ELLIPSE

Service Manual

AMS Analyzer Medical System

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CONFIGURATION SHEET

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CHAPTER 01

- INTRODUCTION -

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1 INTRODUCTION

1.1 THE AIM OF THE TECHNICAL MANUAL

This manual has been written in order to supply the technical staff, the persons who are responsible for the maintenance and for resolving instrument failures, a complete and detailed guide of the Ellipse analyzer, in accordance with the standard UNI EN591 (which requires a manual to be supplied with vitro diagnostic instruments for professional use).

1.1.2 MANUAL OUTLINE

The technical manual is composed of 10 chapters that not only describe the operative technical characteristics of the system, but also the reparation and maintenance procedures to use for the modules that they are composed of.

- **Chapter 1 INTRODUCTION**

  The manual structure is described, and recommendations are given regarding the general use of the analyzer. The technical characteristics of the operative system are given in this chapter.

- **Chapter 2 DESCRIPTION OF THE SYSTEM**

  Describes the system, in particular, the analytical cycle of the single modules and electronic boards.

- **Chapter 3 INSTALLATION**

  Describes the unpacking procedures and the required characteristics for the place of installation.

- **Chapter 4 ELECTRONICS SCHEMES AND DRAWINGS**

  Gives the electronics schemes and assembly drawings of the electronics board and the assembly drawings of the modules that the system is composed of.

- **Chapter 5 DIAGNOSTIC PROGRAM**

  Describes the folders in the Diagnostic Program that are responsible for the checks and the calibration of the modules in the system.

- **Chapter 6 SETTINGS AND ADJUSTMENTS**

  Gives the procedures for replacement, adjustment and check of the system modules.

- **Chapter 7 MANTENANCE**

  Describes the routine maintenance that needs to be done on a regular basis in order to guarantee the correct functioning of the analyzer.

- **Chapter 8 COMUNICATION WITH HOST**

  Describes the communication protocol between the analyzer and the Host computer.

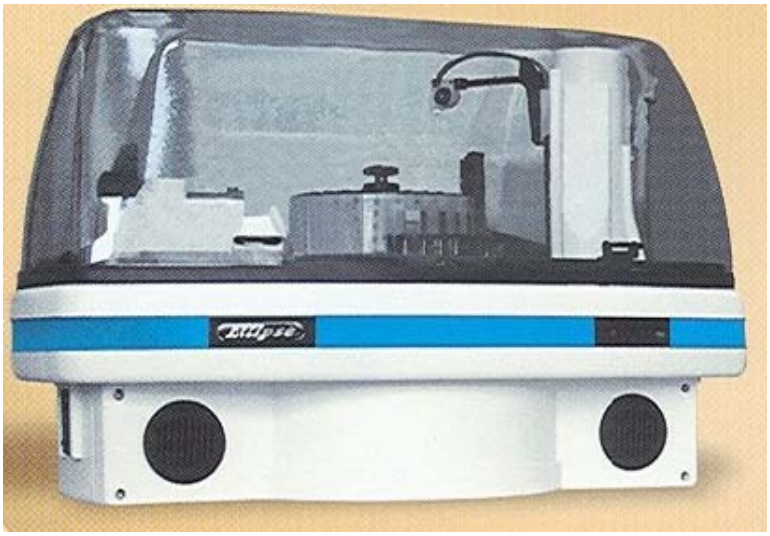
- **Chapter 9 ERROR CODES AND GUIDE TO RESOLVE ANOMALIES**

  Lists the system's error codes, describes the errors in the results and gives a guide for how to implement corrective actions.

The technical staff responsible for resolving the structural anomalies is highly suggested to thoroughly examine the contents of this manual before operating the system.

1.2 SYSTEM INTRODUCTION

The "Ellipse" system is a continuous-loading, random access, bench top instrument for performing chemical and Immunoturbidimetric clinical analysis. It is totally automatic and computer controlled.



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1.3 PRECAUTIONARY MEASURES

1.3.1 CHEMICAL RISKS

The individual operator is responsible for assuring that all possible precautionary measures are taken against eventual risks associated with the use of the "Ellipse" instrument in clinical laboratory settings. The manufacturer will provide the reagents kit and specific written information on the use of each of the reagents.

It is important that the samples be well coagulated and then carefully centrifuged.

Samples which contain fibrinogen clots can obstruct the probe and lead to inexact sampling.

If blood samples containing gel are used, it is suggested that the manufacturer's recommendations be followed.

Immediately clean and remove any accidental leakage of reagent or other liquid.

1.3.2 ELECTRICAL RISKS

As with any electrical device, the risk of electric shock exists.

Is therefore necessary to take every precautionary measure possible when working with this, or any other, electrical instrument to avoid contact with power supply wires, electrical components or electronic boards.

1.3.3 MECHANICAL RISKS

Several precautionary measures should be taken when operating the analyzer:

avoid wearing very loose clothing or jewelry that could become tangled in the instrument's moving parts (e.g. the sample probe); whenever possible, operate the instrument with the main cover panel lowered.

WARNING: Never attempt to service or substitute any part(s) of the analyzer when the instrument is turned on.

Any and all technical repairs or servicing must be performed by specialized personnel only.

1.4 WARRANTY

AMS guarantees the replacement of all defective components and/or materials for a period of time not above of 14 months starting from the date of invoicing. Saying guarantee, as well as Technical Assistance, generally is intended furnished as net ex factory Rome.

This guarantee does not include consumable and instrument parts in contact with liquids. All components not included in the guarantee are reported in the following table.

Besides guarantee does not cover damage caused by :

- improper use of the ELLIPSE instrument (or however not according to the Producer or Seller instructions)
- bad transport
- insufficient (or missing) preventive maintenance by the User

In particular any damages due to the transport must be immediately reported to the carrier when he delivers.

CONSUMABLES AND ACCESSORIES PARTS LIST OUT OF GUARANTEE

Description	Type	Quantity	Code
Reagents containers	35 ml	12 pieces	C101-00190-00
Reagents containers	6 ml	12 "	C101-00191-00
Samples cups	0.8 ml	1000 "	AS-65-0002
Short samples cups	1 ml	1000 "	AS-65-0100
Adapter for short samples cups		1 "	9-01-0609-00
Reaction sectors		6 "	C101-00217-00
Washing solution bottle	2 lt	1 "	9-35-0041-00
Bottle level sensor		1 "	9-05-0078-00
Tubing Kit for peristaltic pump		2 "	65-01835-00
Tubing Kit – complete		1 "	65-01836-00
Cleaning solution	250 ml	2 "	ASRN0020
Rinse solution	50 ml	1 "	ASRN0021
Sampling probe (internal needle)		1 "	05-00707-00
Complete Sampling probe		1 "	10-00703-00
Drying Pad		1 "	10-01920-00
Halogen Lamp (6 V - 10 W)		1 "	9-35-0016-00
Interferential filters Kit		1 "	9-65-0029-00
Fuse 6,3 A-T	5x20	10 "	C130-01238-08
Inlet/outlet fitting for Rinse & Clean conts		1 "	01-01224-00
Cuvettes protection cover		1 "	05-01249-00
Reagent protection cover		1 "	10-00584-00
Reagent plate		1 "	10-00585-00
Samples rack		1 "	05-01829-00
Washing station, first or second cannulas (A)		1	05-01633-00
Washing station, third cannula (B)		1	05-01633-01
Washing station, fourth cannula (C)		1	05-01638-00
Washing station, fifth cannula without pad (D)		1	05-01919-00
Diluter Micro-Pump		1 "	05-01710-40
Air Micro-Pump (µP 6)		1 "	05-01711-20
Micro-Pump (µP 2 ÷5)		1 "	05-01826-16
Predilution rack		1 "	05-01735-00
Solenoid Valve –2 way		1 "	9-35-0035-00
Solenoid Valve –3 way		1 "	9-35-0036-00

1.5 TECHNICAL OPERATING FEATURES

DESCRIPTION	♦ Fully automatic, random access, continuous loading, benchtop analyzer for clinical chemistry and immunoturbidimetric assays;
ASSAY TYPE	♦ End Point, Initial Rate, Kinetic, Bichromatic, Differential;
TEST ENTRY MODE	♦ Selective, Batch, Profiles, STAT
THROUGHPUT	♦ 138 tests per hour
WORKING TEMPERATURE	♦ 37° C
ON LINE REAGENTS	♦ 24 removable containers by 40 ml and 6 ml; ♦ 12 positions for Controls and Standards; ♦ Positive identification by a Bar Code Reader
SAMPLE CONTAINERS	♦ Primary tubes (diameter from 8 to 16 mm; height up to 100 mm) cups from 1 to 4 ml;
SAMPLE LOADING	♦ 4 racks, each having 8 positions for continuous sample loading ♦ Positive identification by a Bar Code Reader
MINIMUM REACTION VOLUME	♦ 220 µl
MAXIMUM REACTION VOLUME	♦ 550 µl
SAMPLING ARM	♦ A single mechanical arm provides all the sampling operations and is equipped with: • Capacitive liquid level sensing • Reagent pre-warming at 37° C • Automatic probe washing
DILUTER	♦ Integrated syringe-free module having the following specifications: • Sample volume: 2 µl ÷ 99 µl (1 µl incr.) • Reagent 1 volume: 3 µl ÷ 500 µl (1 µl incr.) • Reagent 2 volume: 3 µl ÷ 330 µl (1 µl incr.) • Reagent 3 volume: 3 µl ÷ 330 µl (1 µl incr.)
PRECISION	♦ CV < 1 % at 2 µl
READING SYSTEM	♦ Direct reading

OPTIC SYSTEM	♦ Photometer: double beam, interferential filters ♦ Wavelength: 8 narrow band interferential filters from 340 nm to 620 nm , plus one available optional filter position ♦ Light source: 6V/10 W halogen bulb ♦ Linearity range: up to 3,500 Abs ♦ Resolution: 0.0005 Abs
OPTICAL PATH	♦ 6 mm.
WASHING STATION	♦ Composed of five probes that empty, wash and dry the reaction cuvettes.
REACTION PLATE	♦ 6 singular replaceable racks with 20 cuvettes each ♦ Cuvettes Q.C. continuously computer controlled ♦ Incubation temperature: 37°C

1.5.1. COMPUTER & SOFTWARE FEATURE	
TYPE	MINIMUM REQUIREMENTS ♦ IBM Compatible
CPU	♦ Pentium IV 500 MHz, 512 Kb Cache
MEMORY	♦ RAM 256 Mb ♦ Hard Disk 20 Gb ♦ Floppy Disk 3 1/2” 1.44 Mb
MONITOR	♦ Colour SVGA 15’’ low radiation Resolution 800 x 600 pixels; max number of colors 65536 (16 bit)
PRINTER	♦ 80 Columns impact graphic (EPSON LX 300)
INTERFACE	♦ One Bi-directional RS 232C serial ports and one parallel (one second serial port for the Host link)
SOFTWARE AVAILABLE LANGUAGES	♦ Multitasking WINDOWS XP Home edition ♦ Italian, English, Chinese, Czech. Software to be released soon in these languages: Russian, Portuguese, French, Polish. Upon request it is possible to release the software in other languages.
SETTINGS	♦ Disable all the energy saving options ♦ Disable the screen saver ♦ Select English “USA” as language, dot as decimal symbol and date and time in Regional setting

NOTE: Even though the computers demonstrate the same technical and operative characteristics, some of these could have different hardware installed.

This could cause problems for the Ellipse software when running tests (A message appears indicating "Random" error or blocks the program).

Therefore, if the PC is bought separately/locally, it is highly recommended to test the system at your offices before preceding with the installation at the final client's.

Consequently, AMS denies any responsibility for software problems that are due to buying the computer separately from the instrument.

1.5.2 OPTIONAL MODULES
♦ **POSITIVE BARCODE READER**

1.5.3 DIMENSIONS, WEIGHT & OPERATING ENVIRONMENT	
DIMENSIONS	♦ Height: 53 cm ♦ Depth: 57 cm ♦ Length: 75 cm
WEIGHT	♦ 35 Kilos
OPERATING ENVIRONMENT	♦ Temperature: 18°C ÷ 30°C. ♦ Relative humidity: 20% ÷ 85%

1.5.4 INSTALLATION REQUIREMENTS	
POWER REQUIREMENTS	♦ Input Voltage 90 ÷ 250 Vac ♦ Input Frequency: 47 ÷ 63 Hz ♦ Power consumption: ♦ 300 W for the analytical unit ♦ 400 W for the work station
SAFETY REGULATIONS	♦ EN 61010-1:1993 +A2:1995 (IN COMPLIANCE WITH THE MAIN EUROPEAN DIRECTIVES 73/23/CEE AND 93/68/EEC REGARDING SAFETY)

ELECTROMAGNETIC COMPATIBILITY	♦ EMC 89/336/EEC – 92/31/EEC Directives ♦ EN 55011, Class B, Group 1 ♦ EN 50081-1:1992 EMC ♦ EN 55022 ♦ ENV 50140 – ENV 50141 ♦ EN 60601-1-2 ♦ EN 61000-4

Warning: A steady power supply (+ 10%) must be provided for the instrument.

If it is not, the manufacturer highly recommends the use of:

- **UPS** Uninterruptible Power Supply (No-break module)
- **ELECTRONIC STABILIZER**

CHAPTER 02

– SYSTEM DESCRIPTION -

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2 DESCRIPTION OF THE SYSTEM

"Ellipse" is a random access, computer controlled, counter-top, clinical analysis instrument. The system can perform 138 tests per hour and has a machine cycle of 26 seconds. Its execution time ranges from a minimum of 18 seconds to a maximum of 1032, depending on the analysis method chosen.

The first time the system is used for laboratory analyses, the operator must configure the system based on the specific needs of that laboratory; i.e.: the chemistry parameters and the reagents racks, along with the normal ranges, calibrated and control values, must all be defined.

The daily routine analyses will be carried out according to patient sample arrival in a sequential and continuous, non-stop manner.

The work list is organized using a loading rack holding up to 8 patient samples. Rack loading is non-stop.

The racks can accommodate both test tubes and micro cups. The bar code for primary tubes and reagent containers is an optional feature.

When the system, the analytical unit and the computer, is turned on the color-meter lamp is supplied with low voltage power (1.2 volts), the sampling arm pre-heater remains turned off, while instead the reaction plate heater, the reagents refrigerating unit (optional module) and the electronic components are turned on.

In this phase, the "Stand-by" light, placed on the front panel, will flash until the reaction plate reaches a temperature of 36° C. When this temperature is reached, the "Stand-by" light will stop flashing and will remain constantly lit.

In the case of system failure or malfunction, the "Ready" light, situated on the front panel of the instrument, will light up red.

In order to access the main program, double click on the *"Ellipse"* icon on the computer desktop.

The main menu - "System Monitor" - will appear.

Whenever any system function is launched, the color-meter lamp and the sampling arm pre-heater will receive regular power.

2.1 ANALYSES CYCLE

2.1.1 REACTION PLATE

The reaction plate of the *"Ellipse"* system contains 6 disposable racks with 20 reaction cuvettes each.
The racks can be removed individually.
The basic operating cycle of the reaction plate takes 26 seconds. This cycle includes: optic reading of the cuvettes in incubation, aspiration and dispensing of the reagents and the samples by the arm, along with the relative positioning of the plate .
The reactions take place at 37° C. This temperature is maintained constant by a controlled heating unit placed under the reaction plate .

2.1.2 REACTION PLATE CYCLE

After reagents and samples have been placed in cuvette #1, the reaction plate will rotate 40 positions counter-clockwise, so as to bring the first cuvette to be analyzed in front of the color-meter for reading with either one or two wavelengths, as required.
The plate will then, moving counter-clockwise, carry out all the readings of any other prepared cuvettes. After having effectuated all the readings, the plate will move counter-clockwise to its initial position minus one cuvette, ready for a new dispensing.
In this manner, the reaction cuvettes move clockwise 1 - 2 - 3 – 4 for dispensing, washing and for their relative readings.

2.2 SAMPLING ARM - OPERATIONAL SEQUENCE

1. The sampling arm lifts up from the wash well and carries out a wash cycle;
2. The arm moves toward the specific reagent container, while the diluter aspirates an air bubble to separate the rinse column from the reagent;
3. The arm lowers itself into the reagent, below the level indicated by the sensor, and aspirates the required quantity of reagent. If the method requires a Rinse (used in order to reduce the possibility of negative contamination between the water column and the reagent) an extra amount of reagent (not used in the analysis) will be aspirated before the quantity of reagent necessary for the analysis, along with another air bubble for their separation;

4. While the diluter aspirates a second air bubble, the arm rises and then lowers into the wash well so that it can be washed externally, to minimize cross contamination;
5. The arm moves to the specified sample and aspirates a third air bubble;
6. Once the level sensor has indicated the presence of the liquid, the arm stops and aspirates the sample;
7. The arm once again is raised, while the diluter aspirates a fourth air bubble to prevent sample loss;
8. At this point, the arm returns to the wash well in order to clean the outside of the probe and aspirates a fifth air bubble;
9. The arm moves to the reaction PLATE , dispenses, and mixes the reagent and sample in the reaction cuvette for incubation and reading;
10. The arm returns to the wash well and carries out a probe wash cycle.

SAMPLING SYSTEM

Aspiration of Air

Aspiration of Reagent

Aspiration of Air
(To separate reagent from serum)

To wash well to clean the probe

Aspiration of air

Aspiration of serum

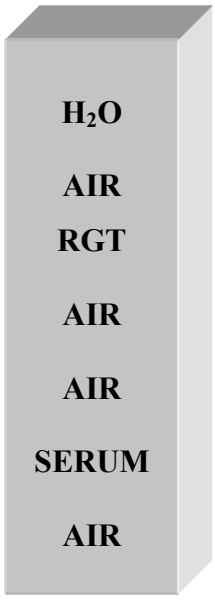
Aspiration of air

To wash well to clean the probe

Aspiration of air

Dispensing and mixing in cuvette

To wash well for final wash



2.3 WASH STATION

The reaction plate wash station is made up of a series of five small needles situated on one side of the reaction PLATE . Said needles are opportunely connected to the valve and pump system for emptying, washing and drying operations (please see the hydraulic diagram).

2.3.1 WASH STATION CYCLE

The wash station carries out its operations alternating upward and downward movement. In its downward movement phase the needles are guided in such a manner as to carry out the following operations:

- The first needle, using the central cannula, removes the reaction mix while the external cannula dispenses, shower-like fashion, the wash solution; after that the external cannula dispenses wash solution and then the liquid is aspirated from the central cannula;
- The second needle operates exactly like the first but uses distilled water instead;
- The third needle operates exactly like the first but dispenses rinse solution into the cuvette so that an optics check can be performed (if the results are negative, the cuvette is discarded);
- The fourth needle aspirates the control water;
- The fifth needles dries the sides.

All these operations are part of the routine operation of the instrument. Every reaction cuvette is washed at the end of each round of analysis.

The reusability (optical integrity) of each reaction cuvette is always tested before the next round of analysis.

2.4 ELECTRONIC DESCRIPTION

2.4.1 INTRODUCTION

The *Ellipse* general interconnection diagram is reported on the document having the code SC-16-00571-XX. This document shows all the electronic boards and the links among them.
The power supply is connected through a dedicated socket to the power line. It supplies, by two separate modules, the two requested voltages +24 VDC and +12 VDC.
All the *Ellipse* electronics boards are following described.

2.4.2 ANALYTICAL CONTROL BOARD (C.P.U.) [P/N: 30-01283-01]

The **Analytical Control Board**, integrated in the *Ellipse* system, is the heart of the low level, real time and processing management. This board, on which is present the micro-controller HITACHI H8S/2633F (U1), permits to manage all the input and output analogical and digital signals
need to the instrument functionality. The mentioned micro-controller, having 128 pin packaging and 12 ports, contains 16 KB of RAM memory and 256 KB flash memory where the firmware is installed. The firmware writing on the flash memory is permitted by an external personal computer by a serial transmission RS232.
The Analytical Control Board is connected to the "Stepper Motors Driver Board" by a 64 pin frontal clutch connector from which receives all the signals for driving the motors.
The following further boards are directly connected to the Analytical Control Board, through specific cables:

- The "Plate Interface Board (Sx)" and "Arm Interface Board (Dx)" for the users interfacing;
- The "Pre-Ampl./ADC" for reading the signals from main and reference channels of the photometer;
- The "Electrovalves Control Board" for commanding all the hydraulic devices.

Besides, through two distinct and direct serial links, it manages (if present) the bar code reader and the ISE modules.
On the board are present also the followings two leds:

- The red led (LD1) not used yet;
- The green led (LD2) is flashing when the board is powered and the firmware activated.

The power supply, by a specific line of the power cable, supplies the board with +24 VDC and +12 VDC. Further two voltages, +5 VDC and +3,3 VDC are generated on the same board by voltage regulators.

Components and integrated circuit dedicated to the programming communication with the micro-controller and those for I/O ports protection, are present on the same board.

Finally, the alarmed fan needed for the electronic area cooling, composed by the Analytical Control Board and the Stepper Motors Driver Board, is powered directly from the same board.

2.4.3 STEPPER MOTORS DRIVER BOARD [P/N: 30-01284-01]

The "Stepper Motors Driver Board" is the interface between the “Analytical Control Board” and the stepper motors.
Besides the Analytical Control Board, there are two more boards directly linked to the Stepper Motors Driver Board. They are the Plate Interface Board (Sx) and the Arm Interface Board (Dx) which transmit (by specific cables) all the command signals to the nine stepper motors present in the instrument. On the boards are present nine driver components (NMB SDI-C403 or TOSHIBA TA8435H). Each driver, on which is installed a metal heatsink by a couple of screws, is dedicated to drive one stepper motor as specified here below:

- driver U1 Sample plate motor;
- driver U7 Reagent plate motor;
- driver U4 Reaction plate motor;
- driver U6 Vertical sampling arm motor;
- driver U3 Horizontal sampling arm motor;
- driver U9 Diluter motor;
- driver U2 Photometer filter wheel motor;
- driver U5 Washing station motor;
- driver U8 Peristaltic pump motor.

By the nine dip switches setting on the board, each motor is driven to ¼ of step unless the filter wheel motor that is driven to 1/8 of step.

The power supply, by a specific power line cable, supplies two voltages +24 VDC and +12 VDC to the board. The +5 VDC needed to the driver components is generated on the same board by a voltage regulator. All the components managing the nine drivers and the relevant signals are mounted on the same board.

2.4.4 PLATE INTERFACE BOARD (SX) [P/N: 30-01281-01]

This board is the hardware interface between the reaction and reading sections of the instrument and the following boards:

- the Analytical Control Board which receives from the Plate Interface Board the I/O signals for managing the relevant devices (the three independents plates home sensors, the washing station home sensor, the photometer filter wheel home sensor, the reaction plate N.T.C., the reaction plate heater, the lamp and the fan of the photometer);
- the Stepper Motors Driver Board from which the Plate Interface Board receives the command signals for the stepper motors of the following devices: sample plate, reagent plate, reaction plate, washing station and photometer filter wheel;
- the Photometer Lamp Board for the photometer halogen lamp checking.

There are also the following two leds:

- the yellow led (LD1) active when the reaction plate resistor is powered;
- the red led (LD2) active when there is a signal from the reaction plate leaking.

The power supply, by a specific power line cable, supplies two voltages +24 VDC and +12 VDC to the board. The +5 VDC needed is generated on the Plate Interface Board by a voltage regulator. All the components managing respective devices are mounted on this board.

2.4.5 ARM INTERFACE BOARD (DX) [P/N: 30-01282-01]

This board is the hardware interface between the Sampling sections of the instrument and the following boards:

- the Analytical Control Board which receives from the Arm Interface Board the I/O signals for managing the relevant devices (the vertical sampling arm home sensor, the horizontal sampling arm home sensor, the diluter home sensor, the diluter electrovalve and pump, the preheater, the level sensor assembly, the temperature service probe, the main alarmed fan, the three buttons – indicators of the Control Panel);
- the Stepper Motors Driver Board from which the Arm Interface Board receives the command signals for the stepper motors of the following relevant devices: vertical and horizontal sampling arm, Diluter, peristaltic pump;
- the Control Panel Board for the three buttons-indicators checking.

There are also the following three led:

- the yellow led (LD1), active when the preheater is powered;
- the red led (LD2), active when there is a signal from the sampling arm leaking sensor;
- the yellow led (LD3), light on when the level sensor is activated.

The power supply, by a specific power line cable, supplies +24 VDC and +12 VDC to the board. +5 VDC needed to the Arm Interface Board is generated on the same board by a voltage regulator. All the components managing respective devices are mounted on this board.

2.4.6 ELECTROVALVES CONTROL BOARD [P/N: 30-01626-00]

This board communicates with the Analytical Control Board all the I/O signals for managing all the relevant devices (electrovalves and micropumps related to the washing station, the washing well and the peristaltic pump; the bottles liquid sensors; the waste sensors; the main cover switch).
The red led (LD1) is active when there is a signal from the washing station leaking sensor;
From the Analytical Control Board the Electrovalves control board receives the +24 VDC . +5 VDC is generated from + 24VDC by a voltage regulator. All the components managing respective devices are mounted on this board.

2.4.7 PRE-AMPL/ADC [P/N: 30-00107-00; P/N: 30-00107-03]

The Pre-Ampl/ADC board P/N: 30-00107-00 is used for reading the signals from the photometer main channel, while the Pre-Ampl/ADC P/N: 30-00107-03 has the same function for the photometer reference channel. They are mounted on the photometer assembly and directly linked to the Analytical Control Board, by two distinct flat cables, for transmitting all the I/O signals. The only difference between them is the R1 resistor value. On the boards, the (FD1) photodiode reveals the signal arriving from the relevant reading channel; the Amplifier (U2) amplifies the signal, which is then inputted in the serial converter ADS 1250 (U3) for its conversion A/D.
From the Analytical Control Board they receive also two continuous voltages ($+V_B$ and $-V_B$).
All the components dedicated to the signal amplification or digital conversion are mounted on the same boards.

2.4.8 PHOTOMETER LAMP BOARD [P/N: 30-01576-00]

This board is linked to the Plate Interface Board (Sx) from which receives the check signal (coming from the Analytical Control Board) to regulate the light intensity of the photometer halogen lamp (+6V, 10W). From the interface board receives the continuous voltage (V_L) which is then converted to +6 VDC on the same board, by a voltage regulator, for powering the lamp.

2.4.9 CONTROL PANEL BOARD [P/N: 30-01850-00]

This board is linked to the Arm Interface Board (Sx) to which transmits the I/O signals from the 3 lighting buttons of the Control Panel.
From the interface board receives also the continuous voltage (V_B) for the three buttons – indicators functionality.

2.4.10 LEVEL SENSOR ASSY [P/N: 10-01478-00]

The level sensor assembly is composed by the level sensor board "A" (P/N:30-01392-00) and the level sensor board "B" (P/N:30-01392-01).
The level sensor assembly, installed on the sampling probe head, is linked to the Arm interface board. By a specific cable it transmits the relevant signal (the capacity variation produced by the contact between the sampling probe and the liquid) to the Analytical Control Board.
Level sensor components and integrated circuits are mounted on the level sensor assembly.

CHAPTER 03 - INSTALLATION

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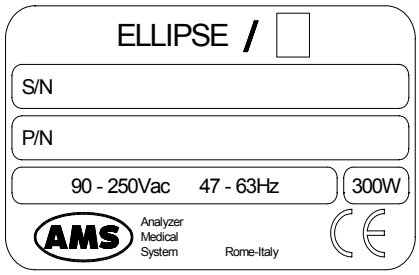
3.1 UNPACKING

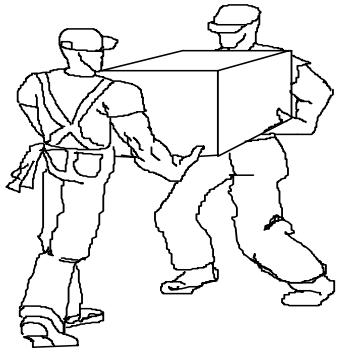
The ***ELLIPSE*** is packed and delivered in two separate wooden crates: one contains the analyzer itself and the other the computer, along with its accessories. In the event that the order not include the PC component, packing and delivery will involve one wooden crate plus a corrugated cardboard box. The packing has been expressly studied and designed to insure maximum protection of the contents during shipping and handling. It is therefore extremely important that the crate(s)/box be carefully examined upon delivery in order to ascertain their integrity. Special attention should be dedicated to examining the color of the "Shock Watch" glued to the crates, which must show the color 'white'. A 'red' "Shock Watch" indicates that the crate(s) have experienced some sort of 'shock' during handling, transport and/or delivery. This fact must be noted by the courier on the delivery note, as must any and all visible external damage (for example: holes, dents, rips or tears, water marks, etc.) evident at the moment of delivery. This will simplify matters in the event of any future claims for damages.

Upon arrival of the crate(s)/box, take out the delivery note and make sure that all the items on the packing list are included in the crates and are undamaged. Make sure the series number on the delivery note/packing list corresponds to that impressed on the plate on the right side of the instrument.



Open the crate(s)/box from the top and very carefully take out:

- the instrument;
- the computer and accessories.



MAKE SURE THAT THE UNPACKING IS CARRIED OUT BY TWO PEOPLE.

Do not discard the delivery crate(s)/box or the packing material until the correct functioning of the instrument has been ascertained.
Remove all the items from the crate(s)/box very carefully.
Remove the adhesive tape from the cover of the samples and reagents housing, from the front panels and from the samples and reagents racks.
Before connecting the *"Ellipse"*, remove the protective packing material placed under the sampling arm and under the wash station group.

Warning: in the event that it is necessary to repack any or all of the delivered item(s), the following procedures must be carefully followed:

- Reposition the protective packing material under the sampling arm and under the wash station group.

- Tape down (using masking tape if possible) the cover of the samples and reagents housing, the front panels, and the samples and reagents racks.

- Remove the probe from the sampling arm and place it inside a cuvette. Then cap the cuvette and tape the cap down.

- Be very careful to not bend the wash station cannulas when repositioning the protective packing material.

- Fill the empty spaces around the accessories packed in the crate using *"pluriballs"* or other suitable packing material.

3.2 INSTALLATION

The ELLIPSE must only be installed by a qualified technician who has been authorised and trained to do so. During its installation the system will be checked once again to ensure correct functioning. The persons who are required to operate the ELLIPSE system must have received the adequate training. This should also include the "know-how" of the normal maintenance for the instrument. A description of the maintenance will be found in Chapter 7 of this manual.

ELLIPSE is a complex system, and it is therefore extremely important that it is correctly installed in order to fully guarantee fine performance. If the installation and use directions, given in this manual, are not correctly followed and/or security indications are not respected, AMS cannot guarantee correct functioning of the instrument. Apart from this, the security of the operator could be placed at risk.

3.2.1 INSTALLATION SITE SPECIFICATIONS

Ascertain that the ELLIPSE system is not exposed to direct sunlight, draughts, dust or strong magnetic fields. In addition, please take note of the following conditions required for the location of the installation:

USE	In covered and dry place
DEGREE OF POLLUTION	2
INSULATION CLASS	I
INSTALLATION CATEGORY	II
TEMPERATURE	between18°- 30°C
HUMIDITY	20% ÷ 85%
ALTITUDE	Max 3000 m
LOCATION	Shelf or table with a minimum surface of 75 x 60 cm stable and free of vibration
VENTILATION	Leave a minimum distance of 10 cm around the instrument to permit air circulation . Make sure that the front and rear holes are not blocked by any object

3.2.2 ELECTRIC CURRENT REQUIREMENTS

The power voltages to which the instrument is adapted are indicated on the left-hand side (see fig. 1). It must be plugged into a plug of the correct voltage.

VOLTAGE	100 ÷ 230 Vac 47/63 Hz ± 10%
FUSES	6.3 Amp/T - 5 x 20

NOTE: IT IS ADVISABLE TO MAINTAIN THE MAXIMUM STABILITY OF THE ELECTRICAL CURRENT IN THE LABORATORY. WHERE THIS IS NOT POSSIBLE OR ASCERTAINABLE, USE OF THE FOLLOWING SUPPLEMENTARY DEVICES IS RECOMMENDED:

ELECTRONIC STABILIZER

Used to stabilise the electric voltage in the laboratory. Any stabiliser with a power potential greater than 0.5 KW, currently available on the market, can be used.

NO-BREAK MODULE UPS - (Uninterrupted Power Supply)

This module provides two important functions:

- stabilises the main-line power
- supplies current to the instrument in case of a main-line power failure.

3.2.3 CONNECTION OF THE ACCESSORIES

3.2.3.1 POWER SUPPLY

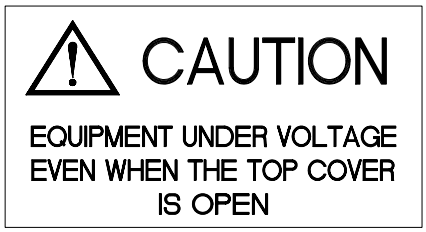
Fig. 1 -– Plug (use the feeder cable supplied with the instrument).
The sticker indicates the power supply voltage and the values of the fuses.

3.2.3.2 COMPUTER - INSTRUMENT CONNECTION

The instrument and the Personal Computer are connected by one serial RS232 standard cable (Cod. 9-35 0055.01), which provides the hardware support for the communication.

3.2.4 ATTENTION

The following label is found at the rear of the instrument.

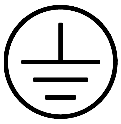


NOTE: THE REAR PANELS OF THE INSTRUMENT MUST NEVER BE OPENED WITHOUT HAVING FIRST SWITCHED THE INSTRUMENT OFF AND DISCONNECTED THE ELECTRICITY CABLE.

THE MAINTENANCE AND CLEANING PROCEDURES FOUND IN CHAPTER 07 OF THIS MANUAL MUST BE RESPECTED AT ALL TIMES. REMEMBER TO FOLLOW THE DECONTAMINATION PROCEDURE IN CASE OF INSTRUMENT REMOVAL (SEE CHAPTER 07) .

3.2.5 SYMBOLS

ATTENTION: READ THE INSTRUCTIONS IN THE USER MANUAL



TERMINAL OF TOTAL MASS PROTECTION (CONDUCTOR)

3.2.6 REGULATORY COMPLIANCE

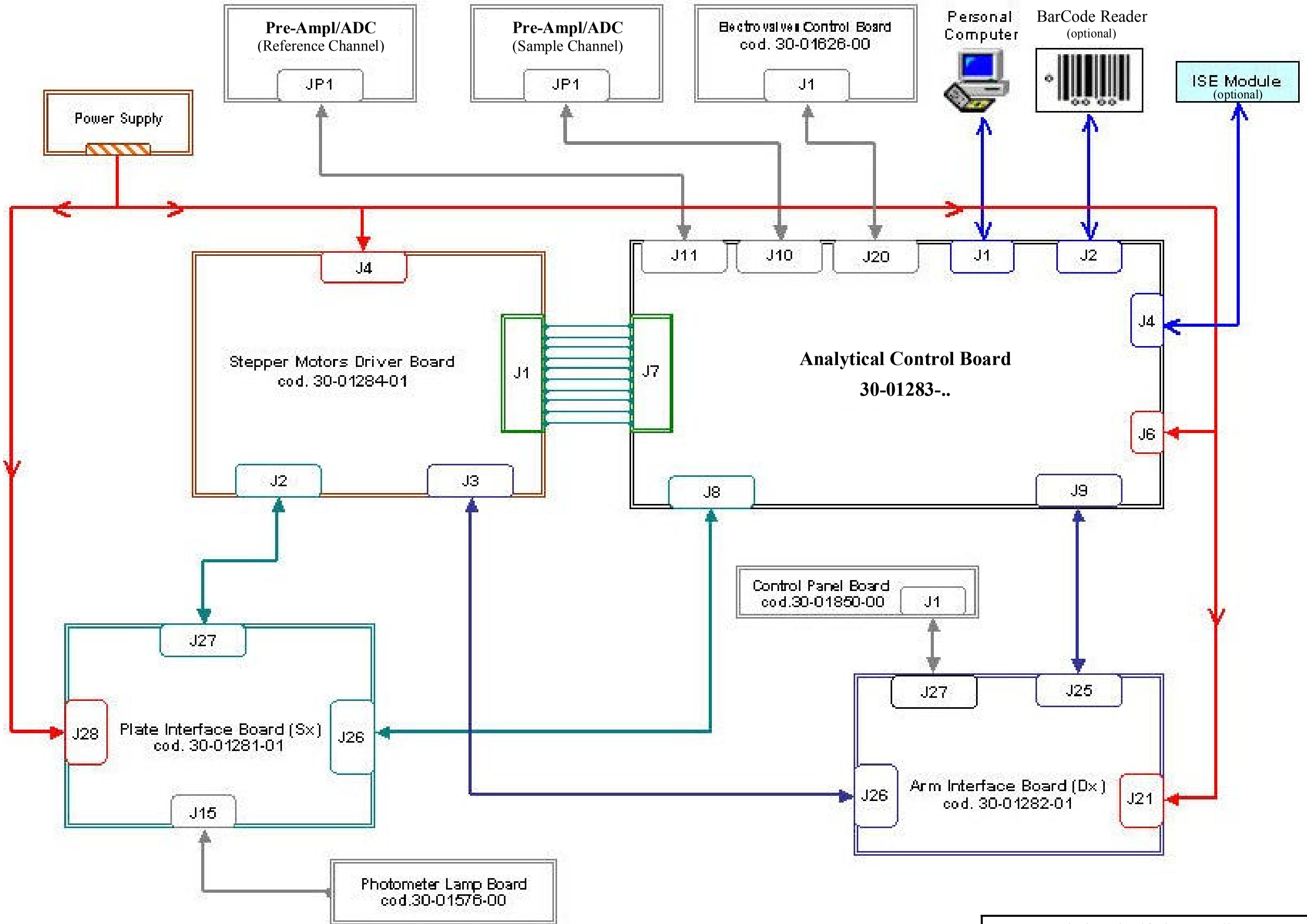
The ELLIPSE instrument complies with:

European Directive **98/79/CE** for In vitro Diagnostics Devices

CHAPTER 04

- ELECTRICAL SCHEMES AND DRAWINGS -

INDEX



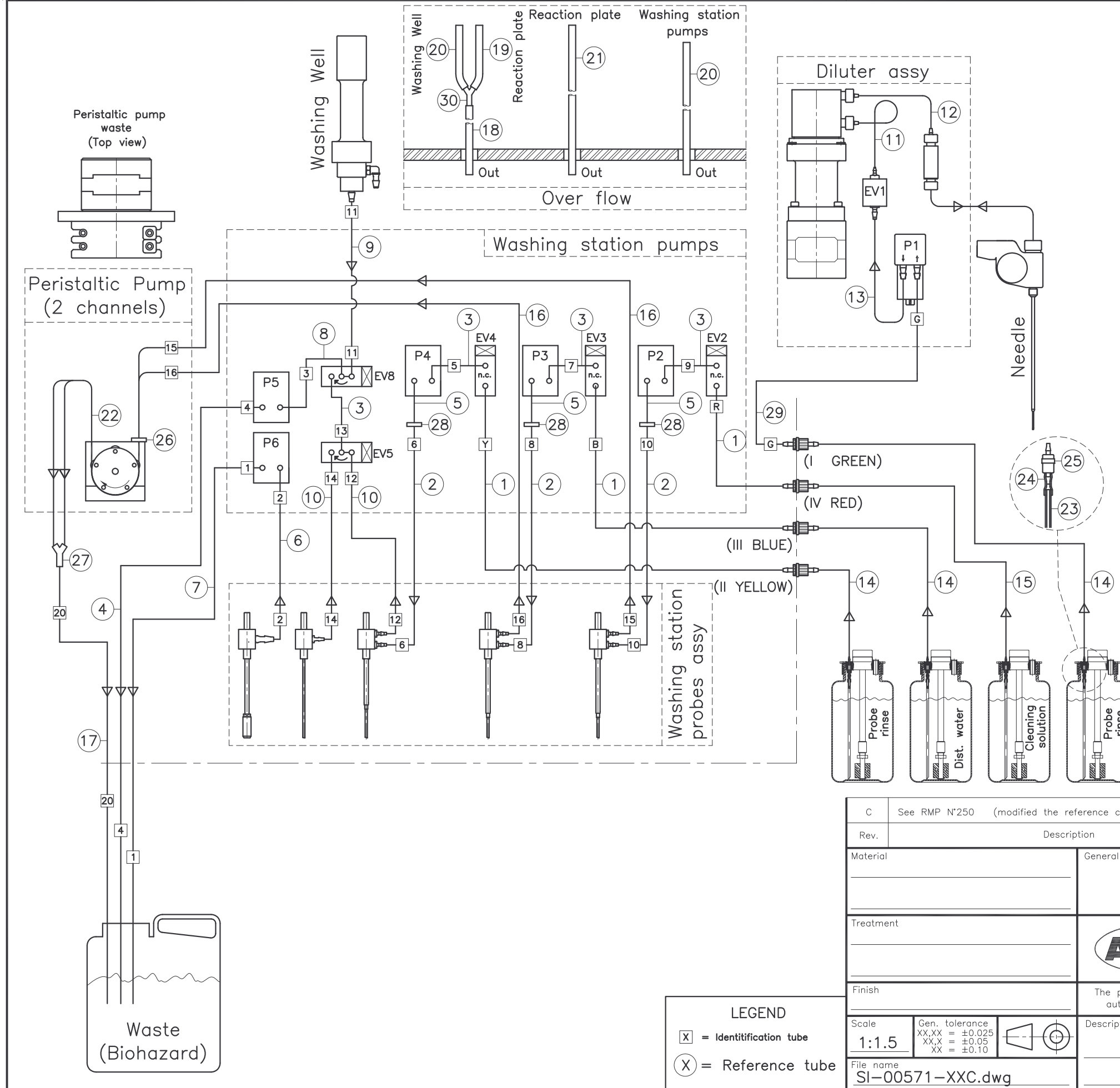
Rev. D: emissione in riferimento alla RMP n.268

AMS Analyzer Medical System
Via E. Barsanti, 17/A
(Via Tiburtina Km 18,300)
00012 Guidonia (Roma)

Drawn: L. Massenzi
Checked: R. Cornacchia
Approved: A. Gagliarducci
Date: 20/10/2005
Sheet: 1 of 1

Description: **Electronic Diagram Ellipse**

Doc.: SC | P/N: 16-00571-XX | Rev.: D



LEGEND

[X] = Identitification tube

(X) = Reference tube

∗—Not included in the tubes kit

	Ref.	Description	Id.	Q.ty	L=m
∗	30	"Y" fitting 002311		1	
	29	Silicon tubing øi2—øe4	G	1	0,80
∗	28	Fitting 90—01467—02		3	
∗	27	"Y" fitting 9—35—0053—00		1	
∗	26	Fitting 645003		2	
∗	25	Fitting 01—01224—00		4	
∗	24	Silicon tubing øi2—øe4		4	0,02
∗	23	Nylon tubing øi2—øe4		4	0,18
	22	Peristaltic pump tubing (Pharmed)		2	0,30
∗	21	PVC tubing øi4—øe6		1	0,18
∗	20	PVC tubing øi4—øe6		2	0,14
∗	19	PVC tubing øi4—øe6		1	0,12
∗	18	PVC tubing øi4—øe6		1	0,05
	17	Silicon tubing øi2—øe4	20	1	1,70
	16	Silicon tubing øi2—øe4	15—16	2	1,10
	15	Tygon tubing øi3,2—øe4,7		1	1
	14	Tygon tubing øi1,85—øe3,2		3	1
	13	Tygon tubing øi2,4—øe5,5		1	0,13
	12	Coextruded tubing øi1.6—øe3.2		1	0,07
	11	Coextruded tubing øi1.6—øe3.2		1	0,11
	10	Silicon tubing øi1.6—øe3.2	12—14	2	0,90
	9	Silicon tubing øi2—øe4	11	1	0,60
	8	Silicon tubing øi2—øe4	3	1	0,27
	7	PVC tubing øi4—øe6	1	1	2,20
	6	PVC tubing øi4—øe6	2	1	1
	5	Silicon tubing øi2—øe4		3	0,05
	4	Silicon tubing øi2—øe4	4	1	2,20
	3	Silicon tubing øi2—øe4	13—5—7—9	4	0,15
	2	Silicon tubing øi1.6—øe3.2	6—8—10	3	1
	1	Silicon tubing øi1.6—øe3.2	R—Y—B	3	0,25

Rev.	Description	Drawn	Checked	Approved	Date
C	See RMP N°250 (modified the reference color)				

Material

General note

Treatment

Finish

Scale 1:1.5

Gen. tolerance
XX,XX = ±0.025
XX,X = ±0.05
XX = ±0.10

File name SI—00571—XXC.dwg

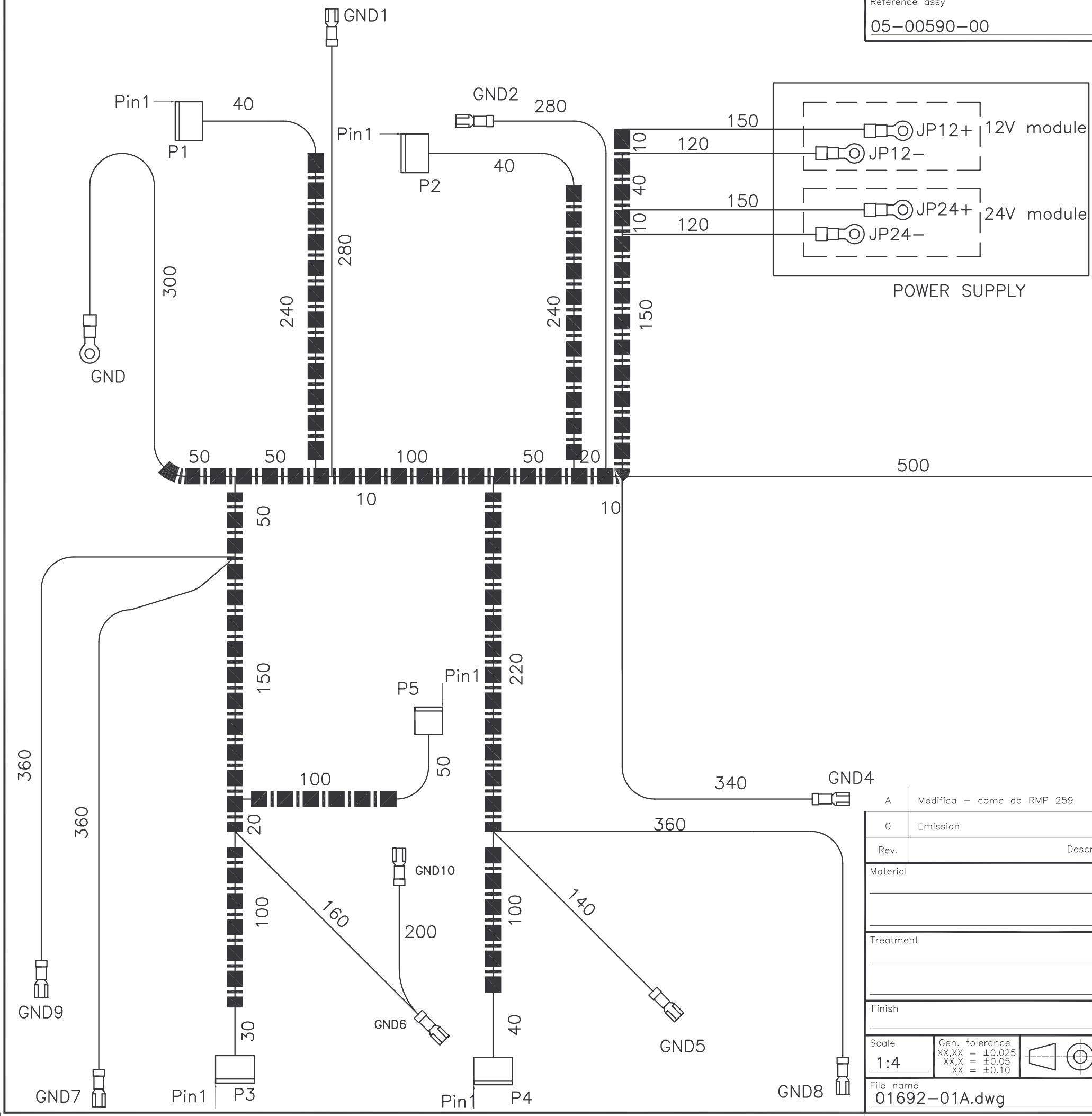
AMS Analyzer Medical System
Via E. Barsanti 17/A
(Via Tiburtina km. 18,300)
00012 Guidonia (Roma)

