK**>.

Figure 18. Select extraction volume

Warning: To secure the quality of the eluate, all primary samples must contain the same volume. (NOTE: Currently the correct sample volume is inserted into an Eppendorf tube that is placed in the sample position)

Loading on the Instrument

5. Scan a **cartridge** of the type (**1**) stated on the touch screen. Then place the cartridge in the indicated track (**2**) and position (**3**).

   The track where the cartridge should be placed is indicated by a green light marking on the instrument. All the other light markings will be red. Peel off the foil before proceeding to load the primary samples.

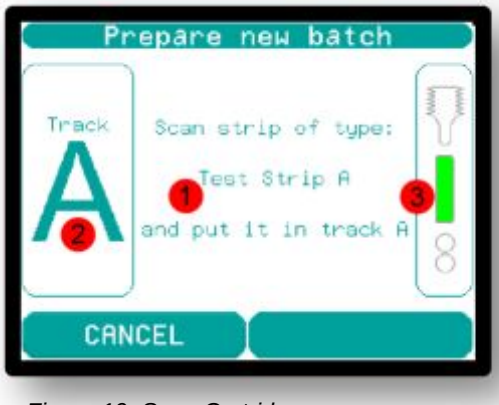


Figure 19. Scan Cartridge

6. Scan the **primary sample** test tube of the type (**1**) stated on the touch screen. Then place the primary sample in the indicated track (**2**) and sample position (**3**).

   If the test tube does not contain any barcode, select <**Manual Entry**> and identify the test tube by manually entering the name of the sample using the touch screen key board.

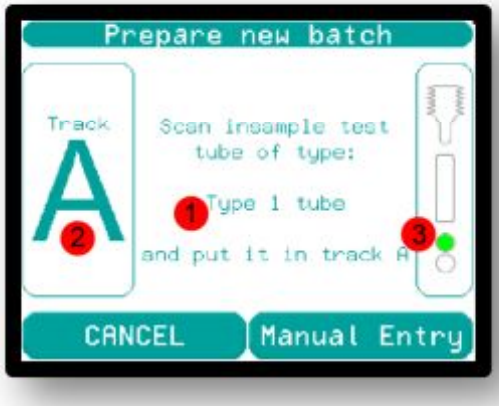


Figure 20. Scan sample tube

7. Scan the **eluate test tube** of the type (**1**) stated on the touch screen. Then place the eluate in the indicated track (**2**) and eluate position (**3**).

   If the test tube does not contain any barcode, select <**Manual Entry**> and identify the test tube by manually entering the name of the sample using the touch screen key board.

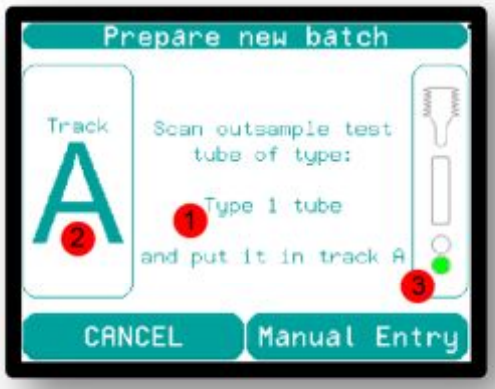


Figure 21. Scan elution tube

8. Place the disposable pipette of the type (**1**) in the indicated track (**2**) and position (**3**).
   Press <**OK**>.

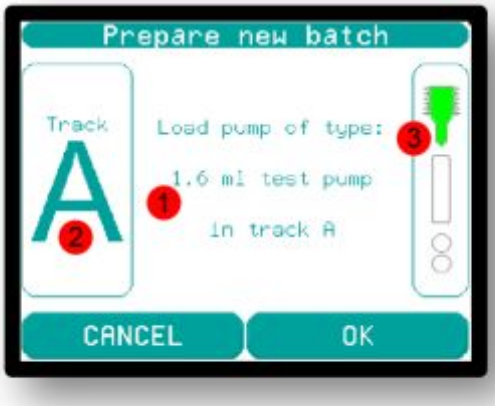


Figure 22. Load pump and tip.

9. Track A is now loaded and ready for execution. If there are more tracks to be loaded, press <**YES**>. The procedure will start over from step 6, loading the next available track.
If no more tracks are to be loaded, press <**NO**>.

