

# ALEXYS OR 100/110

## Organiser rack user manual

184.0010, Edition 4, 2009



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**Intended use**

For research purposes only. While clinical applications may be shown, this instrument is not tested by the manufacturer to comply with the In Vitro Diagnostics Directive.

**WEEE directive**

All equipment of Antec Leyden which are subjected to the WEEE directive shipped after August 13, 2005 are compliant with the WEEE marking requirements. Such products are labelled with the “crossed out wheelie”, depicted on the left site.



The symbol on the product indicates that the product **must not** be disposed as unsorted municipality waste.

**Collection & recycling information**

Please ship the instrument back to the manufacturer (Antec Leyden, the Netherlands) at the end-of-life time of the product. The manufacturer will take care of the proper disposal and recycling of the instrument at its facilities.

Shipping address for the end-of-life products:

Antec Leyden  
Industrieweg 12  
2382NV Zoeterwoude  
The Netherlands

In case of questions, or if further information is required about the collection & recycling procedure, please contact your local distributor.

**ROHS directive**

Our instruments are currently exempt from the RoHS directive because they fall under WEEE Annex IA categories 8 and 9, which includes medical devices and monitoring and control instruments. Nevertheless, we have taken steps to eliminate all restricted substances from our products.



Antec Leyden is an ISO 9001:2000 certified company.

## Symbols

The following symbols are used on the rear panel and oven compartment of the OR 100:



Consult the manual for further safety instructions



Frame or chassis ground terminal

The following pictograms are used in the OR 100/110 manual:



Caution



Caution, risk of electric shock or other electrical hazard (high voltage)

## Safety practices



The following safety practices are intended to ensure safe operation of the equipment.

### Electrical hazards



The removal of protective panels on the OR 100/110 can result in exposure to potentially dangerous voltages. Therefore, disconnect the instrument from all power sources before disassembly. Unqualified personnel should not open the instrument.



Replace blown fuses with fuses of proper type and rating as stipulated on the side panel and specified in the installation section of this manual. The fuse holder is integrated in the mains connector. Ensure that the instrument is never put in operation with fuses of a different type. This can cause fire.



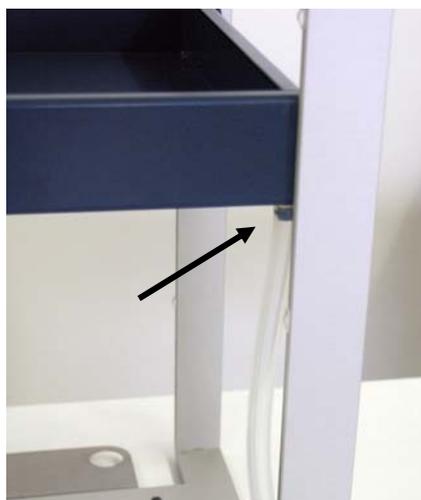
Connect the detector to a grounded AC power source, line voltage 100 – 240 VAC, frequency 50/60 Hz. The instrument should be connected to a protective earth via a ground socket. The power source should exhibit minimal power transients and fluctuations. Replace faulty or frayed power cords.

The OR 100/110 is equipped with 8 AC power outlets at the back panel, divided in two blocks of 4. The maximum power, which can be drawn from these power outlets, is 1900 Watt at 240VAC, 960 Watt at 120V and 800 Watt at 100 VAC. The maximum rated power per outlet is 300 Watt.



Do not exceed the maximum rated power, this can cause fire or other potentially dangerous situations. It is advised to use the outlets only to connect ALEXYS system components, such as the LC 100 pump, AC 100 controller, AS 100 autosampler and DECADE II™ electrochemical detector.

In case of the OR 100 (not applicable for OR 110) always have the silicone tubing connected, which is in the ship kit, to the drain of the mobile phase tray at the back side of the OR 100, to prevent leakage of solvents onto the electrical equipment below (LC 100 pump or AC 100 acquisition controller).



Leakage of solvent on the connectors on the back of the electrical equipment can lead to short circuit.

**General precautions**

Execute periodic leak checks on LC tubing and connections. Do not allow flammable and/or toxic solvents to accumulate. Do not close or block drains. Follow a regulated, approved waste disposal program. Never dispose of such products through the municipal sewage system.



**Use of this product outside the scope of this manual may present a hazard.**

## Spare parts and service availability

Manufacturer provides operational spare parts of the instrument and current accessories for a period of five years after shipment of the final production run of the instrument. Spare parts will be available after this five years period on an 'as available' basis.

Manufacturer provides a variety of services to support her customers after warranty expiration. Repair service can be provided on a time and material basis. Contact your local supplier for servicing. Technical support and training can be provided by qualified chemists on both contractual and as-needed basis.

# Table of contents

DECLARATION OF CONFORMITY	ii
Intended use	iii
WEEE directive	iii
ROHS directive	iii
Symbols	iv
Safety practices	v
Electrical hazards	v
General precautions	vii
Spare parts and service availability	vii

## **OR 100/110 organiser rack 10**

### **Installation guide 12**

Unpacking	12
Operating environment	12
Installation - liquid connections	13
Electrical connections OR 100	18
Mains connections	18
Serial connections	19
Electrical connections OR 110	20
Mains connections	20
Serial connections	21
Powering up system	23

### **Description of instrument 25**

Front side	25
Back side	27

### **Operation 28**

OR 100/110 integrated dual-channel degasser	28
Principle of Operation	28
Principles of degassing using Teflon AF <sup>®</sup> membranes	28
Start-Up Test and Pump Operation	29
Smart Leak Detection	29
Powering up the degasser	29
Extending the degassing flow rate range	30
OR 100/110 integrated pulse damper	31
Principle of operation	31

### **Maintenance 32**

Precautions and system shutdown	32
Corrosive solvent precautions	33

System shutdown 33

**Trouble shooting guide 35**

All ALEXYS system components are off 35

Degasser LEDs are off 35

Degasser yellow status LED is on or flashing 35

Air bubbles in FEP/PTFE tubing 35

No solvent flow through degasser 36

Regular baseline oscillations 36

Leakage of mobile phase via OR 100 drain (bottom plate) 36

**Specifications ALEXYS OR 100/110 Organiser Rack 37**

**Accessories 38**

**Index 39**

## CHAPTER 1

# OR 100/110 organiser rack

Congratulations on your purchase of the OR 100 or 110 organiser rack.