Description
HYDRAULIC DIAGRAM
ELLIPSE

Drawn G.Pucci
Checked L.Mancini
Approved L.Mancini
Date 06.07.2005
Sheet 1 of 1

Doc. SI
P/N 16-00571-XX
Rev. C

Reference assy
05-00590-00



Connections

Conn. / PIN	P1	P2	P3	P4	P5
1	+12V	+12V	+12V	+12V	+12V
2	+12V	+12V	+12V	+12V	+12V
3	+24V	+24V	+24V	+24V	GND
4	+24V	+24V	+24V	+24V	GND
5	GND	GND	GND	GND	
6	GND	GND	GND	GND	

Rev.	Description	Drawn	Checked	Approved	Date
A	Modifica – come da RMP 259				
0	Emission	M.Ottavi	L.Massenzi	A.G.	02.03.2005

Material

Treatment

Finish

Scale 1:4

Gen. tolerance
XX,XX = ±0.025
XX,X = ±0.05
XX = ±0.10

File name 01692-01A.dwg

General note

AMS Analyzer Medical System
Via E. Barsanti 17/A
(Via Tiburtina km. 18,300)
00012 Guidonia (Roma)

Description: WIRING

Drawn: M.Ottavi
Checked: L.Massenzi
Approved: A.Gagliarducci
Date: 19/09/2005
Sheet: 1 of 1

Doc. ME | P/N 50-01692-01 | Rev. A

Plate Interface Board (Sx)
J26
30-01281-01

50-01731-00

50-01732-00

Arm Interface Board (Dx)
J25
30-01282-01

Power Supply

50-01692-01

Pre-Ampl/ADC
(Reference Channel)
JP1

J1

Stepper Motors
Driver Board
30-01284-01

J6 J8 J9

Green Led LD2
Red Led LD1

J7

J11

50-01726-00

J18

50-01729-00

J10

H8S2633F
U1

30-01283-..
Analytical Control Board

J5

J4 J2 J21 J20 J1 J13

JP1
Pre-Ampl/ADC
(Sample Channel)

ISE Module

BarCode
Reader

Electronic Vain Fan Assy
05-01700-20

Electrovalves Control Board
J1
30-01626-00

50-01730-00

50-01743-00

Serial

Rev. A: emissione in riferimento alla RMP n.268

AMS Analyzer Medical System
Via E. Barsanti, 17/A
(Via Tiburtina Km 18,300)
00012 Guidonia (Roma)

Drawn: L. Massenzi
Checked: R. Cornacchia
Approved: A. Gagliarducci

Description: **Analytical Control Board**

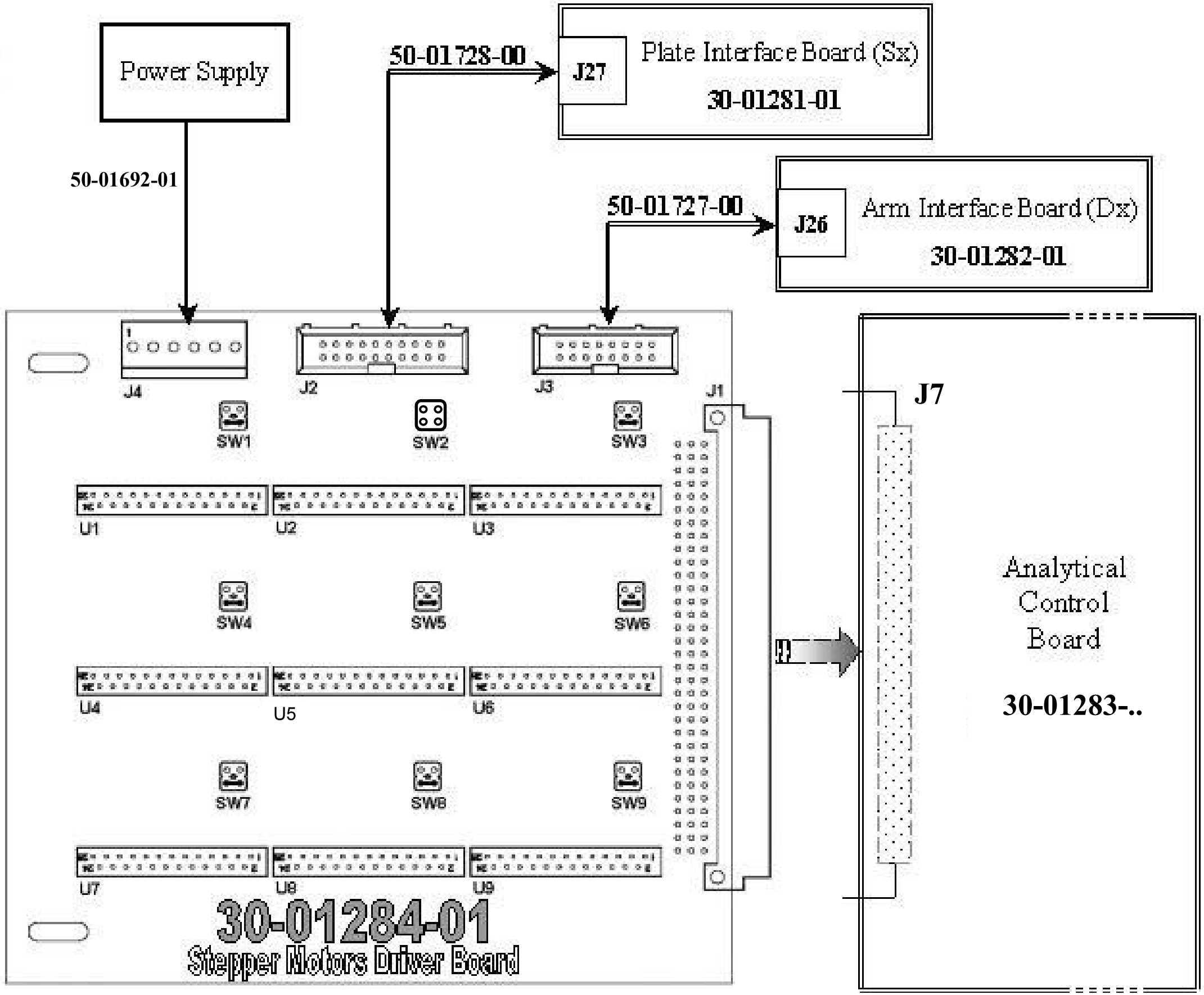
Date: 20/10/2005
Sheet: 1 of 1
Doc.: SC02
P/N: 30-01283-XX
Rev.: A

Rev.	Description	Checked	Approved
0	RMP 224		

Approved	A.G. 10/09/2004	Analytical Control Board	
Checked	I.M. 10/09/2004		
Drawn	R.CORNACCHIA		
Size A3	Document Number SE-30-01283-XX		Rev 0
Date: 10/09/2004	Sheet 1 of 1		

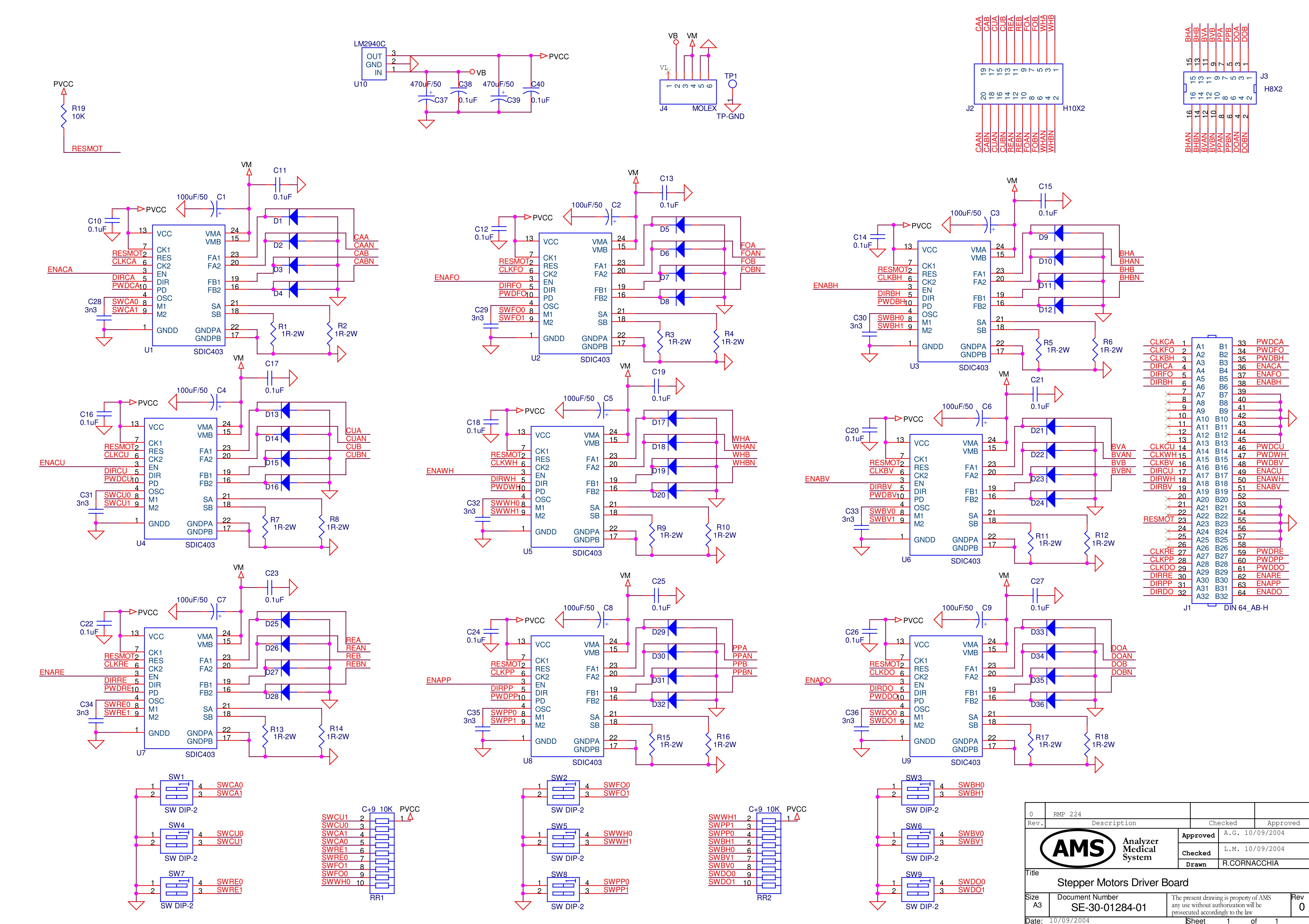
Refer to the Serigrafy

ISE - NO3



Rev. A: emissione in riferimento alla RMP n.268

AMS Analyzer Medical System — Via E. Barsanti, 17/A (Via Tiburtina Km 18,300) 00012 Guidonia (Roma)	Drawn	L. Massenzi
	Checked	R. Cornacchia
The present document is property of AMS, any use without authorization will be prosecuted accordingly to the law.	Approved	A. Gagliarducci
Description: **Stepper Motors Driver Board**	Date 20/10/2005	Sheet 1 of 1
	Doc. **SC02** P/N **30-01284-01**	Rev. **A**



Stepper Motors Driver Board
AMS Analyzer Medical System
Document Number SE-30-01284-01
Rev 0
Size A3
Date: 10/09/2004
Sheet 1 of 1
0 RMP 224
Rev. Description Checked Approved
Approved A.G. 10/09/2004
Checked L.M. 10/09/2004
Drawn R.CORNACCHIA
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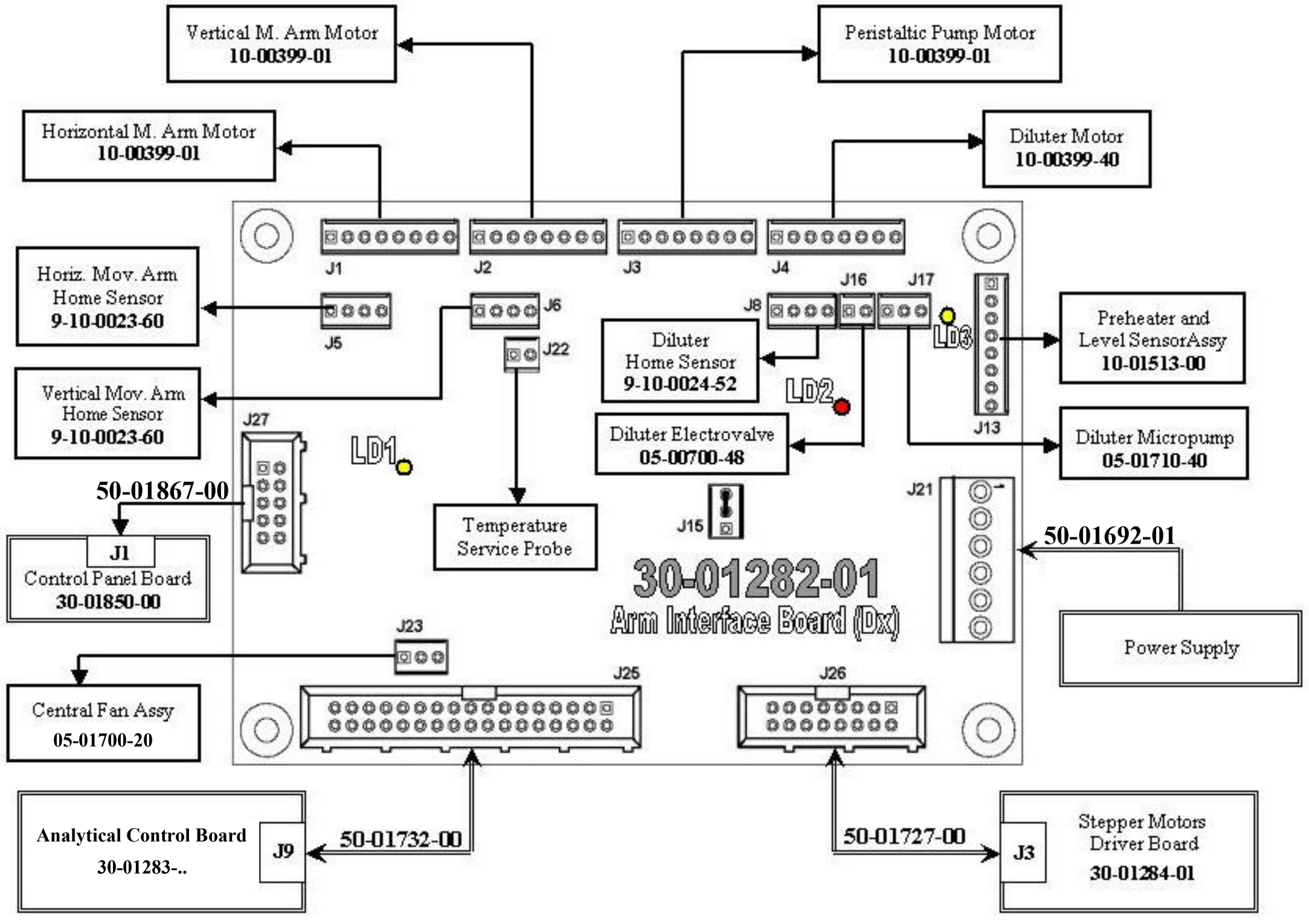
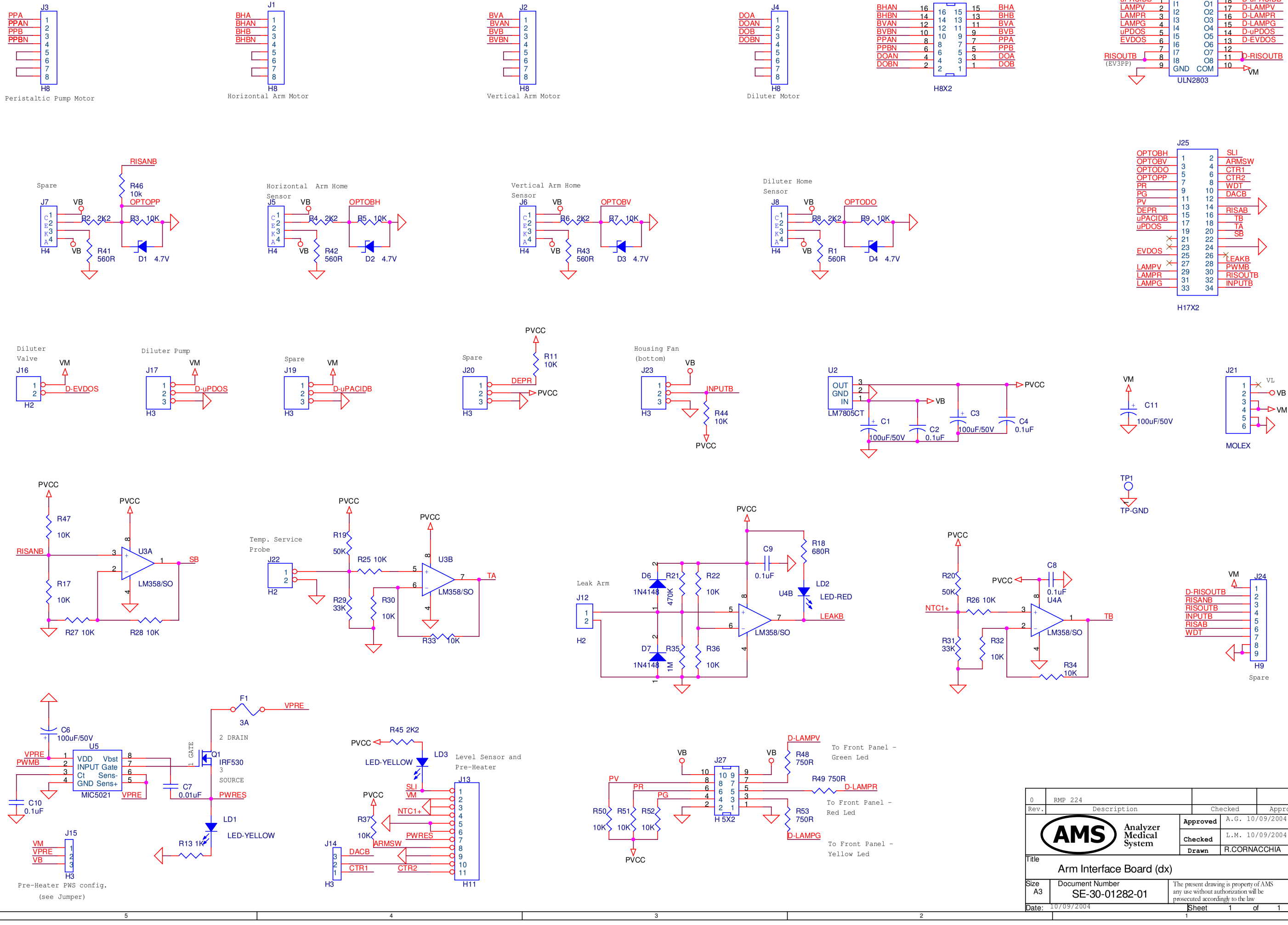


Rev. B: emissione in riferimento alla RMP n.268

AMS Analyzer Medical System — Via E. Barsanti, 17/A (Via Tiburtina Km 18,300) 00012 Guidonia (Roma)	Drawn: L. Massenzi
	Checked: R. Cornacchia
	Approved: A. Gagliarducci
Description: **Arm Interface Board (Dx)**	Date: 20/10/2005 — Sheet: 1 of 1
	Doc.: SC02 — P/N: 30-01282-01 — Rev.: B



0	RMP 224		
Rev.	Description	Checked	Approved

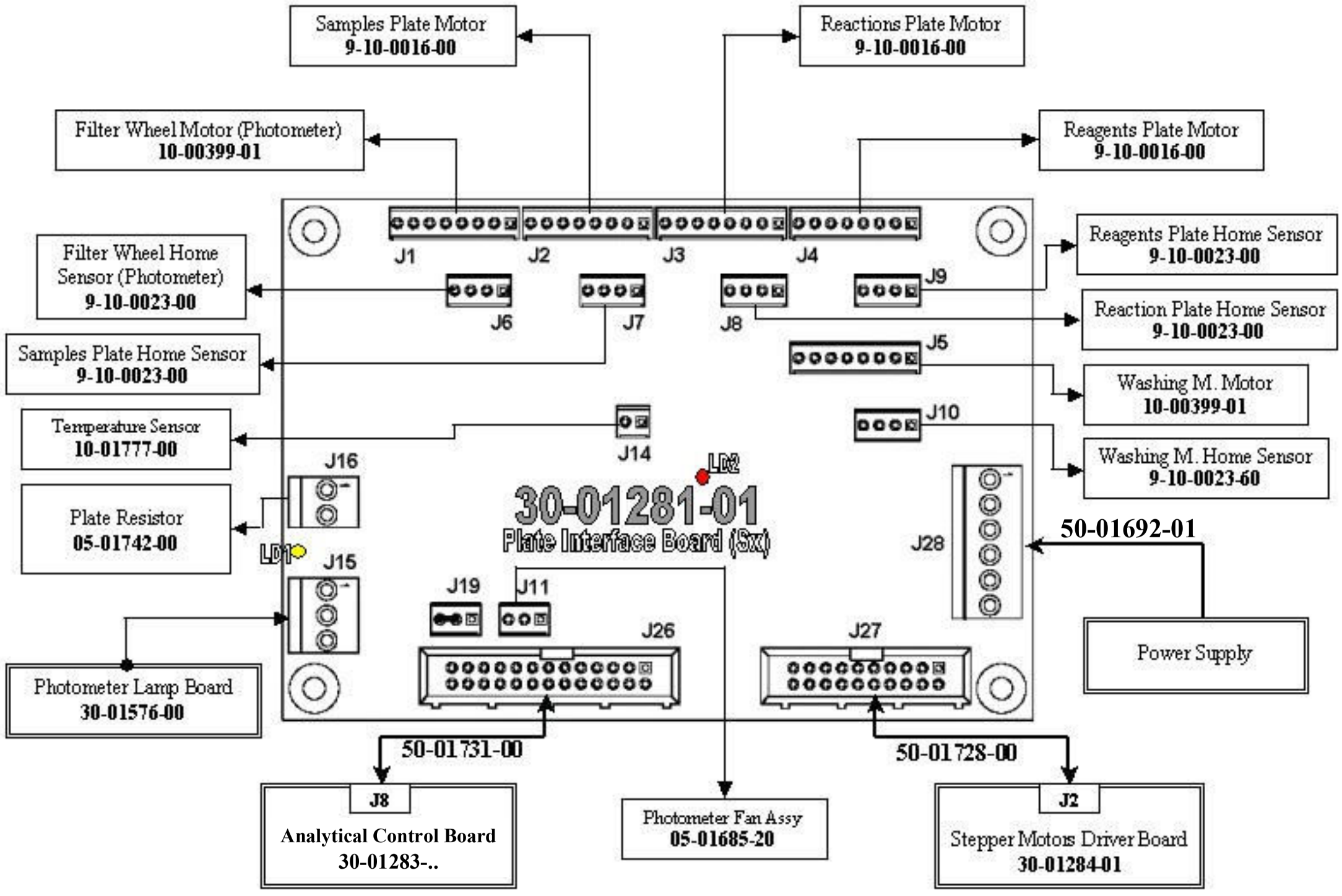
AMS Analyzer Medical System

Approved	A.G. 10/09/2004
Checked	L.M. 10/09/2004
Drawn	R.CORNACCHIA

Title: Arm Interface Board (dx)

Size	Document Number	Rev
A3	SE-30-01282-01	0

Date: 10/09/2004 Sheet 1 of 1



Rev. A: emissione in riferimento alla RMP n.268

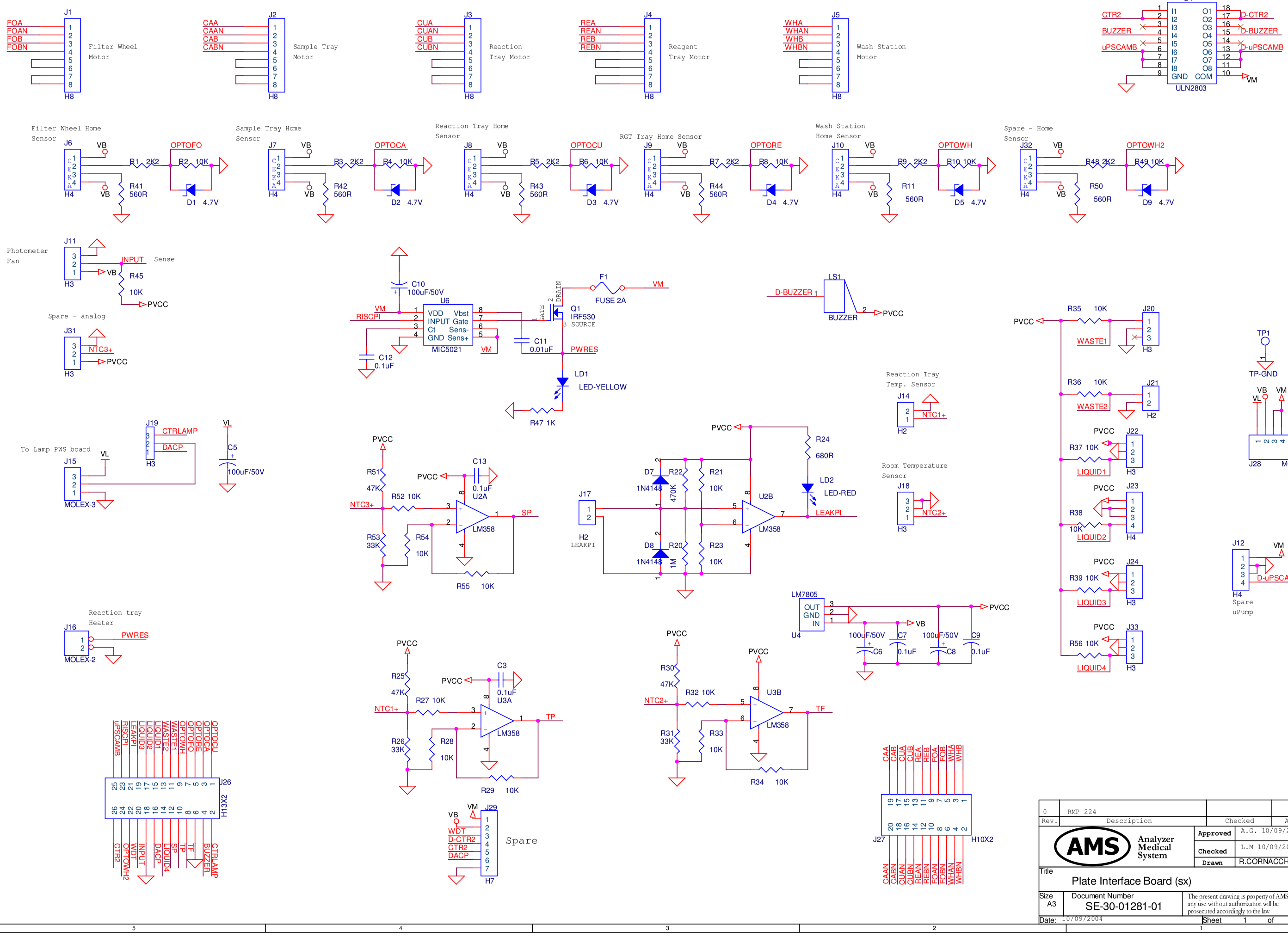
AMS Analyzer Medical System — Via E. Barsanti, 17/A (Via Tiburtina Km 18,300) 00012 Guidonia (Roma)

Drawn: L. Massenzi
Checked: R. Cornacchia
Approved: A. Gagliarducci

Description: **Plate Interface Board (Sx)**

Date: 20/10/2005 | Sheet: 1 of 1

Doc.: SC02 | P/N: 30-01281-01 | Rev.: A



0	RMP 224		
Rev.	Description	Checked	Approved

AMS Analyzer Medical System

Approved	A.G. 10/09/2004
Checked	L.M 10/09/2004
Drawn	R.CORNACCHIA

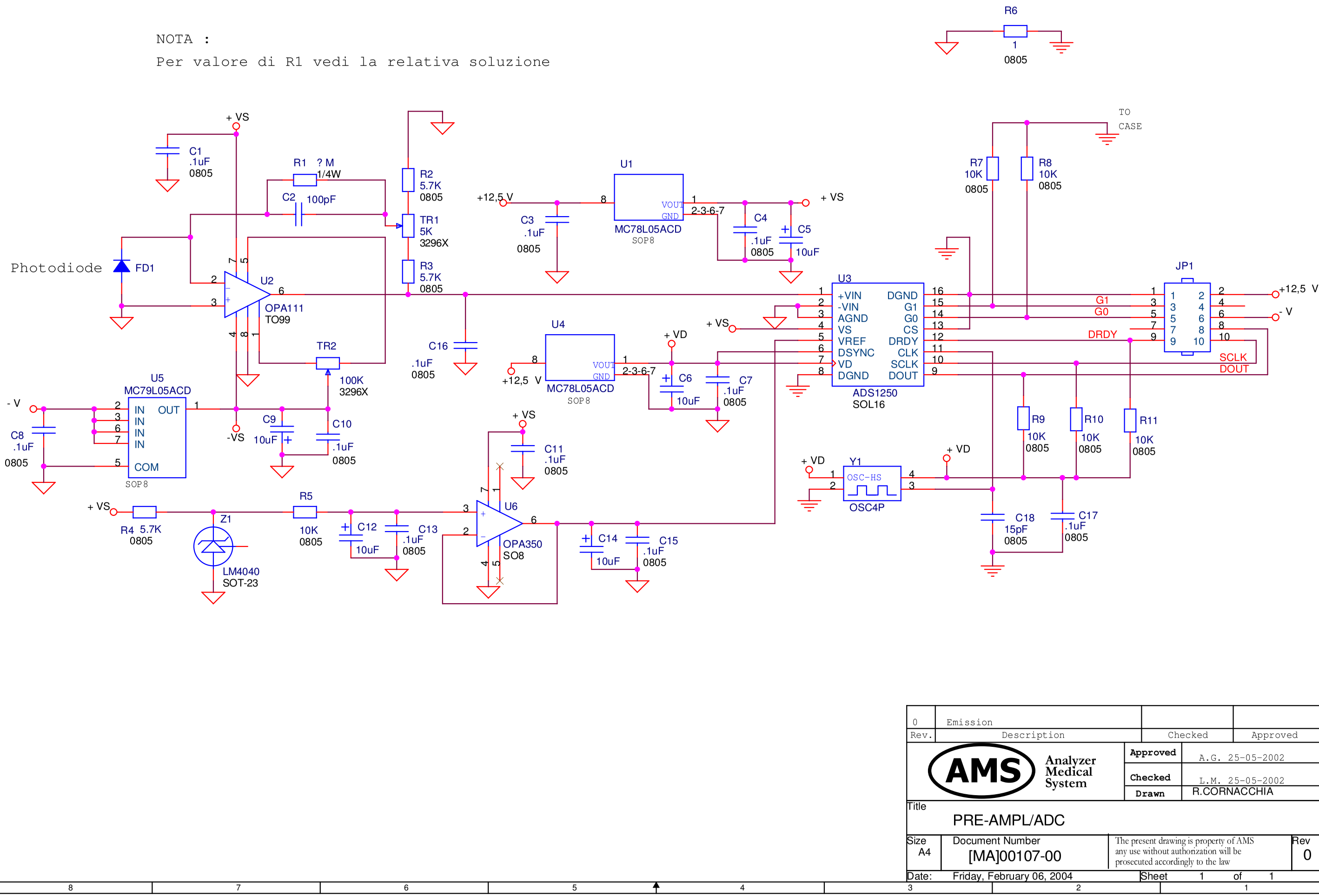
Title: Plate Interface Board (sx)

Size	Document Number		Rev
A3	SE-30-01281-01	The present drawing is property of AMS any use without authorization will be prosecuted accordingly to the law	0

Date: 10/09/2004 Sheet 1 of 1

NOTA :

Per valore di R1 vedi la relativa soluzione



Rev.	Description	Checked	Approved
0	Emission		

AMS Analyzer Medical System	Approved	A.G. 25-05-2002
	Checked	L.M. 25-05-2002
	Drawn	R.CORNACCHIA

Title: PRE-AMPL/ADC

Size	Document Number		Rev
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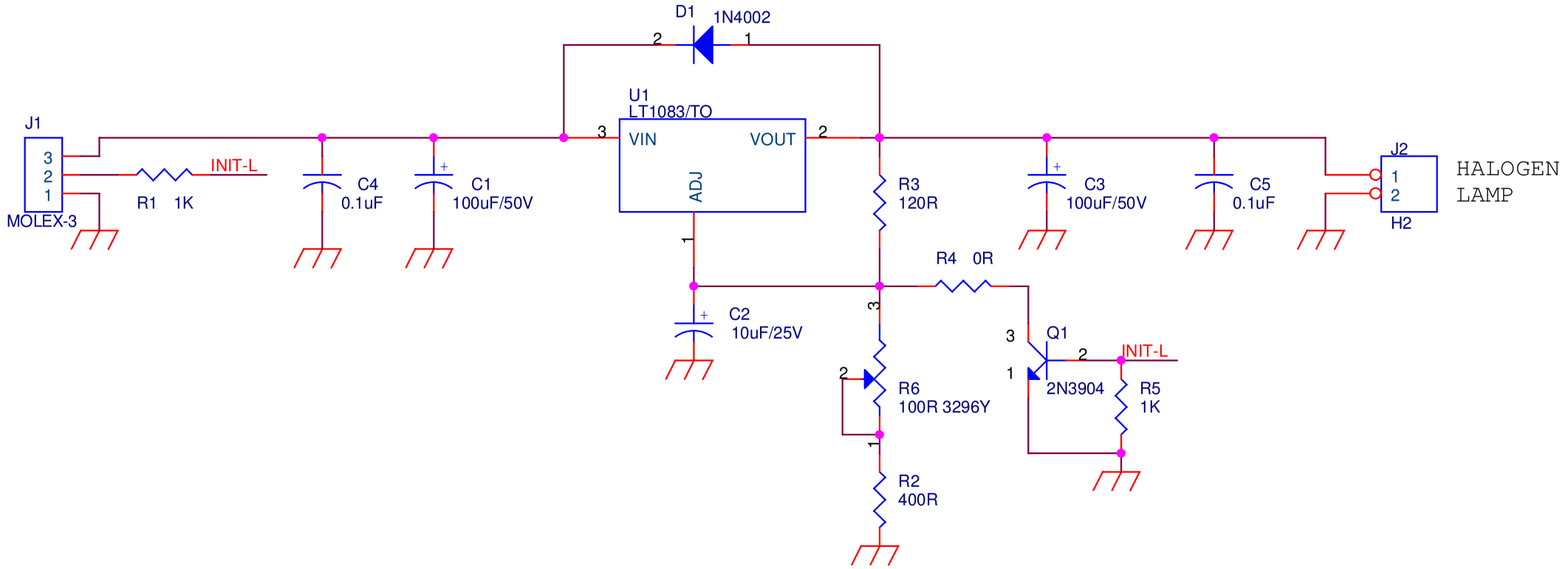
Date: Friday, February 06, 2004 Sheet 1 of 1



Rev.	Description	Checked	Approved
0	Emission		

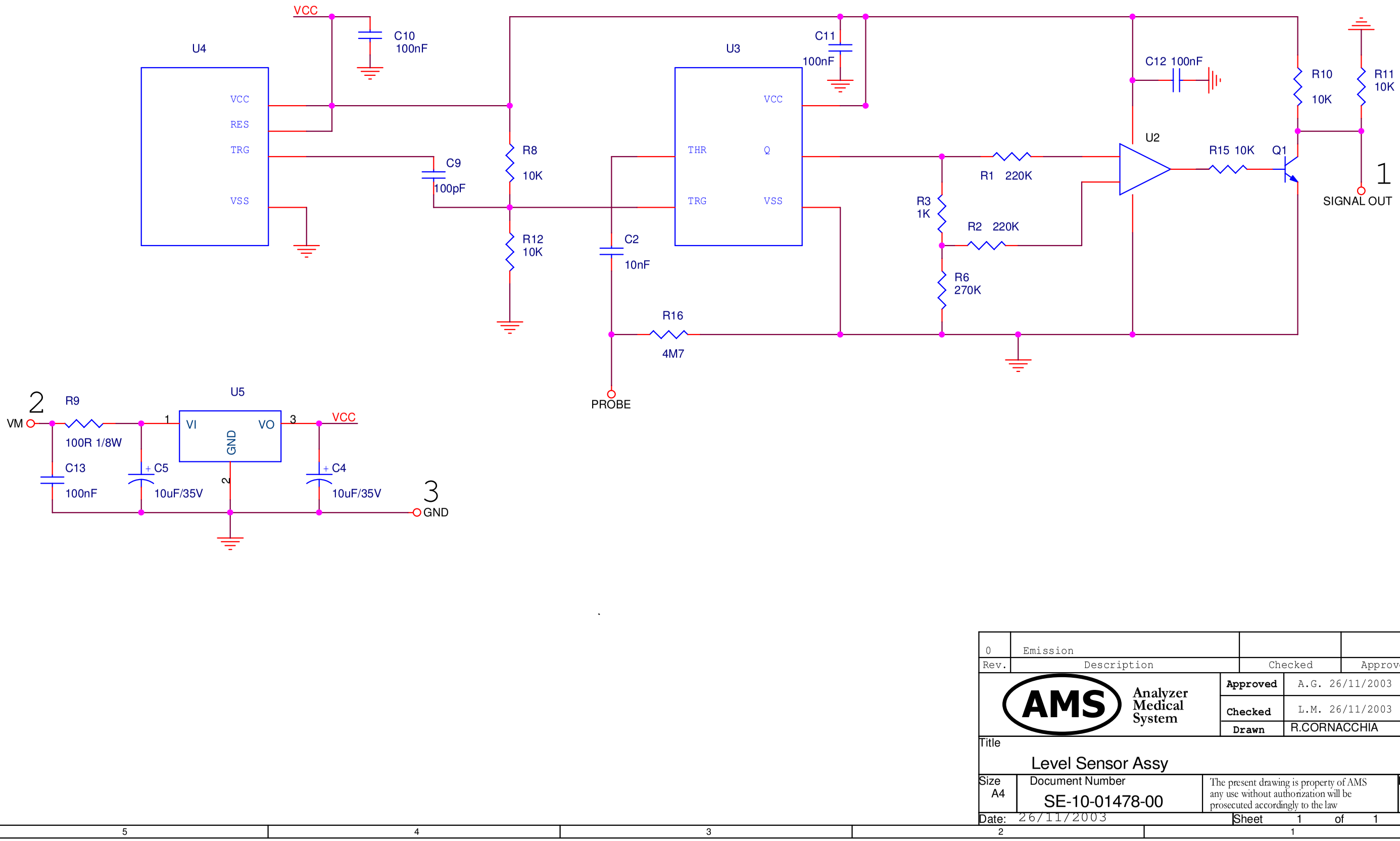
AMS Analyzer Medical System

Approved	A.G. 03/01/2005
Checked	L.M. 03/01/2005
Drawn	R.CORNACCHIA

Title: Photometer Lamp Board

Size	Document Number	Rev
A4	SE-30-01576-00	0

Date: 03/01/2005 Sheet 1 of 1



Rev.	Description	Checked	Approved
0	Emission		

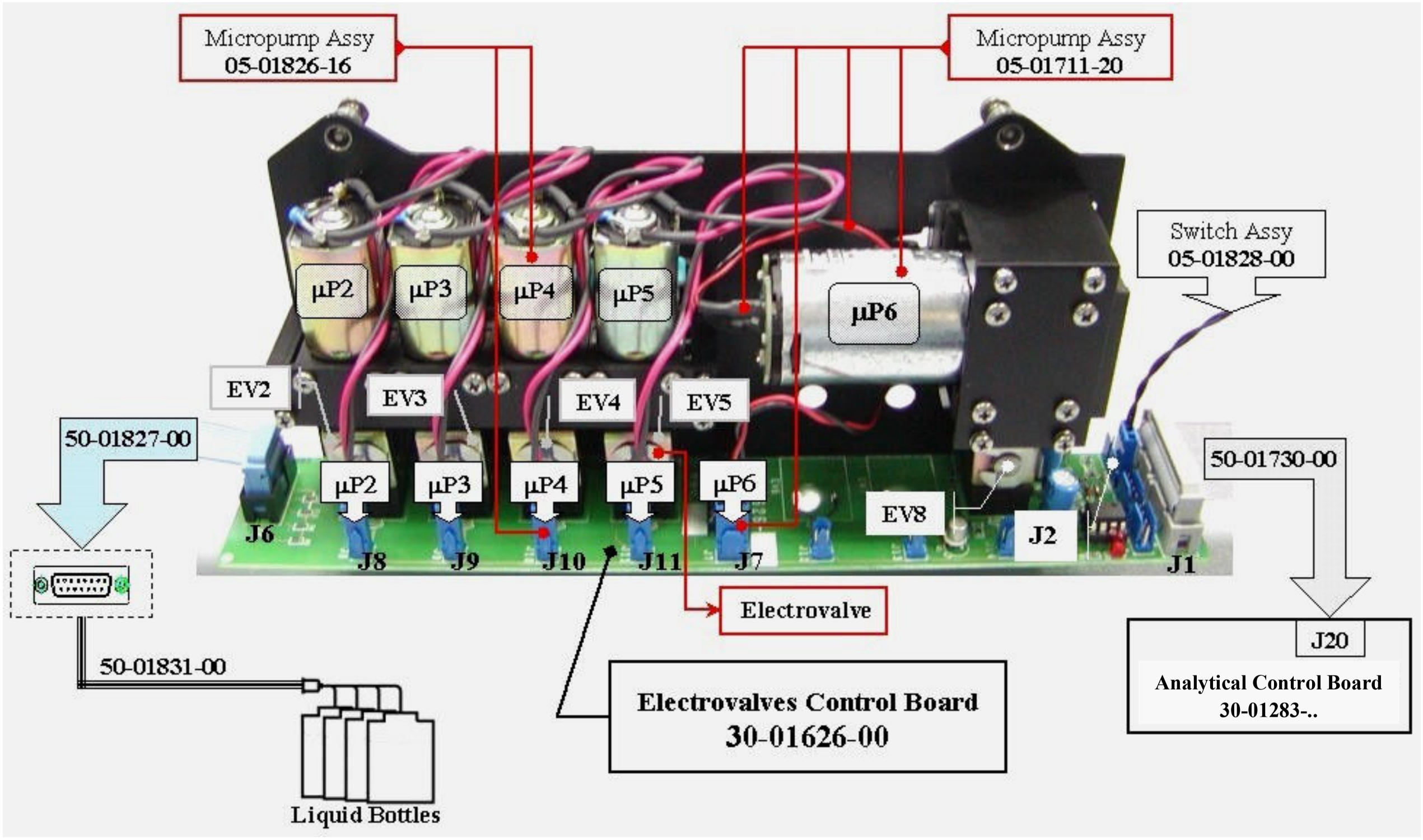
AMS Analyzer Medical System

Approved	A.G. 26/11/2003
Checked	L.M. 26/11/2003
Drawn	R.CORNACCHIA

Title: Level Sensor Assy

Size	Document Number	Rev
A4	SE-10-01478-00	0

Date: 26/11/2003 Sheet 1 of 1



Rev. A: emissione in riferimento alla RMP n.268

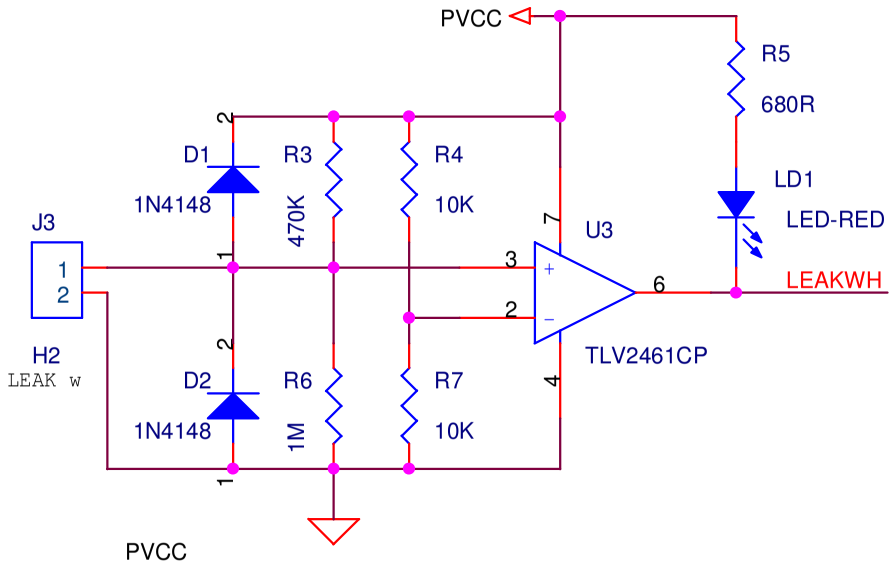
AMS Analyzer Medical System
Via E. Barsanti, 17/A
(Via Tiburtina Km 18,300)
00012 Guidonia (Roma)

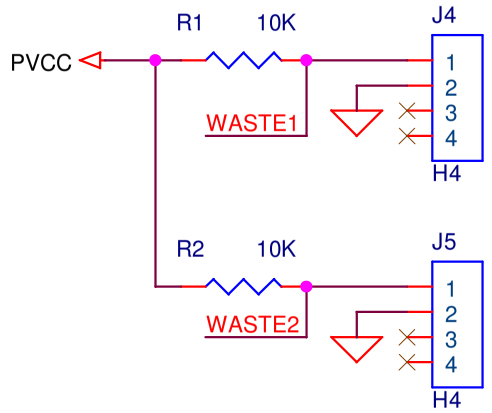
Drawn: L. Massenzi
Checked: R. Cornacchia
Approved: A. Gagliarducci

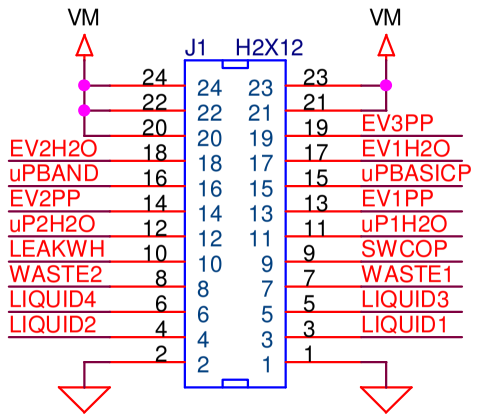
Description: **Electrovalves Control Board**