Figure 23.Loading completed for track A

Start Protocol

10. When all tracks have been loaded, or when the operator has loaded the number of samples to be run, the **Confirm** menu acknowledges that the protocol can be started.

    Verify that all components, that is cartridges, disposable pipettes, and test tubes, are correctly positioned. The process chamber must be clear of all other items during operation.

Figure 24. Start protocol screen

11. Close the door and press <**START**> to start the pipetting process. The run is carried out automatically. The touch screen shows the **Executing Batch menu** from where the operator can select to **Cancel** or to **Pause** the run.

    Do not open the door without pausing during a run. If the door is opened when the instrument is working the run will be aborted. To Pause a run, press pause and WAIT until the instrument displays PAUSED and has come to a complete stop before opening the door. After pausing, Close the door and press Resume on the touchpad to resume the run. When the protocol is completed, the touch screen confirms that the run was successful. The eluate is ready for further analysis and can be removed from the instrument.

    IMPORTANT! Always remove sample test tubes, disposable cartridges and disposable pipettes from the instrument immediately after a run is completed.

    Warning: Hot surfaces inside the device
    The instrument contains a heating block for heating samples to a temperature of up to 100°C (212°F). Take caution when removing test tubes from the incubation positions.

9.3 Log File

Technical information about the run is written to a log file. See "Manage Files" in section 11.2 for information on how to access the log file.

9.4 Disposal of Products

Handling of disposable products is described in "Final Disposal of Instrument and Accessories" in section 5.7.

9.5 Cleaning

Cleaning of the instrument is described in "Cleaning and Decontamination" in section 5.6.

10 OPERATING THE ARROW WITHOUT BARCODES

10.1 Introduction

This Chapter provides information required to operate the NorDiag Arrow pipetting instrument without barcodes, which is a way of using the product where flexibility has been given top priority. The running of the NorDiag Arrow pipetting instrument without barcodes is simplified and should be used when the operator runs a protocol without barcodes. The main differences between operating the instrument with and without barcodes are:

- An optional number of tracks can be loaded in parallel. Any tracks can be used.
- Scanning of test tubes or cartridges is not required.
- The user is given information on the touch screen for only a few steps such as the types of cartridges, pumps, and test tubes to use.

All of these features increase the flexibility and ease of use of the NorDiag Arrow pipetting instrument.

10.2 Operating the NorDiag Arrow Pipetting Instrument without Barcodes

The following information gives an overview of the steps required when operating the NorDiag Arrow pipetting instrument without barcodes:

1. Make sure that the instrument is switched on at the back, then push the on button which is located in the bottom left corner of the instrument's front side (see section 5.3.1).

Main Menu

2. On the **Main Menu**, press <**START NEW BATCH**> to initiate the process.

Select Protocol

3. On the **Select Protocol** menu, select the protocol to be run.

Primary Sample and Eluate Information

4. If required, specify the type of primary sample test tube.

5. If required, specify the type of elution test tube.

6. If required, specify the primary sample volume. Enter the volume in micro liters (µL).
   Press <**OK**>.

Warning: To secure the quality of the eluate, all primary samples must contain the same volume. (NOTE: Currently the correct sample volume is inserted into an Eppendorf tube that is placed in the sample position)

Loading on the Instrument

An optional number of tracks can be loaded in parallel.

7. Load disposable cartridges of the type stated on the touch screen. Peel off the foil before proceeding to load the primary samples.
   Press <**OK**>.

8. Load primary samples of the type stated on the touch screen.
   Press <**OK**>.

9. Load elutuion tubes of the type stated on the touch screen.
   Press <**OK**>.

10. Load disposable pipettes of the type stated on the touch screen.
    Press <**OK**>.

Start Protocol

11. The **Confirm** menu acknowledges that the protocol can be started. Verify that all components, including cartridges, disposable pipettes, sample tubes and elution tubes are correctly positioned. The process chamber must be clear of anything other than the components during operation.

12. Close the door and press <**START**> to start the pipetting process. The run is carried out automatically. The touch screen shows the **Executing Batch menu** from where the operator can select to **Cancel** or to **Pause** the run.