### *OR 100*

The OR 100 is a multi-functional organiser rack for the ALEXYS 100 LC-EC system. It is used to accommodate one or two LC 100 pumps, an AC 100 acquisition controller and mobile phase bottles and is equipped with an integrated two-channel degasser and pulse damper (2 dampers optional). Moreover, it has a power divider on the back panel to supply up to 8 external devices. All ALEXYS system components such as pump(s), autosampler and DECADE II can be fed via the OR 100/110 power divider, so only a single power cord is used to connect a complete ALEXYS LC-EC system to a mains outlet. This construction prevents generation of ground loops and ensures optimum performance of the ALEXYS 100 LC-EC system. See figure 1 and cover page of this manual for a photograph of the OR 100.



*Fig. 1. Front view of the ALEXYS 100 LC-EC system with OR 100 organiser rack, LC 100 pump, AC 100 controller and AS 100 autosampler.*

*OR 110*

The OR 110 is a multi-functional organiser rack for the ALEXYS systems based on the LC 110 pump. It is equipped with an integrated two-channel degasser and pulse damper. Moreover, it has a power divider on the back panel to supply up to 8 external devices. All ALEXYS system components such as pump(s), autosampler and DECADE II can be fed via the OR 100/110 power divider, so only a single power cord is used to connect a complete ALEXYS LC-EC system to a mains outlet. This construction prevents generation of ground loops and ensures optimum performance of the ALEXYS LC-EC system.



*Fig. 2. Front view of OR 110 organiser rack (top). ALEXYS LC-EC system with LC 110 pumps.*

## CHAPTER 2

## Installation guide

### Unpacking

Inspect the *transport box* for possible damage as it arrives. Immediately inform the transport company in case of damage, otherwise she may not accept any responsibility. Keep the transport box as it is designed for optimum protection during transport and it may be needed again. Carefully unpack the instrument and inspect it for completeness and possible damage. Contact your supplier in case of damage or if not all marked items on the checklist are included.

Prior to shipment, your OR 100/110 has been inspected and tested to ensure the best possible performance. The results of these tests are summarized in the Certificate of Performance shipped with the OR 100/110.

### Operating environment

Install the OR 100/110 and ALEXYS LC-EC System in an area, which meets the environmental conditions listed in Table I. Place the OR 100/110 on a flat and smooth surface.

*Table I. Environmental conditions.*

Parameter	Requirement
Storage temperature	0 – 50 °C
Storage humidity	0 – 80%, non-condensing
Operating temperature	10 – 35 °C
Operating humidity	20 – 80%, non-condensing

The OR 100/110 has a drain at the bottom plate located at the front side under the pulse damper. This drain is to dispose of liquids due to possible internal leakage of the pulse damper or degasser. Do not close or block this drain.



The manufacturer will not accept any liability for damage, direct or indirect, caused by connecting this instrument to devices that do not meet the relevant EMC and safety standards. The pump connected to the system

should be specifically designed for use in LC and capable of delivering flow rates typically in the range between 1  $\mu\text{L}/\text{min}$  up to 10 mL/min. Use of this product outside the scope of this manual may present a hazard.

**Do NOT connect OR 100/110 to mains until the entire installation procedure is completed.**

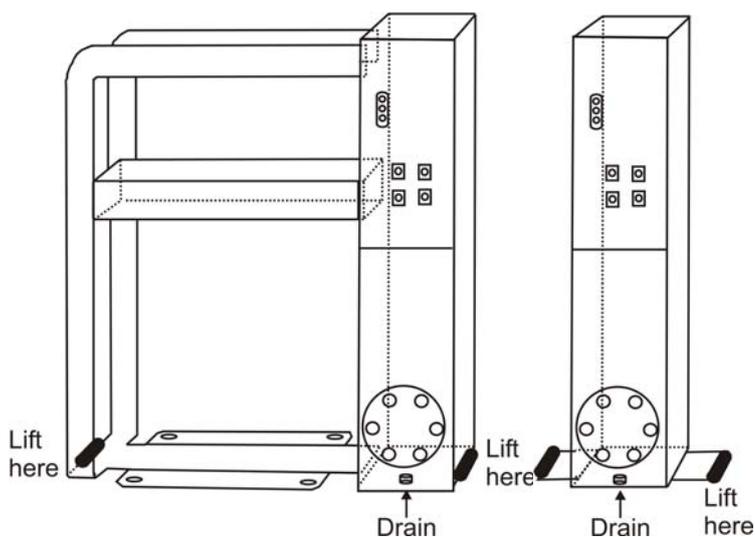
## Installation - liquid connections

This section is NOT a complete installation description for a complete ALEXYS LC-EC System. It describes the installation of the OR 100 / 110 and related liquid and electrical connections only. For a complete installation procedure of ALEXYS LC-EC system consult the user manual of all system components (pump, autosampler etc.) and the installation manual provided in the ALEXYS connection kit.