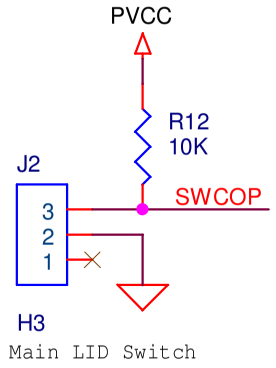
Date: 20/10/2005
Sheet: 1 of 1

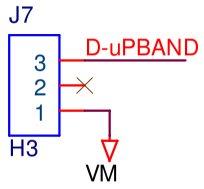
Doc.: SC | P/N: 30-01626-00 | Rev.: A

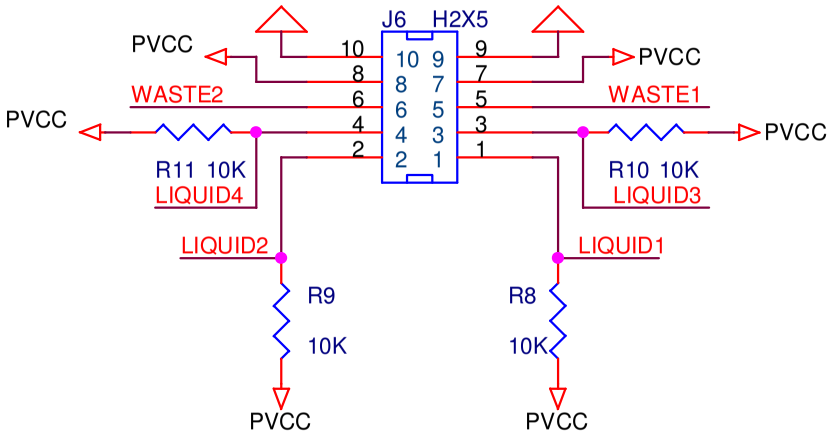


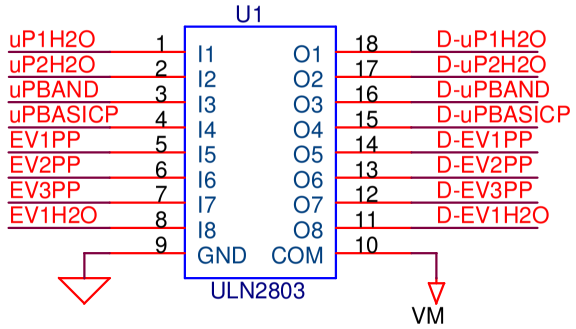


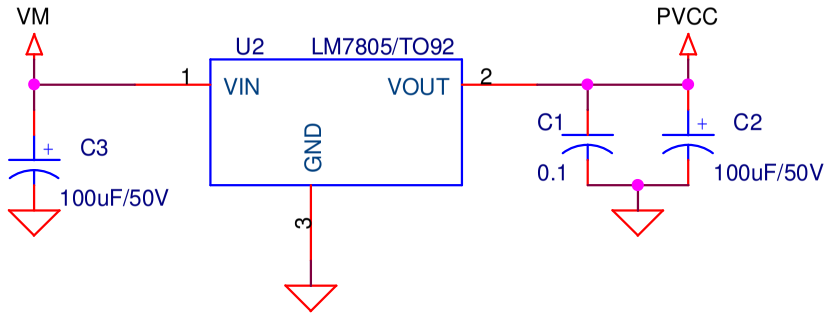


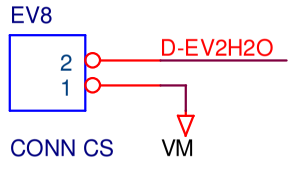


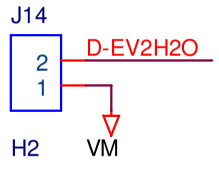


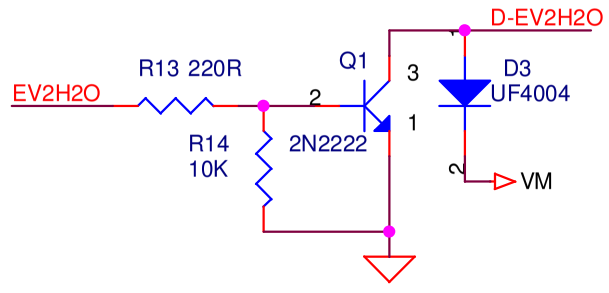


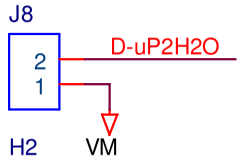


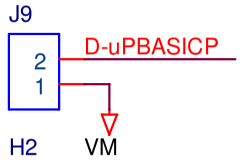


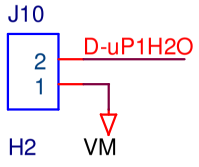


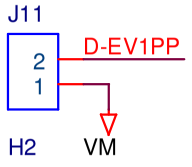


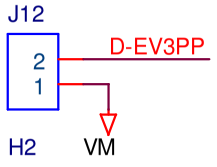


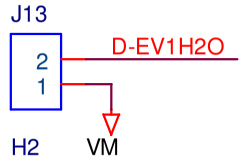


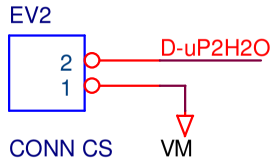


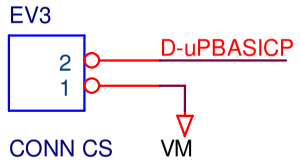


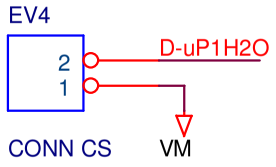


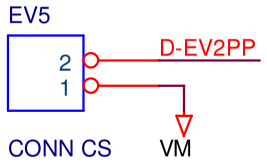


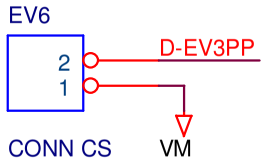


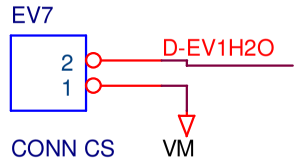












Rev.	Description	Checked	Approved
0	Emission		

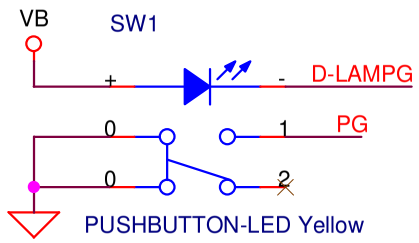
AMS Analyzer Medical System

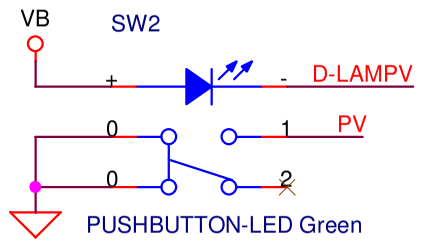
Approved	A.G. 07/09/2004
Checked	L.M. 07/09/2004
Drawn	R.CORNACCHIA

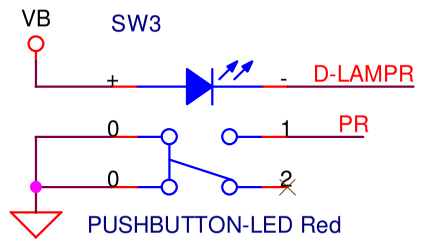
Title: Electrovalves Control Board

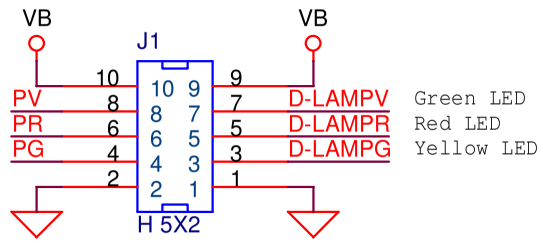
Size	Document Number	Rev
A4	SE-30-01626-00	0

Date: 07/09/2004 Sheet 1 of 1









Rev.	Description	Checked	Approved
0	Emission		

AMS Analyzer Medical System

Approved	A.G. 25/02/2005
Checked	L.M. 25/02/2005
Drawn	R.CORNACCHIA

Title: Control Panel Board

Size	Document Number		Rev
A4	SE-30-01850-00	The present drawing is property of AMS any use without authorization will be prosecuted accordingly to the law	0

Date: 25/02/2005 Sheet 1 of 1

CHAPTER 05

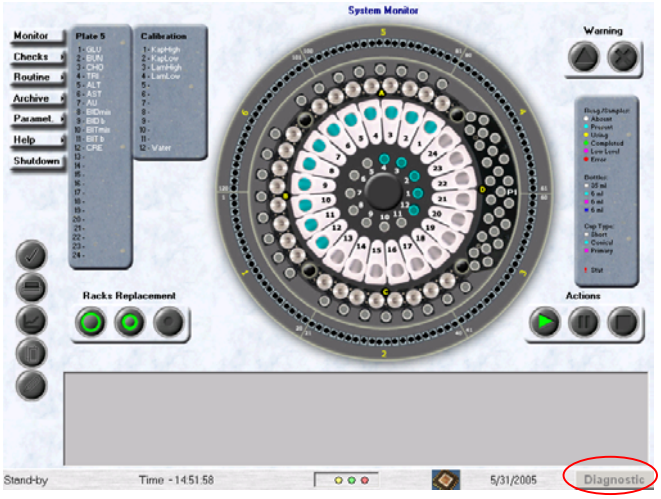
- DIAGNOSTIC PROGRAM -

INDEX

5 DIAGNOSTIC PROGRAM

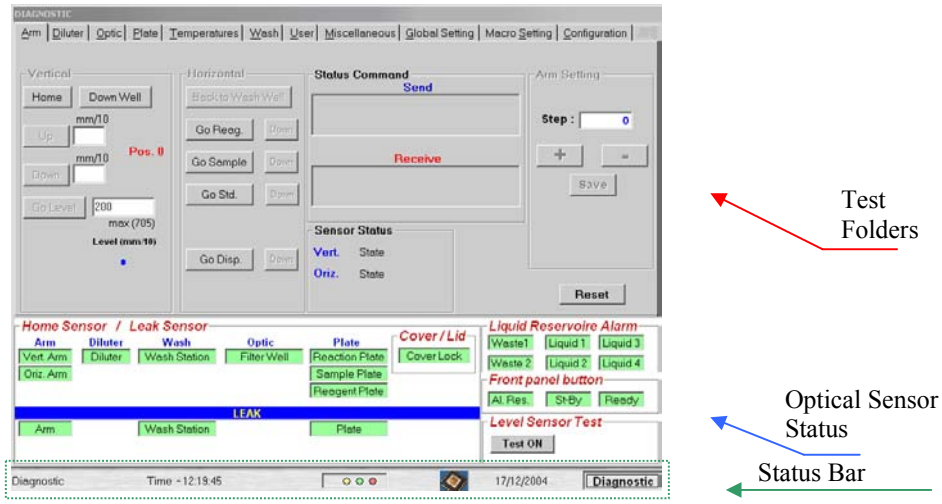
The diagnostic program enables the operator to perform a complete check of each of the Ellipse' module functions.
This program has a folder structure, with each folder containing functions pertaining to the specific module. To launch the program the operator has to click with the left side of the mouse, on the **Diagnostic** area located on the lower right side of the screen of the System Monitor (Fig.1).
The Ellipse must be in the stand-by state to access this area.

Fig. 1



Once the program starts, the following screen appears (Fig. 2)

Fig. 2



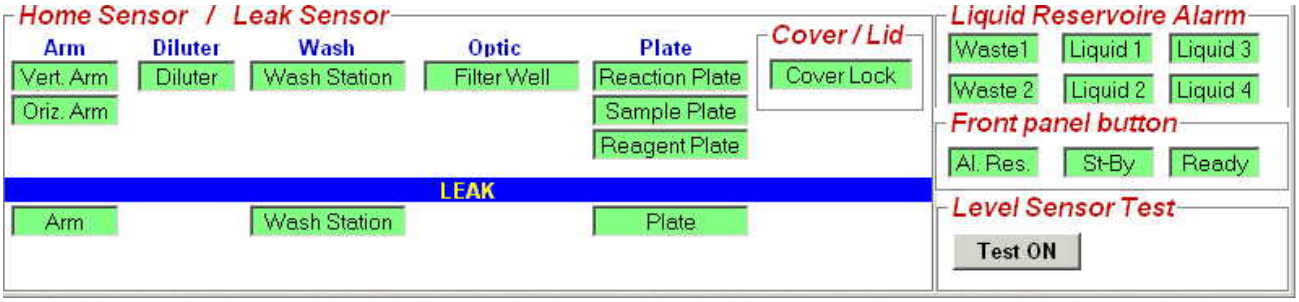
The diagnostic program is subdivided into three distinct areas: test folders, optical sensor status, status bar. The last two areas are present on every diagnostic window.

The three areas enable the operator to verify multiple functions as specified below:

Test Folders: checks the functionality of the Ellipse' various sub-systems; The individual functions are illustrated later on.

Optical Sensor Status: visualizes the sensor status that controls the Sampling Arm, the Diluter, the Washing Station, the Optical filter wheel, the Reaction plate, the Sample plate, the Reagent plate and the Cover Lock, as well as the Liquid Reservoir Alarm, the Front panel button and the Level Sensor Test (Fig. 3)

Fig. 3



Furthermore, there are three types of unused fields for future use: Leak for Arm, Washing Station and Plate. While the program is running, the fields given in the figure can be either of two distinct colors, red or green.

The fields:

- **Vertical Arm's Optical Switch (O.S.)**
- **Horizontal Arm's Optical Switch (O.S.)**
- **Diluter's Optical Switch (O.S.)**
- **Wash Station's Optical Switch (O.S.)**
- **Filter Wheel's Optical Switch (O.S.)**
- **Reaction Plate's Optical Switch (O.S.)**
- **Sample Plate's Optical Switch (O.S.)**
- **Reagent Plate's Optical Switch (O.S.)**

turn green when the specific device is in the home position, and turn red when not in the home position.

The field

- **Cover Lock**

turns green when the cover is closed, and turns red when open.

The fields:

- **Arm Leak Alarm** (Arm Leaking)
- **Wash Station Leak Alarm** (Wash Station Leaking)
- **Plate Leak Alarm** (Reaction Plate Leaking)

Turn green when there is no leaking, and red when there is.

The following six fields signal the alarms for the bottles containing the washings liquids and waste materials:

- **Waste1 Liquid Reservoir Alarm**
- **Waste2 Liquid Reservoir Alarm**

Turning green when the liquid level is not excessive, and red when the waste bottle indicated by the alarm is almost full.

- **Liquid 1 Liquid Reservoir Alarm**
- **Liquid 2 Liquid Reservoir Alarm**
- **Liquid 3 Liquid Reservoir Alarm**
- **Liquid 4 Liquid Reservoir Alarm**

Turning green if the liquid level is above the predetermined minimum limit, and red if the liquid quantity is below the predetermined minimum level (the bottle is almost empty).

The following fields signal the state of the button on the Ellipse's operator panel:

- **Al.Res. Front Panel Button**
- **St-By Front Panel Button**
- **Ready Front Panel Button**

Turning green when the button is not pushed in, and red if it is.

The field

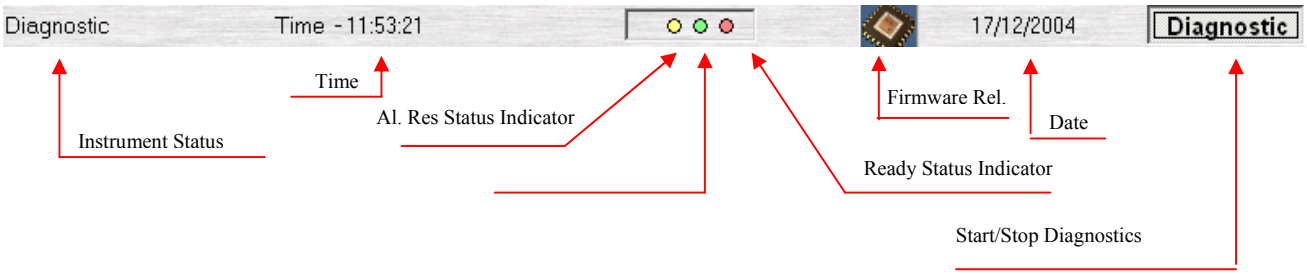
- **Test ON**

It is green fixed; if pushed, on the right of it will be showed a red drop that becomes temporarily green when the liquid is detected.

5.1 STATUS BAR

Monitors the instrument's status (Fig.4).

Fig. 4



5.2 TEST FOLDER

The following is a summary of each individual test folder's function.

The Ellipse's diagnostic program is subdivided into 10 folders:

Arm: the adjustment of the arm position can be checked and carried out;

Diluter: checks if the diluter is functioning correctly;

Optic: checks if the optical block is functioning correctly;

Plate: checks if the reaction, samples and reagents plates are functioning correctly;

Temperature: checks the temperature of the pre-heater and reaction plate;

Wash: checks if the wash station is functioning correctly;

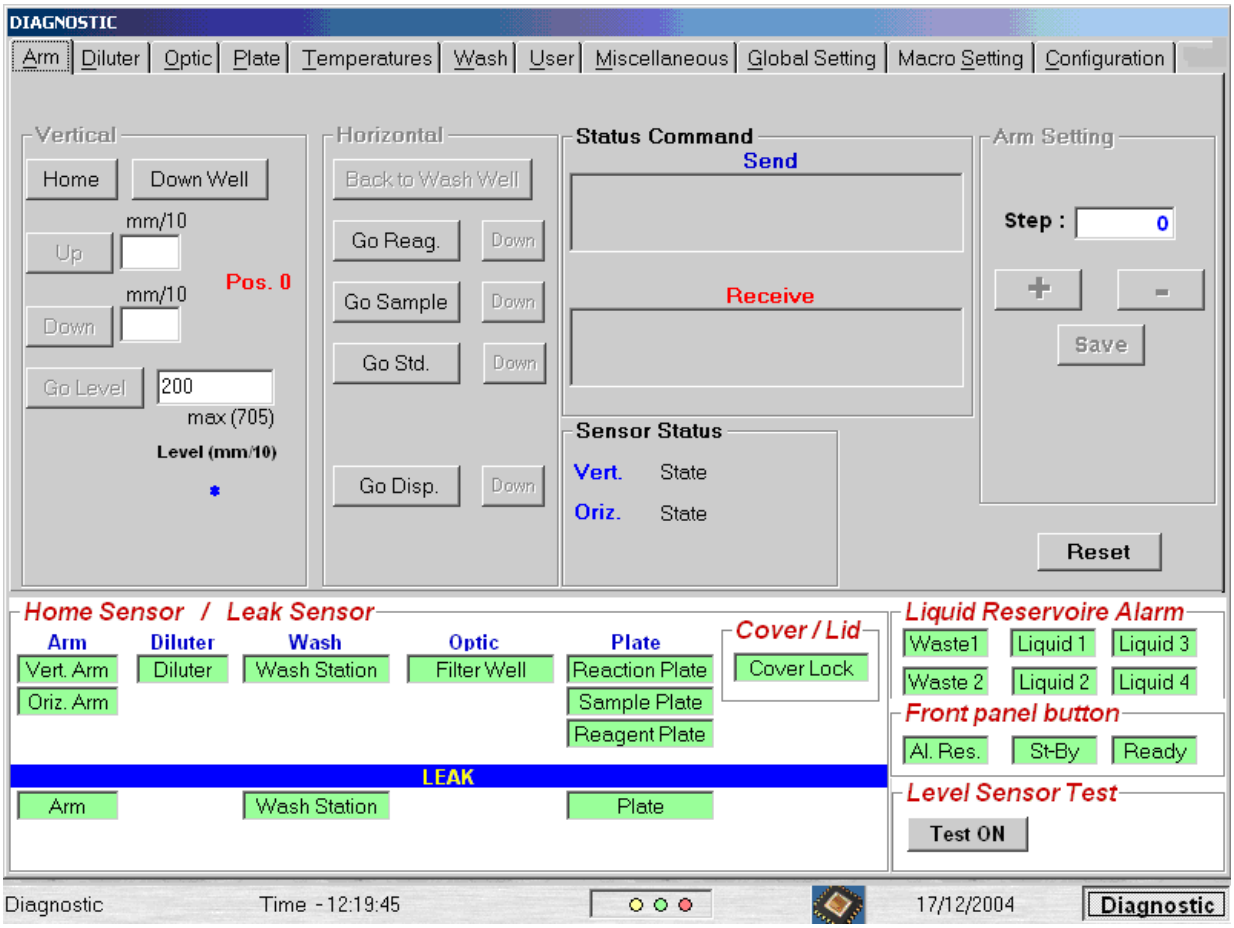
User: checks if the user functions are working properly;

Miscellaneous: performs general checks;

Macro Setting: the operator can identify which macros have been loaded;

Configuration: Through the use of a password, only qualified technical personal can adjust certain parameters (This file is not accessible to the Laboratory operator).

5.3 "ARM" FOLDER



Warning: the improper use of the functions described in this folder can damage the sampling probe.

The Arm File is subdivided into four areas:

- **VERTICAL**
- **HORIZONTAL**
- **STATUS COMMAND**
- **ARM SETTING**

5.3.1 VERTICAL COMMAND AREA

(5 commands)

Home: Brings the arm vertically to a home position;

Down Well: Brings the arm's axis "z" to the height of the well;

Up: Raises the arm tenths of a millimeter as preset in the square found immediately on the right, with relation to the previous Down movement;
the box becomes active when the arm is positioned on a sample, a reagent, a standard or a cuvette.

Down: Lowers the arm tenths of a millimeter as pre-determined by the square found immediately on the right; the box becomes active when the arm is positioned on a sample, a reagent, a standard or a cuvette.

Go Level: Brings the probe to either the reagent level, the sample or the standard and reads the level. Before giving this command, it is necessary to set the parameter for the probe's maximum lowering level in the max area (mm);

5.3.2 HORIZONTAL COMMAND AREA

(5 commands)

Back to wash well: Brings the arm back to the home position;

Go Reag.: Brings the arm to the reagent position specified in the sheet menu next to the command;

Go Sample: Brings the arm to the sample position specified in the sheet menu next to the command;

Go Std.: Brings the arm to the standard/control position specified in the sheet menu next to the command;

Go Disp.: Brings the arm to the dispense position;

5.3.3 STATUS COMMAND AREA

Send: Visualizes the commands sent from the program to the instrument hardware;

Receive: Visualizes the answers of the instrument's hardware to the commands sent by the program;

Sensor State: Indicates the sensor status relative to the arm's vertical axis, the internal arm and the external arm.

5.3.4 ARM SETTING COMMAND AREA

(5 commands)

Step: Visualizes the number of steps.

+ : Performs the counter-clockwise rotation of the arm (to adjust the position);

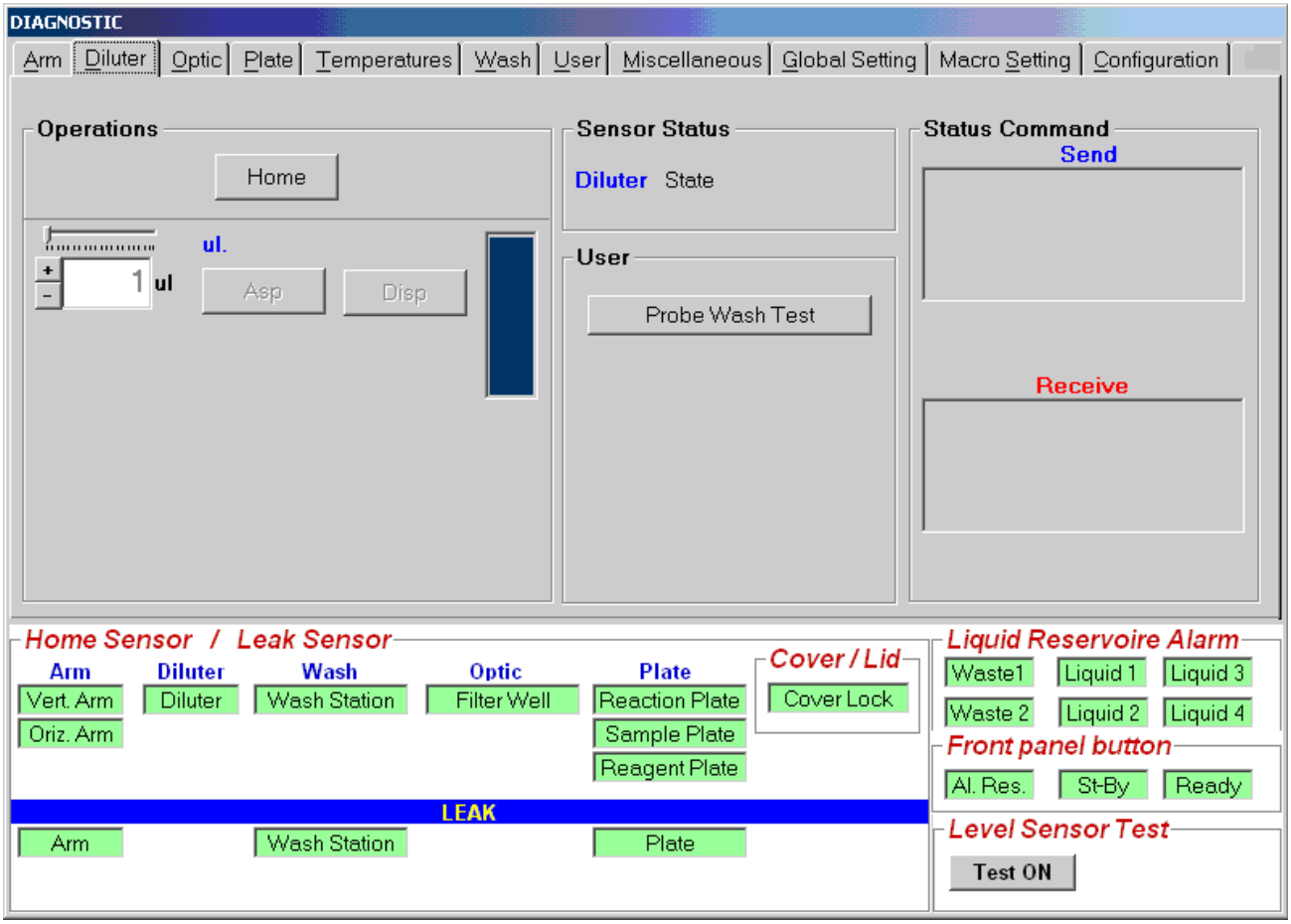
- : Performs the clockwise rotation of the arm (to adjust the position);

Save: Saves the adjustment data;

Reset: Completely resets the Arm

In this area the boxes can be activated when the arm is positioned on a sample, a reagent, a standard or a control or a cuvette.

5.4 "DILUTER" FOLDER



The Diluter Folder is subdivided into four areas:

- **OPERATIONS**
- **SENSOR STATE**
- **USER**
- **STATUS COMMAND**

5.4.1 OPERATIONS AREA

(3 commands)

Home: Brings the diluter to the Home position;

Asp: Aspirates the micro-litres as predetermined in the ul. box (may be set manually through + and – or by using the cursor located immediately above);

Disp.: Distributes the micro-litres as predetermined in the ul. box (may be set manually through + and – or by using the cursor located immediately above);

5.4.2 SENSOR STATE AREA

In the Sensor State area the diluter sensor status is indicated.

5.4.3 USER AREA

(1 command)

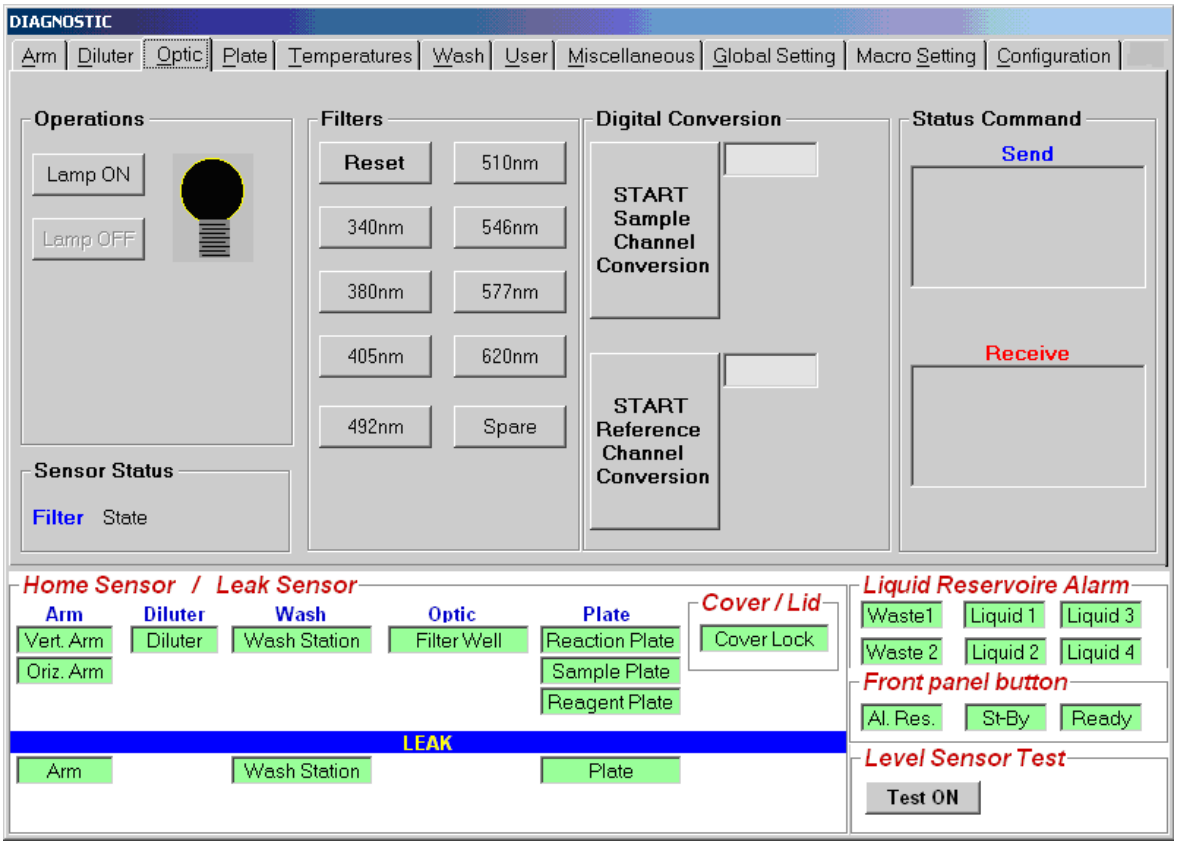
Probe Wash Test: Activates and deactivates the probe wash system

5.4.4 STATUS COMMAND AREA

Send: Visualizes the commands sent by the program to the instrument hardware;

Receive: Visualizes the instrument hardware's response to the commands sent by the program.

5.5 "OPTIC" FOLDER



The Optic folder is subdivided into five areas:

- **OPERATIONS**
- **SENSOR STATUS**
- **FILTERS**
- **DIGITAL CONVERSION**
- **STATUS COMMAND**

5.5.1 OPERATIONS AREA

(2 commands)

Lamp ON: Turns on the Optic Lamp;

Lamp OFF: Turns off the Optic Lamp;

5.5.2 SENSOR STATE AREA

This area indicates the status of the wheel filters.

5.5.3 FILTERS AREA

(10 commands)

Reset : Positions the wheel filters in home position (dark);

340 nm: Positions filter n° 1 in front of the reading sensor;

380 nm: Positions filter n° 2 in front of the reading sensor;

405 nm: Positions filter n° 3 in front of the reading sensor;;

492 nm: Positions filter n° 4 in front of the reading sensor;

510 nm: Positions filter n° 5 in front of the reading sensor;

546 nm: Positions filter n° 6 in front of the reading sensor;

577 nm: Positions filter n° 7 in front of the reading sensor;

620 nm: Positions filter n° 8 in front of the reading sensor;

Spare: Positions filter n° 9 in front of the reading sensor (Optional);

5.5.4 DIGITAL CONVERSION AREA

(2 commands)

START/STOP Sample Channel Conversion: Performs an analogical/digital conversion of the principal channel;

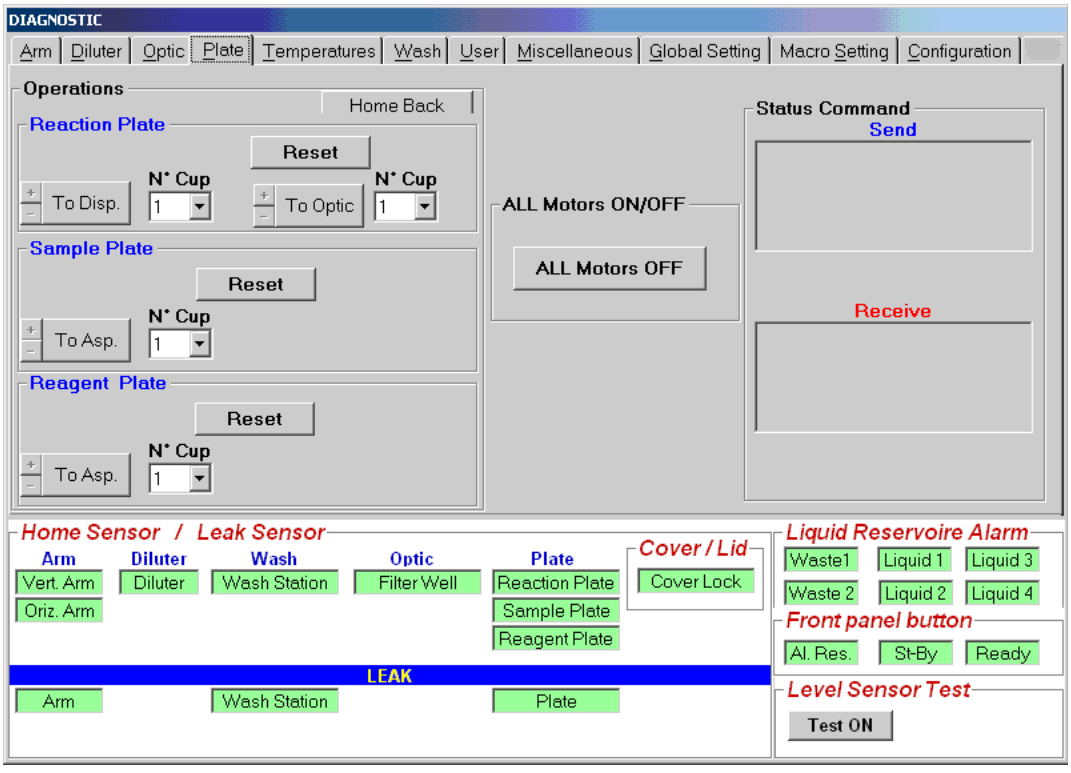
START/STOP Reference Channel Conversion: Performs an analogical/digital conversion of the reference channel;

5.5.5 STATUS COMMAND AREA

Send: Visualizes the commands sent by the program to the instrument hardware;

Receive: Visualizes the instrument hardware's response to the commands sent by the program.

5.6 "PLATE" FOLDER



The Plate Folder is subdivided into three areas:

- **OPERATIONS**
- **ALL MOTORS ON/OFF**
- **STATUS COMMAND**

5.6.1 OPERATIONS AREA

Reaction Plate area:

(3 commands)

To Disp.: Automatically positions the cuvette, indicated on the sheet menu aside, under the dispensing position

To Optic: Automatically positions the cuvette, indicated on the sheet menu aside, in front of the colorimeter

Reset: Performs the reset of the reaction plate by positioning the # 1 cuvette in the dispensing position

Sample Plate area:

(2 commands)

To Asp.: Automatically brings sample, indicated on the sheet menu aside, under the aspiration position

Reset: Performs the reset of the sample plate by positioning the # 1 sample in the aspiration position

Reagent Plate:

(2 commands)

To Asp.: Automatically brings reagent, indicated on the sheet menu aside, under the aspiration position

Reset: Performs the reset of the sample plate by positioning the # 1 reagent in the aspiration position

5.6.2 ALL MOTORS ON/OFF AREA

(1 command)

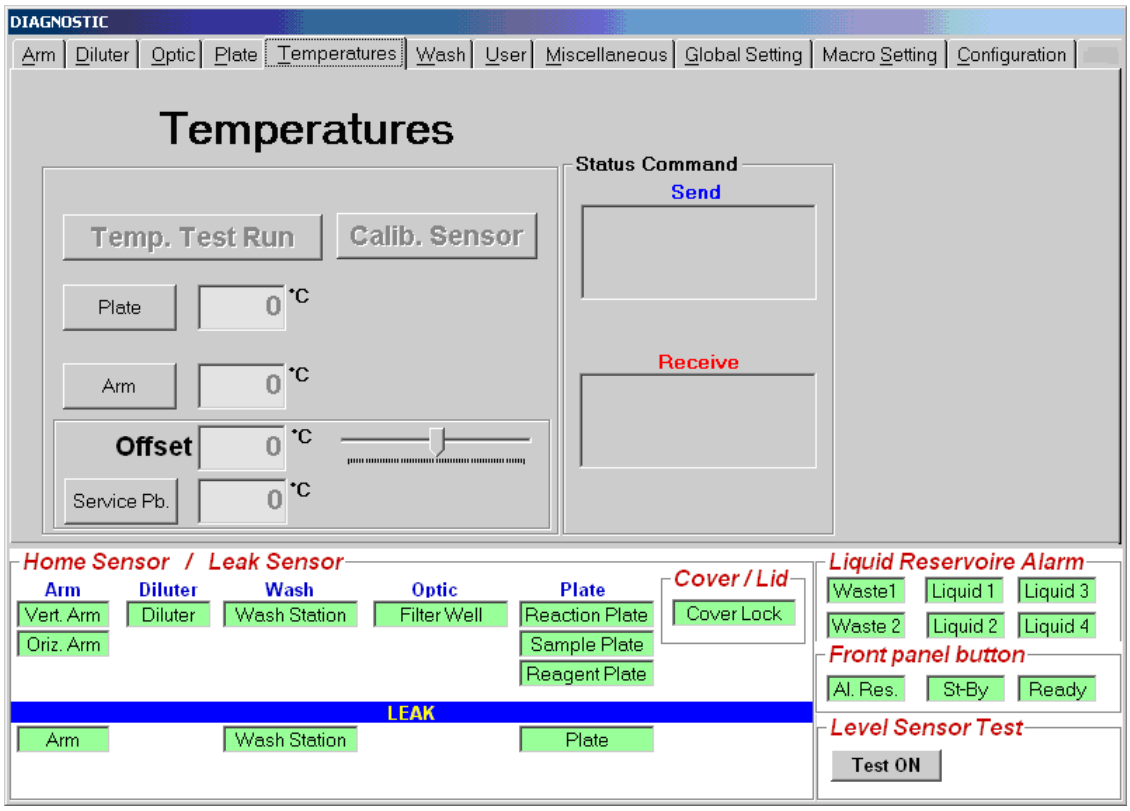
ALL Motors ON/OFF: Engages/Disengages the motors to allow a manual movement of the modules (Sampling Arm; Reaction, Reagents and samples Plates, Washing Station, Filter Wheel and Peristaltic Pump).

5.6.3 STATUS COMMAND AREA

Send: Visualizes the commands sent by the program to the instrument hardware;

Receive: Visualizes the instrument hardware's response to the commands received from the program.

5.7 "TEMPERATURES" FOLDER



The Temperature Folder is subdivided into three areas:

Temperatures

Offset

Status Command

5.7.1 TEMPERATURES AREA

(4 commands)

Temp. Test Run: To enter in the Temperature Test folder

Plate: Performs a temperature reading in the reaction plate compartment;

Arm: Performs a temperature reading in the arm's pre-heater.

Calib. Sensor: To carry out the calibration procedure of the thermometric probe included in the kit P/N 55-01204-00, as illustrated in Chapter Six "Settings and Adjustments".

5.7.2 OFFSET AREA

(2 commands)

To correlate the thermometric probe included in the kit P/N 55-01204-00 with another reference thermometric probe.

Service probe: The offset value that has been previously inserted and the temperature value read by the thermometric probe appear in the closed fields.

Cursor: To enter the offset value ± 3 C°. The offset value will be zero after exiting from the folder.

TEMPERATURE TEST AREA

(3 commands)

START: To perform the test check and to regulate the temperature of the preheater and of the reaction plate by using the kit P/N 55-01204-00, as illustrated in Chapter 6 "Setting and Adjustments".

The number of sample cycles are predefined, whereas the reagent and sample positions for test execution can be selected by the operator.

Service Probe: The field in which the temperature of the service probe appears.

WASH: To run a wash cycle on the cuvettes used for testing.

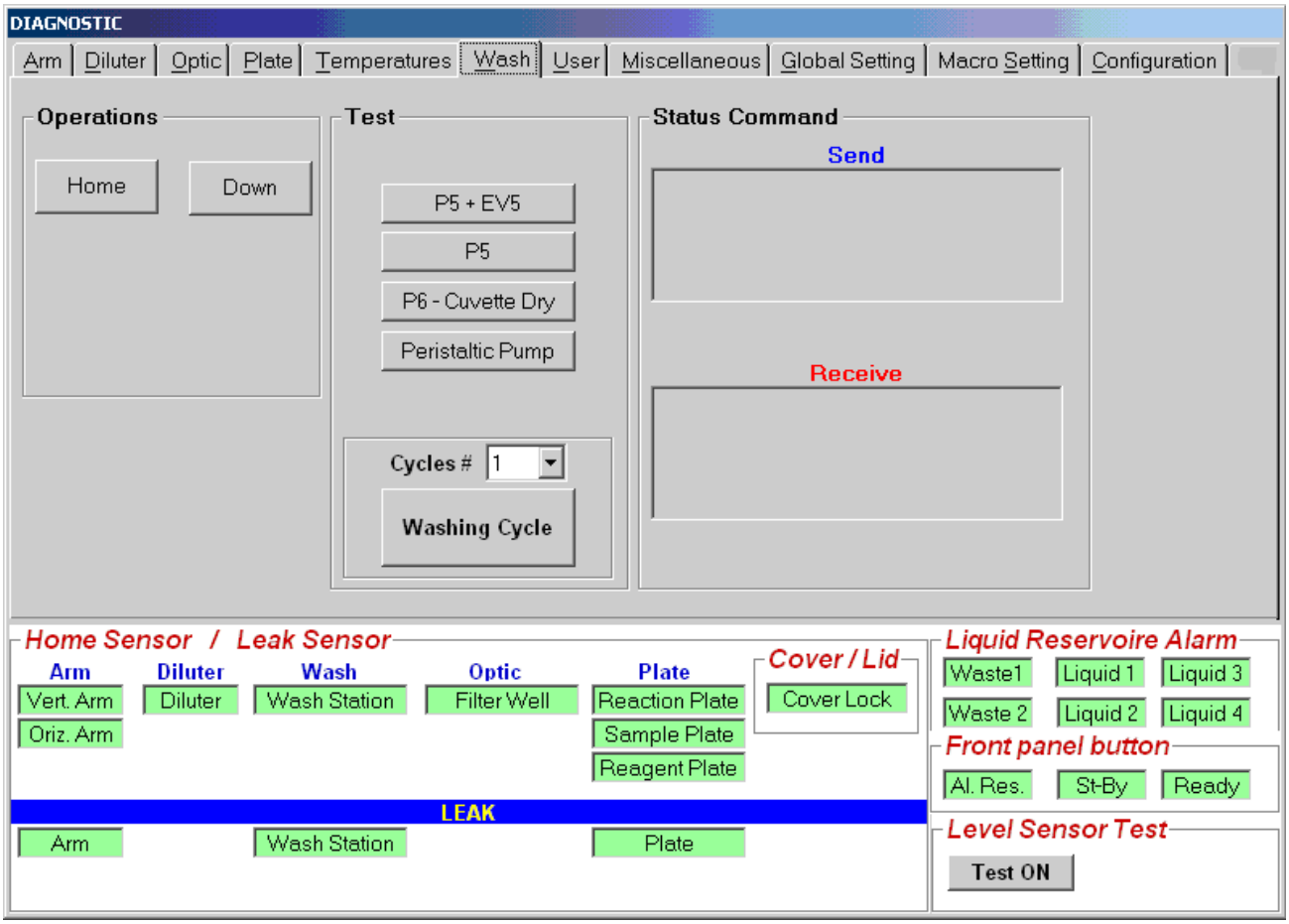
EXIT: To exit from the Temperature Test box and to run a wash cycle on the cuvettes if they have been used.

5.7.3 STATUS COMMAND AREA

Send: Visualizes the commands sent by the program to the instrument hardware;

Receive: Visualizes the instrument hardware's response to the commands sent by the program.

5.8"WASH" FOLDER



The Wash folder is subdivided into three areas:

- **OPERATIONS**
- **TEST**
- **STATUS COMMAND**

5.8.1 OPERATIONS AREA

(2 commands)

Home: Brings the washing device to the Home position;

Down: Makes the washing device go down to the washing position.

5.8.2 TEST AREA

(5 commands)

Test P5 + E.V. 5: Performs switching on of the E.V. 5 solenoid valve and turns on the P5 pump and automatically switching off the E.V. 5 solenoid valve and turns off the P5 pump after a period of four seconds

Test P5: It turns on the µP5 pump and automatically turns it off after a period of four seconds.

Test P6–Cuvette Dry: It turns on the µP6 pump and automatically turns it off after a period of four seconds.

Peristaltic Pump: It turns on the peristaltic pump and automatically turns it off after one second.

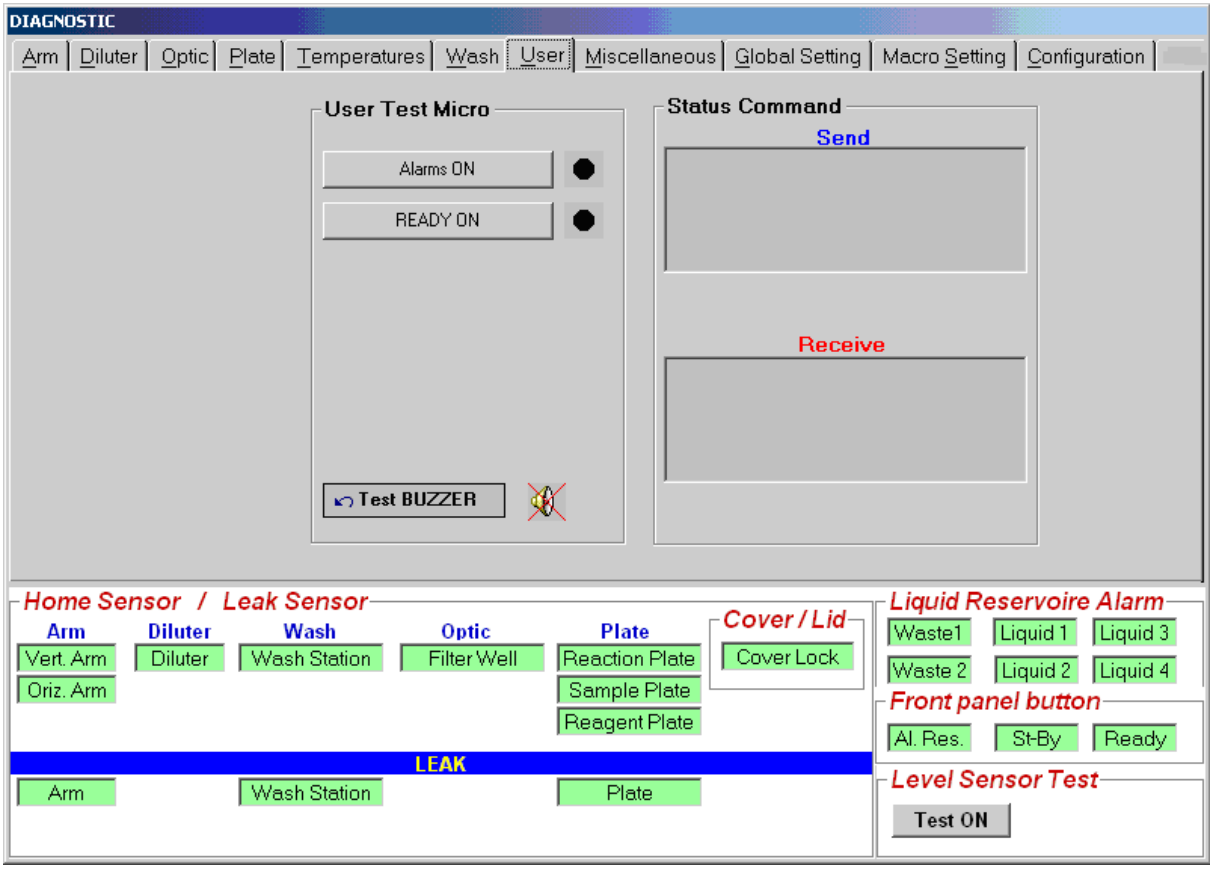
Washing Cycle: It performs the functional check of the Washing Station , as illustrated in Chapter Six "Settings and Adjustments".