    Do not open the door without pausing during a run. If the door is opened when the instrument is working the run will be terminated. To be able to open the door the instrument needs to be **Paused** first. Press Pause on the touchpad, the screen will display pausing, please **WAIT** until the screen displays **PAUSED** and has come to a complete stop prior to opening the door. After pausing, Close the door and press Resume on the touchpad to resume the run. When the protocol is completed, the touch screen confirms that the run was successful. The eluate is ready for further analysis and can be removed from the instrument.

IMPORTANT! Always remove sample test tubes, disposable cartridges and disposable pipettes from the instrument immediately after a run is completed.

Warning: Hot surfaces inside the device
The instrument contains a heating block for heating samples to a temperature of up to 100°C (212°F). Take caution when removing test tubes from the incubation positions.

10.3 Log File

Technical information about the run is written to a log file. See "Manage Files" in section 11.2 for information on how to access the log file.

10.4 Disposable Products

Handling of disposable products is described in "Final Disposal of Instrument and Accessories" in section 0.

10.5 Cleaning

Cleaning of the instrument is described in "Cleaning and Decontamination" in section 5.6

11 THE CONFIGURE MENU

11.1 Introduction

This Chapter describes the configure menu and the options available on the NorDiag Arrow pipetting instrument.The options available in the **Configure menu** are accessed by pressing <**CONFIGURE**> on the *Main menu* of the touch screen.

Figure 25. Arrow main menu

The operator can perform the following activities from the **Configure** menu**:**

- Install and remove configuration files.
- Install new software and firmware.
- Copy files, such as log files, to a USB memory stick.
- Obtain information about the software and firmware version.
- Home and Park the instrument.

Figure 26. Arrow configure menu

Figure 27. Arrow configure menu

Calibration of the mechanical movements on the instrument can also be performed here. However, calibrating may only be performed by personnel authorized by NorDiag.

Warning Attempting to perform re-calibration or software/firmware installation without proper understanding of the procedure may render the instrument inoperable.
NEVER install software or firmware without the express instructions from NorDiag to do so.

11.2 Manage Files

A configuration file is a file that holds information regarding geometrical data and other replaceable data that the applications are using. Installing new configuration files requires that the files are accessible to the system on an USB memory stick.

Install Protocol File

To install a new protocol file, perform the following steps:

1. In the Configure menu, press <**Manage Configuration Files**>.
   The **Manage Files** menu opens.

2. In this menu the operator can select to install a new protocol, or to remove a previously installed protocol that is no longer used. To install a new protocol, press <**Install Protocol**>.

Figure 28. Arrow manage files menu

3. The system asks for a USB memory stick containing protocol files. Insert the USB memory stick into the USB connector located underneath the touch screen (wait 5-10 seconds) .

   See Illustration of “Instrument Layout” on page 8.
   Press <**OK**>.

Figure 29. Install Protocol

> **Example:**
> Installation of the protocol *Blood 052*
> Protocols are installed via a USB-stick. The path on the USB stick MUST be **“DriveLetter:\CfgInstall\Protocols\Blood 052”** where “DriveLetter:\” specifies the drive letter for the USB stick (Usually D, E or F on your machine) and the “Blood052” folder contains the three protocol files: “InstallInfo.xml”, “Blood052.tcl” and “Blood052.xml”.

4. The system reads the USB memory stick and the protocols available on it are displayed on the screen.

   Select the protocol to install and press <**OK**>.

   The new protocol file is installed and the touch screen confirms that the installation was successful.

Figure 30. Install Protocol

Warning: If the Instrument is switched off while data is being transferred from an USB memory stick, data may be lost or corrupted. To prevent loss or corruption of data, always complete the data transfer before switching off the instrument.

Remove Protocol File

To remove a previously installed protocol file, perform the following steps:

1. In the Configure menu, press <**Manage Configuration Files**>.
   The **Manage Files** menu opens.

2. Press <**Remove Protocol**>.

3. The **Remove Protocol** menu opens showing a list of all installed protocols. Select the protocol you want to remove from the list.

   Verify the removal by pressing <**Remove**> in the verification menu.

Figure 31. Remove Protocol

Manage Log Files

Log files that are created for each run can be copied onto a USB memory stick. Perform the following steps:

1. In the Configure menu, press <**Manage Configuration Files**>. The **Manage Files** menu opens.

2. Press <**Copy Log Files**>.

3. To copy the log files, press <**Copy log files to USB memory**>.

4. To clear the list of log files, press <**Clear log files**>.

Install New Firmware

Updates to the instrument's firmware will be done by a NorDiag representative.