**For installation of the LC connections on the OR 100 / 110 the appropriate LC connection kit is required containing a complete set of tubing and fittings.**

### *Unpacking of OR 100/110*

Unpack the OR 100 /100 in the following way. Lift it from its box by both hands as illustrated in Fig. 3 and put it on a suitable location meeting specifications as described in the section operating environment.

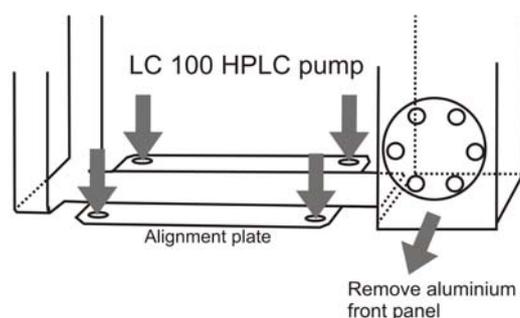


*Fig. 3. Lift instruction OR 100 organiser rack (left side) and OR 110 (right-side).*

*Installation of OR 100*

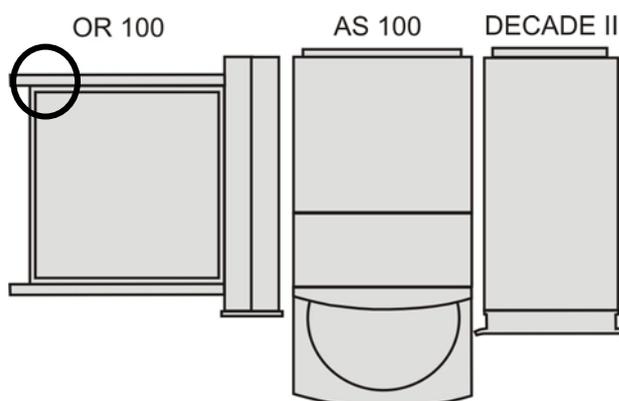
The installation procedure of the OR 100 consists of the following steps:

1. Remove the aluminium covers in front of the pulse damper and de-gasser to avoid scratches on pump and controller during installation. Gently pull on the covers until they release (snap-in connectors).
2. Put the LC 100 pump into the OR 100 organiser rack with its feet into the holes of the alignment plate as depicted in Fig. 4.
3. Stack the AC 100 acquisition controller on top of the LC 100 pump (see Fig. 5.).



*Fig. 4. Stacking LC 100 pump on OR 100 organiser rack.*

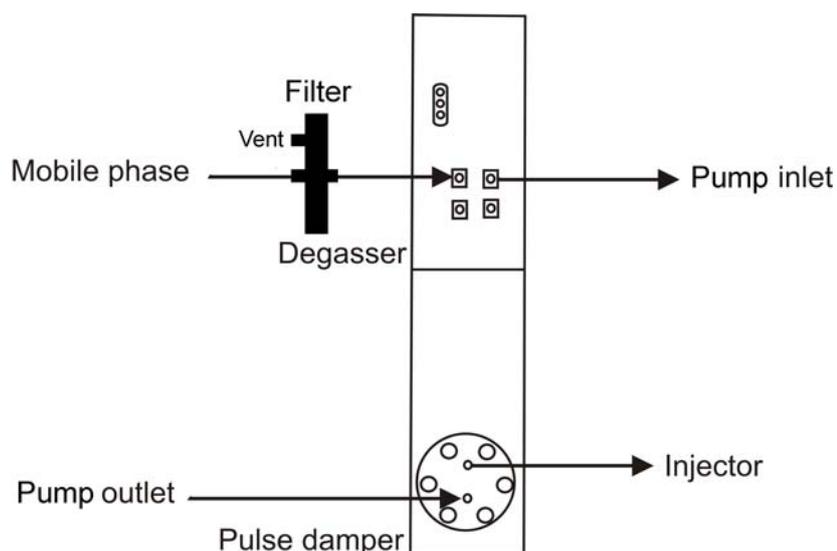
5. If ordered, position the AS 100 autosampler and DECADE II LC-EC workstation at the right side of the OR 100 with a distance between the instruments of a few centimetres. Align the back panels of the equipment as depicted in Fig. 5.



*Fig. 5. Top view of the ALEXYS LC-EC system (schematic). Circle indicates location of OR 100 drain on mobile phase tray.*

6. Verify that the silicone tubing is connected, which is in the ship kit, to the drain of the mobile phase tray at the back side of the OR 100/110, to prevent leakage of solvents onto the electrical equipment below (LC 100 pump or AC 100 acquisition controller).
7. Connect Teflon tubing (part 180.0204) with solvent filter to make a low pressure connection between mobile phase reservoir and degasser.
8. Connect tubing (part 180.0206) from degasser to pump inlet (see Fig. 6). Only use supplied nut/ferrule set (part 180.1550/180.1552) provided in the ship kit to connect tubing to degasser.
9. Connect 0.02" ID stainless steel tubing (part 180.0210) to make a high pressure connection between pump and pulse damper. Only use supplied nut/ferrule set (for pump: part 182.0404/182.0406, pulse damper: part 180.1554/180.1556).

**Further details on installation of all liquid connections are in user manual of the LC connection kit.**



*Fig. 6. LC connections OR 100/110.*

**CAUTION: Never push the solvent through the channel**

### Installation of OR 110

The installation procedure of the OR 110 consists of the following steps:

1. In case the OR 110 was ordered as a part of the ALEXYS system based on the new LC 110 pump: Remove the aluminium instrument support on the bottom of the unit. This can be achieved by removing the two Allen/hex screws on the left side panel which fix the aluminium support to the OR 110 housing (see figure 2). In case the OR 110 is not used in combination with an ALEXYS system do not remove the aluminium support.
2. Position the system components and OR 110 as displayed in figure 7 or 8, with a distance of a few centimetres between the equipment.