5.8.3 STATUS COMMAND AREA

Send: Visualizes the commands sent by the program to the instrument hardware;

Receive: Visualizes the instrument hardware's response to the commands sent by the program.

5.9 "USER" FOLDER



The User Folder is subdivided into two areas:

- **USER TEST MICRO**
- **STATUS COMMAND**

5.9.1 USER TEST MICRO AREA

(3 commands)

Alarms ON: Turns on and off the Alarms indicator lamp;

Ready ON: Turns on and off the READY indicator lamp;

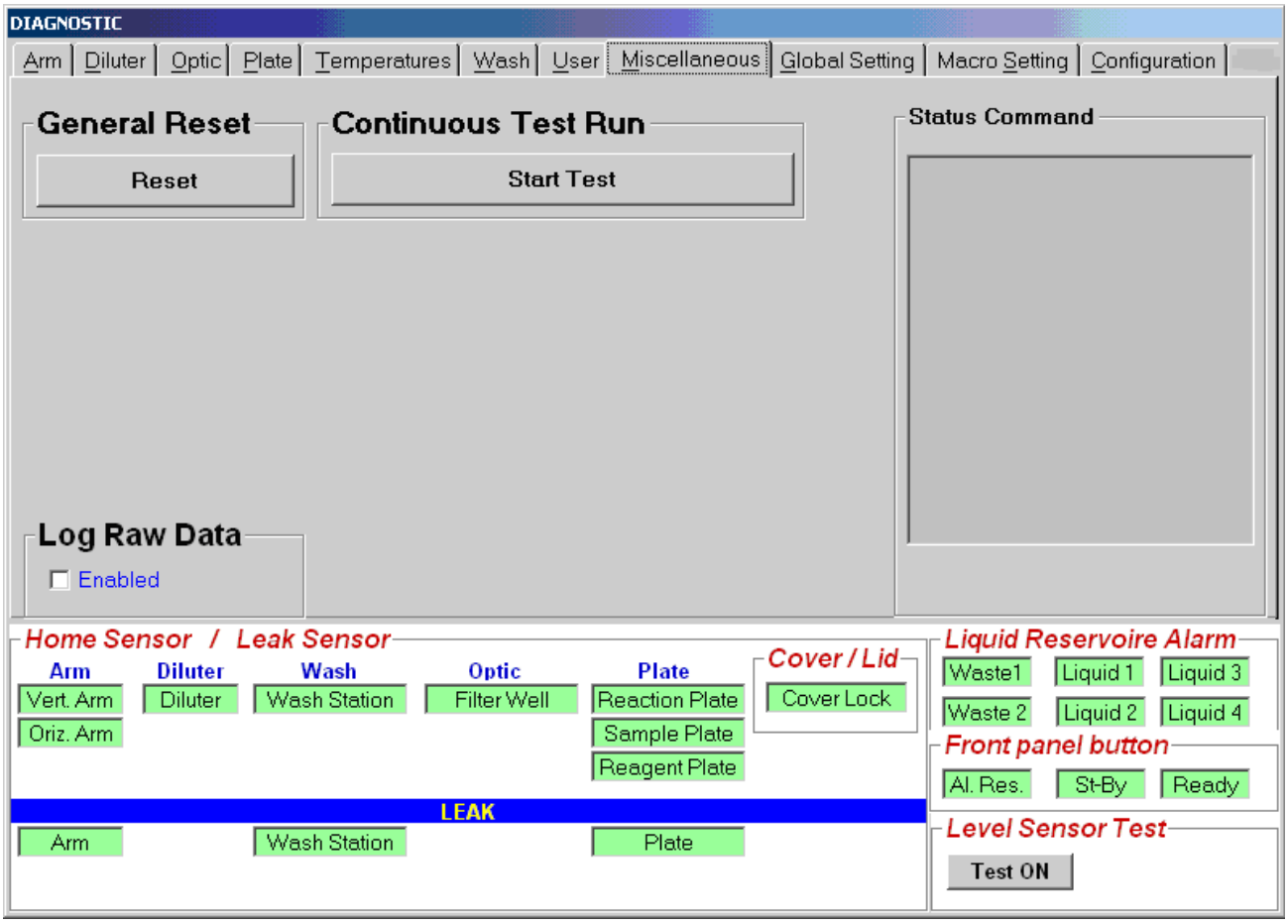
Test BUZZER: Performs a complete operational test of the buzzer;

5.9.2 STATUS COMMAND AREA

Send: Visualizes the commands sent by the program to the instrument hardware;

Receive: Visualizes the instrument hardware's response to the commands sent by the program.

5.10 "MISCELLANEOUS" FOLDER



The Miscellaneous folder is subdivided into four areas:

- **General Reset**
- **Log Raw data**
- **Continuous Test Run**
- **Status Command**

5.10.1 GENERAL RESET AREA

(1 command)

Reset: Performs the resetting of the general system.

5.10.2 LOG RAW DATA AREA

(1 command)

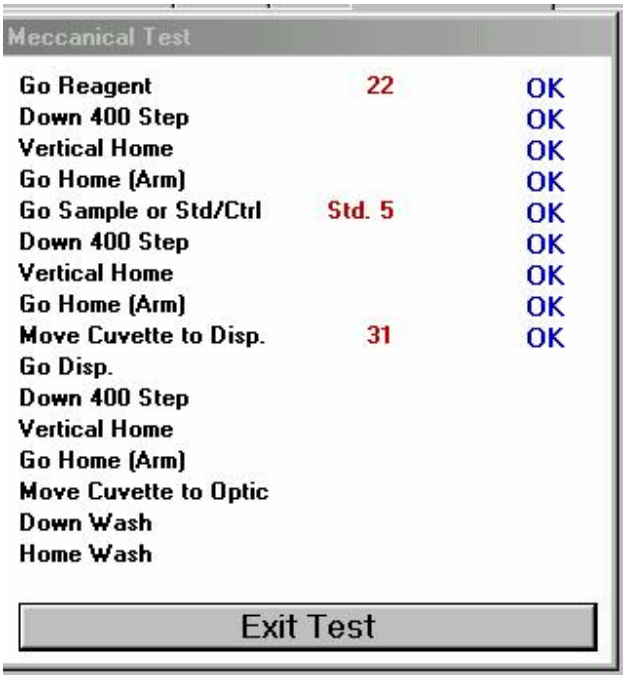
Enable: To save a copy of the files for the technical diagnosis if the instrument malfunctions. The files are memorized in the folder "Log" inside the folder "Analyzer".

5.10.3 CONTINUOUS TEST RUN

(1 command)

Start Test: Performs an automatic test during which the modules (Sampling Arm, Reaction plate, Washing Station and Photometer) are moved to all the different positions.

The correct modules positioning is also automatically verified and showed on the following table:



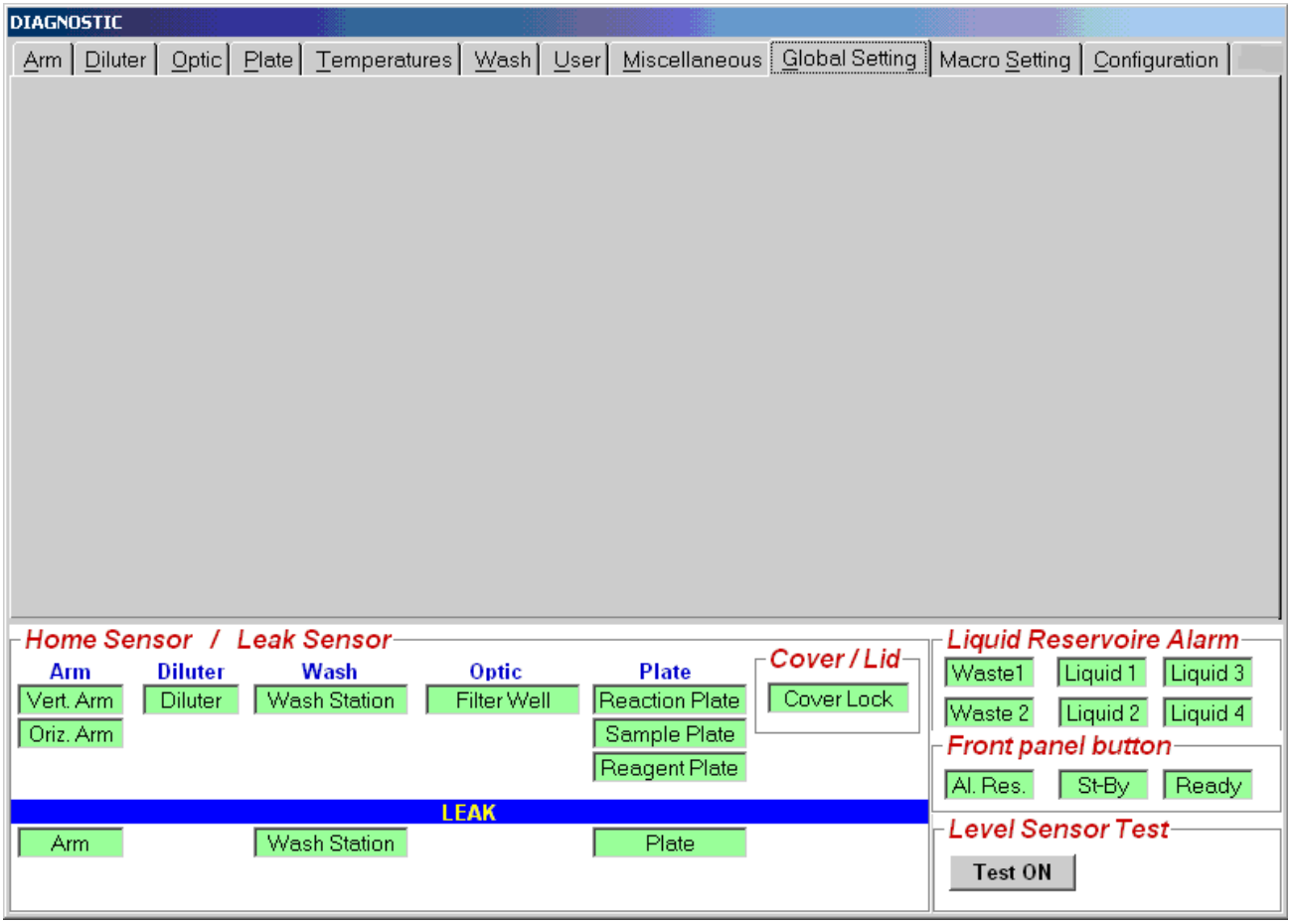
To stop the test push on the "Exit Test" key

5.10.4 STATUS COMMAND AREA

Send: Visualizes the commands sent by the program to the instrument hardware

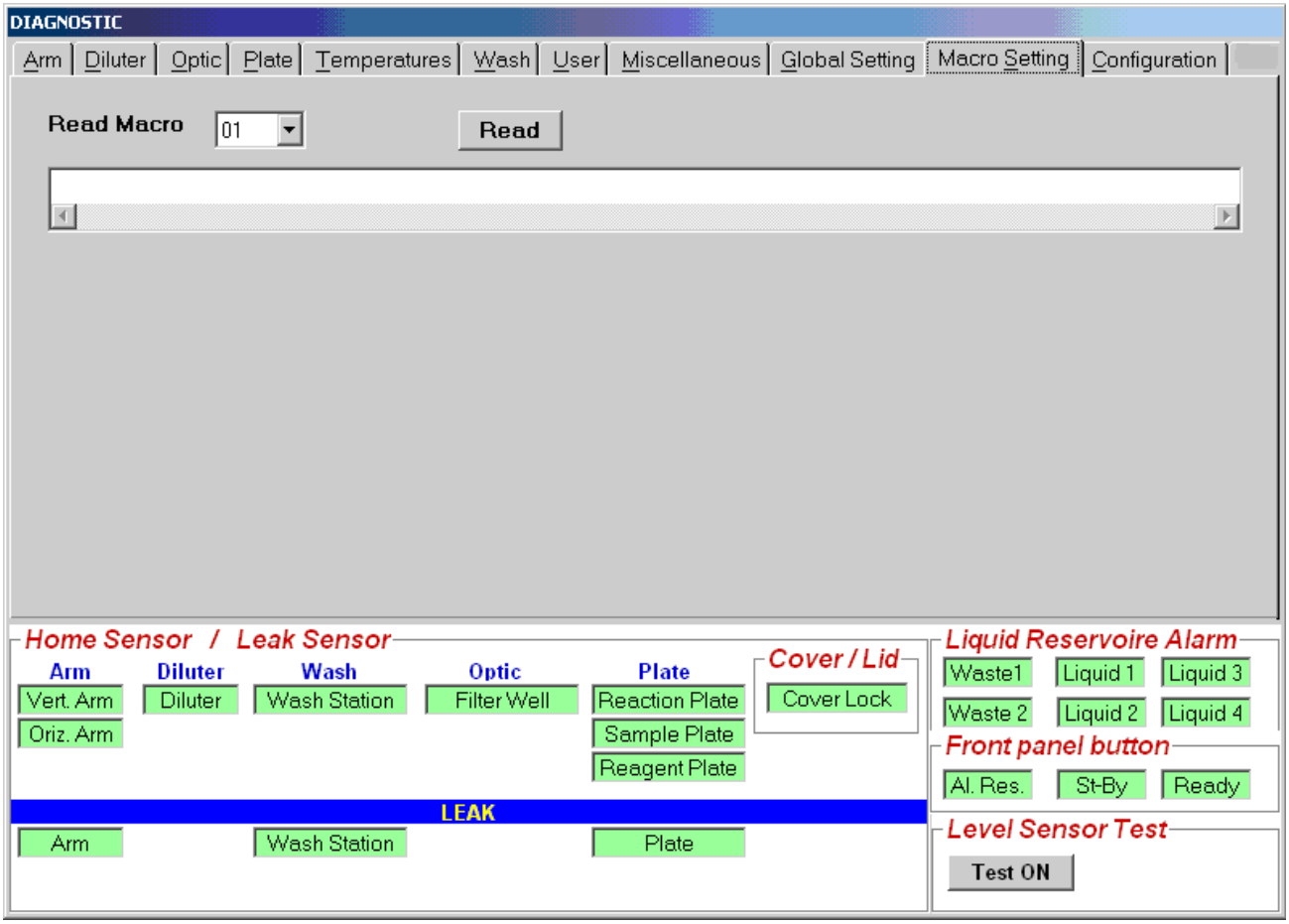
Receive: Visualizes the instrument hardware's response to the commands.

5.11 "GLOBAL SETTING" FOLDER



The Global Setting Folder is for next application.

5.12 "MACRO SETTING" FOLDER



This folder allows the user to read the macro present in the Ellipse.

To read the macro follow the below procedure:

⇒ Select from the menu sheet "Read Macro" the number of relevant macro;

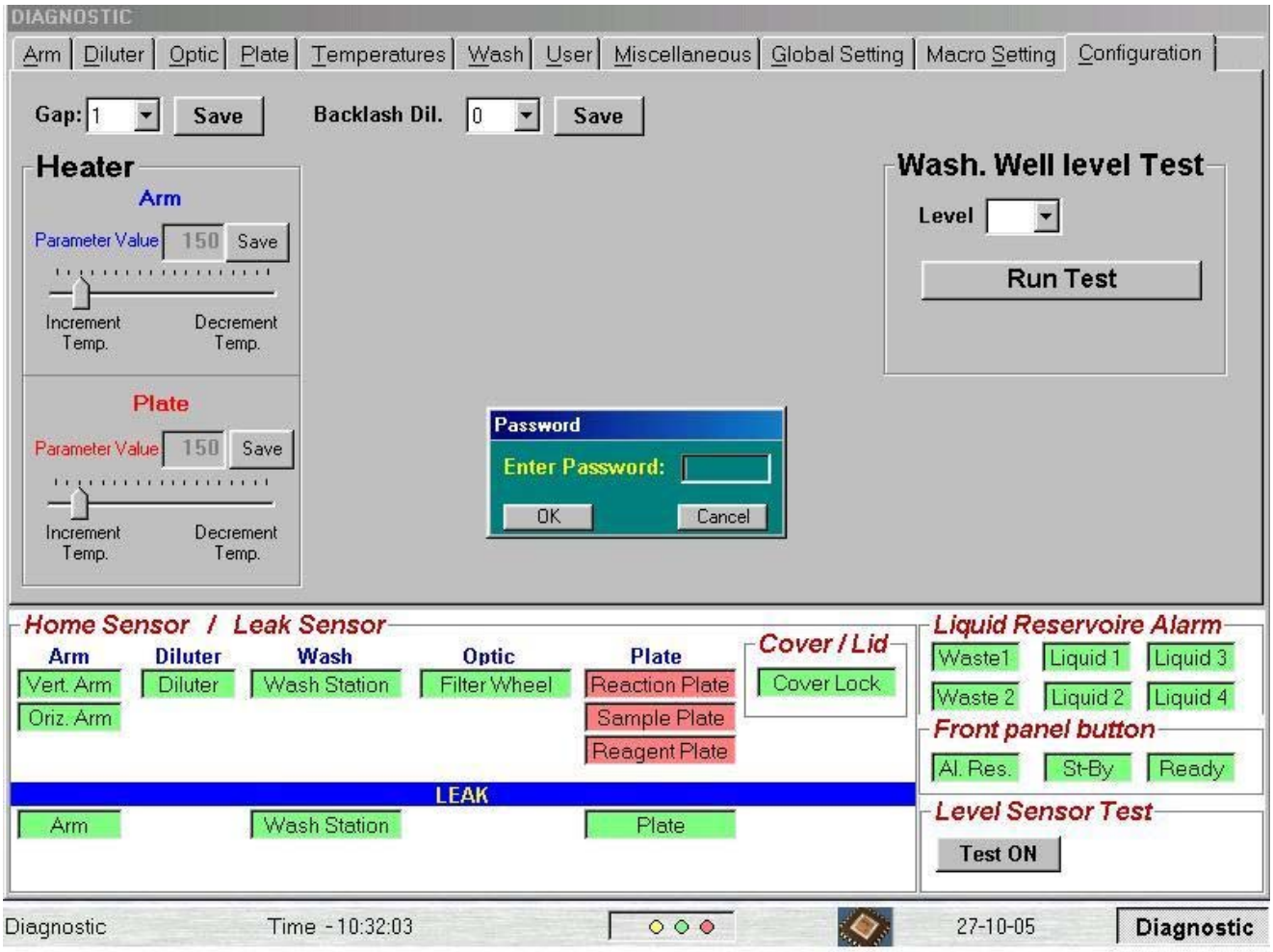
⇒ Click with the left side of the mouse on the Read area;

⇒ If the Macro requested exists, the information will appear in the designated area.

5.13 "CONFIGURATION" FOLDER

This folder may be accessed only by qualified technical assistant.

It is necessary for the technical assistant to insert a password to access this folder.



The Configuration Folder is subdivided into four areas:

- **Gap**
- **Backlash Dil.**
- **Heater**
- **Wash. Well level Test**

Gap: defines the volume, in µL, of the air bubble that separates the Rinse (the liquid column into the sampling arm tube) from the sampled reagent; this volume must be set in the range from 10 to 24 (Standard value 16).

For the correct setting of the gap volume it is necessary to apply the procedure of BIB (Precision check of the Analytical plate) and BIC (Volume precision check of the Sampling line).

If BIC's CV values should exceed the limit specified below, the GAP has to be increased by steps of 2 µL (starting from 10 µL) until obtaining the expected BIC's CV value

Precision check of the Analytical plate BIB

Prepare two series of 32 samples each by using a diluted solution of **K2Cr2O7** (obtained from 4 gr/l concentrated solution diluted 1:100 with Rinse solution (distilled water + 1000 µL/litre of Brij))

Use the same solution as samples and reagent

Program a new method with the following parameters:

Method name: **BIB**

Type: **End Point**

Sample volume **K2Cr2O7 0,04 gr/l**	3 µL
Reagent volume **K2Cr2O7 0,04 gr/l**	300 µL
Rinse volume	20 µL
Filter:	340 nm
Incubation time:	116 sec
Calculation factor:	1000

BIB Procedure

1. Select conical cup in **Options**
2. Program the BIB method using the above parameters and configure a reagent rack containing it
3. Enter in the calibration screen and select RBL for BIB method.
4. Put the Rinse solution as reagent and standard (fourteenth position of the Crt/Std rack) and Start the Calibration

5. Program 64 BIB; fill 32 conical samples cup with **K2Cr2O7 0,04 gr/l**
6. Load the samples racks into the Analyzer at positions 1 and 2
7. Substitute the Rinse Solution with **K2Cr2O7 0,04 gr/l** in the reagent rack
8. Start the Analyzer. At the end of the last sampling, move the samples racks to positions 3 and 4.

The mean of the reading obtained from each of the 32 sample series must fall within **360 ÷ 400.**
The coefficient of variation (CV %) must be lower than **0.7 %** for each series of 32 samples.

Precision check of the Sampling volume BIC

Prepare two series of 32 samples each by using **$K_2Cr_2O_7$ 4 gr/l** (concentrated)
Put Rinse Solution as reagent and **$K_2Cr_2O_7$** solution as sample.
Program a new method with the following parameters:
Method name: **BIC**
Type: **End Point**

Sample volume **$K_2Cr_2O_7$ 4 gr/l**	3 µL
Reagent volume RINSE Solution (distilled water + 1000 µL/litre of Brij)	300 µL
Filter:	340 nm
Incubation time:	116 sec
Calculation factor:	1000

BIC Procedure

1. Program the BIC method using the above parameters and configure a reagent rack
2. Enter in the Calibration screen and select RBL for BIC method.
3. Put the Rinse Solution as reagent and Standard (fourteenth position of the Crt/Std rack) and Start the Calibration
4. Program 64 BIC ; fill 32 conical samples cup with **$K_2Cr_2O_7$ 4 gr/l** (concentrated)
5. Load the samples racks into the Analyzer at positions 1 and 2
6. Start the Analyzer. At the end of the last sampling, move the sample racks to positions 3 and 4.

The mean of the readings obtained from each of the 32 sample series must fall between **350 ÷ 450**.
The coefficient of variation (CV %) must be lower than **1.6 %** for each series of 32 samples

If BIC's CV values should exceed the limit specified above, the GAP has to be increased by steps of 2 µL (starting from 10 µL) until obtaining the expected BIC's CV value

Backlash Dil.: Allows to recover the sampling imprecision generated by the motor when it inverts its rotation; the setting is expressed in µL and obtained by using the following procedure:

1. Enter in the Diagnostic Arm folder menu and make the Sampling Arm "Reset"
2. Enter in the **Diluter** folder, press the "HOME" button and then Push "PROBE WASH TEST" button three times in order to fill the hydraulic sampling line
3. Remove the plastic cover of the sample racks vane and take out the samples racks
4. Enter in the **ARM** folder and push the "GO" button in order to move the probe to sample position # 1
5. Put a sample cup containing distilled water (about 1ml) under the sampling probe
6. Enter in the **DILUTER** folder and aspirate 300 µL of distilled water from the cup
7. Remove the sample cup containing distilled water
8. Select 1 µL to dispense and press the "Disp" key repeatedly until water appears on the tip of the probe.
9. Substract 1 from the number of times you pressed the "Disp" key. The obtained number has to be introduced as BACKLASH value
10. Push the **Save** button to memorize the inserted data
11. Push the **Reset** button into the ARM folder
12. Close the Diagnostic program by clicking on the Diagnostic button

Heater: to adjust the preheater and reaction plate temperatures;

Wash. Well level Test: By clicking on the "Run Test" button the system performs an automatic verification and adjustment cycle for the liquid level in the washing well.
A number appears in the box "Level" that corresponds to the rotation time of the rinse pump in milliseconds, that is necessary to maintain the correct liquid level in the washing well.
The functioning range is between 350 and 700 milliseconds. If the washing well is not sufficiently filled, a message appears to warn the user to check the hydraulic line.
If the value taken during the test is different from the previous one, it is necessary to click on "Save" in order to save the new data.

CHAPTER 06

- SETTING AND ADJUSTMENTS -

INDEX

6 SETTINGS AND ADJUSTMENTS

6.1 SAMPLING ARM

6.1.1 ALIGNMENT AND ADJUSTMENTS

N.B.: Make sure that the instrument (Ellipse) is turned on before performing this procedure.

1. Launch the “Diagnostic” program.
2. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
3. Make sure that all the Home Sensors of the Sampling Arm (Vertical and Horizontal), Reactions, Reagents and Samples Plates light up in green.
4. Make sure that the Sampling Probe is well-placed on the Sampling Arm (see par. 6.1.2).
5. Make sure that the Sampling Probe is centered with respect to the Washing Well (note: the centering of the Sampling Probe with respect to the Washing Well must be checked on the entire stroke of the Sampling Arm). If it not be so, adjust in the following way:
   a. remove the Sampling Arm protective cover unscrewing its fastening screw (Fig. 1);
   b. loosen the set screw of the Horizontal Arm Home Sensor flat bar (Fig. 2);
   c. rotate the flat bar in the right toward in order to obtain the centering;
   d. tighten the set screw of the Horizontal Arm Home Sensor flat bar;
   e. select “Arm” folder and click the “Reset” button. Wait until the reset arm procedure has been completed;
   f. verify the accurate centering of the Sampling Arm with respect to the Washing Well. If it not be so, repeat the steps from 5.b to 5.f .

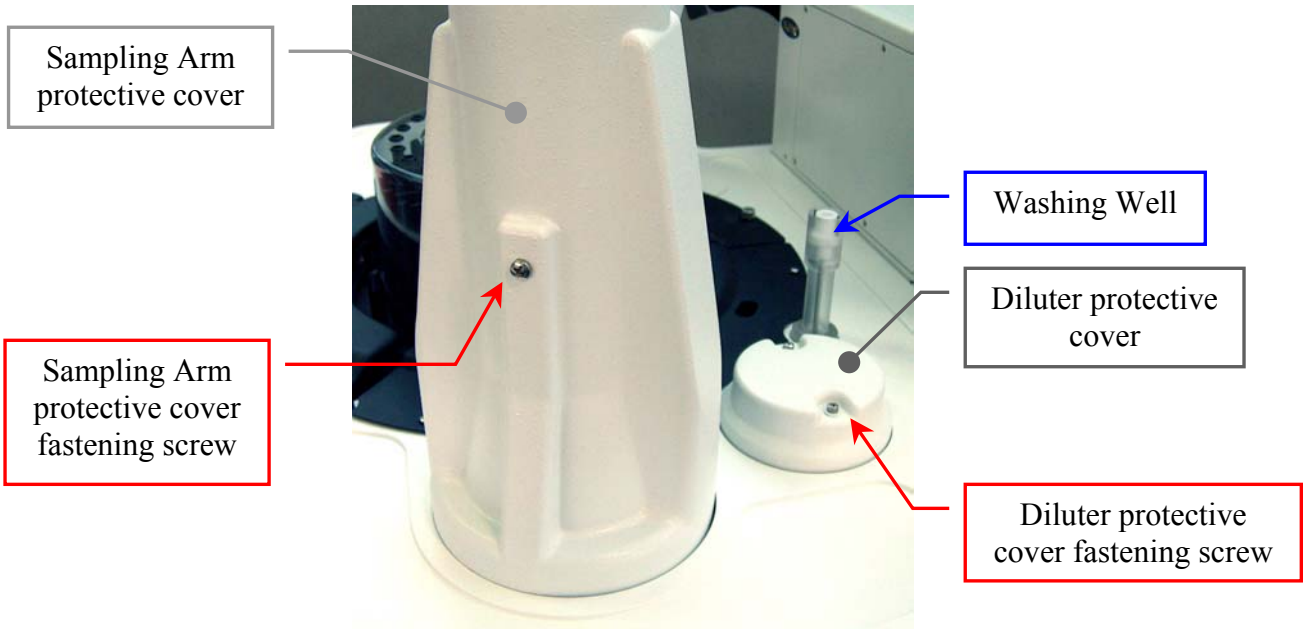


Fig. 1 – Protective covers

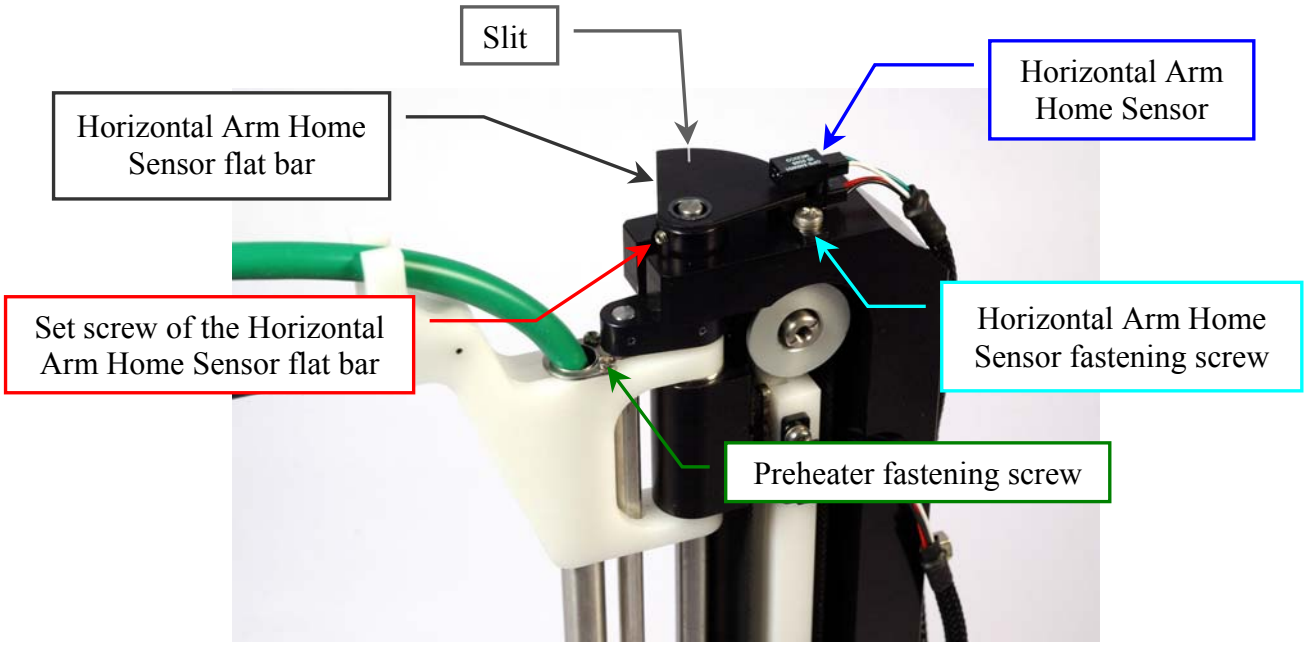


Fig. 2 – Horizontal Arm Home Sensor

6. verify the verticality of the Sampling Probe with respect to the Washing Well. If it not be so, adjust in the following way:

a. loosen slightly the Screw “A” in order to obtain a longitudinal motion of the Sampling Arm head (Fig. 3) and/or loosen slightly the Screw “B” (or “Preheater Head fastening screw”) in order to obtain a latitudinal motion of the Sampling Arm head (Fig. 4);

b. center the Sampling Probe with respect to the Washing Well (checking its verticality for the entire stroke of the Sampling Arm);

c. tighten the Screw “A” and/or the Screw “B”;

d. verify the accurate verticality of the Sampling Probe with respect to the Washing Well. If it not be so, repeat the steps from 6.a to 6.d .

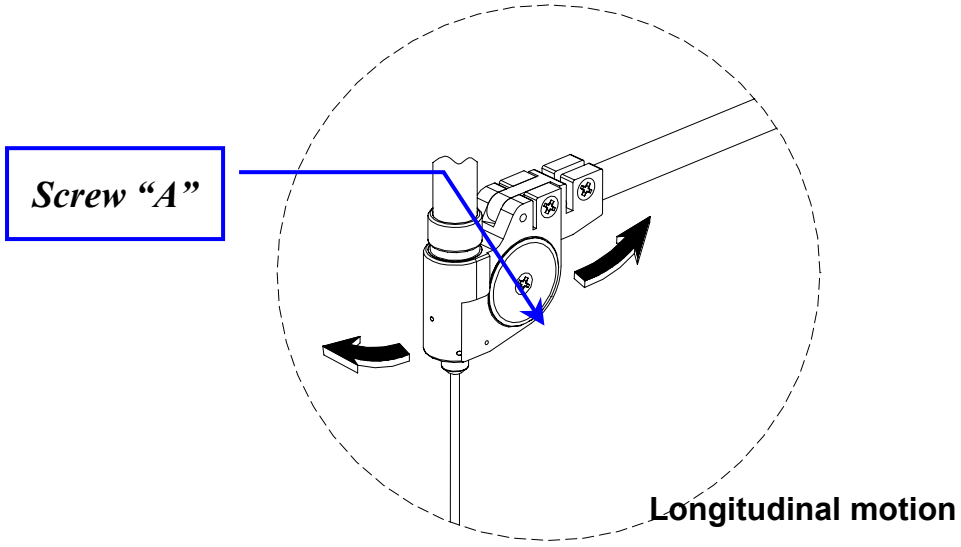


Fig. 3 – Longitudinal motion of the Sampling Arm head

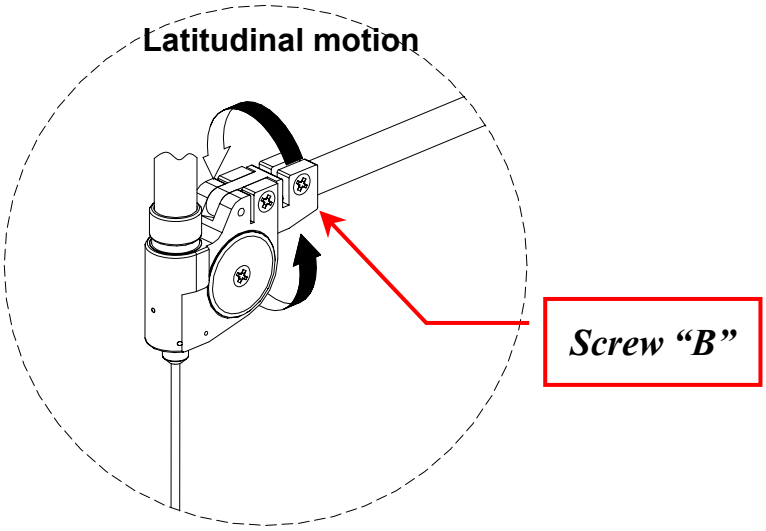


Fig. 4 – Latitudinal motion of the Sampling Arm head

7. Make sure that the distance between the top edge of the Washing Well and the tip of the Sampling Probe is 25 mm.
8. Adjust the Vertical Arm Home Sensor loosing its two fastening screws (Fig. 5).
9. Tighten the two Vertical Arm Home Sensor fastening screws (Fig. 5).
10. Select “Arm” folder and click the “Down Well” button. Wait until the Sampling Probe go down on the Washing Well.
11. Click the “Home” button. Wait until the vertical reset arm procedure has been completed.

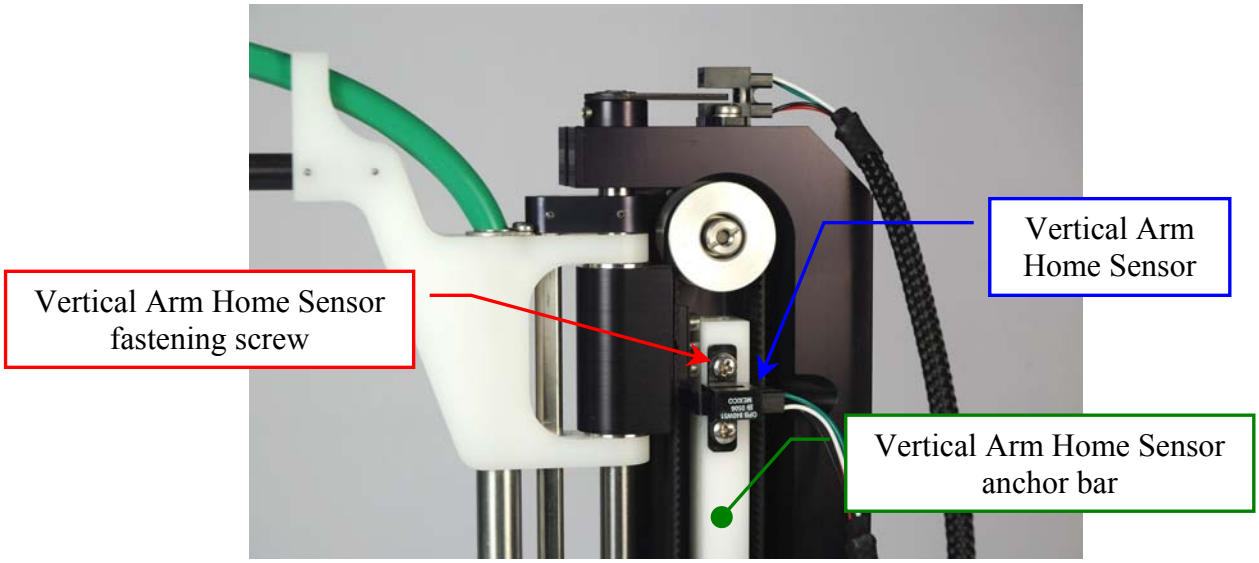


Fig. 5 – Vertical Arm Home Sensor

12. Make sure that the distance between the top edge of the Washing Well and the tip of the Sampling Probe is 25 mm. If it not be so, repeat the above steps from 8 to 12.
13. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
14. Make sure that all the Home Sensors of the Sampling Arm (Vertical and Horizontal), Reactions, Reagents and Samples Plates light up in green.
15. Make sure that the Reagents protection cover is permanently locked on the Reagents Plate (Fig. 6).

16. Select “Arm” folder.

17. Click the "Go Std" button, then click the correspondent “Down” button. The arm will move to position #1 of the Standards Plate, then it will go down until to reach the right height.

18. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Standards Plate. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, adjust (if necessary) the verticality by using the adjustable anchored bearing (Fig. 7), click the ‘Save’ button, then repeat the above steps from 6.

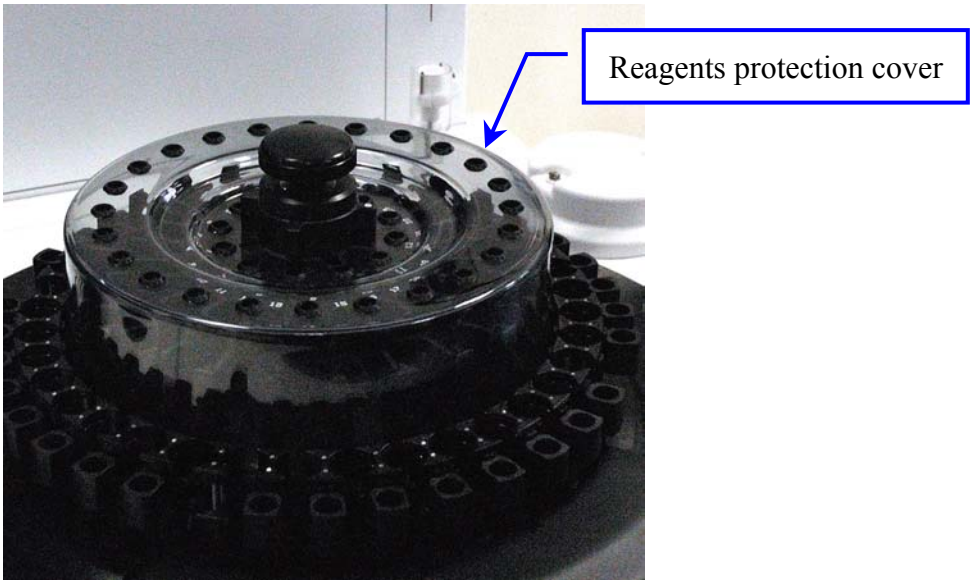


Fig. 6 – Reagents protection cover on the Reagents Plate

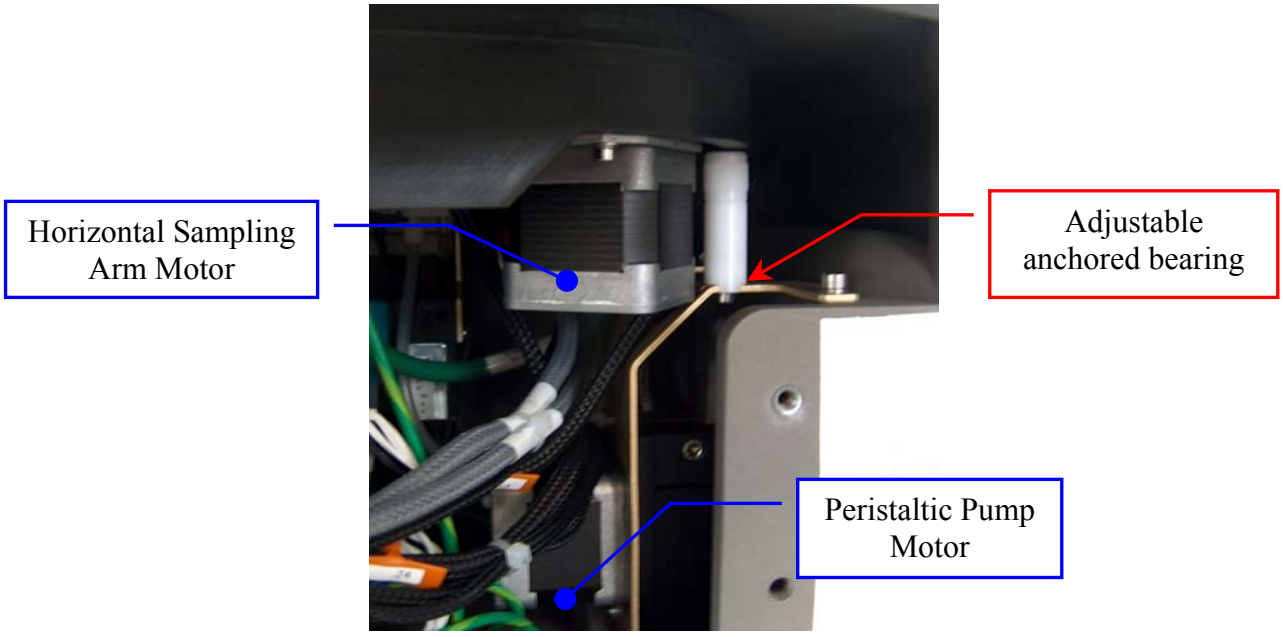


Fig. 7 – Adjustable anchored bearing

19. Click the "Go Reag." button, then click the correspondent “Down” button. The arm will move to position #1 of the Reagents Plate, then it will go down until to reach the right height.
20. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Reagents Plate. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, then click the ‘Save’ button.
21. Click the "Go Sample" button, then click the correspondent “Down” button. The arm will move to position #1 of the Sample Rack #1, then it will go down until to reach the right height.
22. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Sample Rack #1. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, then click the ‘Save’ button.
23. Click the "Go Disp." button, then click the correspondent “Down” button. The arm will move to cuvette #81 of the Reactions Plate, then it will go down until to reach the right height.
24. Make sure that the Sampling Probe is vertically aligned and centered with respect to cuvette #81 of the Reactions Plate. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, then click the ‘Save’ button.
25. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the general reset procedure has been completed.
26. Place the Sampling Arm protective cover screwing its fastening screw (Fig. 1).

N.B.: in case of not enough current centered of the Sampling Probe with respect to the Washing Well and with respect to the cuvette #81 of the Reactions Plate, repeat the "Alignment and Adjustments” procedure privileging the centering of the Sampling Probe with respect to the cuvette #81 of the Reactions Plate.

6.1.2 REPLACEMENT OF THE SAMPLING PROBE

1. Removing of the Sampling Probe:
   a. launch the “Diagnostic” program;
   b. select "Miscellaneous” folder and request an Instrument General Reset. Wait until the general reset procedure has been completed;

c. remove the Sampling Probe from its housing by unscrewing (clockwise) its ring nut (Fig. 8).