1. In the Configure menu,
   press <**Update Firmware**>.
   The **Update Firmware menu** opens.

2. The system asks for a USB memory containing the firmware update files.

3. Insert the USB memory stick into the USB connector located underneath the touch screen.
   See Illustration in "Instrument Layout" on page 8.
   Press <**OK**>.

Figure 32.Update Firmware

The new firmware file is installed and the touch screen confirms that the installation was successful.

Warning: Never attempt a firmware upgrade without having the correct firmware provided by NorDiag on a USB memory stick.
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12 TROUBLESHOOTING

This Chapter contains a list of error messages that may appear on the touch screen, and provides the action that should be taken to fix the error.

ERROR MESSAGE	ACTION
The screen is black and the instrument does not start when pushing the on button.	1. Check that there is light in the adapter pack, and that all connectors are firmly in place. Check that the On/Off switch at the back is turned to the On position. 2. If the instrument still does not respond the fuse may be blown. To change the fuse (see figure 3), pull the power cable out of the instrument, then turn the screw to the left and pull the fuse out. Replace the fuse and screw back into place. Connect power cable and try again. If the instrument is still not responding, contact your local NorDiag service and support representative. **IMPORTANT: Use only fuse recommended by NorDiag. The fuse should be of type: T6.3A/min 24VDC**
ERR# 1, "FAILURE"	General error. Restart the instrument and try again. If the problem persists, contact your local NorDiag service and support representative.
ERR# 4, "BAD_PARAMETER"	General error. Restart the instrument and try again. If the problem persists, contact your local NorDiag service and support representative.
ERR# 5, "TIMEOUT"	An operation timed out. Either the protocol contains errors or there was an internal communication error. If the problem persists, contact your local NorDiag service and support representative.
ERR# 6, "THREAD_FAILED"	Internal Operating system failure. If the problem persists, contact your local NorDiag service and support representative.
ERR# 8, "SIGNAL_FAILED	Internal Operating system failure. If the problem persists, contact your local NorDiag service and support representative.
ERR# 10, "INSTR_CMD_RESPONSE"	An internal communication error occurred. If the problem persists, contact your local NorDiag service and support representative.
ERR# 12, "BAD_TCL_SCRIPT"	The protocol contains errors. Contact your local NorDiag service and support representative.
ERR# 14, "FILE"	General error. If the problem persists, contact your local NorDiag service and support representative
ERR# 18, "DOOR_OPEN"	The door was opened during protocol execution. Restart the

	protocol and **Do not** open the door while the instrument is working.
*ERR# 19, "*HEATER_NOT_ON*"*	The protocol contains errors. The heating block was not activated during the run. Contact your local NorDiag service and support representative.
*ERR# 21, "*BAD_BARCODE*"*	The scanned barcode is not a cartridge barcode OR The scanned barcode is not supported by the instrument. Install the configuration file containing information for this cartridge type. For more information, see "Manage Configuration Files" on page 22.
ERR# 22, "NO_PROTOCOLS_FOUND*"*	No protocols are installed. To install new protocols, see "Manage Configuration Files" on page 22.
*ERR# 26, "*Bad parameter for GetData in Tcl script"	The protocol file contains errors. Contact your local NorDiag service and support representative.
*ERR# 27, "*Failed to open file: <*file name*>*"*	The file could not be opened. If the problem persists, contact your local NorDiag service and support representative.
*ERR# 28, "*The number of testTubePositions (<n>) in the protocolFile doesn't match the number of testTubePositions (<*n*>) in the rackFile."	The protocol contains errors. Contact your local NorDiag service and support representative.
*ERR# 29, "*Failed to read XML entry '<*xml entry name*>s' in file '<*xml file name*>'.*"*	The configuration file contains an error. Contact your local NorDiag service and support representative.
*ERR# 30, "*Failed to read XML entry '<*xml entry name*>' in file '<*xml file name*>'.*"*	The configuration file contains an error. Contact your local NorDiag service and support representative.
*ERR# 31, "*Failed to read XML entry '<*xml entry name*>' in file '<*xml file name*>'.*"*	The configuration file contains an error. Contact your local NorDiag service and support representative.
*ERR# 32, "*Failed to read XML entry '<*xml entry name*>' in file '<*xml file name*>'.*"*	The configuration file contains an error. Contact your local NorDiag service and support representative.
*ERR# 33, "*Failed to read XML entry '<*xml entry name*>' in file '<*xml file name*>'.*"*	The configuration file contains an error. Contact your local NorDiag service and support representative.
*ERR# 34, "*Failed to convert '<*xml entry name*>' to an operation name in file '<*xml file name*>'."	The configuration file contains an error. Contact your local NorDiag service and support representative.
*ERR# 35, "*Failed to convert '<*xml entry name*>' to a registry name in file '<*xml file name*>'."	The configuration file contains an error. Contact your local NorDiag service and support representative.