Fig. 7. ALEXYS system with one pump and AS 100 (top) or AS 110 (bottom) autosampler.



*Fig. 8. ALEXYS system with two pumps and AS 100 (top) or AS 110 (bottom) autosampler.*

5. In case the OR 110 was purchased as a part of an ALEXYS system please refer to the LC-connection kit install guide supplied with the ALEXYS system for further instructions. If the OR 110 was purchased stand-alone (so without ALEXYS system) use orange-striped PEEK tubing (1/16" OD, 500 um ID) to make the LC connections on the high pressure side (so from pump outlet → pulse damper and pulse damper → injector). Use FEP tubing (1/8" OD, 1/16" ID) to make the connection on the low pressure side (so from MP bottle → degasser and degasser → pump inlet). Only use the supplied nut/ferrule set (part 180.1550/180.1552) provided in the ship kit to connect FEP tubing to degasser. For the connections on the high pressure side standard 10-32 PEEK Fingertights can be used.

## Electrical connections OR 100

In this section the electrical connections to the OR 100 are described for an ALEXYS 100 system based on the LC 100 pump and AC 100 controller. For the OR 110 skip this part and continue with the section “Electrical connections OR 110. For a complete installation procedure of an ALEXYS LC-EC system and its components consult the individual user manuals (pump, autosampler etc.) and the installation guide provided in the ALEXYS connection kit.

### Mains connections



**OR 100 does not have a power switch. Plugging in power cord to mains immediately powers up all connected devices.**



**Before connecting power cords, check fuse rating and mains power specifications of ALL devices. See user manuals for details.**

- Connect the 0.6m power cords (p.n. 250.0140) to the LC 100, AC 100 and AS 100 and socket 4-6 on the OR 100 (see Fig. 9).
- Connect the 1.8m power cord (p.n. 250.0141) to the DECADE II and socket 3.
- Connect the 5m power cord (p.n. 250.0143) to the PC and socket 2.



Fig. 9. Back view of the OR 100 with LC 100 pump and AC 100. Connectors 1 – 10 are numbered for reference.



Do **NOT** connect OR 100 to mains power at this point yet.

Table II. Connection scheme OR 100 power cables.

Outlet no.	Part no.	Connect to
1	250.0116	Mains
2	250.0143	Personal Computer
3	250.0141	DECADE II detector
4	250.0140	AS 100 autosampler
5	250.0140	LC 100 pump
6	250.0140	AC 100 acquisition controller



Use the manufacturer-supplied power cable(s) only to connect all other devices with the OR 100. Manufacturer will not accept any liability for damage, direct or indirect, caused by connecting this instrument to devices, which do not meet relevant safety standards.

### Serial connections

Every individual ALEXYS system component is shipped with a specific RS232C cable for computer control. These cables can be found in the corresponding ship kits. The part numbers are listed in the table below.

Table III. Serial cables of ALEXYS 100 LC-EC system components.

Part no.	Description	Qty
250.0122	DECADE II RS232 cable	1
181.0596	AS 100 serial cable, 9M-9F pins	1
182.0544	LC 100 serial cable, 9F-25F pins	1
183.0502	AC 100 serial cable, 9F-9F pins	1

- Connect serial cables specified in Table IV in corresponding ports of the AC 100. See Fig. 9 for port numbers.

Use always D-A-P (DECADE II, Autosampler, Pump) order of connecting devices to be compatible with pre-configured device drivers in ALEXYS data system!

Table IV. Connection scheme RS232 cables on AC 100.

Port	Part no.	Connect to
PC (7)	183.0502	Personal computer
1/5 (8)	250.0122	DECADE II
2/6 (9)	181.0596	AS 100 autosampler
3/7 (10)	182.0544	LC 100 pump

Please refer to the manuals of the individual system components (LC 100, AC 100, AS 100 and DECADE II) for specific installation instructions. These manuals contain important information about the installation, maintenance and safety practices.

Individual ship kits of ALEXYS 100 components have a small overlap of parts with ALEXYS installation kit. Therefore:

**In case of a complete ALEXYS 100 system installation a few superfluous parts in the kit are left over.**

## Electrical connections OR 110

In this section the electrical connections to the OR 110 are described for an ALEXYS system based on the LC 110 pump. Such system is delivered without AC 100 controller. For the OR 100 refer to the previous section "Electrical connections OR 100". For a complete installation procedure of an ALEXYS LC-EC system and its components consult the individual user manuals (pump, autosampler etc.) and the installation guide provided in the ALEXYS connection kit.

### Mains connections



**OR 110 does not have a power switch. Plugging in power cord to mains immediately powers up all connected devices.**



**Before connecting power cords, check fuse rating and mains power specifications of ALL devices. See user manuals for details.**

- Connect the 1.8m power cord (p.n. 250.0141) to the DECADE II detector and socket 2 of the OR 110 (see Fig. 9).

- Connect the 0.6 m power cord (p.n. 250.0140) to the AS 100 or AS 110 autosampler and socket 3 of the OR 110.
- Connect the OR 110-LC 110 power cord (p.n. 250.0144) to the LC 110 pump and socket 4 of the OR 110. If the system has 2 pumps connect the second pump to socket 5.