2. Replacement of the Sampling Probe:

a. launch the “Diagnostic” program;

b. select "Miscellaneous” folder and request an Instrument General Reset. Wait until the general reset procedure has been completed;

c. attach the (straight) Sampling Probe to the Probe holder of the Sampling Arm (Fig. 9 – Step 1);

d. insert the Sampling Probe in the Probe holder and slowly rotate (counter clockwise) the Sampling Probe ring nut (Fig. 9 – Step 2);

e. keep on rotating the Sampling Probe ring nut until you feel the stop (taking it around 25 mm from the ring nut) (Fig. 9 – Step 3). This is to allow a perfect contact between Sampling Probe and the Probe holder;

f. make sure that the Sampling Probe is snug (Fig. 9 – Step 4);

g. take the dynamometric key (Fig. 10) and place the head around the ring nut of the Sampling Probe (Fig. 11);

h. screw (counter clockwise) the Sampling Probe with the dynamometric key (Fig. 12) until the correct torque is reached and the key spins freely around the Sampling Probe;

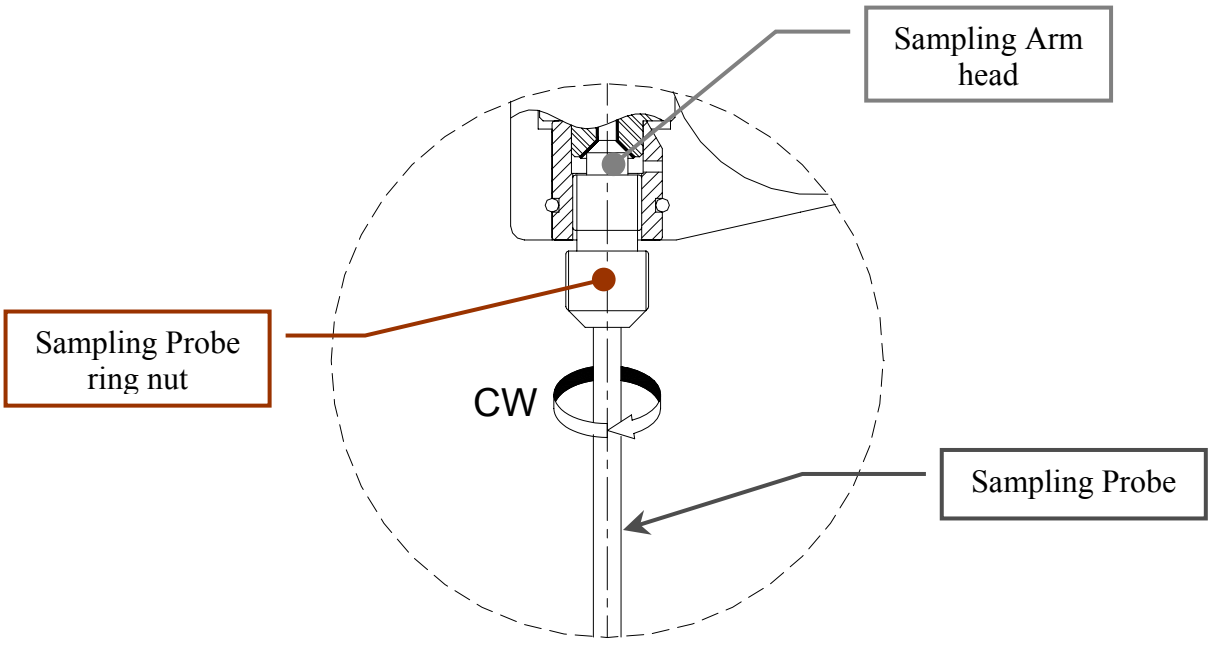


Fig. 8 - Removing of the Sampling Probe

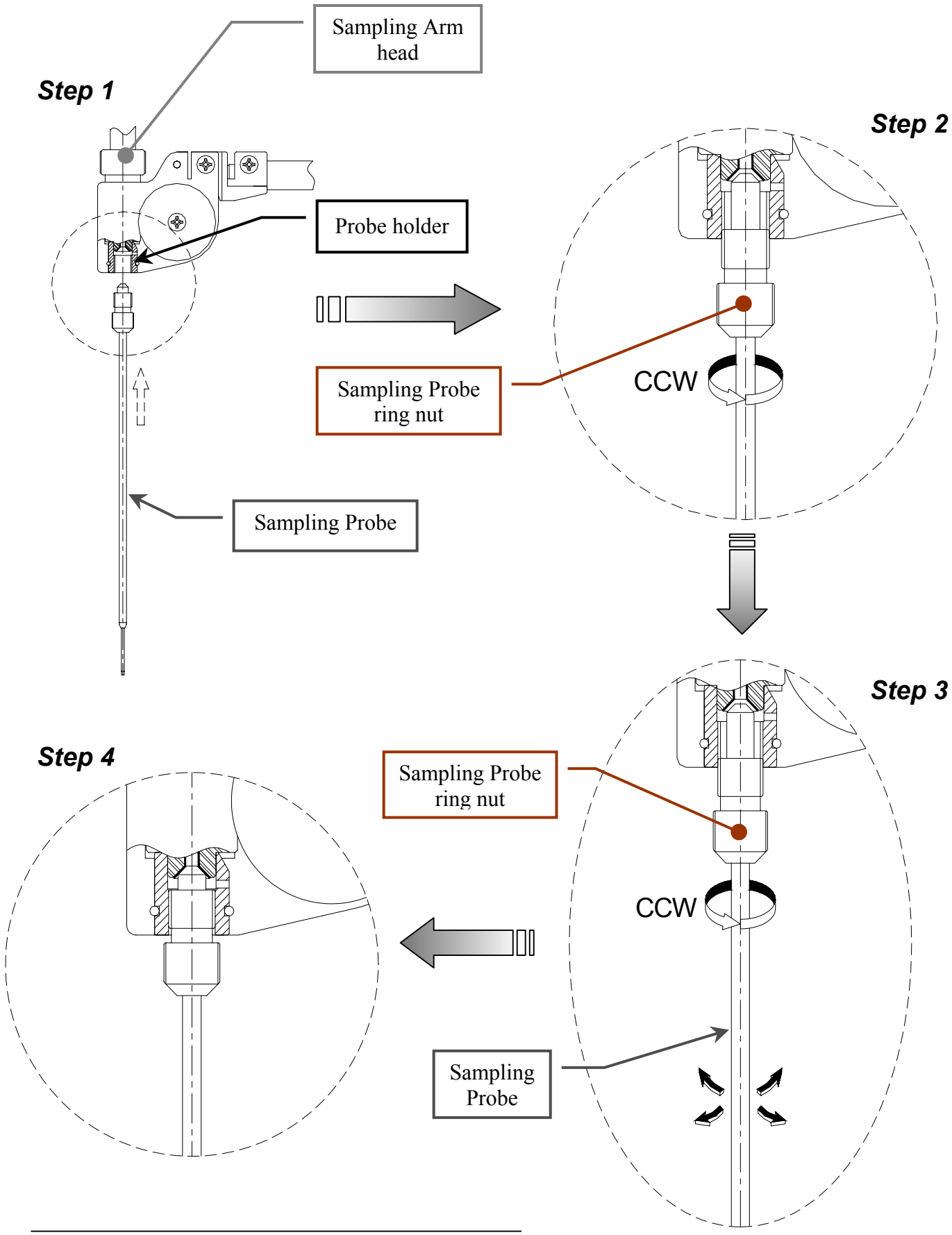

Sampling Arm head
Step 1
Step 2
Probe holder
Sampling Probe ring nut
CCW
Sampling Probe
Step 3
Step 4
Sampling Probe ring nut
CCW
Sampling Probe

Fig. 9 - Replacement of the Sampling Probe

i. remove the dynamometric key;

j. turn in the “Diagnostic” program;

k. select "Miscellaneous” folder and request an Instrument General Reset. Wait until the general reset procedure has been completed;

l. make sure that all the Home Sensors of the Sampling Arm (Vertical and Horizontal), Reactions, Reagents and Samples Plates light up in green.

N.B.: after having replaced the Sampling Probe, it is necessary to verify the verticality and the centering of it with respect to the Washing Well. In case of misalignment: perform the procedure "Alignment and Adjustments”, described into the previous Section 6.1.1, from step 5.

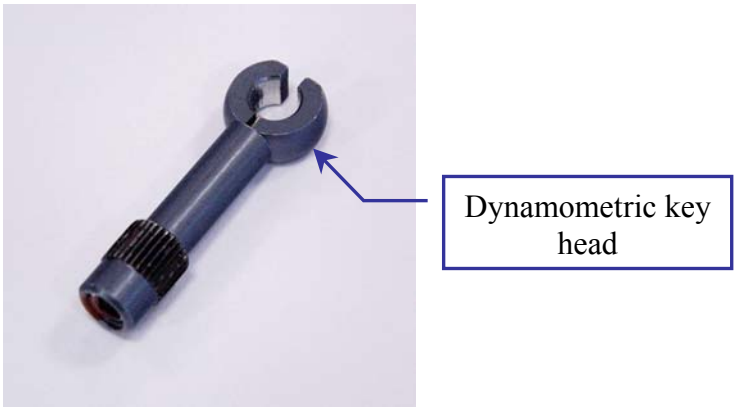


Fig. 10 – Dynamometric key

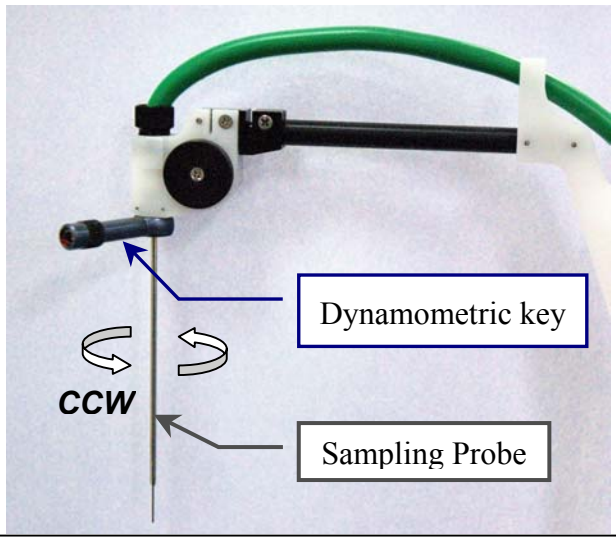


Fig. 11 - Dynamometric key head around the ring nut

Fig. 12 – Dynamometric key rotation

6.1.3 REPLACEMENT OF THE SAMPLING ARM

1. Remove the Sampling Probe from its housing unscrewing (clockwise) its ring nut (Fig. 8).
2. Make sure that the instrument (Ellipse) is turned off.
3. Remove the instrument front panel unscrewing its four anchored screws (Fig. 13).
4. Unplug the J1, J2, J5, J6, J13 connectors from the Arm Interface Board (Fig. 14), remove the Sampling Arm protective cover unscrewing its fastening screw (Fig. 1) and unplug the ground wire from the Sampling Arm Assembly.
5. Unscrew the two fastening screws and remove the Diluter protective cover (Fig. 1).
6. Unscrew the two anchored screws (Fig. 15) and pull out the Diluter Module from its hole.
7. Remove the Preheater teflon tube from the manifold of the Diluter Solenoid Valve by unscrewing the fitting (Fig. 16), paying special attention to liquid leakage.
8. Remove the Preheater clamp, located into the Peristaltic Pump housing, unscrewing its fastening screw (Fig. 17).
9. Unscrew the two Preheater fastening screws (Fig. 2), loosen the “Screw “B” (Fig. 4) and remove the Level Sensor and Preheater Assembly from its housing.
10. Unscrew the two Sampling Arm anchored screws (Fig. 18), pull out the Sampling Arm from its housing and substitute it with the new one.

To replace the new Sampling Arm, perform the following steps:

11. Repeat the above steps in inverse order: from 10 to 4.
12. Perform the procedure "Alignment and Adjustments” described into the previous Section 6.1.1.
13. Select “Diluter” folder and perform - with the selection of the “Probe Wash Test” button - at least five successive Probe Wash Test to fill the hydraulic circuit with the liquid.
14. Verify the absence of liquid leakage from the hydraulic circuit.
15. Place the instrument front panel screwing its four anchored screws (Fig. 13).

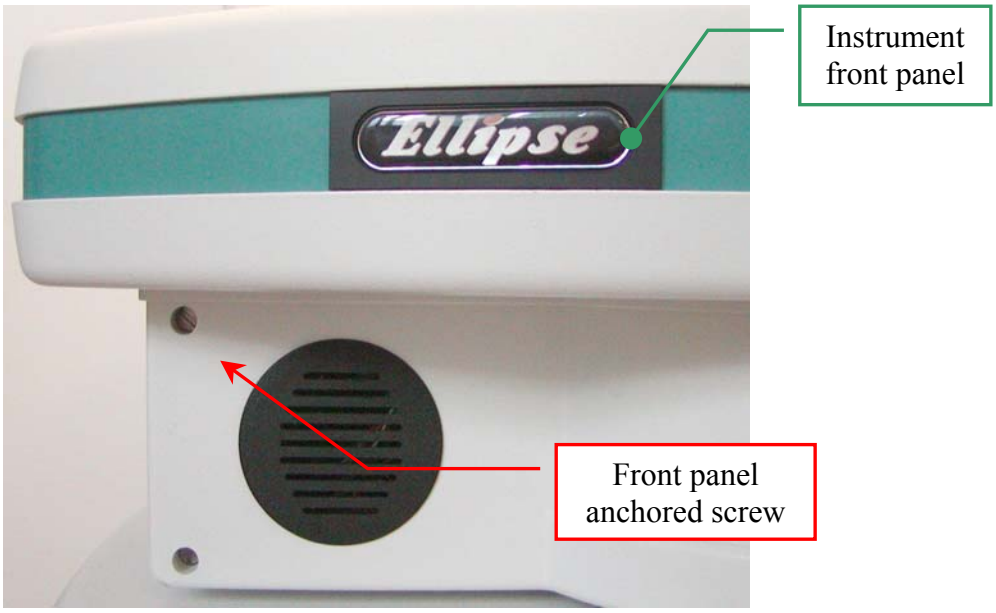


Fig. 13 - Front panel anchored screws

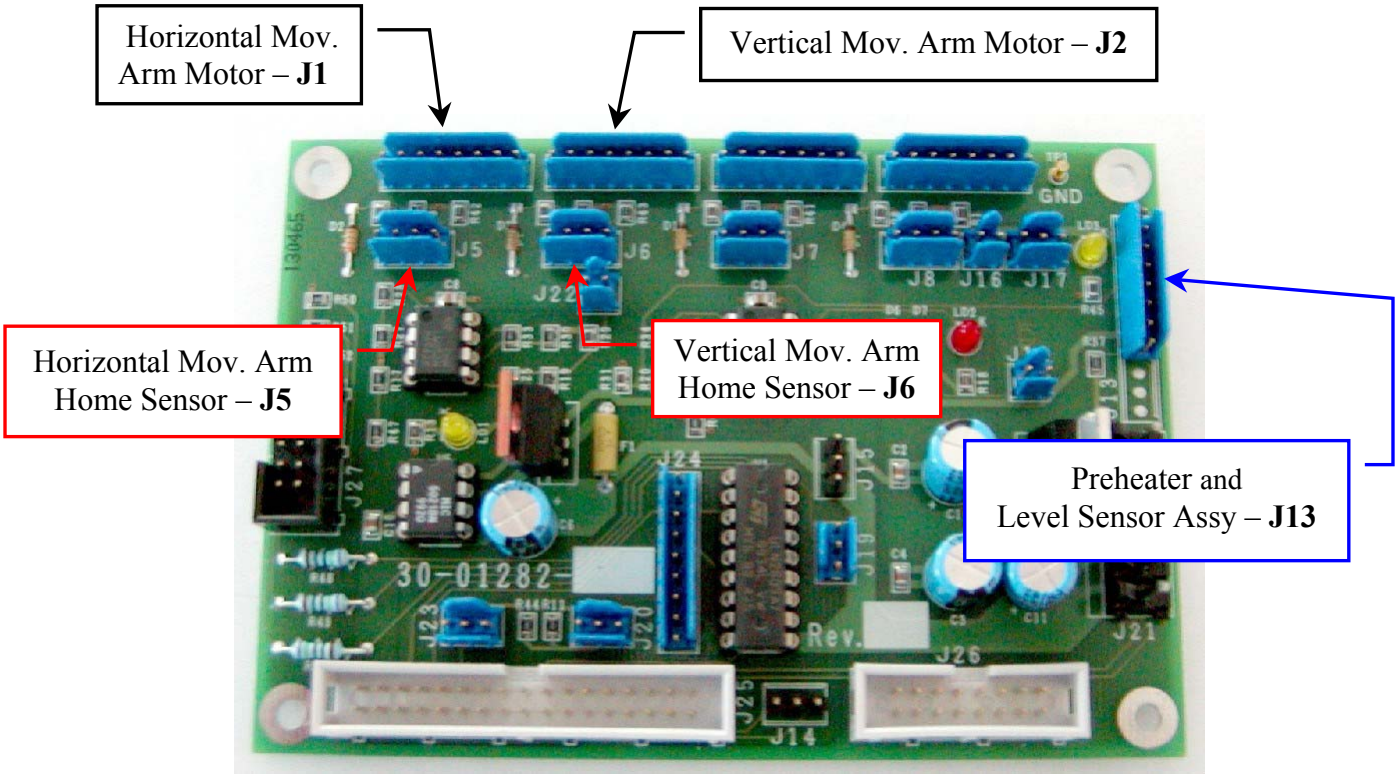


Fig. 14 - Arm Interface Board (Dx) [P/N: 30-01282-01]

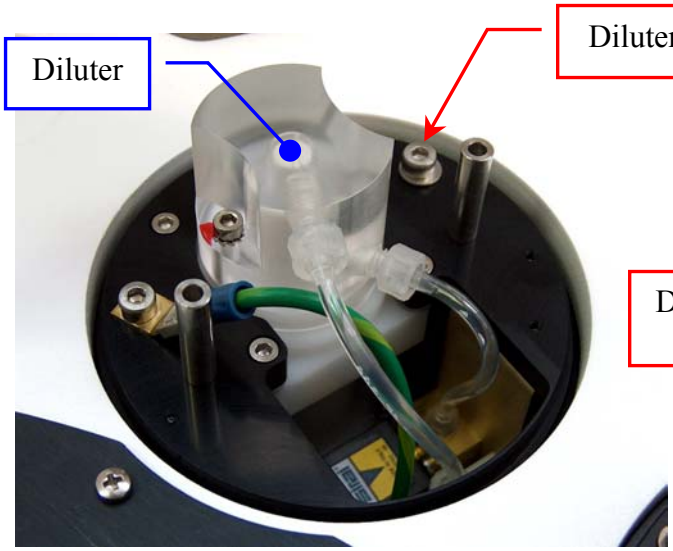


Fig. 15 - Diluter Module (*top view*)

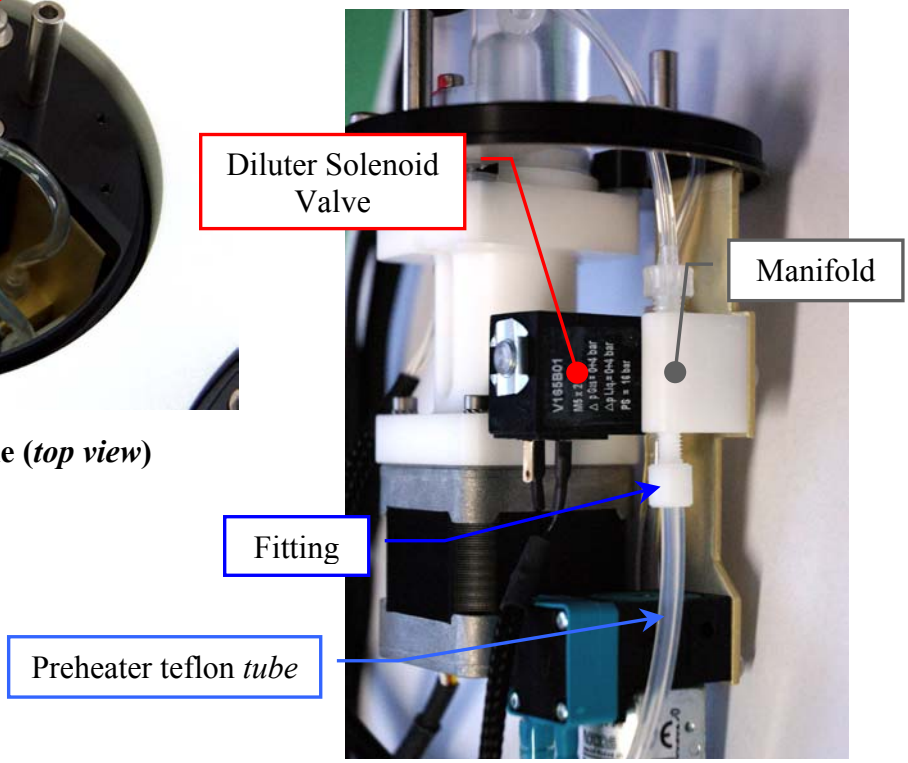


Fig. 16 – Diluter fitting

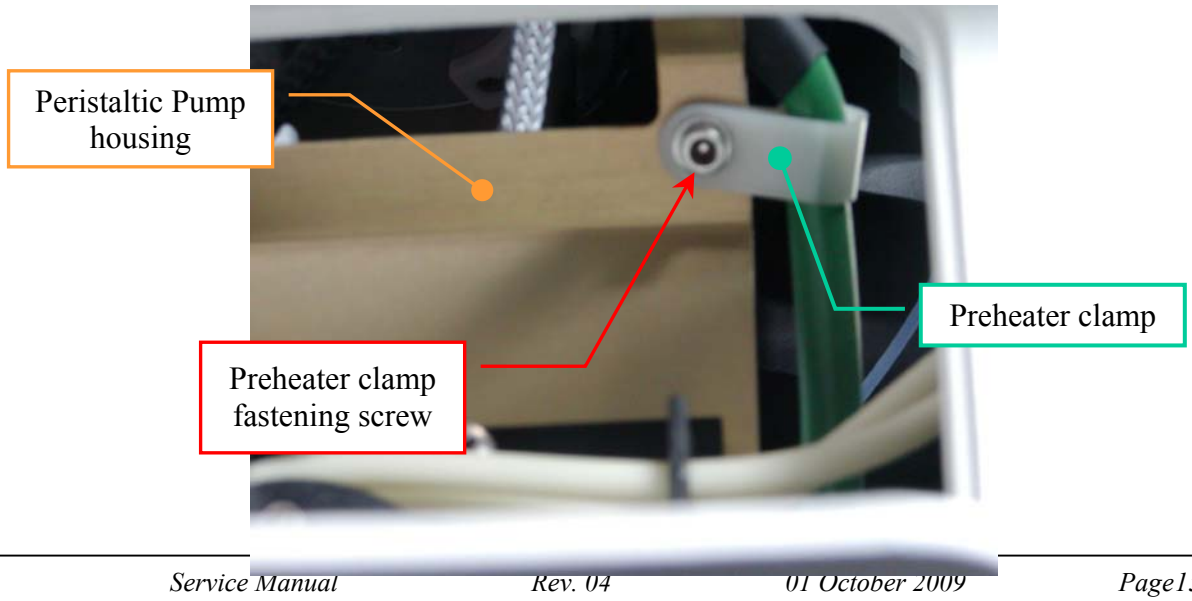


Fig. 17 – Preheater clamp

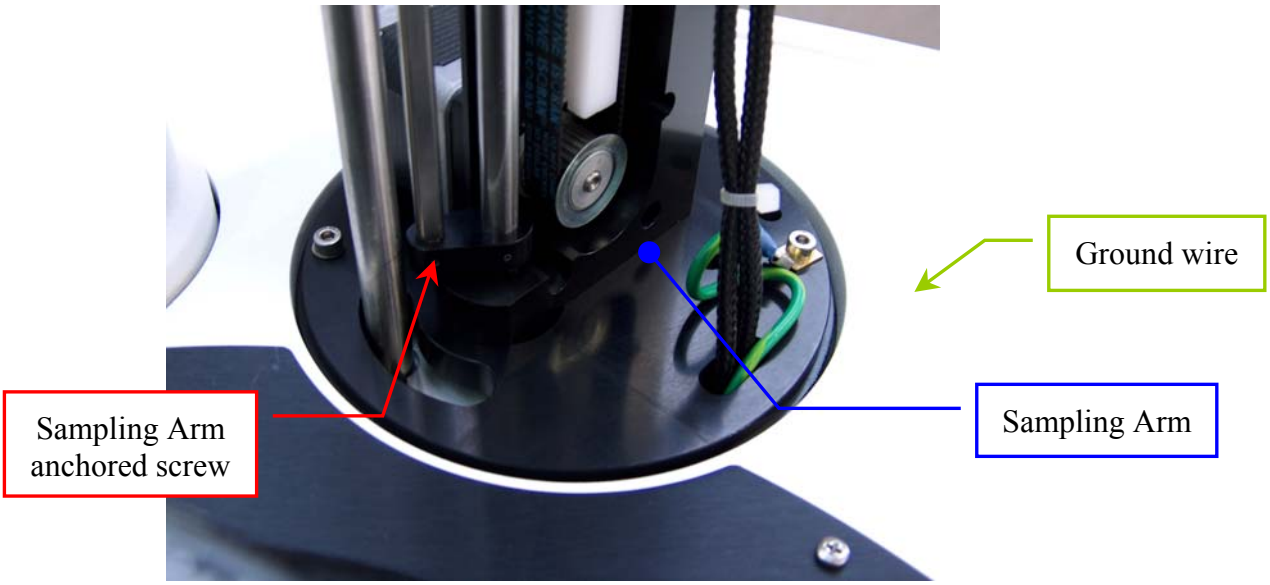


Fig. 18 – Sampling Arm anchored screws

6.1.4 REPLACEMENT OF THE ARM HOME SENSORS

6.1.4.1 Replacement of the Horizontal Arm Home Sensor

N.B.: make sure that the instrument (Ellipse) is turned off before performing this procedure.

1. Remove the Sampling Arm protective cover unscrewing its fastening screw (Fig. 1).
2. Loosen the set screw of the Horizontal Arm Home Sensor flat bar and turn the flat bar in order to unscrew the two Horizontal Arm Home Sensor fastening screws (Fig. 2).
3. Remove the instrument front panel unscrewing the four anchored screws (Fig. 13).
4. Unplug the J5 connector from the Arm Interface Board (Fig. 14), take out the entire Arm Home Sensor Assy and substitute it with the new one (Fig. 19).

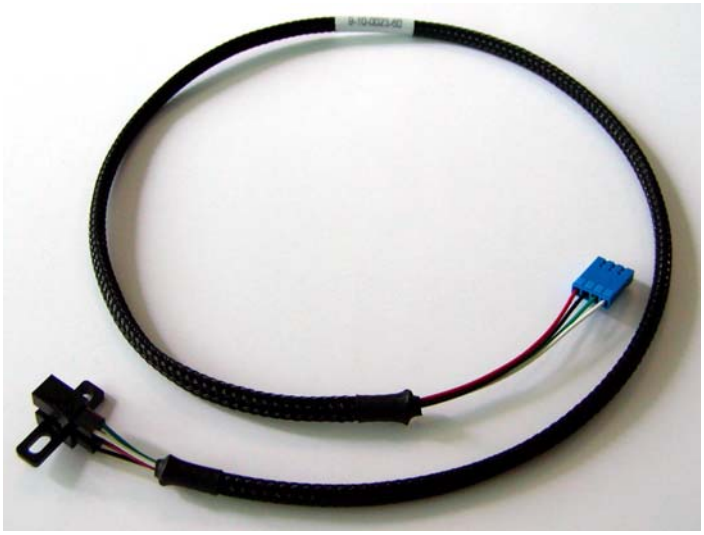


Fig. 19 - Arm Home Sensor Assy [P/N: 9-10-0023-60]

To replace the new (Horizontal) Arm Home Sensor Assy, perform the following steps:

5. Repeat steps 4 and 3.
6. Turn on the instrument Ellipse.
7. Launch the "Diagnostic" program.
8. Center (manually) the Sampling Probe with respect to the Washing Well.
9. Position the slit of the Horizontal Arm Home Sensor flat bar (Fig. 2) to the center of the Horizontal Arm Home Sensor.
10. Tighten the set screw of the Horizontal Arm Home Sensor flat bar (Fig. 2).
11. Select "Arm" folder and click the "Reset" button. Wait until the reset arm procedure has been completed.
12. Make sure that the Horizontal Arm Home Sensor light up in green.
13. Make sure that the Sampling Probe is centered with respect to the Washing Well. If it not be so, adjust in the following way:

    a. loosen the set screw of the Horizontal Arm Home Sensor flat bar (Fig. 2);

b. turn slightly the Horizontal Arm Home Sensor flat bar to the right toward in order to obtain the centering;

c. tighten the set screw of the Horizontal Arm Home Sensor flat bar (Fig. 2);

d. select “Arm” folder and click the “Reset” button. Wait until the reset arm procedure has been completed;

e. make sure that the Horizontal Arm Home Sensor light up in green;

f. verify that the Sampling Probe is centered with respect to the Washing Well. If it not be so, repeat steps from 13.a to 13.f .

14. perform the procedure "Alignment and Adjustments”, described into the previous Section 6.1.1, from step 13 to step 26.

6.1.4.2 Replacement of the Vertical Arm Home Sensor

N.B.: make sure that the instrument (Ellipse) is turned off before performing this procedure.

1. Remove the Sampling Arm protective cover unscrewing its fastening screw (Fig. 1).
2. Unscrew the two Vertical Arm Home Sensor fastening screws (Fig. 5).
3. Remove the instrument front panel unscrewing the four anchored screws (Fig. 13).
4. Unplug the J6 connector from the Arm Interface Board (Fig. 14), take out the entire Arm Home Sensor Assy and substitute it with the new one (Fig. 19).

   To replace the new (Vertical) Arm Home Sensor Assy, perform the following steps:

5. Repeat steps 4, 3 and 2.
6. Turn on the instrument Ellipse.
7. Launch the “Diagnostic” program.
8. Select “Arm” folder and click the “Reset” button. Wait until the reset arm procedure has been completed.
9. Make sure that the Vertical Arm Home Sensor light up in green.
10. Make sure that the distance between the top edge of the Washing Well and the tip of the Sampling Probe is 25 mm. If it not be so, adjust in the following way:

    a. loosen the two Vertical Arm Home Sensor fastening screws (Fig. 5);

    b. move slightly the Vertical Arm Home Sensor to the right vertically toward in order to obtain the centering;

    c. tighten the two Vertical Arm Home Sensor fastening screws (Fig. 5);

d. select “Plate” folder and click “All Motors OFF” button;

e. move downward (manually) the Sampling Arm;

f. click “All Motors ON” button in the “Plate” folder. Wait until the reset instrument procedure has been completed;

g. verify that the distance between the top edge of the Washing Well and the tip of the Sampling Probe is 25 mm. If it not be so, repeat steps from 10.a to 10.g .

11. Place the Sampling Arm protective cover screwing its fastening screw (Fig. 1).

6.1.5 REPLACEMENT OF THE SAMPLING ARM MOTORS

6.1.5.1 Replacement of the Horizontal Sampling Arm Motor

N.B.: make sure that the instrument (Ellipse) is turned off before performing this procedure.

1. Remove the Sampling Probe from its housing by unscrewing (clockwise) its ring nut (Fig. 8).
2. Remove the Sampling Arm protective cover unscrewing its fastening screw (Fig. 1).
3. Remove the instrument front panel unscrewing the four anchored screws (Fig. 13).
4. Unplug the J1, J2, J5, J6, J13 connectors from the Arm Interface Board (Fig. 14) and the ground wire from the Sampling Arm Assembly (Fig. 18).
5. Unscrew the two fastening screws and remove the Diluter protective cover (Fig. 1).
6. Unscrew the two anchored screws (Fig. 15) and pull out the Diluter Module from its hole.
7. Remove the Preheater teflon tube from the manifold of the Diluter Solenoid Valve by unscrewing the fitting (Fig. 16), paying special attention to liquid leakage.
8. Remove the Preheater clamp, located into the Peristaltic Pump housing, unscrewing its fastening screw (Fig. 17).
9. Unscrew the two Preheater fastening screws (Fig. 2), loosen the “Screw “B” (Fig. 4) and remove the Level Sensor and Preheater Assembly from its housing.
10. Unscrew the two Sampling Arm anchored screws (Fig. 18) and pull out the Sampling Arm from its housing.
11. Remove the four Horizontal Sampling Arm Motor fastening screws (Fig. 20).
12. Remove the belt from the Horizontal Sampling Arm Motor pulley (Fig. 21).
13. Pull out the Horizontal Sampling Arm Motor from its housing.

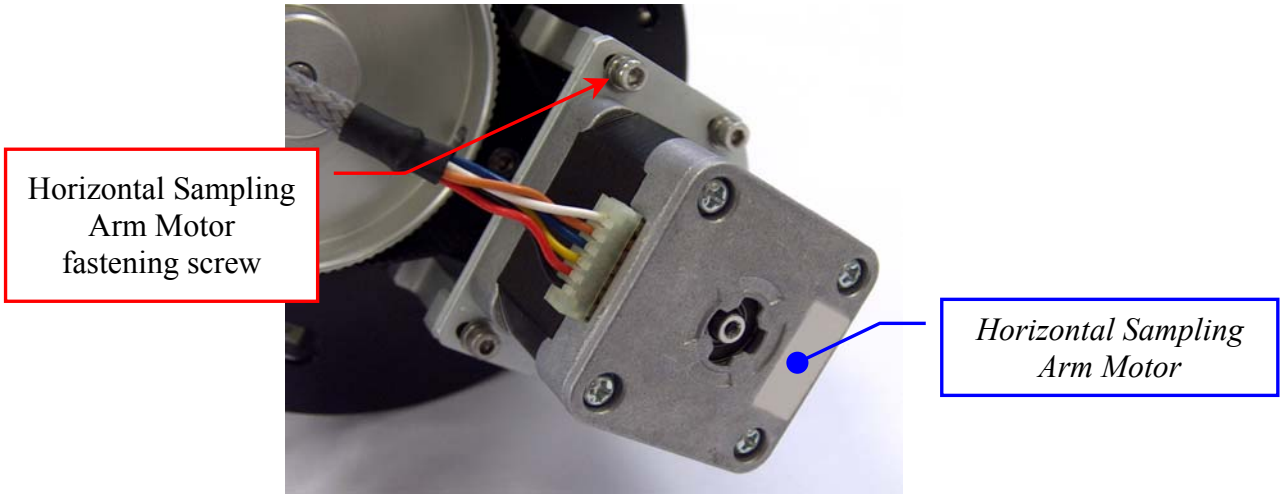


Fig. 20 – Horizontal Sampling Arm Motor

14. Loosen the two set screws of the Horizontal Sampling Arm Motor pulley (Fig.21), then extract the pulley to the motor axis.
15. Unscrew the four fastening screws of the Horizontal Sampling Arm Motor anchor plate (Fig. 21), then take out the anchor plate to the motor.
16. Insert the pulley to the motor axis of the new Arm Motor Assy (Fig. 23).
17. Position the pulley to 2.00 mm with respect to upper motor plane (Fig. 22), then tighten the two set screws of the pulley (Fig. 21).
18. Position correctly the anchor plate on the upper plane of the new motor (Fig. 21), then screw the four anchor plate fastening screws (Fig. 21).

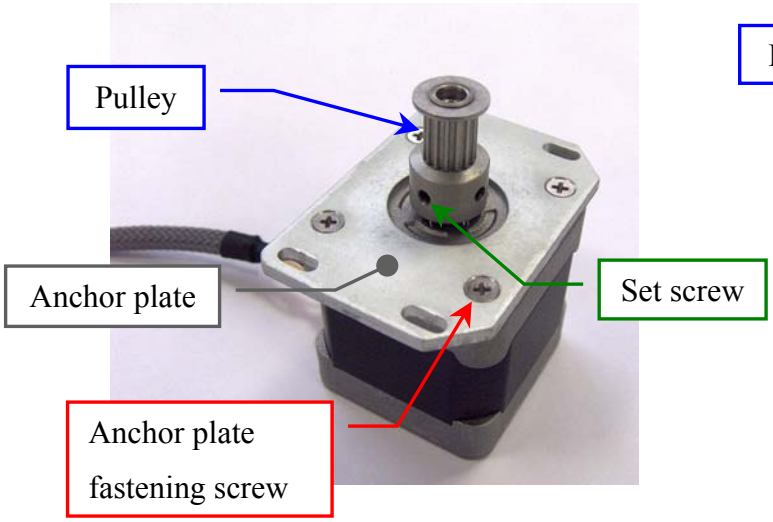


Fig. 21 - Horizontal Sampling Arm Motor anchor plate

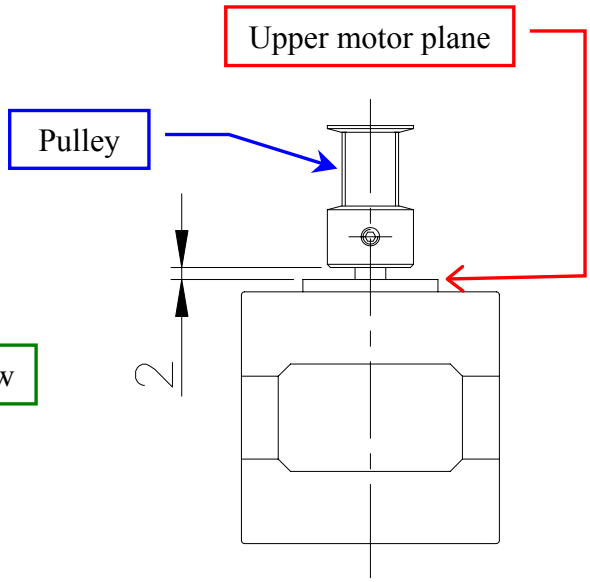


Fig. 22 - Horizontal Sampling Arm Motor scheme

19. Replace the Horizontal Sampling Arm Motor into its Sampling Arm housing, then insert (without tighten) the four Horizontal Sampling Arm Motor fastening screws (Fig. 20).
20. Wrap the belt around the Horizontal Sampling Arm Motor pulley.
21. Push the motor outward from the arm axis and holding it in this position, so as to maintain the belt in tension, then tighten the four Horizontal Sampling Arm Motor fastening screws (Fig. 27).
22. To replace the Sampling Arm, repeat the above steps in inverse order: from 10 to 1.

N.B.: after having replaced the Horizontal Sampling Arm Motor, it is necessary to align mechanically the Sampling Probe with respect to the Washing Well and center all the other positions by following the procedure "Alignment and Adjustments" described into the previous Section 6.1.1

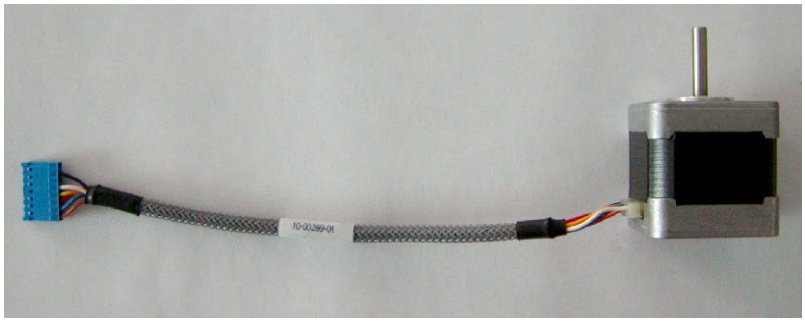


Fig. 23 – Arm Motor Assy [P/N: 10-00399-01]

6.1.5.2 Replacement of the Vertical Sampling Arm Motor

N.B.: make sure that the instrument (Ellipse) is turned off before performing this procedure.

1. Remove the Sampling Probe from its housing by unscrewing (clockwise) its ring nut (Fig. 8).
2. Remove the Sampling Arm protective cover unscrewing its fastening screw (Fig. 1).
3. Remove the instrument front panel unscrewing the four anchored screws (Fig. 13).
4. Unplug the J2 connector from the Arm Interface Board (Fig. 14).
5. Loosen the four fastening screws of the belt tension plate that permit to adjust the belt tension for the vertical Sampling Probe movement (Fig. 24).
6. Remove the belt from the Vertical Sampling Arm Motor pulley (Fig. 25).
7. Unscrew the four Vertical Sampling Arm Motor fastening screws (Fig. 25).

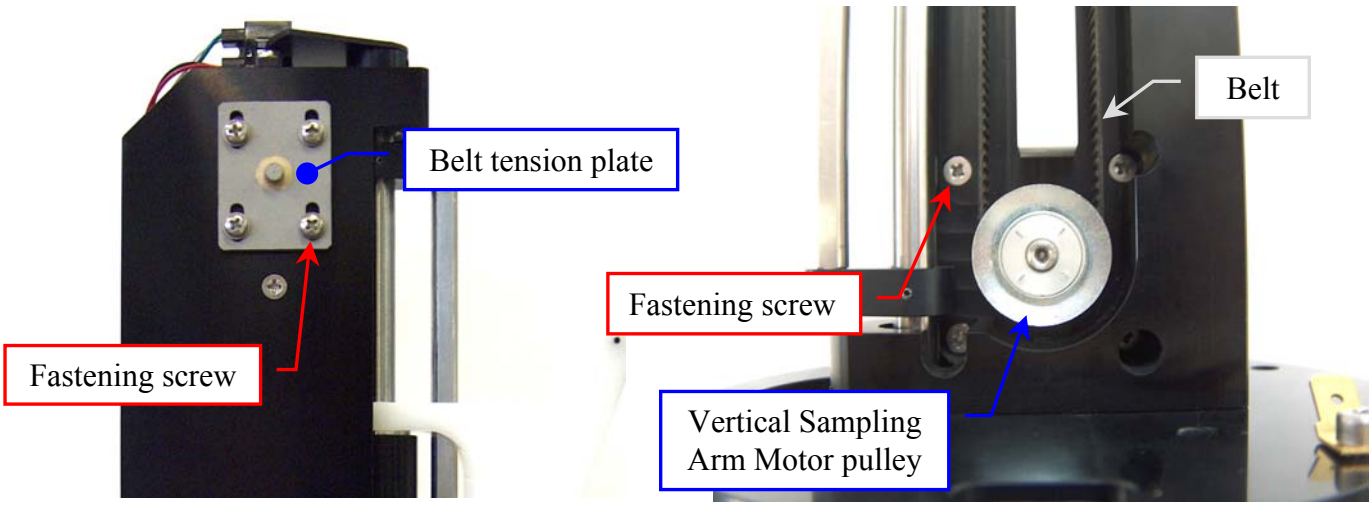


Fig. 24 – Belt tension plate

Fig. 25 – Vertical Sampling Arm Motor fastening screws

8. Pull out the Vertical Sampling Arm Motor from its housing, then remove the anchor plate to the motor.
9. Loosen the two set screws of the Vertical Sampling Arm Motor pulley (Fig. 26), then extract the pulley to the motor axis.
10. Insert the pulley to the motor axis of the new Arm Motor Assy (Fig. 23).
11. Position the pulley to 1.50 mm with respect to upper motor plane (Fig. 26), then tighten the two set screws of the pulley (Fig. 26).

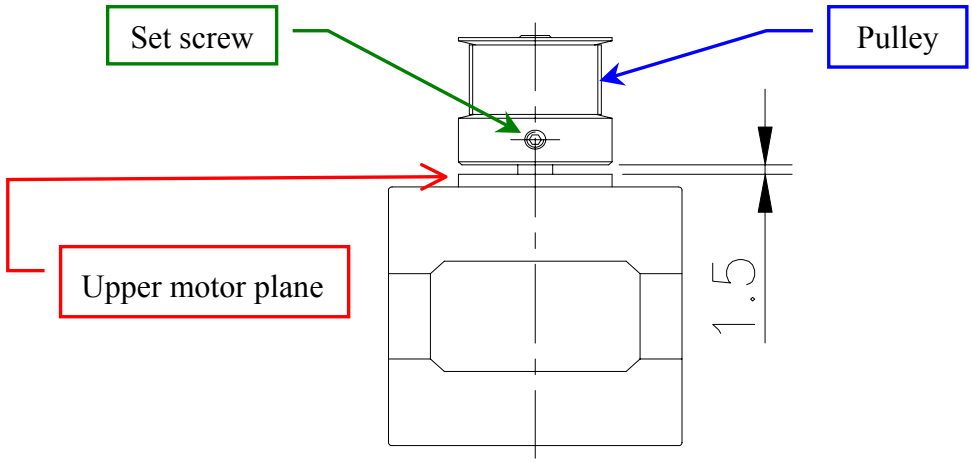


Fig. 26 – Vertical Sampling Arm Motor scheme

12. Position the anchor plate on the upper plane of the new motor, then replace the Vertical Sampling Arm Motor into its Sampling Arm housing (Fig. 25).
13. Tighten the four Vertical Sampling Arm Motor fastening screws (Fig. 25).
14. Wrap the belt around the Vertical Sampling Arm Motor pulley.
15. Push upwards the belt tension plate (Fig. 24) and holding it in this position, so as to maintain the belt in tension, then tighten its four fastening screws (Fig. 24).
16. To complete, repeat the above steps in inverse order: from 4 to 1.

N.B.: after having replaced the Vertical Sampling Arm Motor, it is necessary to require a Instrument General Reset and perform the procedure "Alignment and Adjustments", described into the previous Section 6.1.1, from step 7.

6.1.6 REPLACEMENT OF THE SAMPLING ARM BELTS

6.1.6.1 Replacement of the Horizontal Sampling Arm Belt

N.B.: make sure that the instrument (Ellipse) is turned off before performing this procedure.

1. Remove the Sampling Probe from its housing by unscrewing (clockwise) its ring nut (Fig. 8).
2. Remove the Sampling Arm protective cover unscrewing its fastening screw (Fig. 1).
3. Remove the instrument front panel unscrewing the four anchored screws (Fig. 13).
4. Unplug the J1, J2, J5, J6, J13 connectors from the Arm Interface Board (Fig. 14) and the ground wire from the Sampling Arm Assembly (Fig. 18).
5. Unscrew the two fastening screws and remove the Diluter protective cover (Fig. 1).
6. Unscrew the two anchored screws (Fig. 15) and pull out the Diluter Module from its hole.
7. Remove the Preheater teflon tube from the manifold of the Diluter Solenoid Valve by unscrewing the fitting (Fig. 16), paying special attention to liquid leakage.
8. Remove the Preheater clamp, located into the Peristaltic Pump housing, unscrewing its fastening screw (Fig. 17).
9. Unscrew the two Preheater fastening screws (Fig. 2), loosen the “Screw “B” (Fig. 4) and remove the Level Sensor and Preheater Assembly from its housing.
10. Unscrew the two Sampling Arm anchored screws (Fig. 18) and pull out the Sampling Arm from its housing.
11. Loosen the four Horizontal Sampling Arm Motor fastening screws (Fig. 27).
12. Remove the belt from the Horizontal Sampling Arm Motor pulley (Fig. 21) from the horizontal handling pulley, then substitute it with the new one.

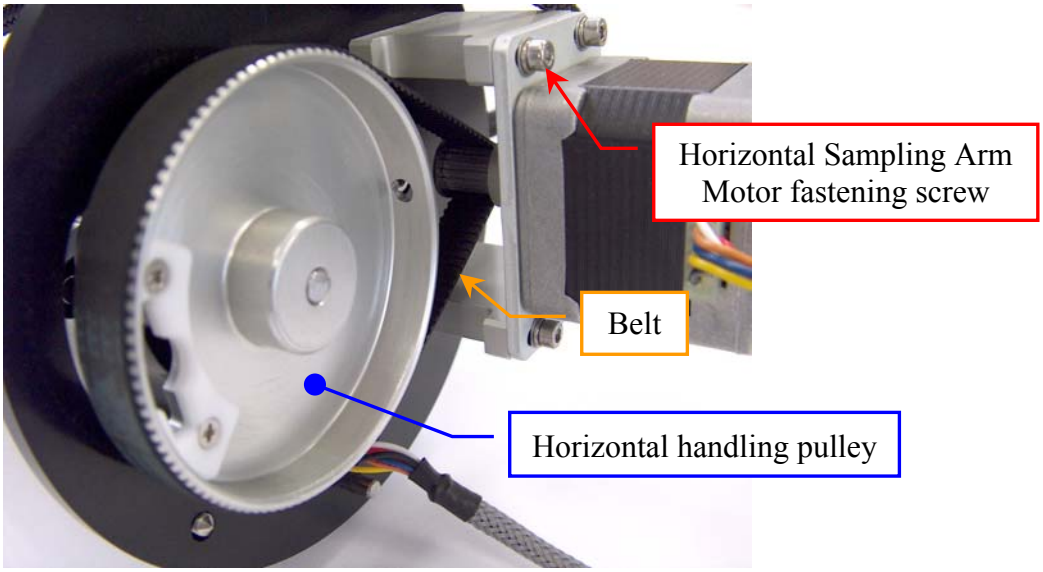


Fig. 27 – Horizontal Sampling Arm Belt

13. Wrap the new belt over the Horizontal Sampling Arm Motor pulley and over the horizontal handling pulley (Fig. 27).

14. Push the motor outward from the arm axis and holding it in this position, so as to maintain the belt in tension, then tighten the four Horizontal Sampling Arm Motor fastening screws (Fig. 27).

15. To replace the Sampling Arm, repeat the above steps in inverse order: from 10 to 1.

N.B.: after having replaced the Horizontal Sampling Arm Belt, it is necessary to align mechanically the Sampling Probe with respect to the Washing Well and center all the other positions by following the procedure "Alignment and Adjustments" described into the previous Section 6.1.1 .

6.1.6.2 Replacement of the Vertical Sampling Arm Belt

N.B.: make sure that the instrument (Ellipse) is turned off before performing this procedure.

1. Remove the Sampling Probe from its housing by unscrewing (clockwise) its ring nut (Fig. 8).
2. Remove the Sampling Arm protective cover unscrewing its fastening screw (Fig. 1).
3. Loosen the four fastening screws of the belt tension plate that permit to adjust the belt tension for the vertical Sampling Probe movement (Fig. 28).
4. Unscrew the four fastening screws (Fig. 28) of the Vertical Arm Home Sensor anchor bar (Fig. 5) and remove it to the Sampling Arm.