*ERR# 36, "*Failed to convert '<*xml entry name*>' to a search mode name in file '<*xml file name*>'."	The configuration file contains an error. Contact your local NorDiag service and support representative.
*ERR# 37, "*Failed to convert '<*xml entry name*>' to a loading algorithm name in file '<*xml file name*>'."	The protocol contains errors. Contact your local NorDiag service and support representative.
*ERR# 38, "*Parameter out of bounds, motionId=<*n*>, tipPosition=<*n*>, min=<*n*>, max=<*n*>."	The protocol or the configuration file contains errors. The requested value is above or below the allowed min or max values. Contact your local NorDiag service and support representative.
ERR# 39, "Parameter out of bounds, motionId=<*n*>, armPosition=<*n*>, min=<*n*>, max=<*n*>."	The protocol or the configuration file contains errors. The requested value is above or below the allowed min or max values. Contact your local NorDiag service and support representative.
ERR# 40, "Parameter out of bounds, volume=<*n µl*>, min=<*n µl*>, max=<*n µl*>."	The protocol or the configuration file contains errors. The requested value is above or below the allowed min or max values. Contact your local NorDiag service and support representative.
ERR# 41, "Parameter out of bounds, positionZP=<*n mm*>, min=<*n mm*>, max=<*n mm*>."	The protocol or the configuration file contains errors. The requested value is above or below the allowed min or max values. Contact your local NorDiag service and support representative.
ERR# 42, "Parameter out of bounds, tipPosition=<*n*>, min=<*n*>, max=<*n*>."	The protocol or the configuration file contains errors. The requested value is above or below the allowed min or max values. Contact your local NorDiag service and support representative.
ERR# 43, "Parameter out of bounds, angle=<*n*>, min=<*n*>, max=<*n*>."	The protocol or the configuration file contains errors. The requested value is above or below the allowed min or max values. Contact your local NorDiag service and support representative.
ERR# 44, "Parameter out of bounds, motorControllerID=<*n*>, targetPositionSteps=<*n*>, min=<*n*>, max=<*n*>."	The protocol or the configuration file contains errors. The requested value is above or below the allowed min or max values. Contact your local NorDiag service and support representative.
ERR# 45, "Parameter out of bounds, motorControllerID=<*n*>, maxVelocitySteps=<*n*>, max=<*n*>."	The protocol or the configuration file contains errors. The requested value is above or below the allowed min or max values. Contact your local NorDiag service and support representative.
ERR# 46, "Parameter out of bounds, target temperature=<*n*>, max=<*n*>."	The protocol or the configuration file contains errors. The requested value is above or below the allowed min or max values. Contact your local NorDiag service and support representative.
ERR# 49, "Failed to parse XML file	The configuration file contains an error. Contact your local