**Do NOT connect OR 110 to mains power at this point yet.**

*Table V. Connection scheme OR 100 power cables.*

Outlet no.	Part no.	Connect to
1	250.0116	Mains
2	250.0141	DECADE II detector
3	250.0140	AS 100/110 autosampler
4	250.0144	LC 110 pump

**Use the manufacturer-supplied power cable(s) only to connect all other devices with the OR 110. Manufacturer will not accept any liability for damage, direct or indirect, caused by connecting this instrument to devices, which do not meet relevant safety standards.**

### Serial connections

The first step to establish all serial connections is to install the Serial port connection kit (p/n 190.0202B or 190.0204B) supplied with your ALEXYS LC-EC system. This kit consists of one or two 2-port serial PCI cards which needs to be installed in the PC which controls the LC system. This kit will add 2 or 4 COM ports to the PC, necessary for the serial connections with your LC system components. For the installation and configuration of the PC COM ports follow the instructions in the install guide p/n 190.7004B carefully.

Every individual ALEXYS system component is shipped with a specific RS232C cable for computer control. These cables can be found in the corresponding ship kits. The part numbers are listed in Table VI.

Table VI. Serial cables of ALEXYS 100 LC-EC system components.

Part no.	Description	Qty
250.0122	DECADE II RS232 cable	1
181.0596*	AS 100 serial cable, 9M-9F pins	1
191.0528*	AS 110 serial cable, 9M-9F pins	1
193.0412	LC 110 serial cable, 9F-9F pins	1

\* Depending on the configuration purchased.

The serial cables for the detector, autosampler and pump specified in Table VI should be connected to PC COM port 7, 8 and 9, respectively. The serial cable of a second pump should be connected to COM 10.

**Use always D-A-P (DECADE II, Autosampler, Pump) order of connecting devices to be compatible with pre-configured device drivers in ALEXYS data system!**

Table VII. Connection scheme RS232 cables on PC COM ports.

PC port	Part no.	Connect to
COM7	250.0122	DECADE II
COM8	181.0596 or 191.0528	AS 100 or AS 110 autosampler
COM9	193.0412	LC 110 serial cable, 9F-9F pins
COM10	193.0412	LC 110 serial cable, 9F-9F pins

Please refer to the manuals of the individual system components (LC 110, AS 100/110 and DECADE II) for specific installation instructions. These manuals contain important information about the installation, maintenance and safety practices.

Individual ship kits of ALEXYS 100 components have a small overlap of parts with ALEXYS installation kit. Therefore:

**In case of a complete ALEXYS system installation a few superfluous parts in the kit are left over.**

## Powering up system

Last step in the installation procedure is connecting OR 100/110 to mains and powering up all devices.



**Before connecting power cords, check fuse rating and mains power specifications of ALL connected devices. See user manuals for details.**

**OR 100/110 does not have a power switch. Plugging in power cord to mains immediately powers up all connected devices.**

1. Make sure that the power switches of all connected devices are switched OFF.
2. Connect mains cable (p.n. 250.0116) to OR 100/110 mains entry (see Fig. 9, connector 1). Plug in power cord in wall socket to power up system.
3. Switch on OR 100/110 degasser, LEDs light up indicating system is functioning.

OR 100/110 is now ready for use.

**Switching off your ALEXYS LC-EC system is not recommended.**

The ALEXYS LC-EC system has been developed for continuous operation. For maximum stability it is advised to leave the system ON continuously. If preferred, the flow cell may be switched OFF at night. If not in use for longer period of time (more than a few days) see recommendations for system shutdown.



## CHAPTER 3

**Description of instrument**

Front side



*Fig. 10. front side of the OR 100 organiser rack.*

	<b>Element</b>	<b>Description</b>
1	P	Degasser power LED (green). Indicates when power is applied to the degasser (power cord connected and the power switch at the back panel ON)
2	S	Degasser status LED (orange). Indicates when the vacuum exceeds the operating range. It may also indicate an error condition. The LED will flash in case of an internal leakage or a vacuum signal error.
3	V	Degasser vacuum LED (green). Indicates when the vacuum level is within operating range. LED will go on

	Element	Description
		after the initial pump-down and will remain on as long as the degasser is powered up and the vacuum level is below 100mm of Hg absolute (0,13 bar)
4	Degasser solvent ports 1	In- and outlet port of degasser channel 1. Fitting: ¼"-28 female. One port (inlet) should be connected by ¼" tubing via the in-line mobile phase filter to the mobile phase container, other port (outlet) to the inlet of the pump
5	Degasser solvent ports 2	In- and outlet port of degasser channel 2. Identical to degasser channel 1
6	Pulse damper	Stainless steel membrane-type pulse damper. Fitting: 1/16"-32 female. Bottom: inlet, top: outlet
7	Solvent tray	Tray for storage of bottles with mobile phase, waste and solvent for pump piston back-flush
8*	Alignment plate	Stainless steel plate to align and fix the LC 100 pump and AC 100 controller into the organiser rack. The instrument feet of the pump fit in the holes in the alignment plate (9*).

\*) Does not apply for the OR 110.

## Back side



Fig. 11. Back side of the OR 100 organiser rack.

	Element	Description
1	Power switch	Degasser power switch
2	AC outlets	Block of 8 AC outlets to connect all ALEXYS system components such as pump, autosampler and DECADE II to mains
3	Mains inlet	Mains inlet with in-line fuse holder to supply power to the integrated degasser and the 8 AC outlets
4.*	Drain	Drain for tubing connection to prevent possible leakage of solvents from the tray onto the electrical equipment stacked below

\*) does not apply for OR 110.

## CHAPTER 4

## Operation

### OR 100/110 integrated dual-channel degasser

#### Principle of Operation

The OR 100/110 vacuum degasser has 2 vacuum chambers, degassing tube, variable speed vacuum pump, microprocessor controller, sensor and check valves. The solvent (mobile phase) flows through a degassing tube, which is inside a vacuum chamber. In accordance with Henry's Law, decreased pressure in the chamber causes the outward movement of gas dissolved in the mobile phase across the tube wall, thus degassing the mobile phase. The pressure in the vacuum chamber is established by the vacuum pump and monitored by the microprocessor through an integrated, absolute pressure sensor. Degassed mobile phase exits the vacuum degasser and enters the pump.