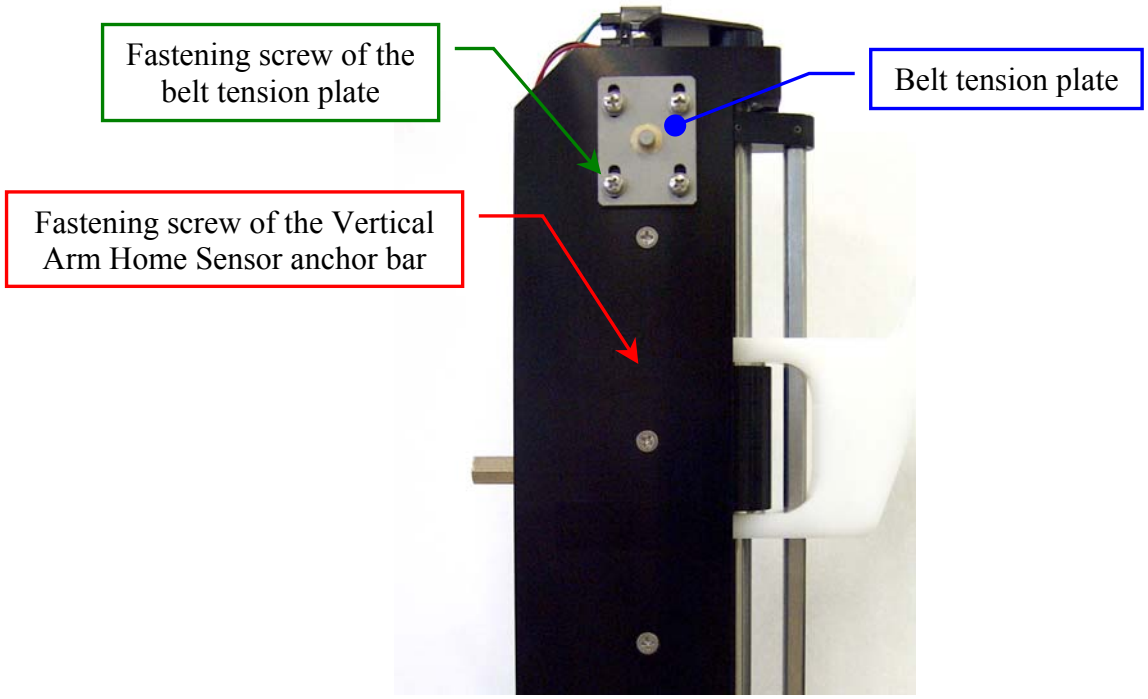


Fig. 28 – Fastening screw of the Vertical Arm Home Sensor anchor bar

5. Unscrew the two clamping belt fastening screw, remove the two small plates (Fig. 29), take off the belt to the Sampling Arm, then substitute it with the new one.

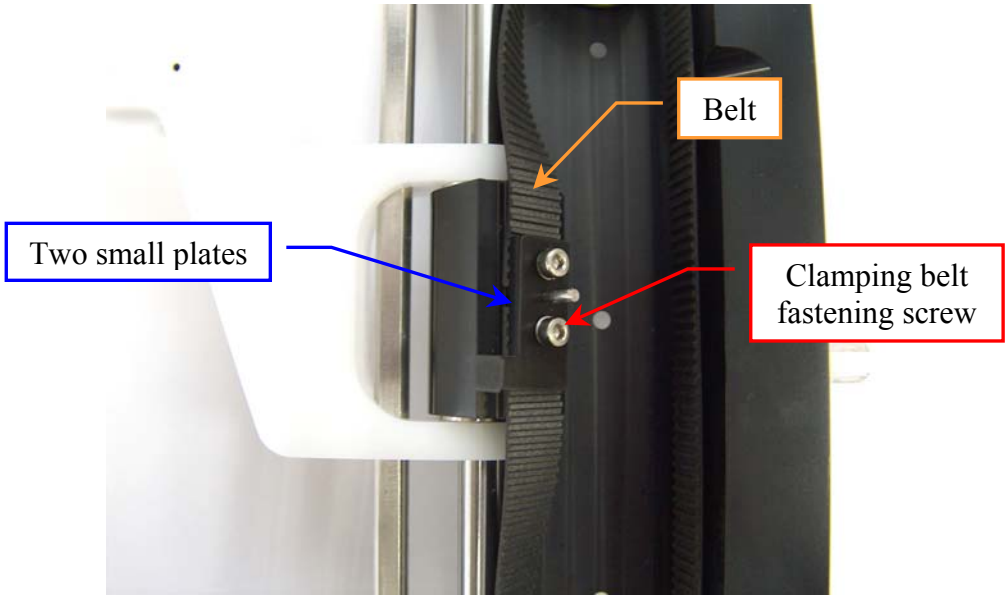


Fig. 29 –Vertical Sampling Arm Belt

6. To replace the new Vertical Sampling Arm Belt, repeat the above steps in inverse order: from 5 to 1.

N.B.: after having replaced the Vertical Sampling Arm Belt, it is necessary to require a Instrument General Reset and perform the procedure "Alignment and Adjustments", described into the previous Section 6.1.1, from step 7.

6.2 DILUTER MODULE

6.2.1 REPLACEMENT OF THE DILUTER MODULE

1. Make sure the instrument Ellipse is turned off.
2. Unscrew the two fastening screws and remove the Diluter protective cover (Fig. 1).
3. Remove the instrument front panel unscrewing its four anchored screws (Fig. 13).
4. Take off the Rinse Solution cannula (I) from its bottle.
5. Unplug the J4, J8, J16, J17 connectors from the Arm Interface Board (Fig. 30) and the ground wire from the Diluter Module.

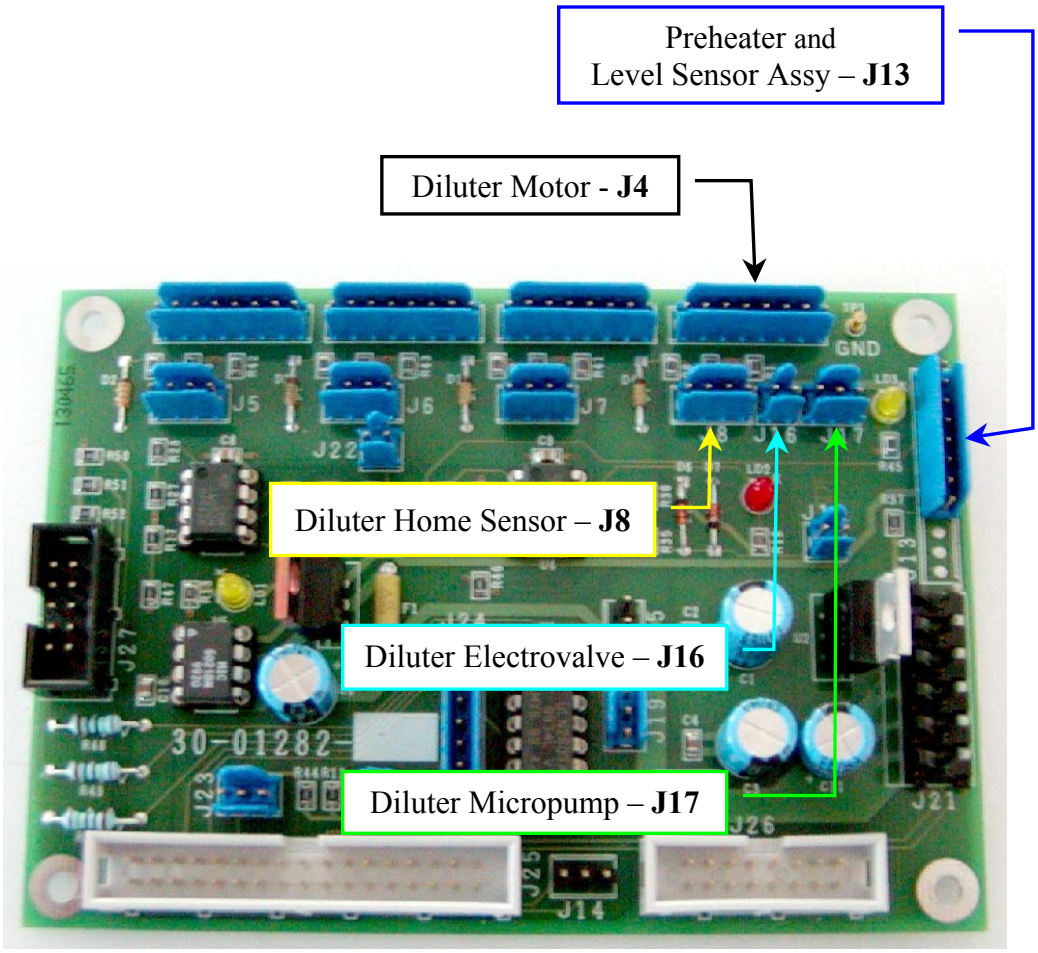


Fig. 30 - Arm Interface Board (Dx) [P/N: 30-01282-01]

6. Loosen the two anchored screws (Fig. 31) and pull out the Diluter Module (Fig. 32) from its hole, making attention not to crash the tubes of the hydraulic circuit.
7. Unscrew the two fitting from the Diluter head (Fig. 31), making attention to the spillage of the Rinse Solution from the two tubes.
8. Take off the Diluter Module cables from its hole.
9. Unscrew the four Diluter fastening screws (Fig. 31) and pull out the Diluter from its mechanical support.

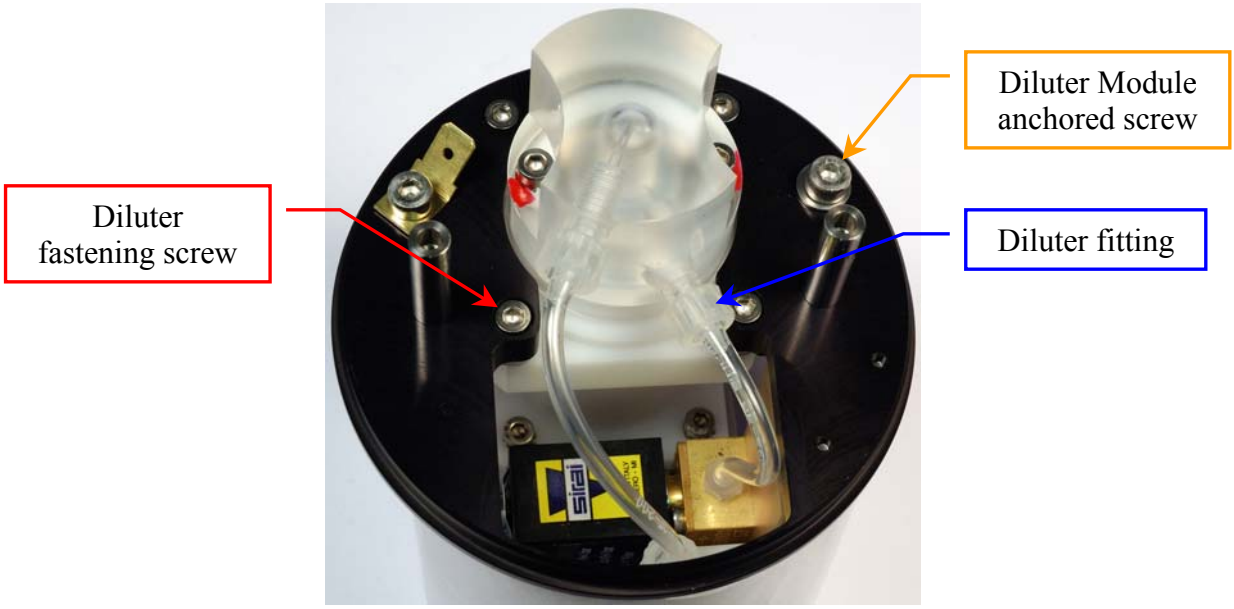


Fig. 31 – Diluter Module (top view)

10. Remove the four Diluter fastening screw washer.

11. Replace the Diluter with one new Diluter.

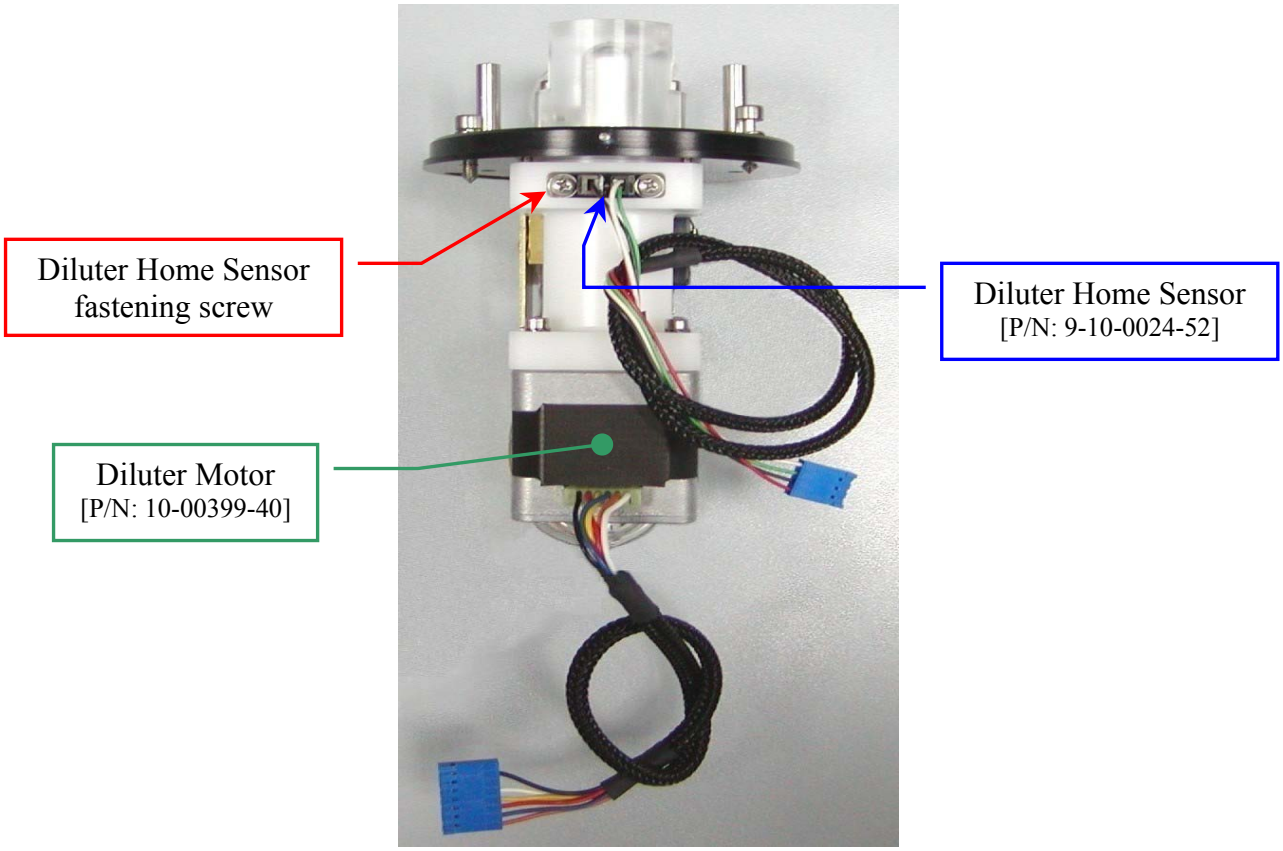


Fig. 32 – Diluter Module [P/N: 10-00496-01]

12. To replace, repeat the above steps in inverse order: from 10 to 4.

N.B.: make sure that the two fitting are very screws on the Diluter head in order to guarantee the hydraulic seal of the circuit. Moreover, make sure that the Diluter Module cables in the instrument do not hinder the movement of the Pre-Heater in its zone of job.

13. Turn on the instrument *Ellipse*.
14. Make sure that sufficient liquid in the Rinse bottle is present.
15. Launch the "Diagnostic" program.
16. Select "Diluter" folder and click the "Home" button. Wait until the reset Diluter procedure has been completed.
17. Set up the aspiration volume to the maximum value (980 µl) and click the "Asp" button. Make sure that the diluter executes the aspiration procedure correctly.
18. Click the "Disp" button. Make sure that the diluter executes the dispenses procedure correctly.
19. Click the "Asp" button with the aspiration volume to the maximum value (980 µl).
20. Click the "Probe Wash Test" button.

N.B.: before proceeding with the Probe Wash Test, make sure that one written on the warning message is respected.

21. Click the “OK” button. Wait until the Probe Wash Test has been completed.
22. Repeat the above steps 20 and 21 at least others five times in order to fill up the hydraulic circuit completely.
23. Make sure that inside the Diluter are not present of the air bubbles. If it not be so, repeat the Probe Wash Test (steps 20 and 21) until the elimination of the air bubbles.
24. Verify the absence of liquid leakage from the hydraulic circuit.
25. Click the “Home” button. Wait until the reset Diluter procedure has been completed.
26. Place the instrument front panel screwing its four anchored screws (Fig. 13).
27. Place the Diluter protective cover screwing its two fastening screws (Fig. 1).

N.B.: the following steps allows to perform the procedure "Backlash Diluter”. This procedure in order to recover the sampling imprecision generated by the Diluter Motor when it inverts its rotation.

28. Remove the Reagents protection cover on the Reagents Plate and take out the Samples Racks.
29. Select “Arm” folder and click the “Reset” button. Wait until the reset Sampling Arm procedure has been completed.
30. Click the "Go Sample" button. The arm will move to position #1 of the Sample Rack #1.
31. Put a Sample cup containing distilled water (about 1 ml) under the Sampling Probe.
32. Select “Diluter” folder, set up the aspiration volume to the 300 µl and click the “Asp” button. Wait until the Diluter has been aspirated 300 µl of distilled water from the Sample cup.
33. Remove the Sample cup containing distilled water.
34. Set up the dispensation volume to the 1 µl and repeatedly click the “Disp” button until water appears on the tip of the Sampling Probe.
35. Subtract 1 from the number of times in which it has been selected the “Disp” button. The obtained number is the Backlash Diluter value.
36. Select "Configuration" folder, enter the password (“1234”) in the appropriate window and click the “OK” button.

37. Select the Backlash Diluter value in the "Backlash Dil." Pull Down Menu and click the "Save" button. Wait until the Backlash Diluter value has been saved.
38. Select "Arm" folder and click the "Reset" button. Wait until the reset Sampling Arm procedure has been completed.
39. Put on the Samples Racks and place the Reagents protection cover on the Reagents Plate.

6.2.2 REPLACEMENT OF THE DILUTER MICROPUMP

1. Make sure the instrument Ellipse is turned off.
2. Unscrew the two fastening screws and remove the Diluter protective cover (Fig. 1).
3. Remove the instrument front panel unscrewing its four anchored screws (Fig. 13).
4. Take off the Rinse Solution cannula (I) from its bottle.
5. Unplug the J4, J8, J16, J17 connectors from the Arm Interface Board (Fig. 30) and the ground wire from the Diluter Module.
6. Loosen the two anchored screws (Fig. 31) and pull out the Diluter Module (Fig. 32) from its hole, making attention not to crash the tubes of the hydraulic circuit.
7. Take off the Diluter Module cables from its hole.
8. Remove the two tubes from Micropump (Fig. 33).

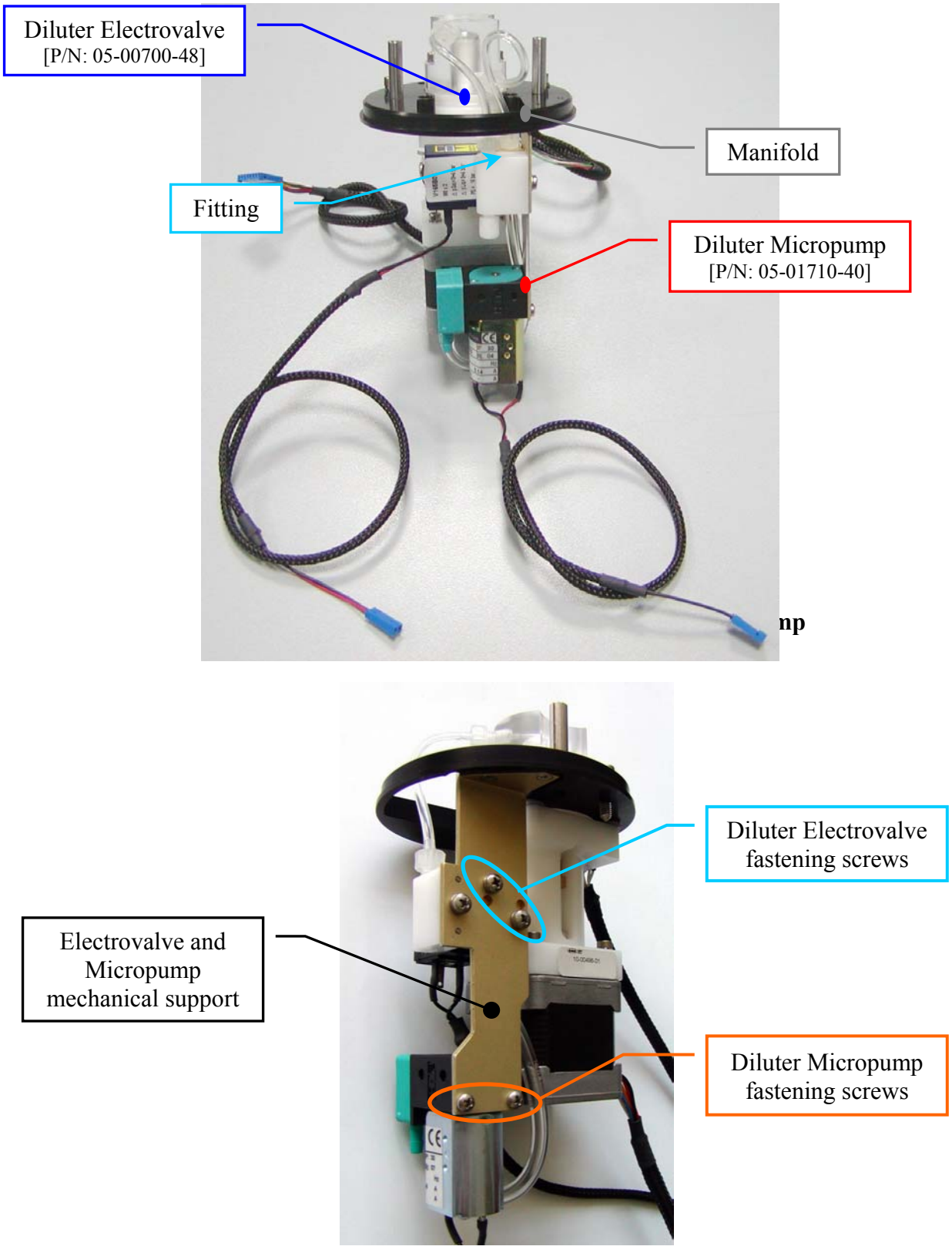


Fig. 34 – Electrovalve and Micropump mechanical support

9. Unscrew the two Micropump fastening screws (Fig. 34) and pull out the Micropump from its mechanical support.

10. Replace the Micropump with one new Micropump.
11. To replace, repeat the above steps in inverse order: from 9 to 4.
12. Turn on the instrument *Ellipse*.
13. Make sure that sufficient liquid in the Rinse bottle is present.
14. Launch the “Diagnostic” program.
15. Select “Diluter” folder and click the “Home” button. Wait until the reset Diluter procedure has been completed.
16. Set up the aspiration volume to the maximum value (980 µl) and click the “Asp” button. Make sure that the Diluter executes the aspiration procedure correctly.
17. Click the “Disp” button. Make sure that the Diluter executes the dispenses procedure correctly.
18. Click the “Asp” button with the aspiration volume to the maximum value (980 µl).
19. Click the “Probe Wash Test” button.

N.B.: before proceeding with the Probe Wash Test, make sure that one written on the warning message is respected.

20. Click the “OK” button. Wait until the Probe Wash Test has been completed.
21. Repeat the above steps 20 and 21 at least others five times in order to fill up the hydraulic circuit completely.
22. Make sure that inside the Diluter are not present of the air bubbles. If it not be so, repeat the Probe Wash Test (steps 20 and 21) until the elimination of the air bubbles.
23. Verify the absence of liquid leakage from the hydraulic circuit.
24. Click the “Home” button. Wait until the reset Diluter procedure has been completed.
25. Place the instrument front panel screwing its four anchored screws (Fig. 13).
26. Place the Diluter protective cover screwing its two fastening screws (Fig. 1).
27. Select "Configuration" folder, enter the password (“1234”) in the appropriate window and click the “OK” button.
28. Select the value 0 in the “Level” Pull Down Menu.
29. Click the “Run Test” button. Wait until the Washing Well level Test has been completed.

30. Click the "OK" button in the appropriate window in order to save the new value. Wait until the new value has been saved.

6.2.3 REPLACEMENT OF THE DILUTER ELECTROVALVE

1. Make sure the instrument Ellipse is turned off.
2. Unscrew the two fastening screws and remove the Diluter protective cover (Fig. 1).
3. Remove the instrument front panel unscrewing its four anchored screws (Fig. 13).
4. Take off the Rinse Solution cannula (I) from its bottle.
5. Unplug the J4, J8, J16, J17 connectors from the Arm Interface Board (Fig. 30) and the ground wire from the Diluter Module.
6. Loosen the two anchored screws (Fig. 31) and pull out the Diluter Module (Fig. 32) from its hole, making attention not to crash the tubes of the hydraulic circuit.
7. Take off the Diluter Module cables from its hole.
8. Unscrew the two Electrovalve fastening screws (Fig. 34) and pull out the Electrovalve from its mechanical support.
9. Remove the two tubes from Electrovalve (Fig. 33).
10. Unscrew the two fittings from Electrovalve.
11. Screw the two fittings on the new Electrovalve.

N.B.: make sure that the two fitting are very screws on the new Electrovalve in order to guarantee the hydraulic seal of the circuit.

12. To replace, repeat the above steps in inverse order: from 9 to 4.
13. Turn on the instrument Ellipse.
14. Make sure that sufficient liquid in the Rinse bottle is present.
15. Launch the "Diagnostic" program.
16. Select "Diluter" folder and click the "Home" button. Wait until the reset Diluter procedure has been completed.
17. Set up the aspiration volume to the maximum value (980 µl) and click the "Asp" button. Make sure that the Diluter executes the aspiration procedure correctly.
18. Click the "Disp" button. Make sure that the Diluter executes the dispenses procedure correctly.
19. Click the "Asp" button with the aspiration volume to the maximum value (980 µl).

20. Click the “Probe Wash Test” button.

N.B.: before proceeding with the Probe Wash Test, make sure that one written on the warning message is respected.

21. Click the “OK” button. Wait until the Probe Wash Test has been completed.
22. Repeat the above steps 20 and 21 at least others five times in order to fill up the hydraulic circuit completely.
23. Make sure that inside the Diluter are not present of the air bubbles. If it not be so, repeat the Probe Wash Test (steps 20 and 21) until the elimination of the air bubbles.
24. Verify the absence of liquid leakage from the hydraulic circuit.
25. Click the “Home” button. Wait until the reset Diluter procedure has been completed.
26. Place the instrument front panel screwing its four anchored screws (Fig. 13).
27. Place the Diluter protective cover screwing its two fastening screws (Fig. 1).

6.2.4 REPLACEMENT OF THE DILUTER HOME SENSOR

1. Make sure the instrument Ellipse is turned off.
2. Unscrew the two fastening screws and remove the Diluter protective cover (Fig. 1).
3. Remove the instrument front panel unscrewing its four anchored screws (Fig. 13).
4. Unplug the J4, J8, J16, J17 connectors from the Arm Interface Board (Fig. 30) and the ground wire from the Diluter Module.
5. Loosen the two anchored screws (Fig. 31) and pull out the Diluter Module (Fig. 32) from its hole, making attention not to crash the tubes of the hydraulic circuit.
6. Take off the Diluter Module cables from its hole.
7. Unscrew the two Diluter Home Sensor fastening screws (Fig. 32) and pull out the Home Sensor from its hole within the Diluter.
8. Replace the Home Sensor with one new Home Sensor (Fig. 35).

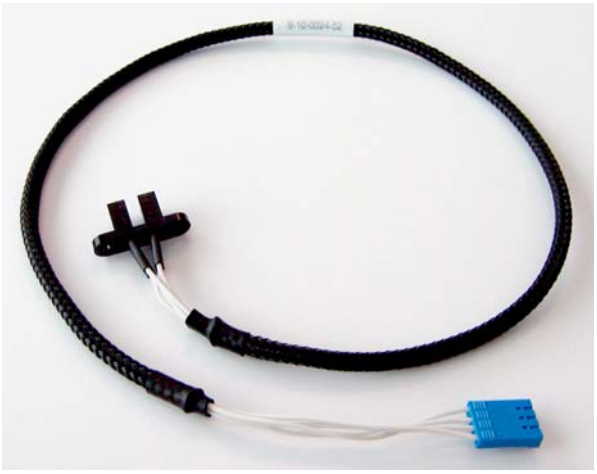


Fig. 35 – Diluter Home Sensor Assy [P/N: 9-10-0024-52]

9. To replace, repeat the above steps in inverse order: from 7 to 4.
10. Turn on the instrument Ellipse.
11. Launch the "Diagnostic" program.
12. Select "Diluter" folder and click the "Home" button. Wait until the reset Diluter procedure has been completed.
13. Set up the aspiration volume to the maximum value (980 µl) and click the "Asp" button. Make sure that the Diluter Home Sensor on the "Diagnostic" program becomes of red color (outside of the home position).
14. Click the "Home" button. Wait until the reset Diluter procedure has been completed.
15. Make sure that the Diluter Home Sensor on the "Diagnostic" program becomes of green color (home position).
16. Place the instrument front panel screwing its four anchored screws (Fig. 13).
17. Place the Diluter protective cover screwing its two fastening screws (Fig. 1).

6.3 PRE-HEATER AND LEVEL SENSOR

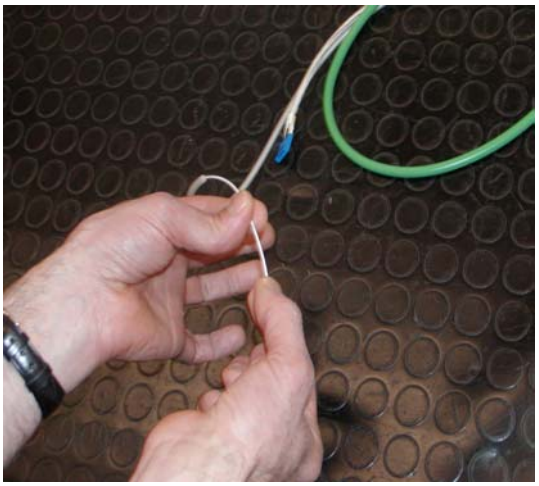
6.3.1 SUBSTITUTION OF THE PRE-HEATER AND LEVEL SENSOR ASSEMBLY

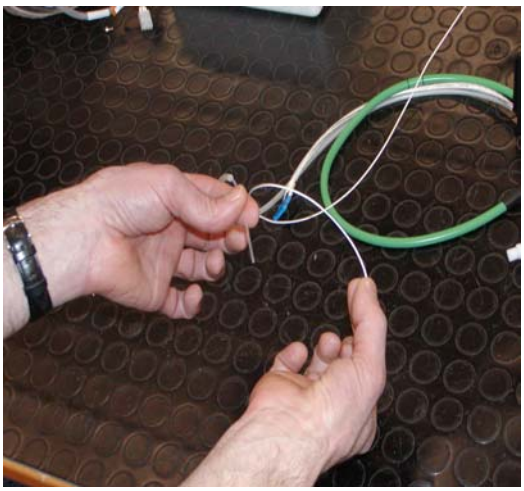
1. Turn on the Ellipse system (instrument and computer).
2. Launch the Diagnostic program, select the “Diluter” function and make two or three “Probe Wash Test” cycles with the Rinse solution cannula out of his bottle, in order to completely empty the Rinse hydraulic line.
3. Exit from the diagnostic program, pressing the "Diagnostic" key and exit from the analyzer program pressing “Shutdown” key. Remove the sampling probe from its housing.
4. Unscrew the two fastening screws and remove the Diluter protective cover (Fig. 36).
5. Unscrew the two anchored screws and pull out the Diluter Module from his hole (Fig. 37).
6. Remove the Preheater teflon tube on the Diluter Solenoid Valve by unscrewing the fitting (Fig. 38).
7. Remove the front panel unscrewing the four anchored screws (Fig. 40) and unplug the J13 connector from the Arm Interface board (Fig. 41).
8. Remove the Preheater clamp located into the Peristaltic Pump housing, unscrewing its fastening screw (Fig. 44).
9. Unscrew the Preheater and Level sensor fastening screws, remove it from its housing and substitute it with the new one (Fig. 42).
10. Reinstall the new assembly, making the vertical alignment of the sampling probe, with reference to the washing well and then screw the Preheater head and Level sensor fastening screw (Fig. 39).
11. After reinstalling the new assembly, repeat the above steps in inverse order: from step 9 to 1 and then, carry out the check procedure for the mechanical functioning described on the next pages.

WARNING

Do the following operations only after substitution of the Level Sensor and Pre-heater assembly:

a) Remove the white wire from the teflon tube before connecting it to the diluter (the white wire must be removed only at this stage of the procedure and not before). Be sure of having properly connected the tube to the diluter.





b) Remove the protecting cap before positioning the sampling probe.

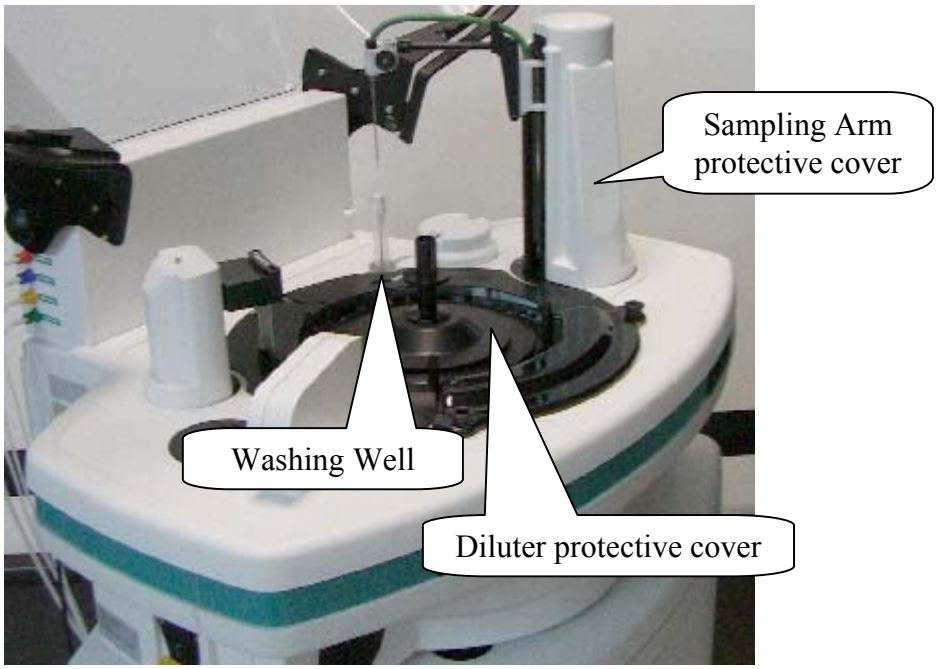


Fig. 36

6.3.2 LEVEL SENSOR – CHECK AND ADJUSTMENT PROCEDURE

1. Turn on the Ellipse system (instrument and computer) and launch the diagnostic program.
2. Select the "Configuration" function. Digit the password (1234) in the appropriate window and press “OK”.
3. Press the "Wash. Well level test". By clicking on the “Run Test” button the system performs an automatic verification and **adjustment** cycle for the liquid level in the washing well.
   A number appears in the box “Level” that corresponds to the rotation time of the rinse pump in milliseconds, that is necessary to maintain the correct liquid level in the washing well.
4. The functioning range is between 350 and 700 milliseconds. If the washing well is not sufficiently filled, a message appears to warn the user to check the hydraulic line.
5. If the value taken during the test is different from the previous one, it is necessary to click on “Save” in order to save the new data.
6. Make sure that no liquid leaks from the probe assembly and/or the dilutor. Make sure that the liquid flows from the probe freely.
7. Press “Test ON” on the “Level sensor Test” folder, on the right of it will be showed a red drop that becomes temporarily green when the liquid is detected or when the probe is touched with your finger (Fig. 43).

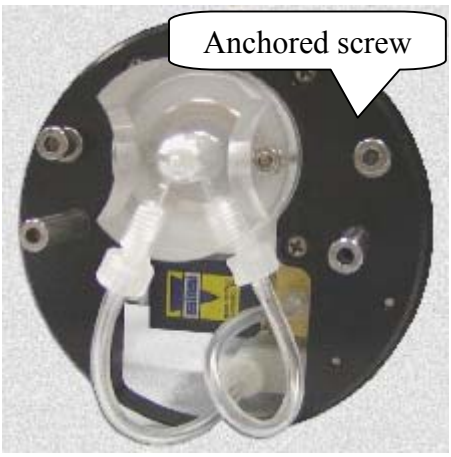


Fig. 37 Diluter – Top view

Fig. 38 Dilutor

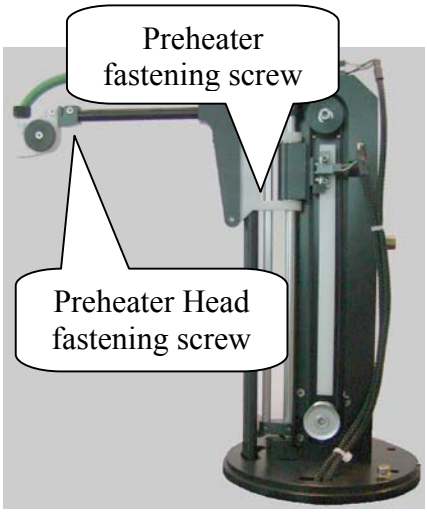


Fig. 39 Sampling Arm

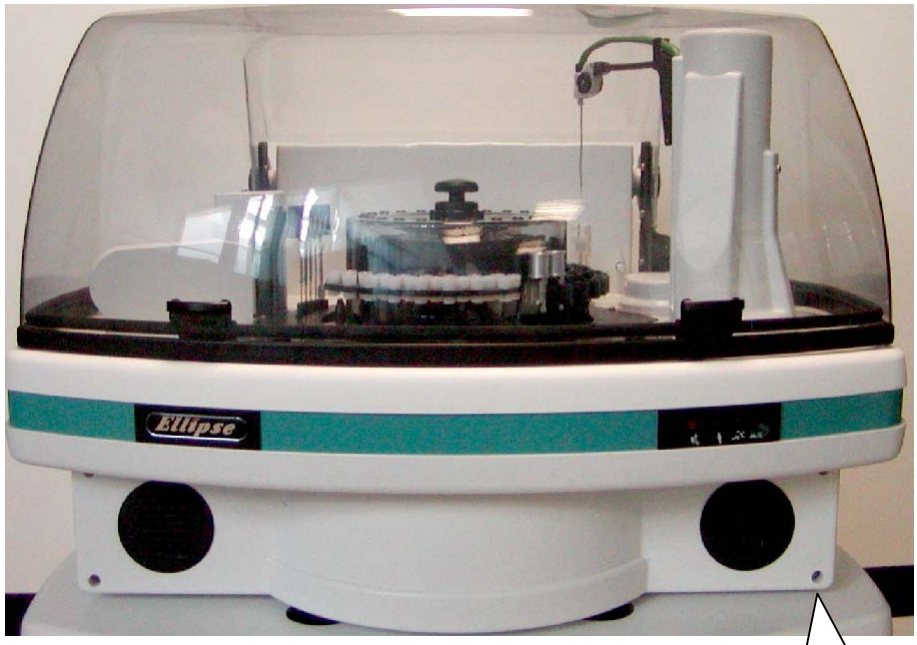


Fig. 40 Instrument front view

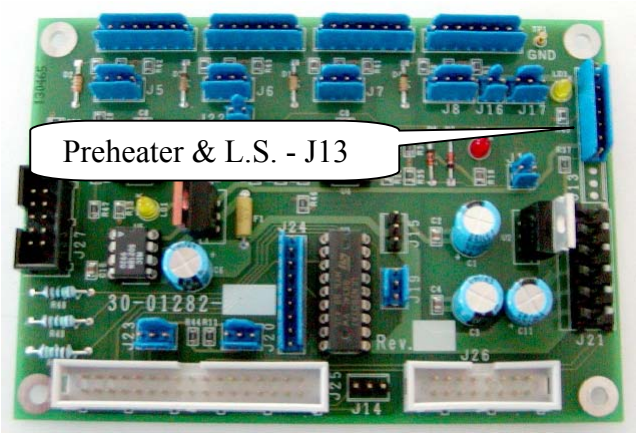


Fig. 41 Arm Interface board Cd. 30-01282-01

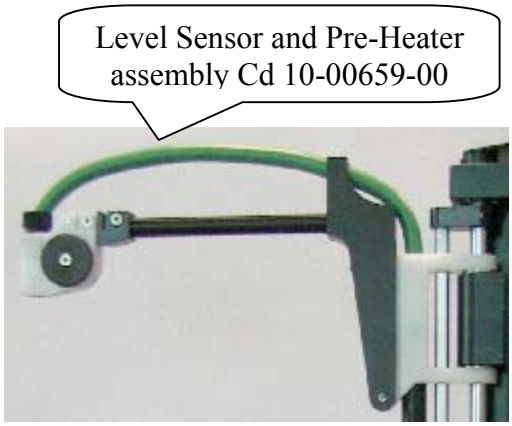


Fig. 42 Level Sensor & Preheater Assembly

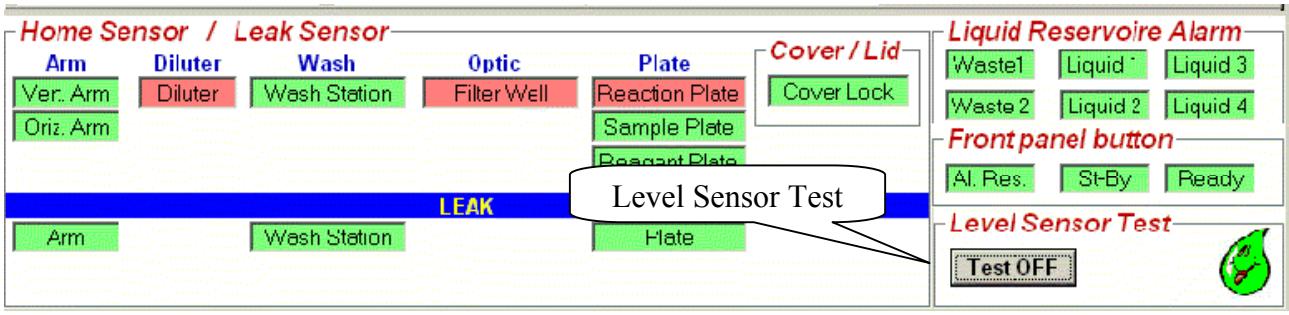


Fig. 43

8. In order to more specifically verify the correct level-sensing functioning, proceed as follows:
   a. Place a cup containing liquid in the first samples rack, position nr 1 (e.g . 500 µl) and launch the diagnostic program.
   b. Select the "Arm" function and press the "Go Sample" key in order to allow the probe to move into the position corresponding to the sample cup.
   c. In the window next to the "Go Level", enter the maximum descent of the probe (e.g.500).
   d. Select "Go Level" and make sure that the probe drops down into the cup until it senses the liquid. In the window to the right of the "Go Level" key the level reached by the probe will appear, expressed in tenths of millimeters
   e. Repeat step d) several times, each time returning to the Vertical "Home" position. Make sure that the level indicated remains constant ≤ 10 (1 mm).
   f. Repeat steps b) to e) for positions 8 of the first rack using the same sample cup. Make sure that the difference between all the positions is ≤ 1mm.

g. Repeat steps b) to f) for samples racks two, three and four.
h. Press the "Back to Wash Well" key and then select "Go Sample" in order to allow the probe to return to a position in the rack, which does not contain any cup.
i. Select "Go Level" and make sure that the level reached is the maximum indicated in the given window is 9999.
j. Select the "Reset" key, remove the cups from the racks and exit the program by pressing the "Diagnostic" key.
k. To exit the analyzer program press “shutdown” key.

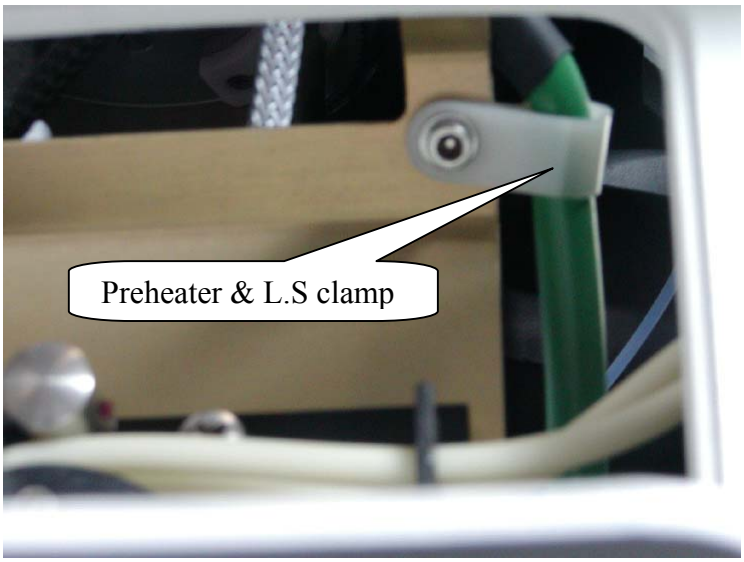


Fig. 44

6.4 OPTIC ASSEMBLY

6.4.1 SUBSTITUTION OPTIC ASSEMBLY

N.B.: Make sure the instrument (Ellipse) is turned off before performing this substitution procedure.

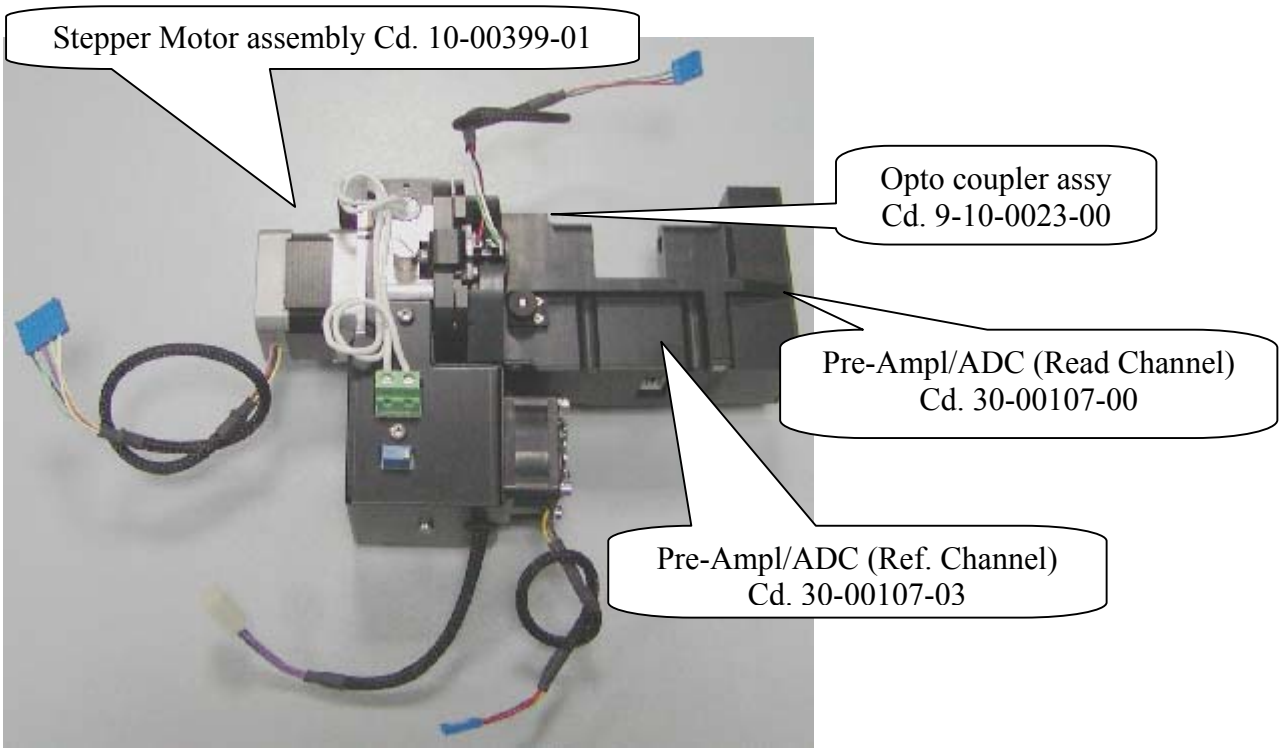


Fig. 45 Optic Assembly Cd. 10-01688-00

1. Remove the front panel unscrewing the four anchored screws (Fig. 46).
2. Remove the J1, J6, J11, J15 connectors from the Plate Interface board (Fig. 47) and the ground wire from the Optic Assembly.
3. Unscrew the four fastening screws of the Plate Interface board (Fig. 47).
4. Remove the connectors from JP1 of the Pre-Amplifier ADC boards.
5. Unscrew the four Optic Assembly fastening screws, remove it from its housing and substitute it with the new one (Fig. 45).
6. Remount the assembly, repeating the above steps, 5 through 1, in reverse order.
7. After remounting, reseat the lamp and carry out the electronic adjustment check procedures as described in the following pages.