'<*file name*>', <*detailed error string*>."	NorDiag service and support representative.
ERR# 50, "Failed to write XML file '<*file name*>', <*detailed error string*>."	The configuration file contains an error. Contact your local NorDiag service and support representative.
ERR# 52, "Couldn't find root node '<*string*>' in XML file '<*file name*>'."	The configuration file contains an error. Contact your local NorDiag service and support representative.
ERR# 53, "Couldn't find requested entry in XML file '<*xml file name*>'."	The configuration file contains an error. Contact your local NorDiag service and support representative.
ERR# 54, "Failed to parse XML file, <*xml file name*>."	The configuration file contains an error. Contact your local NorDiag service and support representative.
ERR# 55, "Failed to update AVR firmware, <*string*>."	Try the following: 1. Remove the USB memory stick 2. Restart the instrument 3. Insert the USB memory stick and try again If the problem persists, contact your local NorDiag service and support representative.
ERR# 56, "Failed to send/receive message, communication is paused."	An internal error occurred when updating the firmware. If the problem persists, contact your local NorDiag service and support representative.
ERR# 57, "Unable to mount USB memory, returned: <*internal error number*>."	Unable to read from USB memory. Try the following: 1. Remove the USB memory 2. Insert it again 3. Wait 30 seconds and then try again. If the problem persists, the USB memory might be incompatible. Try using different USB memory's. If nothing helps contact your local NorDiag service and support representative.
ERR# 59, "Unable to establish contact with firmware."	Internal communication error or mother board failure. If the problem persists, contact your local NorDiag service and support representative.
ERR# 60, "It was not possible to put the instrument back in a safe state, make sure to remove all pumps before turning power off, and beware of the instrument arm that may fall when power is turned off."	The instrument was not able to place the arm in its "parking position". Try to park the instrument manually by pressing the "Home All" followed by "Park Instrument" button on the touch screen section "Configure". If this is not possible the instrument requires a restart. Make sure to clear the process chamber from any objects before switching off the instrument as the arm might fall down when the electrical power is lost.

13 CUSTOMER SUPPORT

NorDiag ASA and its representatives maintain a fully trained team of technical specialists. For technical assistance please contact your nearest NorDiag Arrow representative.

14 TECHNICAL DATA

This chapter provides technical data information for the NorDiag Arrow pipetting instrument.

Dimensions

Width	442 mm (17.4 inches)
Depth	445 mm (17.5 inches)
Height (door closed)	465 mm (18.3 inches)
Height (door opened)	840 mm (33.1 inches)

Weight

Weight	22 kg (48.5 Lb)

Power

Power Ratings	240 VAC Standby: 0,2A
	240 VAC Max: 0,7A
	100 VAC Standby 0,3A
	100 VAC Max1,3A
Input Voltage from adapter	24V DC with ESD earth. * (7,5A)
Fuse (A)	T6.3A/min 24VDC

***** Only use the transformer supplied with the instrument or one that has been recommended by NorDiag or your NorDiag distributor.

Mains supply cords:

For US and Canada:

Manufacturer	Various
Type/Model	UL Listed and CSA certified, cord type min. SV.
Technical Data	Min. 18 AWG 3 conductors Rated min. 60ºC Provided with grounding-type (NEMS 6-15P) attachment plug, rated 125 Vac or 250 Vac, min 2.5 A Opposite end terminators in, IEC 320 style connector, reated 125 Vas or 250 Vac, min 2.5 A
Product Standard(s)	UL62, UL498 or UL817
Required Marks or Conformity	C-ULus or UL and CSA

For Other Countries:

Manufacturer	Various
Type/Model	Cord type min. H05RR-F or min. H05VV-F or min. H05VVH2-F

Technical Data	3 x 0.75 mm^2 Rated min. 60ºC Provided with grounding-type (NEMS 6-15P) attachment plug, rated 250 Vac, min 2.5 A Opposite end terminators in, IEC 320 style connector, rated 250 Vac, min 2.5 A
Product Standard(s)	Set: UEC60799 Cord: IEC60245 or IEC 60227 Plug: IEC 60884
Required Marks or Conformity	<HAR> or IEC

Interfaces

USB	USB 1.1
Ethernet	RJ 45 Ethernet interface, LAN (10/100Mbit/s)
RS232	Serial port

Work Area for the Arm

Height (Z)	140 mm (5.5 inches)
Depth (Y)	270 mm (10.6 inches)
Distance between pipettes (X)	22 mm (0.9 inches)

Touch Screen

Display	3.5 inches color TFT touch screen
Resolution	320 x 240 pixels

Heating Block

Type	Separate block for heating samples to a temperature of up to 100°C (212°F)
No. of sample positions	1 x 12

Cooling

Type	Fan 80 x 80 mm (3.1 x 3.1 inches)
Air Intake	Back
Air Outlet	Right side

UV source

Location	Back/underneath arm
Type	Osram PURITEC HNS S/E 9W 2G7

Miscellaneous

Magnet Plate Length of Stroke	20 mm (0.8 inches)
Pump Length of Stroke	18 mm (0.7 inches)
Pump Capacity	1,6 mL (using the small pump)
Driving System	Step motors with drive belts or toothed gearing

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