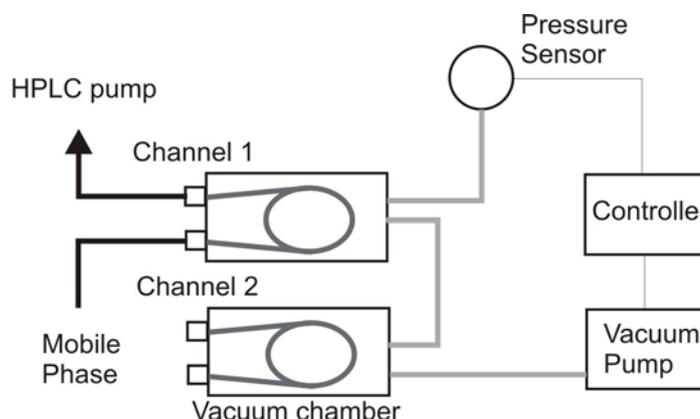


Fig. 12. Block diagram of OR 100 degasser

#### Principles of degassing using Teflon AF<sup>®</sup> membranes

The fully amorphous nature of Teflon AF<sup>®</sup> has a molecular level porosity superior to the mechanically induced porosity in extruded PTFE tubing in many other devices. The very small surface area required to degas the mobile phase, reduces the carryover from one solvent to another to virtually zero. Teflon AF<sup>®</sup> is inert to all solvents normally used in HPLC. However, Teflon AF<sup>®</sup> is soluble in perfluorinated solvents such as Fluorinert<sup>®</sup> FC-75 and FC-40 and Fomblin perfluoro polyether solvents. Use of such

solvents in the degasser will result in dissolution and destruction of the membrane.

Teflon AF<sup>®</sup> is permeable to some degree to water vapour whereas PTFE is not. While the vacuum pump in the degasser contains internal provisions for sweeping water or solvent vapour from the pump continuously, it is possible that over time, high concentration buffers may form crystals within the channel due to the loss of water within the channel. Therefore:



**Flush system with pure water before switching off OR 100/110 for longer period of time (days) as precipitation of salts may occur. Always switch off flow cell first.**

### Start-Up Test and Pump Operation

Immediately upon turning on the instrument, the microprocessor examines the vacuum sensor signal to confirm that it is within an expected range. Following the start-up test, the microprocessor ramps the vacuum pump to high RPM, to quickly exhaust atmosphere from the vacuum chamber. As the vacuum level approaches the preset control value, the pump will slowly ramp down to a low speed (typically 40 to 60 RPM). Afterwards, the pump RPM will vary slightly, as needed under the changing degassing load, to maintain a virtually constant vacuum level ( $\pm 50$  mm Hg / 70 mbar). This is necessary, due to the extremely low mass, high response of the degassing device, hence ensuring a highly stable baseline.

### Smart Leak Detection

A potential leak in the vacuum degassing system can be observed by monitoring the RPM of the pump. If a leak occurs inside the chamber, the microprocessor will increase the pump RPM to maintain the vacuum level. If the pump fails to do so (if it runs at an elevated RPM for more than 30 minutes), the yellow LED will flash, indicating a possible leak condition, and the system will shut down and go into a “safe” mode.

### Powering up the degasser

With the OR 100 connected to mains with a power cord, switch on the degasser by means of the power switch at the rear panel of the OR 100. The green Power LED illuminates.

Immediately upon turning on the degasser, the microprocessor examines the vacuum sensor signal to confirm that it is within an expected range. Following the start-up test, the microprocessor ramps the vacuum pump to

high RPM, to quickly exhaust atmosphere from the vacuum chamber. As the vacuum level approaches the preset control value, the pump will slowly ramp down to a low speed (typically 40 to 60 RPM) and will vary slightly as needed under the changing degassing load to maintain a virtually constant vacuum level.

During initial pump-down, the yellow Status LED will be lit. Once the vacuum has reached normal operating level, the yellow LED will extinguish and the green Vacuum LED will illuminate. If you want to confirm that the pump is running, beyond the front panel LEDs, the slight vibration caused by the micro stepping of the motor driving the vacuum pump may be felt by placing your hand on the instrument.

By varying the speed of the vacuum pump, the degasser maintains a constant vacuum pressure of 50mm Hg absolute (nominal) depending on the degassing load in the system. The pump is designed for at least 5 years of constant running and has integral in-pump venting, which eliminates the need for stop-start running. If a potential leak is detected (if the pump RPM > 300 for 30 minutes), the pump will be shut down and the yellow Status LED will flash. The vacuum is maintained as long as the degasser is powered on. Solvent flowing through the degasser will continue to be degassed as long as the instrument is on and running.

### **Extending the degassing flow rate range**

Certain organic solvents used in reversed phase chromatography outgas upon mixing with water, if not properly degassed. These solvents are generally alcohols (e.g. methanol), acetonitril and tetrahydrofuran. Passing water and methanol through a single channel is generally sufficient to degas these solvents.

To more thoroughly degas a mobile phase, connect the outlet of the organic channel to the inlet a second channel and the outlet of the second channel to the pump. This places the two channels in series and doubles the degassing capacity for the organic portion of the mobile phase.

## OR 100/110 integrated pulse damper

### Principle of operation

The OR 100/110 is equipped with a membrane-type pulse damper with stainless steel housing. Pump pulsations are strongly suppressed improving detection limits in HPLC-EC.