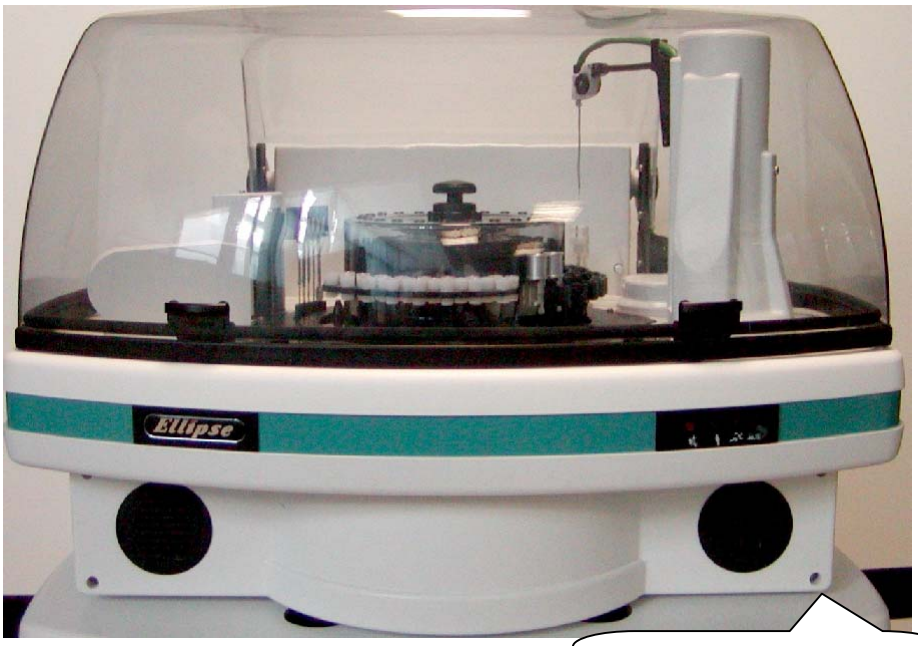


Fig. 46 Instrument front view

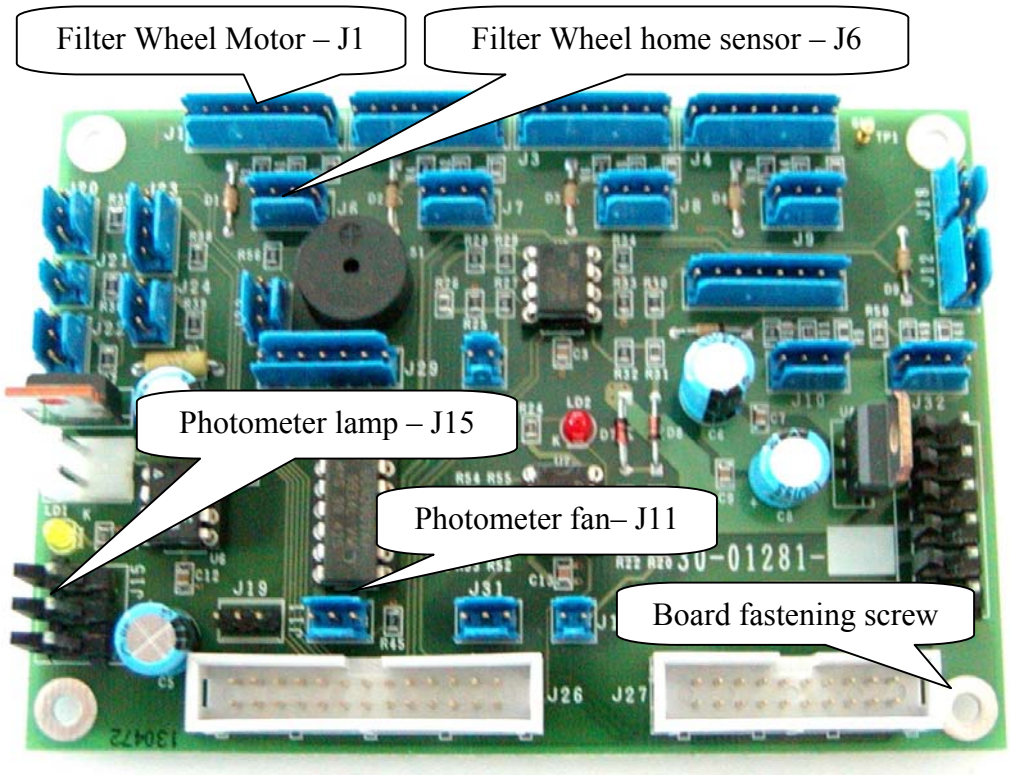


Fig. 47 Plate Interface Board Cd. 30-01281-01

6.4.2 SUBSTITUTION OF THE OPTIC LAMP

N.B.: Make sure the instrument (Ellipse) is turned off before performing this substitution procedure.

1. Remove the front panel unscrewing the four anchored screws (Fig. 46).
2. Remove the lamp's electrical wires connected to the Lamp Regulator board by loosening the two screws on the M1 connector (Fig.48).
3. Unscrew the lamp's fastening screws and remove it from its housing.
4. Remount the new lamp, repeating the above steps, 3 through 1, in reverse order.
5. Carry out the electronic adjustment of the Optic as described in the following pages.

Warning: Do not touch the glass portions of the lamp.

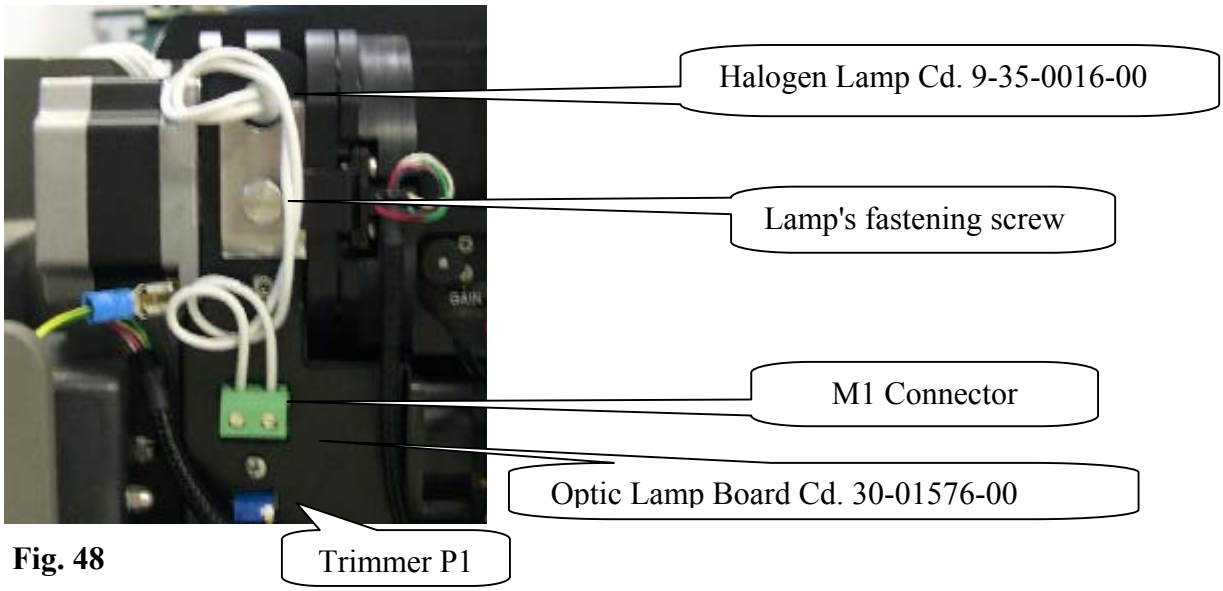


Fig. 48

6.4.3 ELECTRONIC ADJUSTMENT OF THE OPTIC

<u>Warning:</u> make sure that the Optic lamp and the reaction cuvettes are brand-new before applying the following procedure.

1. Turn on the "Ellipse" system (instrument and computer). Remove the front panel unscrewing the four anchored screws (Fig.46).
2. Launch the diagnostic program, select the "Plate " function and reset by clicking on the appropriate key.
3. Make sure that the "Home Sensor" Reaction Plate window lights up green.
4. Place 500 µL of distilled water in cuvette # 1 of the reaction plate.
5. Select Sample plate position number three in order to make accessible the main channel Gain and Offset holes.
6. Select the "Optic" function and turn the lamp "On" by clicking on the appropriate field.
7. Reset the filter wheel by clicking on the appropriate key.
8. Make sure that "Home Sensor" Filter Wheel window lights up green.
9. Make sure that the Regulator board for Connector M1 shows 6.0 volts ± 0.1. If not, turn the P1 trimmer (Fig.48).

N.B.: The reaction cuvette must be perfectly clean. If not, carry out a "Cuvette Wash" cycle (Start Work)

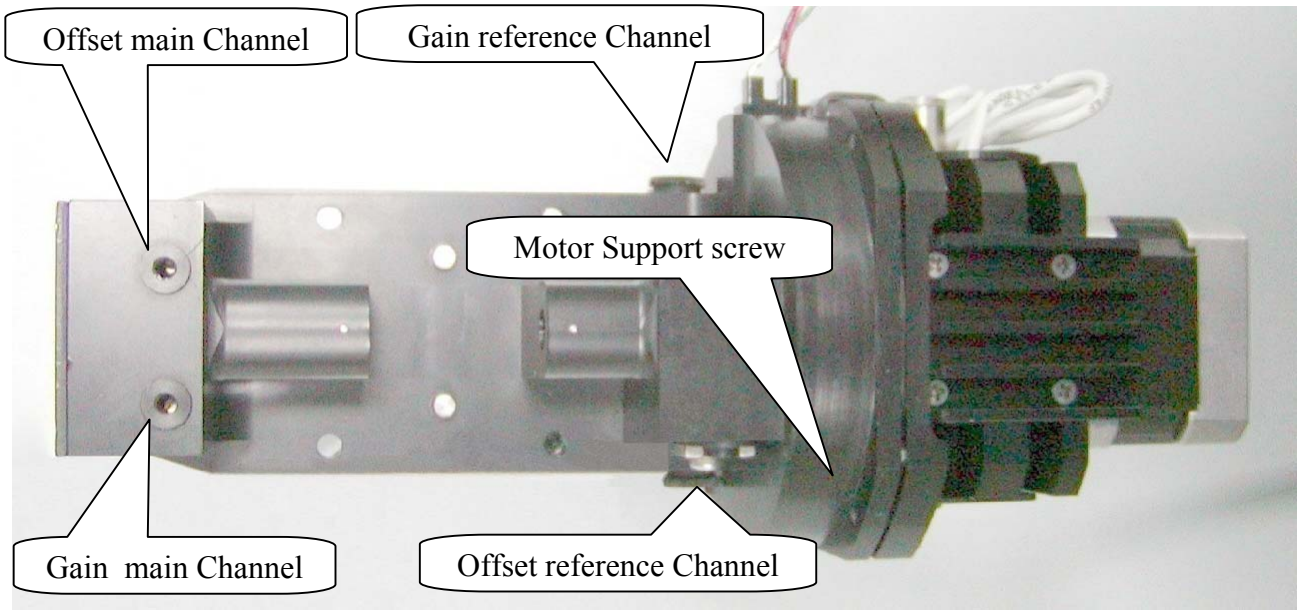


Fig. 49 Optic Assembly – top view

Warning: Room lighting and daylight can influence the reading. To avoid this interference, remount the front panel before carrying out any check procedures.

10. Click on "Start Sample Channel Conversion" key and make sure that the adjacent window shows a count value of 100 ± 50. If not, adjust the Preamp/ADC (Read Channel) Board "Offset" trimmer in order to set the desired value (Fig. 49).
11. After regulating of the main channel offset, it is necessary to click on " Stop Sample Channel Conversion" key.
12. Click on "Start Reference Channel Conversion" and make sure that the adjacent window shows a count value of 100 ± 50. If not, adjust the Preamp/ADC (Ref. Channel) Board "Offset" trimmer in order to set the desired value (Fig. 49).
13. After regulating of the reference channel offset, it is necessary to click on " Stop Reference Channel Conversion" key.
14. Select the filter positions from 1 to 8 (from 340 nm to 620 nm) and click on" Start/Stop Sample Channel Conversion" key and determine **which filter transmit the highest signal.**
15. Verify in the adjacent window a count value between 55.000 and 60.000. If not, adjust the Preamp/ADC board "Gain" trimmer in order to set the desired value (Fig. 49).
16. After regulating the Gain, select all the other filters and clicking on "Start/Stop Sample Channel Conversion" verify count values between 29.000 and 60.000

Warning: Room lighting and daylight can influence the reading. To avoid this interference, remount the front panel before carrying out any check procedures.

17. Select the highest signal filter, clicking on "Start Reference Channel Conversion" and make sure that the adjacent window shows a count value between 38.000 and 42.000. If not, adjust the Preamp/ADC board "Gain" trimmer in order to set the desired value (Fig. 49).
18. After regulating the Gain, select all the other filters and clicking on "Start/Stop Reference Channel Conversion" verify count values between 19000 and 42000.
19. After concluding these operations, empty cuvette # 1, remount the front panel and exit the diagnostic program by clicking on the "Diagnostic" key.
20. Exit the analyzer program press "shutdown" key.

6.4.4 SUBSTITUTION OF THE OPTO SENSOR

N.B.: Make sure the instrument (Ellipse) is turned off before performing this substitution procedure.

1. Remove the front panel unscrewing the four anchored screws (Fig. 46).
2. Remove the J1, J6, J11, J15 connectors from the Reaction Plate Interface board (Fig. 47) and the ground wire from the Optic Assembly.
3. Unscrew the four fastening screws of the Plate Interface board (Fig. 47).
4. Remove the connectors from JP1 of the Pre-Amplifier ADC boards.
5. Unscrew the four Optic Assembly fastening screws, remove it from its housing (Fig. 45).
6. Remove the lamp's power supply wires connected to the Lamp Regulator board by loosening the two screws on the M1 connector (Fig. 48).
7. Unscrew the lamp's fastening screws and remove it from its housing.
8. Unscrew the four fastening screws on the motor support in order to access the filter wheel (Fig. 49).
9. Position the filter wheel in such a manner as to make it possible to see and unscrew the internal home sensor support screw. Unscrew the external home sensor support screw.
10. Unscrew the home sensor fastening screws from its support and substitute with the new one (Fig. 50).

N.B.: when remounting the Home sensor, make sure to center it with respect to the slots.

11. Remount the assembly, repeating the above steps, 10 through 1, in reverse order.
12. After remounting, reseat the lamp and carry out the electronic adjustment procedures as described in the previous pages.

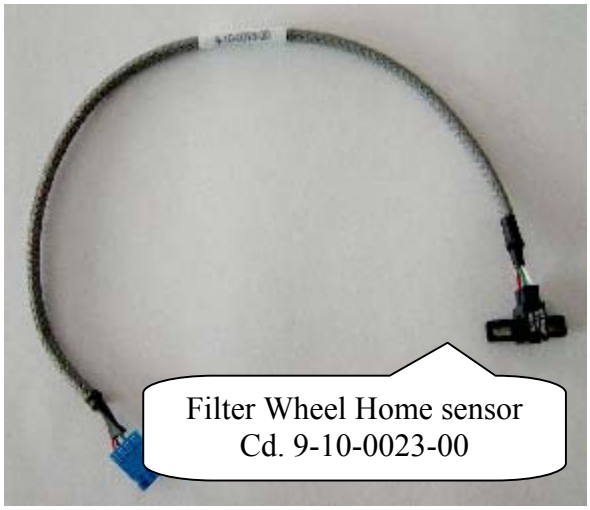


Fig. 50

Fig. 51

6.4.5 SUBSTITUTION OF THE MOTOR

N.B.: Make sure the instrument (Ellipse) is turned off before performing this substitution procedure.

1. Remove the front panel unscrewing the four anchored screws (Fig. 46).
2. Remove the J1, J6, J11, J15 connectors from the Plate Interface board (Fig. 47) and the ground wire from the Optic Assembly.
3. Unscrew the four fastening screws of the Plate Interface board (Fig .47).
4. Remove the connectors from JP1 of the Pre-Amplifier ADC boards.
5. Unscrew the four Optic Assembly fastening screws, remove it from its housing (Fig. 45).
6. Remove the lamp's power supply wires connected to the Lamp Regulator board by loosening the two screws on the M1 connector (Fig. 48).
7. Unscrew the lamp's fastening screws and remove it from its housing.
8. Unscrew the four fastening screws on the motor support in order to access the pulley (Fig. 49).
9. Unscrew the four fastening screws on the motor; loosen the pulley fastening screws.
10. Remove the motor and substitute it with the new one (Fig.48).
11. Remount the assembly, repeating the above steps, 10 through 1, in reverse order.

Warning: when tightening the motor pulley fastening screws, make sure that the filter wheel is centered with respect to the opto sensor.

12. After remounting, reseat the lamp and carry out the electronic adjustment procedures as described in the previous pages.

6.4.6 SUBSTITUTION OF THE OPTIC FILTERS
Interferential filters Kit Cd. 9-65-0029-00

N.B.: Make sure the instrument (Ellipse) is turned off before performing this substitution procedure.

1. Remove the front panel unscrewing the four anchored screws (Fig. 46).
2. Remove the J1, J6, J11, J15 connectors from the Plate Interface board (Fig. 47) and the ground wire from the Optic Assembly.
3. Unscrew the four fastening screws of the Plate Interface board (Fig. 47).
4. Remove the connectors from JP1 of the Pre-Amplifier ADC boards.
5. Unscrew the four Optic Assembly fastening screws and remove it from its housing (Fig. 45).
6. Remove the lamp's power supply wires connected to the Lamp Regulator board by loosening the two screws on the M1 connector (Fig. 48).
7. Unscrew the lamp's fastening screws and remove it from its housing.
8. Unscrew the four fastening screws on the motor support in order to access the filter wheel (Fig. 49).
9. Unscrew the fastening screw that holds the elastic band of the filters.
10. Remove the filter from its housing and substitute it with the new one.
11. Remount the assembly, repeating the above steps, 9 through 1, in reverse order.
12. After remounting, reseat the lamp and carry out the electronic adjustment procedures as described in the previous pages.

Warning: Do not touch the glass parts of the filter.

Warning: when substituting an interferential filter due to malfunctioning or functional anomalies, it is always advisable to substitute the entire set of filters mounted on the instrument.

6.5 PLATES

6.5.1 REMOVAL OF THE PLATES ASSEMBLY

1. Make sure that the instrument (Ellipse) is turned off.
2. Open the analyzer main cover.
3. Remove the Sampling Probe from its housing unscrewing (clockwise) its ring nut.
4. Remove the reactions cuvettes front cover.
5. Remove with accuracy the left reactions cuvettes cover (placed under the Washing Station cannulas) unscrewing its three screws.
6. Remove the Reagents protection cover and remove the Reagents rack from over the Reagents Plate.
7. Remove all the Sample Racks from over the Samples Plate.
8. Remove with accuracy all the cuvettes Racks from over the Reactions Plate.

N.B.: before exctracting the Plates Assembly from the analyzer, it is necessary remove the Sampling Arm, the Diluter Module, the Washing Station and then the Washing Well.

9. To remove the Sampling Arm, perform the relative procedure described into the previous Section 6.1.3, from step 3 to step 10 (without substitute it with the new one).
10. To remove the Diluter Module, perform the relative procedure described into the previous Section 6.2.1, from step 4 to step 6.
11. To remove the Washing Station, perform the relative procedure described into the successive Section 6.6.1.
12. Remove with accuracy the instrument chassis cover unscrewing the six anchored screws (Fig. 52).

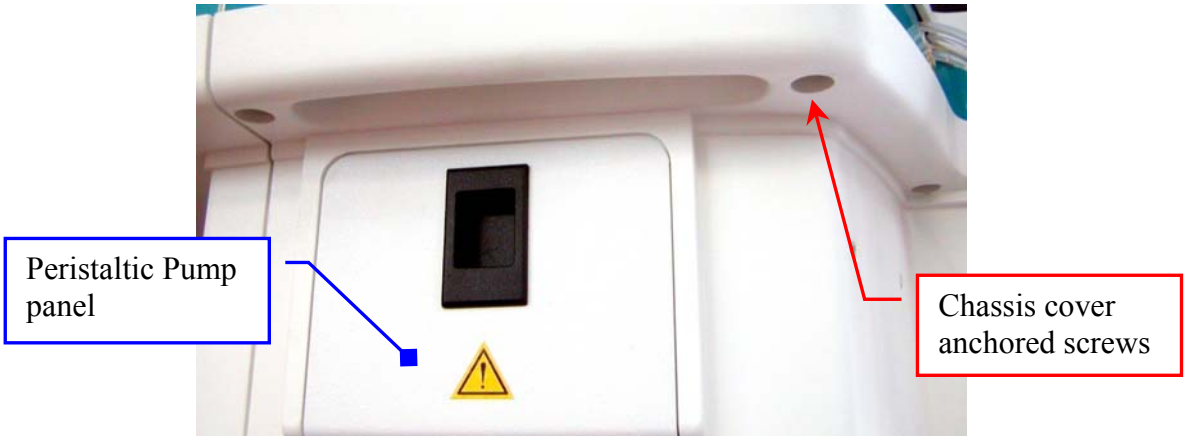
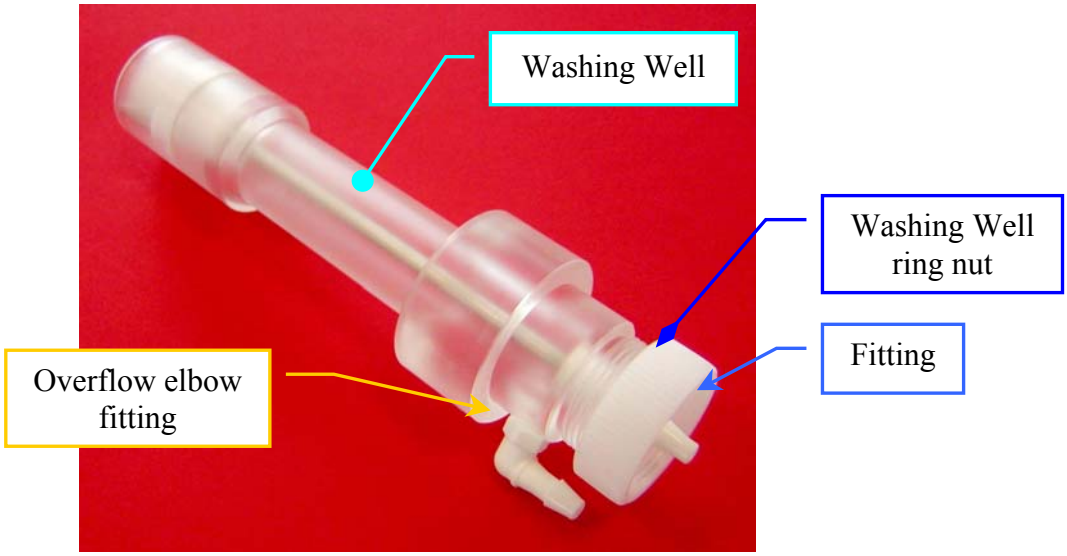


Fig. 52 - Chassis cover anchored screws

13. Remove the two tubes from the overflow elbow fitting and fitting of the Washing Well (Fig. 52), making attention not to crash them.

14. Unscrew the Washing Well ring nut (Fig. 52) and pull out the Washing Well from its hole.



15. Remove the Peristaltic Pump waste tube to the relative "Y" fitting, making attention to the spillage of the biohazard liquid from the tube and from the "Y" fitting.

16. Unplug the J3 connector from the Arm Interface Board and the ground wire from the Peristaltic Pump mechanical support.

17. Close with accuracy the instrument main cover.

18. Open the Electronic Rack panel unscrewing the two quarter-turn fasteners (Fig. 53).

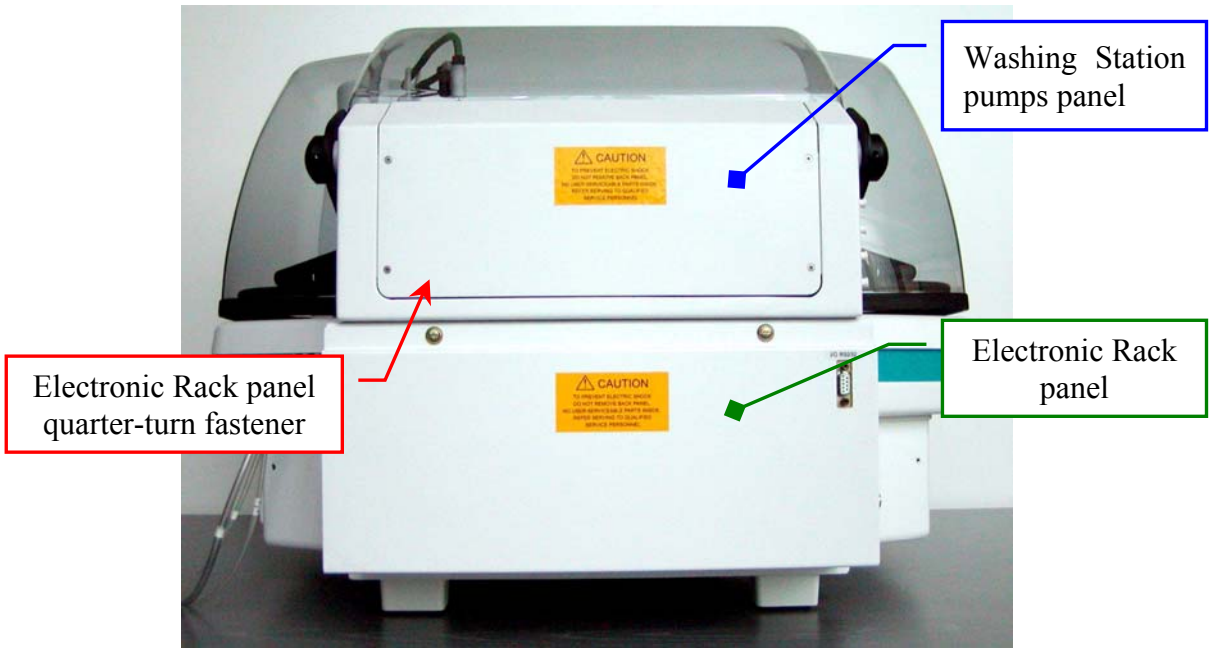


Fig. 53 - Instrument (posterior view)

19. Extract the Electronic Rack from its vain (Fig. 53).

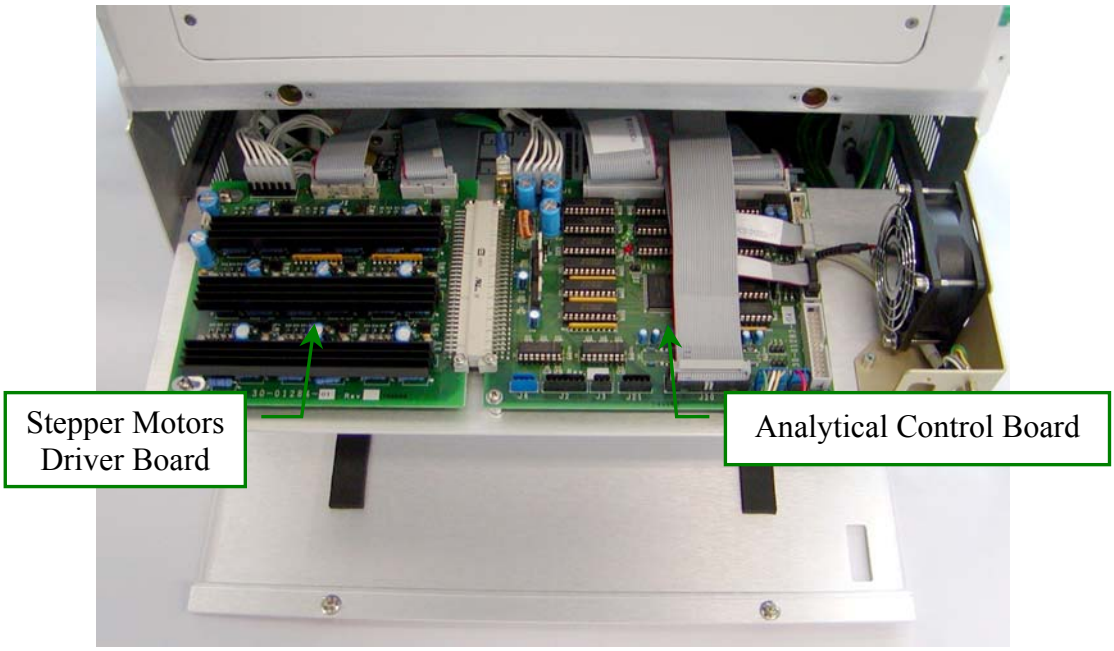


Fig. 54 - Electronic Rack

20. Unplug the J6, J8, J9, J10, J11 e J20 connectors and the ground wire from the Analytical Control Board (Fig. 54).

21. Unplug the J1, J2 e J4 connectors and the ground wire from the Stepper Motors Driver Board (Fig. 54).

22. Insert with accuracy the Electronic Rack in its vain.

23. Extract the Power Supply Rack from its vain (Fig. 55).

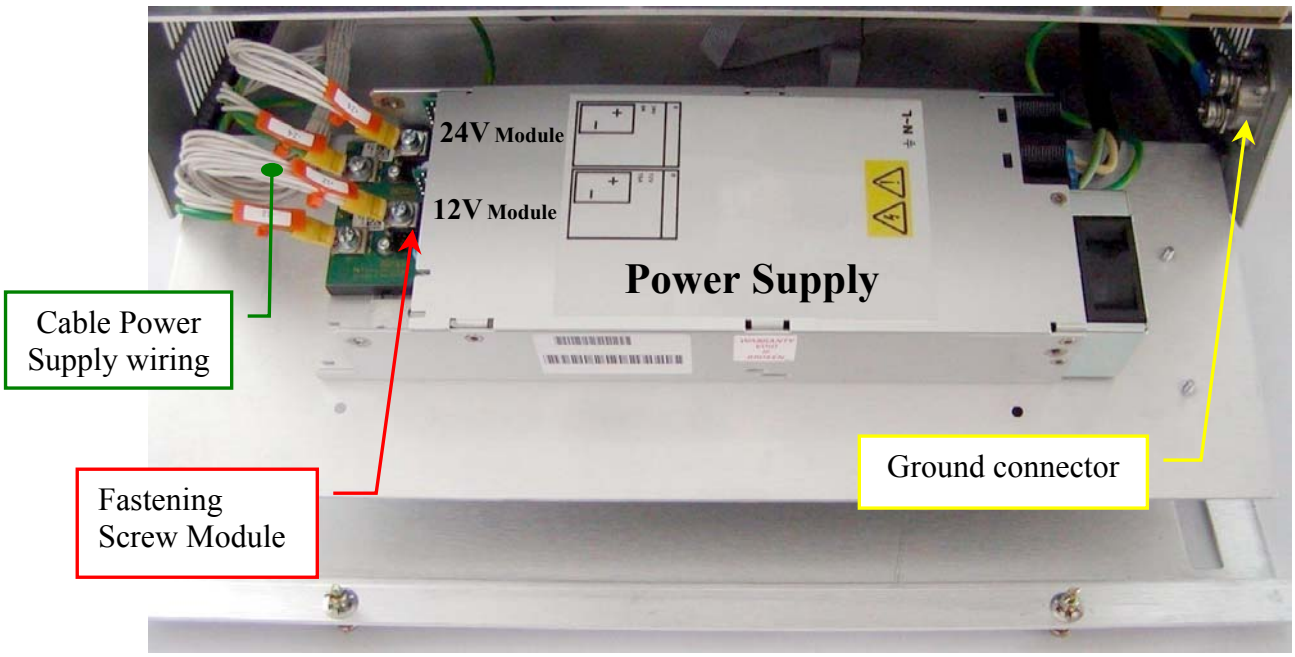


Fig. 55 - Power Supply Rack

24. On the Power Supply, unscrew the four fastening screw of the “24V Module” and “12V Module” and then, remove the relative four cables [JP24+, JP24-, JP12+, JP12-] of the Power Supply wiring (Fig. 55).

25. Unscrew the two ground connector fastening screws and remove all its ground wires (Fig. 55).

26. Insert with accuracy the Power Supply in its vain.

27. Close the Electronic Rack panel screwing the two quarter-turn fasteners (Fig. 55).

28. Lay down delicately the instrument on its posterior side (Fig. 56) and open the instrument main cover

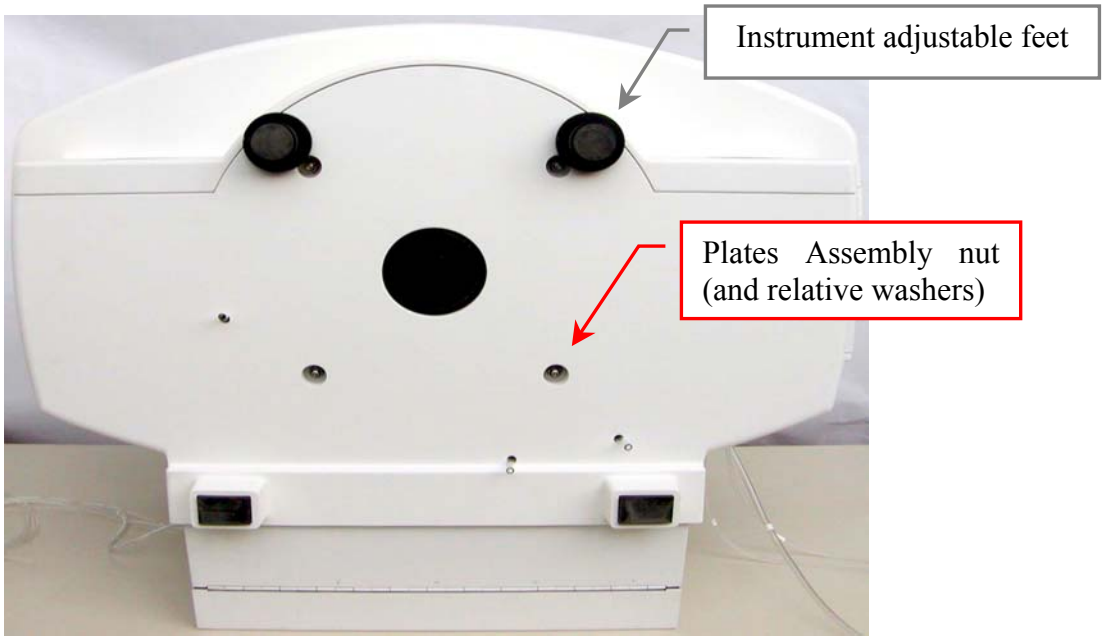


Fig. 56 - Instrument (inferior surface view)

29. Loosen the two instrument adjustable feet (Fig. 56).
30. Holding berthed the Plates Assembly to the instrument, unscrew the four Plates Assembly nuts and remove the relative washers (Fig. 56).
31. Close the instrument main cover and then, lay down delicately the instrument on its inferior side.
32. Open the instrument main cover, take out with accuracy the Plates Assembly to the instrument and then, lay down the Plates Assembly outside the instrument.
33. Close with accuracy the instrument main cover.
34. Unplug the J28 connector and the ground wire from the Plate Interface Board (Fig. 57).
35. Unplug the J21, J23 connectors and the ground wire from the Arm Interface Board.
36. Unplug the two connectors to the Pre-Ampl./ADC (Read Channel) and the Pre-Ampl./ADC (Reference Channel) placed in the Optic Assembly.
37. Unscrew only the two Plate Interface Board fastening screws placed on its inferior side.
38. Unscrew only the two Arm Interface Board fastening screws placed on its inferior side.

39. Put up the Plates Assembly and remove its Base Plate Assy from the four Plates Assembly spacing bars (**Fig. 6.5.8**).

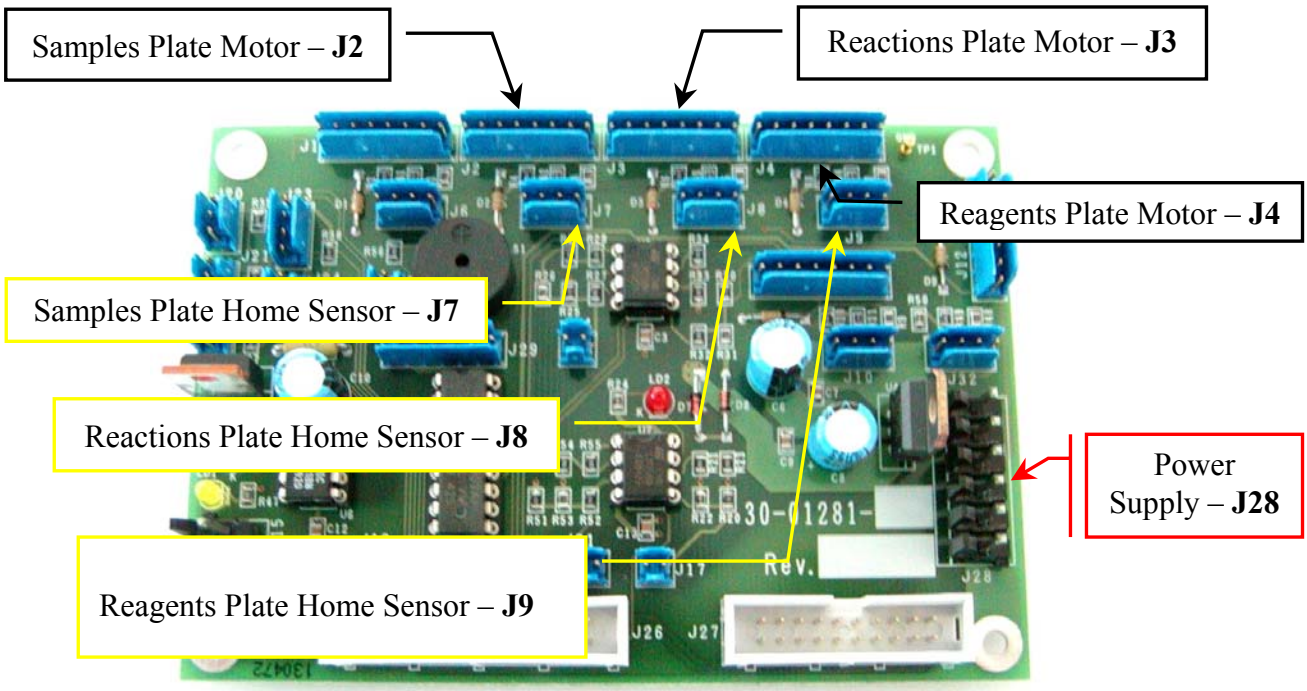


Fig. 57 - Plate Interface Board (Sx) [P/N: 30-01281-01]

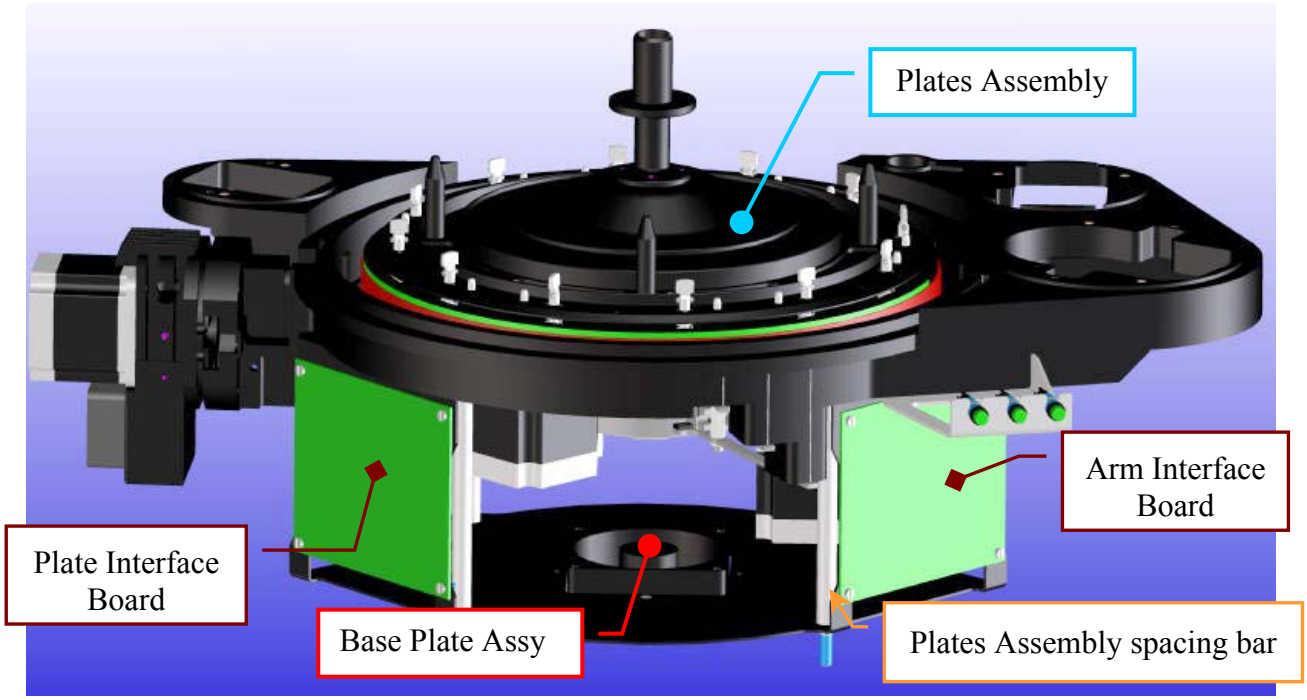


Fig. 58 - Plates Assembly and Base Plate Assy

40. Lay down the Plates Assembly on its four spacing bars.

6.5.2 REPLACEMENT OF THE REAGENTS PLATE MOTOR

N.B.: before replacing of the Reagents Plate Motor, it is necessary remove the Plates Assembly from the instrument.

1. To remove the Plates Assembly, perform the relative procedure described into the previous Section 6.5.1.
2. Unplug the J4 connector from the Plate Interface Board (Fig. 57).
3. Loosen the four fastening screws of the Reagents Plate Motor (Fig. 59).

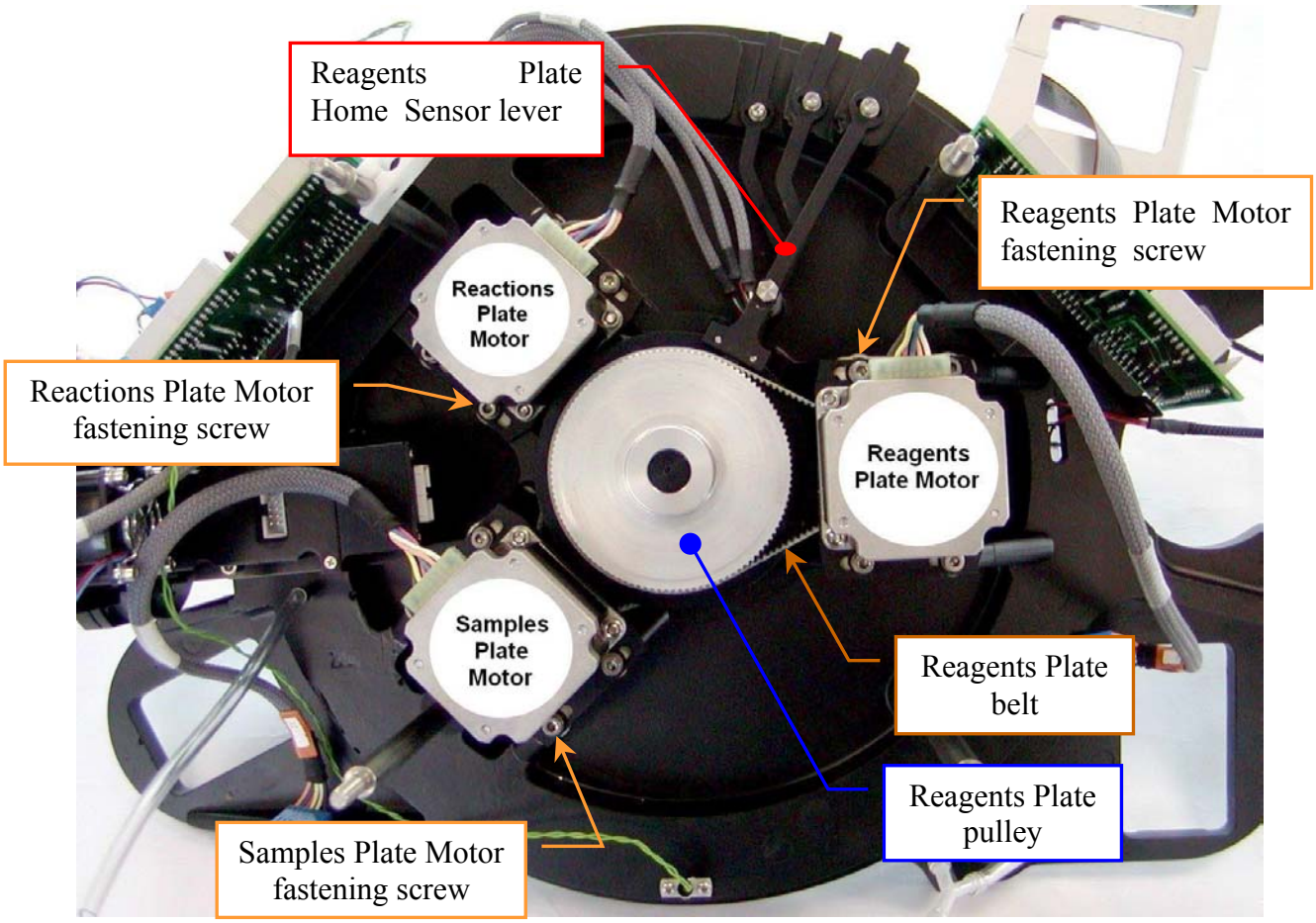


Fig. 59 - Plates Assembly (inferior view)

4. Unscrew the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) and rotate the Reagents Plate Home Sensor lever (Fig. 59) out of the Reagents Plate pulley.
5. Remove the belt from the Reagents Plate Motor pulley (Fig. 59).
6. Remove the belt from the Reagents Plate pulley.