The pulse damper reduces pulsations by compressing a fluid held within the bottom cavity of the unit. This fluid is isolated from the LC mobile phase by a durable but flexible inert diaphragm. As the LC system pressure increases, the fluid is compressed. When the LC pump piston is retracting, the compressed fluid expands maintaining system pressure and, more important, keeps the mobile phase flowing at a constant rate. When the system pressure is at its maximum allowable pressure (40 MPa = 6000 psi) the volume of mobile phase in the damper is only 0.9 mL.

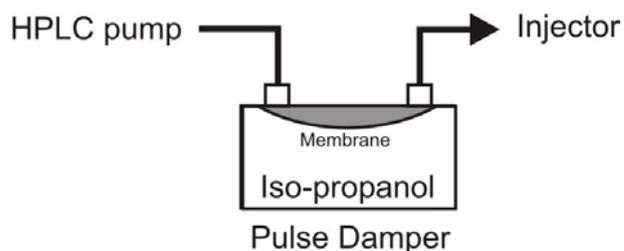


Fig. 13. Schematic representation of OR 100 pulse damper

Operation of the pulse damper is automatic. The pulse damper works best if the pressure is at least 35 bar (500 psi/3.5 MPa) and preferably 70 bar (1000 psi/7.0 MPa). In case of low pressure it may be desirable to install a restrictor between damper and injector. The advised operating temperature is between 15 -35 °C.



**CAUTION: Never induce large and sudden pressure drops in the system, because this will damage the internal diaphragm of the pulse damper resulting in leakage.**

To avoid pressure drops, remove fittings of high-pressure tubing only after the pump is switched off and the pressure has dropped to atmospheric pressure.

## CHAPTER 5

## Maintenance

Perform preventive maintenance to ensure that your OR 100/110 with integrated degasser and pulse damper will perform consistently at an optimal level. The following measures are recommended:

1. Use only high-purity solvents (preferably (HP)LC Grade) for mobile phases. Water should be bottled (LC Grade), or ultra-pure (18 MOhm.cm). Filter all solvents to prevent particulate contamination and plugged tubing.
2. Perform periodic leak checks on LC tubing and connections on the degasser and pulse damper of the OR 100/110. Check if the drain on the bottom of the mobile phase tray is not blocked or closed.
3. Do not allow flammable and/or toxic solvents to accumulate. Follow a regulated, approved waste disposal program. Empty and clean waste container regularly. Never dispose of such products through the municipal sewage system.
4. Clean the OR 100/110 external surfaces on a regular basis. Use a cloth wetted with water only to clean the detector. **Do not use any organic solvents** to clean the exterior.
5. Use only high-purity gases when drying contact areas. Ensure that all new tubing (stainless steel) is passivated and thoroughly flushed before making pump connections.
6. Never allow large pressure drops in the system, because this can damage the pulse damper membrane. To avoid such pressure drops, remove fittings of high-pressure tubing only after the pump is switched off and the pressure has dropped to atmospheric pressure.

When the ALEXYS LC-EC system is not used for a longer period of time (weeks) follow the system shutdown procedure.

### Precautions and system shutdown

The ALEXYS system has been developed for continuous operation. For maximum stability it is advised to leave the system ON continuously. If preferred, the flow cell may be switched OFF at night. However, precautions should be taken when:

- system is not in use for longer period of time (more than a few days)
- using mobile phase buffers at pH < 2 or pH > 9
- using corrosive mobile phase

- 1. Always switch off flow cell when changing to solvents without electrolytes.**
- 2. First read column manufacturer recommendations. Take out column in case of solvent incompatibility.**
- 3. Start always with flushing LC system with water when switching solvents.**

### Corrosive solvent precautions

When the system is not in use overnight or weekends switch off the cell and read column manufacturer recommendations. Flush with an appropriate solvent and only take out column in case of solvent incompatibility. Flush system with pure water and set the HPLC pump to a low flow rate. Next working day change water for mobile phase and continue operation. Before switching on the cell make sure mobile phase has been flushed throughout the system.

Corrosive solvents are: high concentrations of sodium hydroxide (carbohydrate analysis) or other buffers of pH > 9 or pH < 2.

### System shutdown

When not in use for a number of days flush the OR 100/110 first with water then with iso-propanol or 50/50 water/methanol. Store column and flow cell according to manufacturer recommendations. Then turn off all ALEXYS system components. Turn off the OR 100. Disconnect all tubing from the degasser and pulse damper. Plug all of the ports on the OR 100 with the appropriate caps.

Before using the OR 100/110 again, completely purge the degasser and pulse damper with the correct mobile phase before reconnecting the column and restarting the system.

**Avoid precipitation of buffer salts in organic solvents. Start always with flushing system with water when switching solvents.**

Replace blown fuses with fuses of proper type and rating (8AT/250V, UL/CSA approved ) stipulated on the side panel and specified in the instal-

lation section of this manual. The fuse holder is integrated in the mains inlet.



**V~100-240V**

**FUSE RATING**

**50-60Hz**



**8 AT / 250V**



**WARNING - RISK OF FIRE**

**REPLACE FUSE AS MARKED**

**AVERTISSEMENT - RISQUE DE FEU**

**REMPLEZ LE FUSIBLE COMME INDIQUÉ**

*Fig. 14. Fuse holder.*

To access the fuse holder, push plastic lever on the bottom side of the holder completely and pull holder out of inlet. Ensure that the instrument is never put in operation with fuses of a different type. This can cause fire.

## CHAPTER 5

**Trouble shooting guide****All ALEXYS system components are off**

Possible cause	Remedy
No power	Plug in power cord
Power switch off	Turn power switch on
Faulty fuses	Replace fuses
Divergent mains voltage	Check line voltage, see page 11

**Degasser LEDs are off**

Possible cause	Remedy
No power	Plug in power cord
Power switch off	Turn power switch on
Faulty OR 100 mains fuses	Replace fuses
Divergent mains voltage	Check line voltage, see page 11

**Degasser yellow status LED is on or flashing**

Possible cause	Remedy
Yellow LED is on	Typical normal operation (see 'Powering up the degasser' page 29)
Yellow LED is flashing	System leak or fault. Contact your local supplier for service

**Air bubbles in FEP/PTFE tubing**

Possible cause	Remedy
Loose fittings	Check and if needed tighten the input and output 1/8" fittings on the solvent ports
Mixing of solvents requires more capacity of degasser	Connect both channels to double capacity
Flow rate too high	Connect both channels to double capacity
Degasser not functioning	Switch on degasser
Damaged PTFE tubing	Replace FEP/PTFE tubing

**No solvent flow through degasser**

<b>Possible cause</b>	<b>Remedy</b>
Air in pump head	Prime/ purge the pump head
Blocked 0.2 µm in-line filter	Replace filter
Blocked degasser solvent port caused by unfiltered or buffered mobile phases	Use a different degasser channel or flush/back flush the channel with water or other appropriate solvent (MeOH, isopropanol. Note: draw the solvent through the channel to dissolve salts or remove particles.

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**Regular baseline oscillations**

<b>Possible cause</b>	<b>Remedy</b>
Malfunctioning pump (regular pattern)	Check pump (seals, valves)
Back pressure too low for pulse damper	For optimal dampening of flow pulsations a backpressure of at least (7 MPa = 70 bar =1000 psi) is needed. Use backpressure regulator or restriction capillary <i>between pulsedemper and injector</i> to increase pressure
Pulse damper defect (internal membrane ruptured)	Contact your local supplier for service

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**Leakage of mobile phase via OR 100 drain (bottom plate)**

<b>Possible cause</b>	<b>Remedy</b>
Internal leakage of degasser vacuum chambers or tubing	Contact your local supplier for service
Internal leakage of pulse damper	Contact your local supplier for service

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When trouble shooting is not successful, contact supplier.

## CHAPTER 6

## Specifications ALEXYS OR 100/110 Organiser Rack

<p><b>General specifications</b></p>	<p>Power 100 – 240 VAC, 50/60 Hz, 20 VA degasser only</p> <p>Operating conditions 10 – 35°C, 20 – 80% RH, non-condensing</p> <p>Storage conditions 0 - 50°C, 20 – 80 % RH, non condensing</p> <p>Power outlets 8 outlets: 100 VAC (max 800 VA total) – 240 VAC (max 1900 VA total), max 300 VAC per outlet</p> <p>Degasser 2 channels, volume 480 µL/channel, capacity &lt; 2 ppm O<sub>2</sub> at 1 mL/min, max flow rate 10 mL/min LED for power, start-up and vacuum level wetted materials: PEEK, PTFE, Teflon AF</p> <p>Pulse damper membrane type, dead volume 0.9 mL at max pressure 41.4 MPa (6,000 PSI) wetted materials: 316 SS and FEP</p>
<p><b>Physical specifications</b></p>	<p>Dimensions <i>OR100</i> 35 (D) x 39 (W) x 44 (H) cm 13.6" (D) x 15.2" (W) x 17.3" (H)</p> <p><i>OR 110</i> 35 (D) x 9 (W) x 44 (H) cm</p> <p>Weight <i>OR 100</i> 12.5 kg (27.5 lbs) with 1 pulse damper</p> <p><i>OR 110</i> 10.3 kg (22.7 lbs) with 1 pulse damper</p>

## CHAPTER 7

**Accessories**

The OR 100 organiser rack is shipped with a number of parts. The listing in the table below may not be complete, see checklist of delivery for complete listing.

*Table VIII. Accessories OR 100 organiser rack.*

<b>Part no</b>	<b>Description</b>
184.0204	OR 100 mobile phase tray drain
250.0115	Fuses 8AT/250V
250.0116	Mains cable (EUR)
250.0140	OR 100/110 power cord, 0.6 m
250.0141	OR 100/110 power cord, 1.8 m
250.0143	OR 100/110 power cord, 5m
250.1550	Ferrule for OR 100/110 degasser
250.1552	Nut for OR 100/110 degasser
250.1554	Ferrule for OR 100/110 pulse damper
250.1556	Nut for OR 100/110 pulse damper

The OR 110 organiser rack is shipped with a number of parts. The listing in the table below may not be complete, see checklist of delivery for complete listing.

*Table IX. Accessories OR 110 organiser rack.*

<b>Part no</b>	<b>Description</b>
250.0115	Fuses 8AT/250V
250.0116	Mains cable (EUR)
250.0140	OR 100/110 power cord, 0.6 m
250.0141	OR 100/110 power cord, 1.8 m
250.0144	OR 110 – LC 110 power cord
250.1550	Ferrule for OR 100/110 degasser
250.1552	Nut for OR 100/110 degasser
250.1554	Ferrule for OR 100/110 pulse damper
250.1556	Nut for OR 100/110 pulse damper

# Index

accessories .....	38
cables	
power .....	19, 21
serial.....	19, 22
degasser.....	28
degasser LED.....	25
degasser power switch.....	27
degassing principle .....	28
drain.....	12
electrical hazards .....	v
environmental conditions .....	12
fuse replacement.....	33
fuse replacement.....	v
installation kit.....	13
leak detection .....	29
leakage .....	36
LED degasser.....	25
lift instruction .....	13
maintenance .....	32
pulse damper.....	31
safety practices .....	v
specifications OR 100 .....	37
trouble shooting.....	35