7. Pull upwards the support Reagents Rack (Fig. 60) and remove it to the Plates Assembly.

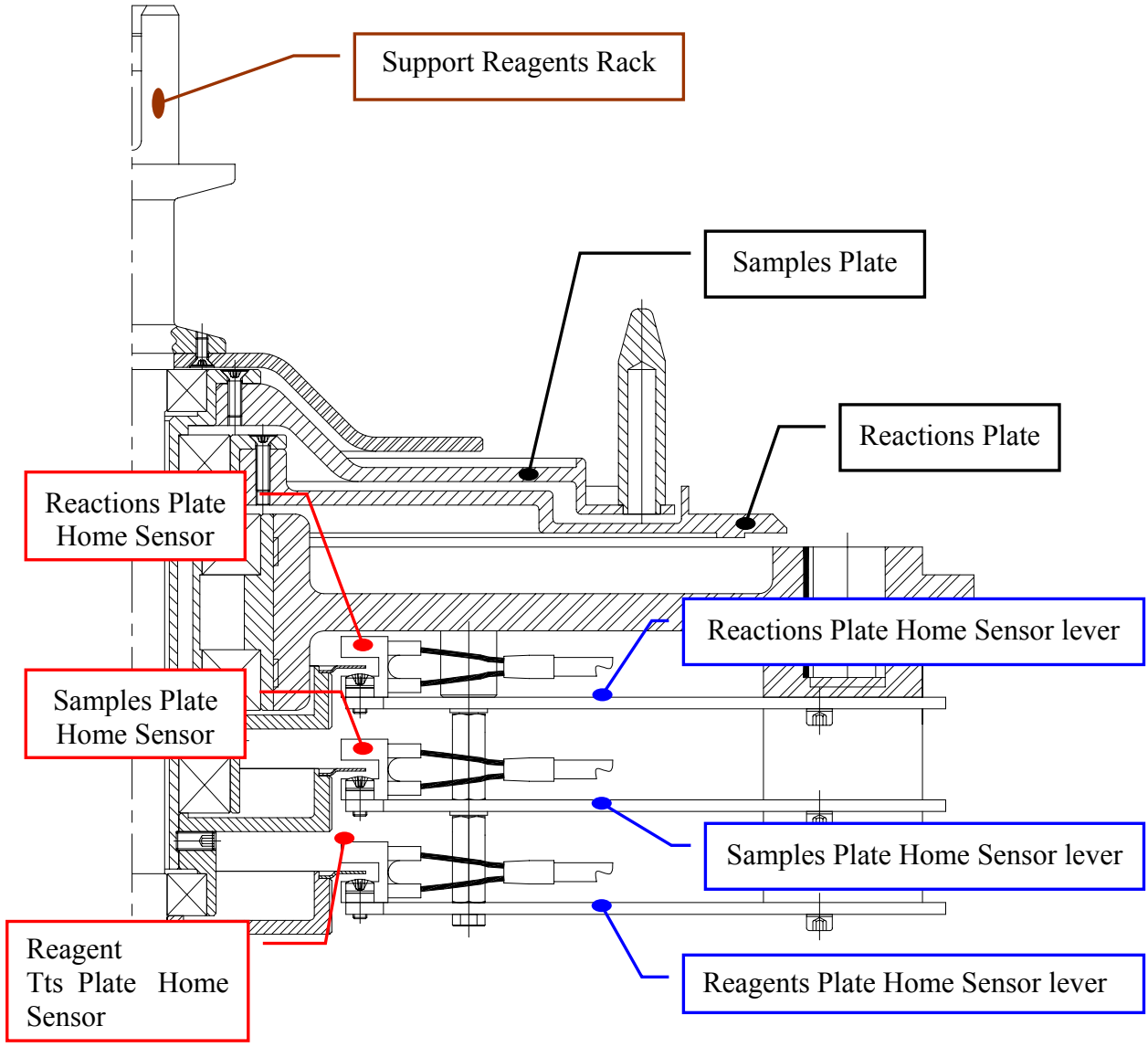


Fig. 60 - Plates, Plate Home Sensors and Plate Home Sensor levers

Fig. 61 - Support Reagents Rack

8. Upset the Plates Assembly carefullying lay down it from the part of the Reactions Plate (Fig. 59).
9. Unscrew completely the four fastening screws of the Reagents Plate Motor (Fig. 59) and pull out it from its housing.
10. Loosen the pulley clamp screw and extract the pulley clamp to the motor pulley (Fig. 62).

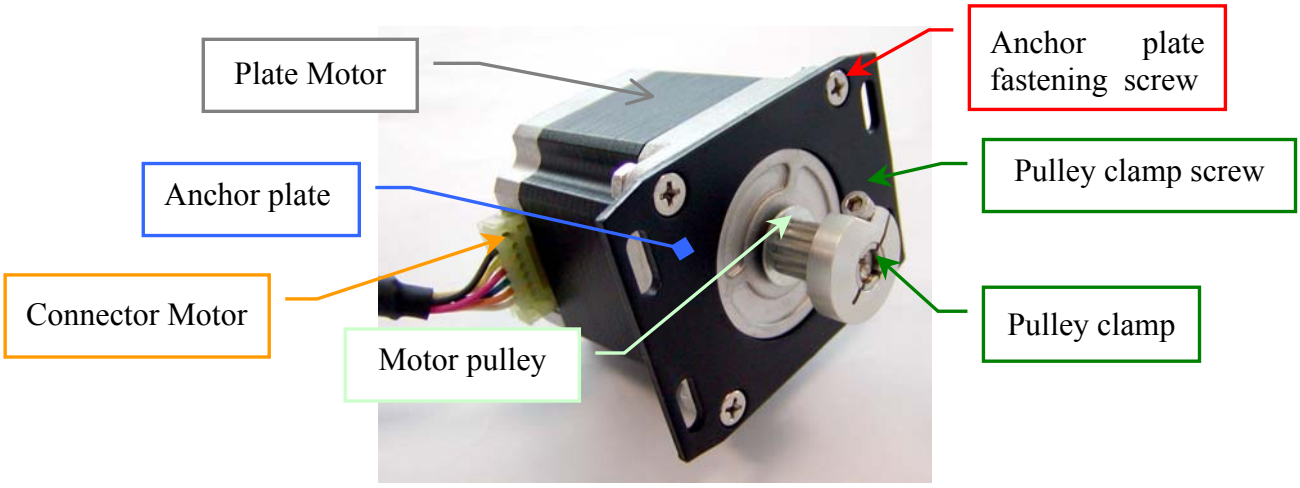


Fig. 6.5.12 - Plate Motor with pulley

11. Take out the motor pulley from its axis (Fig. 64).
12. Unscrew the four fastening screws of the Reagents Plate Motor anchor plate (Fig. 62) and take out the anchor plate to the motor.
13. Replace the motor with the new Plate Motor Assy (Fig. 63).

Fig. 63 - Plate Motor Assy [P/N: 9-10-0016-00]

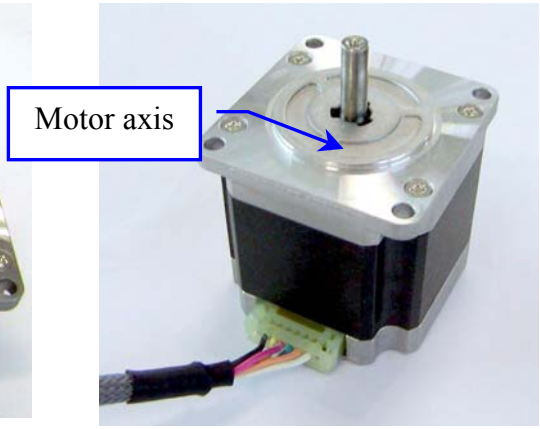


Fig. 64 - Plate Motor

14. Insert the pulley clamp on the motor pulley (Fig. 62).
15. Insert the motor pulley (with the motor clamp) to the motor axis of the new Plate Motor Assy (Fig. 62).
16. Position the motor pulley to 1.50 mm with respect to upper motor plane (Fig. 65), then tighten the pulley clamp screw (Fig. 62).

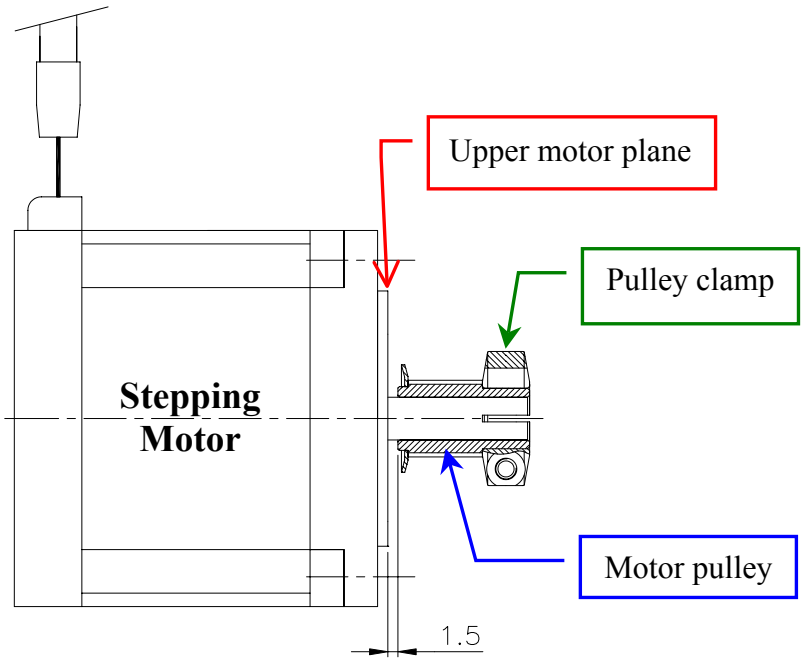


Fig. 65 - Plate Motor scheme

17. Position the anchor plate on the upper plane of the new motor with the two anchor plate slots on the side of the motor connector (like represented in the (Fig. 62).
18. Screw the four anchor plate fastening screws (Fig. 62).
19. Replace the Reagents Plate Motor on its housing with the connector turned towards the Reagents Plate Home Sensor lever (Fig. 59).
20. Insert (without tighten) the four Reagents Plate Motor fastening screws (Fig. 59).
21. Insert the support Reagents Rack in the Plates Assembly (Fig. 61).
22. Wrap the belt around the Reagents Plate pulley.
23. Wrap the belt around the Reagents Plate Motor pulley.

24. Push the motor outward from the Plates pulleys axis and holding it in this position, so as to maintain the belt in tension, then tighten the four fastening screws of the Reagents Plate Motor (Fig. 59).
25. Make sure that the belt thoots are correctly inserted on the Reagents Plate pulley.
26. Make sure that the belt thoots are correctly inserted on the Reagents Plate Motor pulley.
27. Insert the Reagents Plate Home Sensor around the Home sensor disk.
28. Tighten the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect its index.
29. Rotate with accuracy the Reagents Plate pulley and check that the belt tension is corrected and that the Home Sensor disk not to touch the Reagents Home Sensor.
30. Plug in the J4 connector from the Plate Interface Board (Fig. 57).
31. To replace the Plates Assembly, perform the procedure described into the previous Section 6.5.1 in inverse order: from step 40 to step 1.

N.B.: after having replaced the new Reagents Plate Motor and the Plates Assembly, it is necessary to align mechanically the Reagents Plate by following the procedure described into the Section 6.5.14.1 .

6.5.3 REPLACEMENT OF THE SAMPLES PLATE MOTOR

N.B.: before replacing of the Samples Plate Motor, it is necessary remove the Plates Assembly from the instrument.

1. To remove the Plates Assembly, perform the relative procedure described into the previous Section 6.5.1.
2. Loosen the four fastening screws of the Reagents Plate Motor (Fig. 59).
3. Unscrew the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) and rotate the Reagents Plate Home Sensor lever out of the Reagents Plate pulley.
4. Remove the belt from the Reagents Plate Motor pulley.
5. Remove the belt from the Reagents Plate pulley.
6. Loosen the two grains of the Reagents Plate pulley (Fig. 66) and extract the pulley to the plates axis, making attention not to fold (or to detach) its Home Sensor disk (Fig. 66).

7. Pull upwards the support Reagents Rack (Fig. 61) and remove it to the Plates Assembly.
8. Upset the Plates Assembly carefullying lay down it from the part of the Reactions Plate (Fig. 59).
9. Unplug the J2 connector from the Plate Interface Board (Fig. 57).
10. Loosen the four fastening screws of the Samples Plate Motor (Fig. 59).
11. Remove the belt from the Samples Plate Motor pulley (Fig. 66).
12. Remove the belt from the Samples Plate pulley.
13. Unscrew completely the four fastening screws of the Samples Plate Motor (Fig. 59) and pull out it from its housing.
14. Loosen the pulley clamp screw and extract the pulley clamp to the motor pulley (Fig. 62).
15. Take out the motor pulley from its axis (Fig. 64).
16. Unscrew the four fastening screws of the Samples Plate Motor anchor plate (Fig. 62) and take out the anchor plate to the motor.
17. Replace the motor with the new Plate Motor Assy (Fig. 63).
18. Insert the pulley clamp on the motor pulley (Fig. 62).
19. Insert the motor pulley (with the motor clamp) to the motor axis of the new Plate Motor Assy (Fig. 62).
20. Position the motor pulley to 1.50 mm with respect to upper motor plane (Fig. 65), then tighten the pulley clamp screw (Fig. 62).
21. Position the anchor plate on the upper plane of the new motor with the two anchor plate slots on the side of the motor connector (like represented in the Fig. 62).
22. Screw the four anchor plate fastening screws (Fig. 62).
23. Replace the Samples Plate Motor on its housing with the connector turned towards the Optic Assembly (Fig. 59).
24. Insert (without tighten) the four Samples Plate Motor fastening screws (Fig. 59).
25. Wrap the belt around the Samples Plate pulley.
26. Wrap the belt around the Samples Plate Motor pulley.

27. Push the motor outward from the Plates pulleys axis and holding it in this position, so as to maintain the belt in tension, then tighten the four fastening screws of the Samples Plate Motor (Fig. 59).
28. Make sure that the belt thoots are correctly inserted on the Samples Plate pulley.
29. Make sure that the belt thoots are correctly inserted on the Samples Plate Motor pulley.
30. Rotate with accuracy the Samples Plate pulley and check that the belt tension is corrected.
31. Plug in the J2 connector from the Plate Interface Board (Fig. 57).
32. Insert the Reagents Plate pulley (Fig. 66) on the plates axis, making attention not to fold (or to detach) its Home Sensor disk [Fig. 66] (and with the Home Sensor disk slit aligned with respect to the slits of the other two Home Sensor disks).
33. Tighten the two grains of the Reagents Plate pulley (Fig. 66) only after to have verified that the three Plate Motor pulleys are locked between of them.
34. Wrap the belt around the Reagents Plate pulley.
35. Wrap the belt around the Reagents Plate Motor pulley.
36. Push the motor outward from the Plates pulleys axis and holding it in this position, so as to maintain the belt in tension, then tighten the four fastening screws of the Reagents Plate Motor (Fig. 59).
37. Make sure that the belt thoots are correctly inserted on the Reagents Plate pulley.
38. Make sure that the belt thoots are correctly inserted on the Reagents Plate Motor pulley.
39. Insert the Reagents Plate Home Sensor around the Home sensor disk.
40. Tighten the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect its index.
41. Rotate with accuracy the Reagents Plate pulley and check that the belt tension is corrected and that the Home Sensor disk not to touch the Reagents Home Sensor.
42. To replace the Plates Assembly, perform the procedure described into the previous Section 6.5.1 in inverse order: from step 40 to step 1.

N.B.: after having replaced the new Samples Plate Motor, the Reagents Plate Motor and the Plates Assembly, it is necessary to align mechanically the Samples Plate and the Reagents plate by following the procedure described into the Section 6.5.15.1

6.5.4 REPLACEMENT OF THE REACTIONS PLATE MOTOR

N.B.: before replacing of the Reactions Plate Motor, it is necessary remove the Plates Assembly from the instrument.

1. To remove the Plates Assembly, perform the relative procedure described into the previous Section 6.5.1.
2. Perform the procedure described into the previous Section 6.5.3 from step 2 to step 8.
3. Unscrew the Samples Plate Home Sensor lever adjusting screw (Fig. 67) and rotate the Samples Plate Home Sensor lever out of the Samples Plate pulley.
4. Loosen the four fastening screws of the Samples Plate Motor (Fig. 59).
5. Remove the belt from the Samples Plate Motor pulley.
6. Remove the belt from the Samples Plate pulley.
7. Loosen the two grains of the Samples Plate pulley (Fig. 66) and extract the pulley to the plates axis, making attention not to fold (or to detach) its Home Sensor disk (Fig. 66).
8. Loosen the four fastening screws of the Reactions Plate Motor (Fig. 59).
9. Remove the belt from the Reactions Plate Motor pulley.
10. Remove the belt from the Reactions Plate pulley.
11. Unplug the J3 connector from the Plate Interface Board (Fig. 57).
12. Unscrew completely the four fastening screws of the Reactions Plate Motor (Fig. 59) and pull out it from its housing.
13. Loosen the pulley clamp screw and extract the pulley clamp to the motor pulley (Fig. 62).
14. Take out the motor pulley from its axis (Fig. 64).

15. Unscrew the four fastening screws of the Reactions Plate Motor anchor plate (Fig. 62) and take out the anchor plate to the motor.
16. Replace the motor with the new Plate Motor Assy (Fig. 63).
17. Insert the pulley clamp on the motor pulley (Fig. 62).
18. Insert the motor pulley (with the motor clamp) to the motor axis of the new Plate Motor Assy (Fig. 62).
19. Position the motor pulley to 1.50 mm with respect to upper motor plane (Fig. 65), then tighten the pulley clamp screw (Fig. 62).
20. Position the anchor plate on the upper plane of the new motor with the two anchor plate slots on the side of the motor connector (like represented in the Fig. 62).
21. Screw the four anchor plate fastening screws (Fig. 62).
22. Replace the Reactions Plate Motor on its housing with the connector turned towards the Reactions Home Sensor lever (Fig. 59).
23. Insert (without tighten) the four Reactions Plate Motor fastening screws (Fig. 59).
24. Wrap the belt around the Reactions Plate pulley.
25. Wrap the belt around the Reactions Plate Motor pulley.
26. Push the motor outward from the Plates pulleys axis and holding it in this position, so as to maintain the belt in tension, then tighten the four fastening screws of the Reactions Plate Motor (Fig. 59).
27. Make sure that the belt thoots are correctly inserted on the Reactions Plate pulley.
28. Make sure that the belt thoots are correctly inserted on the Reactions Plate Motor pulley.
29. Rotate with accuracy the Reactions Plate pulley and check that the belt tension is corrected.

30. Plug in the J3 connector from the Plate Interface Board (Fig. 57).

31. Replace the Samples Plate pulley (Fig. 66) and tighten the two its grains only after to have verified that the two Plate Motor pulleys are locked between of them (and with the Home Sensor disk slit aligned with respect to the slit of the other Home Sensor disk).

32. Perform the procedure described into the previous Section 6.5.3 from step 25 to step 29.

33. Tighten the Samples Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect its index.

34. Rotate with accuracy the Samples Plate pulley and check that the belt tension is corrected and that the Home Sensor disk not to touch the Samples Home Sensor.

35. Perform the procedure described into the previous Section 6.5.3 from step 32 to step 41.

36. To replace the Plates Assembly, perform the procedure described into the previous Section 6.5.1 in inverse order: from step 40 to step 1.

N.B.: after having replaced the new Reactions Plate Motor, the Samples Plate Motor, the Reagents Plate Motor and the Plates Assembly, it is necessary to align mechanically all the plates by following the procedure described into the Section 6.5.16.1.

6.5.5 REPLACEMENT OF THE REAGENTS PLATE BELT

N.B.: before replacing of the Reagents Plate Belt, it is necessary remove the Plates Assembly from the instrument.

1. To remove the Plates Assembly, perform the relative procedure described into the previous Section 6.5.1.
2. Loosen the four fastening screws of the Reagents Plate Motor (Fig. 59).
3. Remove the belt from the Reagents Plate Motor pulley (Fig. 62).
4. Remove the belt from the Reagents Plate pulley (Fig. 66).
5. Pull upwards the support Reagents Rack (Fig. 61) and remove it to the Plates Assembly.

6. Upset the Plates Assembly carefullying lay down it from the part of the Reactions Plate (Fig. 59).
7. Substitute the belt with the new belt.
8. Insert the support Reagents Rack in the Plates Assembly (Fig. 60).
9. Wrap the new belt around the Reagents Plate pulley.
10. Wrap the new belt around the Reagents Plate Motor pulley.
11. Push the motor outward from the Plates pulleys axis and holding it in this position, so as to maintain the new belt in tension, then tighten the four fastening screws of the Reagents Plate Motor (Fig. 59).
12. Make sure that the belt thoots are correctly inserted on the Reagents Plate pulley.
13. Make sure that the belt thoots are correctly inserted on the Reagents Plate Motor pulley.
14. Rotate with accuracy the Reagents Plate pulley and check that the belt tension is corrected.
15. To replace the Plates Assembly, perform the procedure described into the previous Section 6.5.1 in inverse order: from step 40 to step 1.

N.B.: after having replaced the new Reagents Plate belt and the Plates Assembly, it is necessary to align mechanically the Reagents Plate by following the procedure described into the Section 6.5.14.1.

6.5.6 REPLACEMENT OF THE SAMPLES PLATE BELT

N.B.: before replacing of the Samples Plate belt, it is necessary remove the Plates Assembly from the instrument.

1. To remove the Plates Assembly, perform the relative procedure described into the previous Section 6.5.1.
2. Loosen the four fastening screws of the Reagents Plate Motor (Fig. 59).
3. Unscrew the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) and rotate the Reagents Plate Home Sensor lever out of the Reagents Plate pulley.
4. Remove the belt from the Reagents Plate Motor pulley (Fig. 62).

5. Remove the belt from the Reagents Plate pulley (Fig. 66).
6. Loosen the two grains of the Reagents Plate pulley (Fig. 66) and extract the pulley to the plates axis, making attention not to fold (or to detach) its Home Sensor disk (Fig. 66).
7. Pull upwards the support Reagents Rack (Fig. 61) and remove it to the Plates Assembly.
8. Upset the Plates Assembly carefullying lay down it from the part of the Reactions Plate (Fig. 59).
9. Loosen the four fastening screws of the Samples Plate Motor (Fig. 59).
10. Remove the belt from the Samples Plate Motor pulley (Fig. 62).
11. Remove the belt from the Samples Plate pulley (Fig. 66).
12. Substitute the belt with the new belt.
13. Insert the support Reagents Rack in the Plates Assembly (Fig. 60).
14. Wrap the new belt around the Samples Plate pulley.
15. Wrap the new belt around the Samples Plate Motor pulley.
16. Push the motor outward from the Plates pulleys axis and holding it in this position, so as to maintain the belt in tension, then tighten the four fastening screws of the Samples Plate Motor (Fig. 59).
17. Make sure that the belt thoots are correctly inserted on the Samples Plate pulley.
18. Make sure that the belt thoots are correctly inserted on the Samples Plate Motor pulley.
19. Rotate with accuracy the Samples Plate pulley and check that the belt tension is corrected.
20. Perform the procedure described into the previous Section 6.5.3 from step 32 to step 41.
21. To replace the Plates Assembly, perform the procedure described into the previous Section 6.5.1 in inverse order: from step 40 to step 1.

N.B.: after having replaced the new Samples Plate belt, the Reagents Plate Motor and the Plates Assembly, it is necessary to align mechanically the Samples Plate and the Reagents Plate by following the procedure described into the Section 6.5.15.1.

6.5.7 REPLACEMENT OF THE REACTIONS PLATE BELT

N.B.: before replacing of the Reactions Plate belt, it is necessary remove the Plates Assembly from the instrument.

1. To remove the Plates Assembly, perform the relative procedure described into the previous Section 6.5.1.
2. Loosen the four fastening screws of the Reagents Plate Motor (Fig. 59).
3. Unscrew the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) and rotate the Reagents Plate Home Sensor lever out of the Reagents Plate pulley.
4. Remove the belt from the Reagents Plate Motor pulley (Fig. 62).
5. Remove the belt from the Reagents Plate pulley (Fig. 66).
6. Pull upwards the support Reagents Rack (Fig. 61) and remove it to the Plates Assembly.
7. Upset the Plates Assembly carefullying lay down it from the part of the Reactions Plate (Fig. 59).
8. Loosen the two grains of the Reagents Plate pulley (Fig. 66) and extract the pulley to the plates axis, making attention not to fold (or to detach) its Home Sensor disk (Fig. 66).
9. Loosen the four fastening screws of the Samples Plate Motor (Fig. 59).
10. Unscrew the Samples Plate Home Sensor lever adjusting screw (Fig. 67) and rotate the Samples Plate Home Sensor lever out of the Samples Plate pulley.
11. Remove the belt from the Samples Plate Motor pulley (Fig. 62).
12. Remove the belt from the Samples Plate pulley (Fig. 66).
13. Loosen the two grains of the Samples Plate pulley (Fig. 66) and extract the pulley to the plates axis, making attention not to fold (or to detach) its Home Sensor disk (Fig. 66).

14. Loosen the four fastening screws of the Reactions Plate Motor (Fig. 59).

15. Remove the belt from the Reactions Plate Motor pulley (Fig. 62).

16. Remove the belt from the Reactions Plate pulley (Fig. 66).

17. Substitute the belt with the new belt.

18. Insert the support Reagents Rack in the Plates Assembly (Fig. 60).

19. Wrap the belt around the Reactions Plate pulley.

20. Wrap the belt around the Reactions Plate Motor pulley.

21. Push the motor outward from the Plates pulleys axis and holding it in this position, so as to maintain the belt in tension, then tighten the four fastening screws of the Reactions Plate Motor (Fig. 59).

22. Make sure that the belt thoots are correctly inserted on the Reactions Plate pulley.

23. Make sure that the belt thoots are correctly inserted on the Reactions Plate Motor pulley.

24. Rotate with accuracy the Reactions Plate pulley and check that the belt tension is corrected.

25. Replace the Samples Plate pulley and tighten the two its grains only after to have verified that the two Plate Motor pulleys are locked between of them (and with the Home Sensor disk slit aligned with respect to the slit of the other Home Sensor disk).

26. Perform the procedure described into the previous Section 6.5.3 from step 25 to step 29.

27. Tighten the Samples Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect its index.

28. Rotate with accuracy the Samples Plate pulley and check that the belt tension is corrected and that the Home Sensor disk not to touch the Samples Home Sensor.

29. Perform the procedure described into the previous Section 6.5.3 from step 32 to step 41.

30. To replace the Plates Assembly, perform the procedure described into the previous Section 6.5.1 in inverse order: from step 40 to step 1.

N.B.: after having replaced the new Reactions Plate belt, the Samples Plate pulley, the Reagents Plate pulley and the Plates Assembly, it is necessary to align mechanically all the plates by following the procedure described into the Section 6.5.16.1.

6.5.8 REPLACEMENT OF THE REAGENTS PLATE PULLEY

N.B.: before replacing of the Reagents Plate pulley, it is necessary remove the Plates Assembly from the instrument

1. To remove the Plates Assembly, perform the relative procedure described into the previous Section 6.5.1.
2. Perform the procedure described into the previous Section 6.5.7 from step 2 to step 13.
3. Substitute the pulley with the new pulley (Fig. 66).

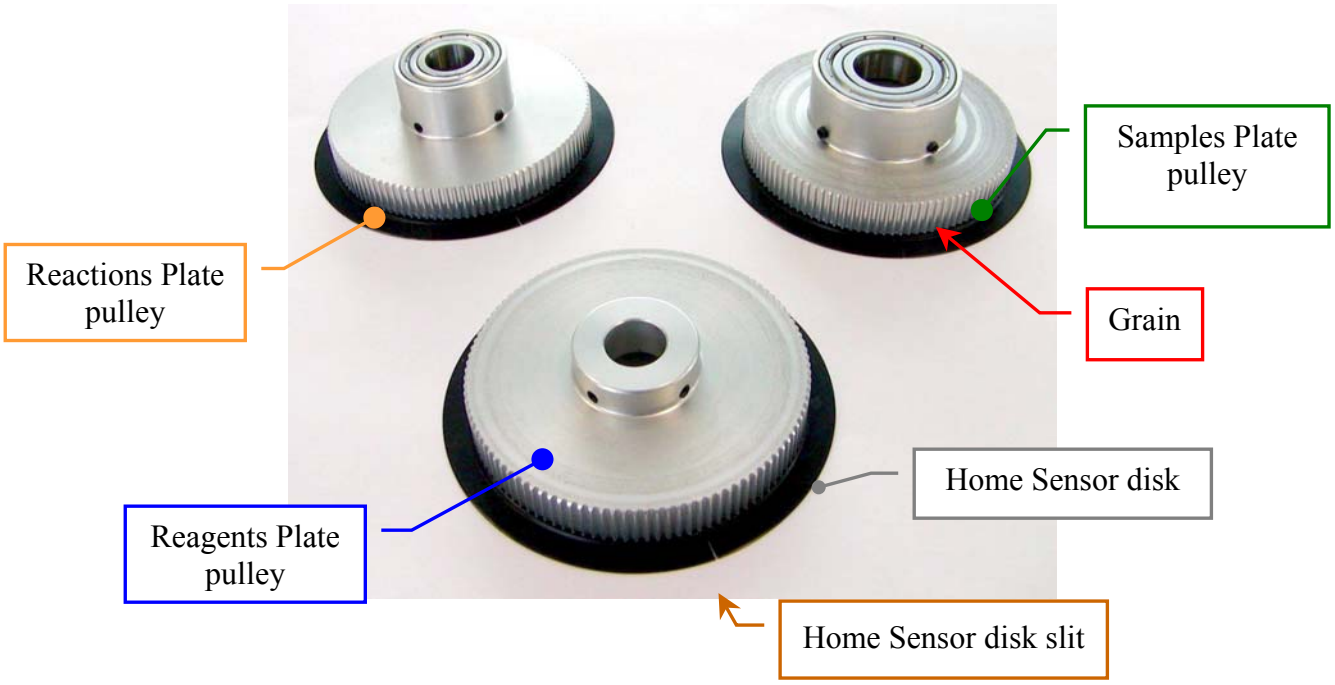


Fig. 66 - Plates pulleys

4. Perform the procedure described into the previous Section 6.5.3 from step 32 to step 41.

5. To replace the Plates Assembly, perform the procedure described into the previous Section 6.5.1 in inverse order: from step 40 to step 1.

N.B.: after having replaced the new Reagents Plate pulley and the Plates Assembly, it is necessary to align mechanically the Reagents Plate by following the procedure described into the Section 6.5.14.2.

6.5.9 REPLACEMENT OF THE SAMPLES PLATE PULLEY

N.B.: before replacing of the Samples Plate pulley, it is necessary remove the Plates Assembly from the instrument.

1. To remove the Plates Assembly, perform the relative procedure described into the previous Section 6.5.1.
2. Perform the procedure described into the previous Section 6.5.4 from step 2 to step 7.
3. Substitute the pulley with the new pulley (Fig. 66).
4. Perform the procedure described into the previous Section 6.5.7 from step 25 to step 29.
5. To replace the Plates Assembly, perform the procedure described into the previous Section 6.5.1 in inverse order: from step 40 to step 1.

N.B.: after having replaced the new Samples Plate pulley, the Reagents Plate pulley and the Plates Assembly, it is necessary to align mechanically the Samples Plate and the Reagents Plate by following the procedure described into the Section 6.5.15.2.

6.5.10 REPLACEMENT OF THE REACTIONS PLATE PULLEY

N.B.: before replacing of the Reactions Plate pulley, it is necessary remove the Plates Assembly from the instrument

1. To remove the Plates Assembly, perform the relative procedure described into the previous Section 6.5.1.
2. Perform the procedure described into the previous Section 6.5.7 from step 2 to step 16.
3. Unscrew the Reactions Plate Home Sensor lever adjusting screw (Fig. 67) and rotate the Reactions Plate Home Sensor lever out of the Reactions Plate pulley.

4. Loosen the two grains of the Reactions Plate pulley (Fig. 67) and extract the pulley to the plates axis, making attention not to fold (or to detach) its Home Sensor disk (Fig.67).
5. Substitute the pulley with the new pulley (Fig. 66).
6. Replace the new Reactions Plate pulley and tighten the two its grains only after to have verified that it is locked on the superior surface.
7. Insert the Reactions Plate Home Sensor around the Home Sensor disk.
8. Tighten the Reactions Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect to its index.
9. Perform the procedure described into the previous Section 6.5.7 from step 18 to step 29.
10. To replace the Plates Assembly, perform the procedure described into the previous Section 6.5.1 in inverse order: from step 40 to step 1.

N.B.: after having replaced the new Reactions Plate pulley, the Samples Plate pulley, the Reagents Plate pulley and the Plates Assembly, it is necessary to align mechanically all the plates by following the procedure described into the Section 6.5.16.2 .

6.5.11 REPLACEMENT OF THE REAGENTS PLATE HOME SENSOR

1. Remove the instrument front panel unscrewing its four anchored screws.
2. Unplug the J9 connector from the Plate Interface Board (Fig. 57).
3. Unscrew the Home Sensors screw (Fig. 67).

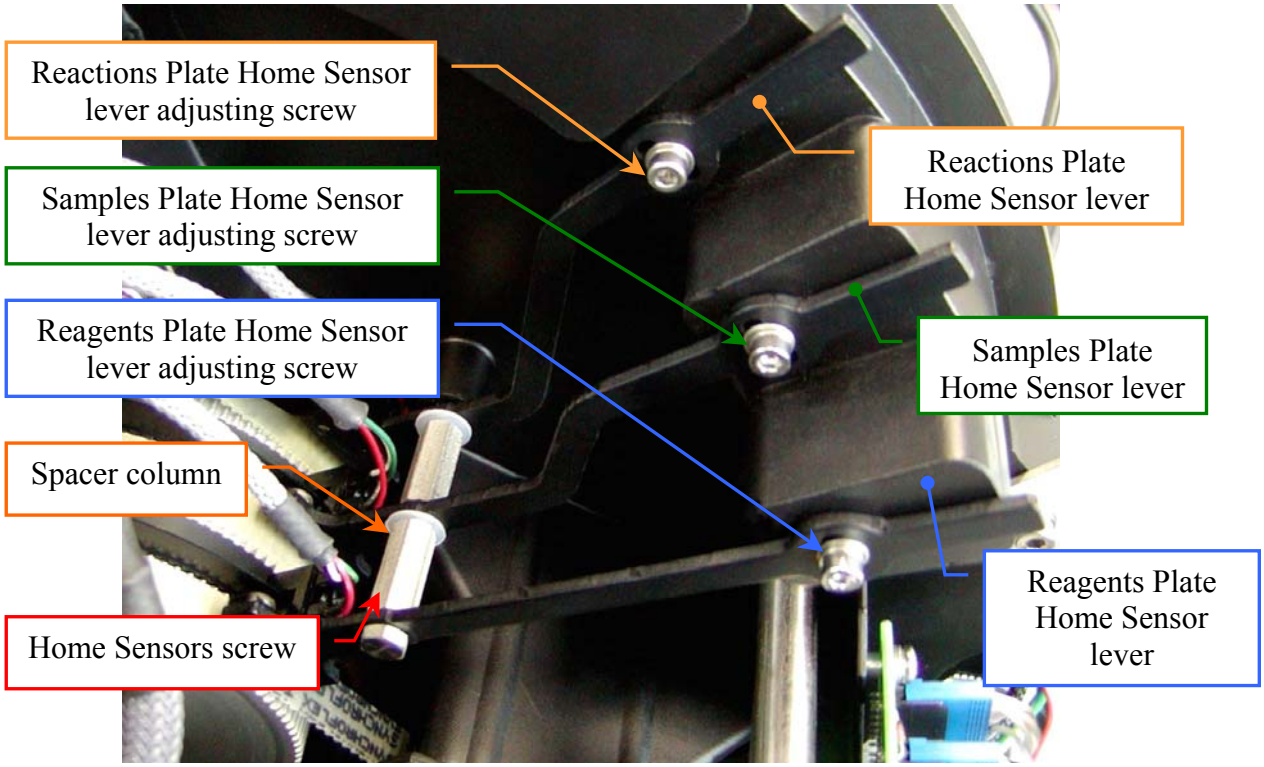


Fig. 67 - Plates Home Sensors levers adjusting screws

4. Unscrew the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) and remove the Reagents Plate Home Sensor lever from the Reagents Plate pulley.
5. Unscrew the two Reagents Plate Home Sensor fastening screws on the its lever (Fig. 68).
6. Substitute the Home Sensor with the new Home Sensor (Fig. 69).

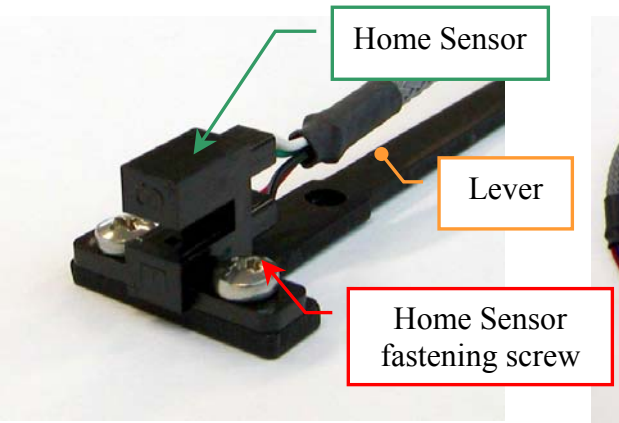


Fig. 68 - Plate HomeSensor fastening screws

Fig. 69 – Plate Home Sensor Assy [P/N: 9-10-0023-00]

7. Replace the new Home Sensor on its lever with the window Home Sensor outward-facing (Fig. 68) and screw the two Reagents Plate Home Sensor fastening screws.
8. Insert the Reagents Plate Home Sensor around the Home Sensor disk.
9. Replace the Reagents Plate Home Sensor lever on its location and screw the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect to its index.
10. Screw the Home Sensors screw (Fig. 67).
11. Plug in the J9 connector in the Plate Interface Board (Fig. 57).
12. Rotate with accuracy the Reagents Plate pulley and check that the Home Sensor disk not to touch the Reagents Home Sensor.
13. Place the instrument front panel screwing its four anchored screws.

N.B.: after having replaced the new Reagents Plate Home Sensor, it is necessary to align mechanically the Reagents Plate by following the procedure described into the Section 6.5.14.3 .

6.5.12 REPLACEMENT OF THE SAMPLES PLATE HOME SENSOR

1. Remove the instrument front panel unscrewing its four anchored screws.
2. Unscrew the Home Sensors screw (Fig. 67).
3. Unscrew the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) and remove the Reagents Plate Home Sensor lever from the Reagents Plate pulley.
4. Unscrew the first spacer of the Home Sensor levers with the relative washer (Fig. 67).
5. Unplug the J7 connector from the Plate Interface Board (Fig. 57).
6. Unscrew the Samples Plate Home Sensor lever adjusting screw (Fig. 67) and remove the Samples Plate Home Sensor lever from the Samples Plate pulley.
7. Unscrew the two Samples Plate Home Sensor fastening screws on the its lever (Fig. 68).
8. Substitute the Home Sensor with the new Home Sensor (Fig. 69).
9. Replace the new Home Sensor on its lever with the window Home Sensor outward-facing (Fig. 68) and screw the two Samples Plate Home Sensor fastening screws.
10. Insert the Samples Plate Home Sensor around the Home sensor disk.
11. Replace the Samples Plate Home Sensor lever on its location and screw the Samples Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect to its index.
12. Replace the spacer washer and screw the first spacer of the Home Sensor levers.
13. Plug in the J7 connector in the Plate Interface Board (Fig. 57).
14. Rotate with accuracy the Samples Plate pulley and check that the Home Sensor disk not to touch the Samples Home Sensor.
15. Insert the Reagents Plate Home Sensor around the Home Sensor disk.
16. Replace the Reagents Plate Home Sensor lever on its location and screw the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect its index.
17. Screw the Home Sensors screw (Fig. 67).
18. Rotate with accuracy the Reagents Plate pulley and check that the Home Sensor disk not to touch the Reagents Home Sensor.
19. Place the instrument front panel screwing its four anchored screws.

N.B.: after having replaced the new Samples Plate Home Sensor and the Reagents Plate Home Sensor, it is necessary to align mechanically the Samples Plate and Reagents Plate by following the procedure described into the Section 6.5.15.3.

6.5.13 REPLACEMENT OF THE REACTIONS PLATE HOME SENSOR

1. Remove the instrument front panel unscrewing its four anchored screws.
2. Unscrew the Home Sensors screw (Fig. 67).
3. Unscrew the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) and remove the Reagents Plate Home Sensor lever from the Reagents Plate pulley.
4. Unscrew the first spacer of the Home Sensor levers with the relative washer (Fig. 67).
5. Unscrew the Samples Plate Home Sensor lever adjusting screw (Fig. 67) and remove the Samples Plate Home Sensor lever from the Samples Plate pulley.
6. Unplug the J8 connector from the Plate Interface Board (Fig. 57).
7. Unscrew the second spacer of the Home Sensor levers with the relative washer (Fig. 57).
8. Unscrew the Reactions Plate Home Sensor lever adjusting screw (Fig. 67) and remove the Reactions Plate Home Sensor lever from the Reactions Plate pulley.
9. Unscrew the two Reactions Plate Home Sensor fastening screws on the its lever (Fig. 68).
10. Substitute the Home Sensor with the new Home Sensor (Fig. 69).
11. Replace the new Home Sensor on its lever with the window Home Sensor outward-facing (Fig. 68) and screw the two Reactions Plate Home Sensor fastening screws.
12. Insert the Reactions Plate Home Sensor around the Home sensor disk.
13. Replace the Reactions Plate Home Sensor lever on its location and screw the Reactions Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect to its index.
14. Replace the spacer washer and screw the second spacer of the Home Sensor levers.
15. Plug in the J8 connector in the Plate Interface Board (Fig. 57).
16. Rotate with accuracy the Reactions Plate pulley and check that the Home Sensor disk not to touch the Reactions Home Sensor.
17. Insert the Samples Plate Home Sensor around the Home Sensor disk.

18. Replace the Samples Plate Home Sensor lever on its location and screw the Samples Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect its index.
19. Replace the spacer washer and screw the first spacer of the Home Sensor levers.
20. Rotate with accuracy the Samples Plate pulley and check that the Home Sensor disk not to touch the Samples Home Sensor.
21. Insert the Reagents Plate Home Sensor around the Home sensor disk.
22. Replace the Reagents Plate Home Sensor lever on its location and screw the Reagents Plate Home Sensor lever adjusting screw (Fig. 67) so that it is centered with respect its index.
23. Screw the Home Sensors screw (Fig. 67).
24. Rotate with accuracy the Reagents Plate pulley and check that the Home Sensor disk not to touch the Reagents Home Sensor.
25. Place the instrument front panel screwing its four anchored screws.

N.B.: after having replaced the new Reactions Plate Home Sensor, the Samples Plate Home Sensor and the Reagents Plate Home Sensor, it is necessary to align mechanically all the plates by following the procedure described into the Section 6.5.16.3

6.5.14 ALIGNMENT AND ADJUSTMENTS OF THE REAGENTS PLATE

6.5.14.1 Alignment and adjustment of the Reagents Plate in case of replacement of the Reagents Plate motor or of the Reagents Plate belt

N.B.: in case of replacement of the Reagents Plate motor or of the Reagents Plate belt, it is necessary only control that the Reagents Plate is centered with respect to the Sampling Arm

1. Make sure the instrument (Ellipse) is turned on.
1. Make sure that the Reagents protection cover is permanently locked on the Reagents Plate.
2. Launch the “Diagnostic” program.
3. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
4. Make sure that the distance between the top edge of the Washing Well and the tip of the Sampling Probe is 25 mm.

5. Select “Arm” folder.
6. Click the "Go Std" button, then click the correspondent “Down” button. The arm will move to position #1 of the Standards Plate, then it will go down until to reach the right height.
7. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Standards Plate. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, adjust (if necessary) the verticality by using the adjustable anchored bearing (Fig. 7), click the ‘Save’ button, then repeat the above steps from 6.
8. Click the "Go Reag." button, then click the correspondent “Down” button. The arm will move to position #1 of the Reagents Plate, then it will go down until to reach the right height.
9. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Reagents Plate. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, then click the ‘Save’ button.
10. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the general reset procedure has been completed.

6.5.14.2 Alignment and adjustment of the Reagents Plate in case of replacement of the Reagents Plate pulley

N.B.: in case of replacement of the Reagents Plate pulley, align and adjust the Reagents Plate with respect to the Sampling Arm.

1. Make sure that the instrument (Ellipse) is turned on.
2. Make sure that the Reagents protection cover is permanently locked on the Reagents Plate.
3. Remove the instrument front panel unscrewing its four anchored screws.
4. Launch the “Diagnostic” program.
5. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
6. Make sure that the distance between the top edge of the Washing Well and the tip of the Sampling Probe is 25 mm.
7. Select “Plate” folder.
8. Click the "ALL Motors OFF" button.

9. Loosen the two grains of the Reagents Plate pulley (Fig. 66).
10. Click the "ALL Motors ON" button. Wait until the reset instrument procedure has been completed.
11. Select “Arm” folder.
12. Click the "Go Reag." button, then click the correspondent “Down” button. The arm will move to position #1 of the Reagents Plate, then it will go down until to reach the right height.
13. Rotate manually the Reagents Plate until to reach the right centering of the position #1 of the Reagents Plate with respect to the Sampling Probe, then adjust (if necessary) the positioning of the Sampling Probe by using the ‘+’ and ‘-‘ keys.
14. Tighten the grain at sight of the Reagents Plate pulley only after to have verified that the three Plate Motor pulleys are locked between of them, then click the ‘Save’ button.
15. Select “Plate” folder and click the "ALL Motors OFF" button.
16. Rotate manually the Reagents Plate until to have in view the other grain of the Reagents Plate pulley, then tighten it.
17. Click the "ALL Motors ON" button. Wait until the reset instrument procedure has been completed.
18. Select “Arm” folder.
19. Click the "Go Std" button, then click the correspondent “Down” button. The arm will move to position #1 of the Standards Plate, then it will go down until to reach the right height.
20. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Standards Plate. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, adjust (if necessary) the verticality by using the adjustable anchored bearing, click the ‘Save’ button, then repeat the above steps from 15.
21. Click the "Go Reag." button, then click the correspondent “Down” button. The arm will move to position #1 of the Reagents Plate, then it will go down until to reach the right height.
22. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Reagents Plate. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, then click the ‘Save’ button.

23. Select "Miscellaneous" folder and request an Instrument General Reset. Wait until the general reset procedure has been completed.
24. Place the instrument front panel screwing its four anchored screws.

6.5.14.3 Alignment and adjustment of the Reagents Plate in case of replacement of the Reagents Plate Home Sensor

N.B.: in case of replacement of the Reagents Plate Home Sensor, center the Reagents Plate with respect to the Sampling Arm adjusting the position of the Reagents Plate Home Sensor lever.

1. Make sure that the instrument (Ellipse) is turned on.
2. Make sure that the Reagents protection cover is permanently locked on the Reagents Plate.
3. Remove the instrument front panel unscrewing its four anchored screws.
4. Launch the "Diagnostic" program.
5. Select "Miscellaneous" folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
6. Make sure that all the Home Sensors of the Sampling Arm (Vertical and Horizontal), Reactions, Samples and Reagents Plates light up in green.
7. Select "Arm" folder.
8. Click the "Go Reag." button, then click the correspondent "Down" button. The arm will move to position #1 of the Reagents Plate, then it will go down until to reach the right height.
9. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Reagents Plate. If it not be so:
   a. loosen the Reagents Plate Home Sensor lever adjusting screw (Fig. 67);
   b. turn slightly the Reagents Plate Home Sensor lever to the right toward in order to obtain the centering;
   c. tighten the Reagents Plate Home Sensor lever adjusting screw;
   d. repeat the steps from 5 to 9.
10. Click the "Go Std" button, then click the correspondent "Down" button. The arm will move to position #1 of the Standards Plate, then it will go down until to reach the right height

11. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Standards Plate.
12. Select "Miscellaneous" folder and request an Instrument General Reset. Wait until the general reset procedure has been completed.
13. Place the instrument front panel screwing its four anchored screws.

6.5.15 LIGNMENT AND ADJUSTMENTS OF THE SAMPLES PLATE

6.5.15.1 Alignment and adjustment of the Samples Plate in case of replacement of the Samples Plate motor or of the Samples Plate belt

N.B.: in case of replacement of the Samples Plate motor or of the Samples Plate belt, it is necessary control that the Samples Plate is centered with respect to the Sampling Arm and then, align and adjust the Reagents Plate

1. Perform the procedure described into the previous Section 6.5.14.2 from step 1 to step 20.
2. Select “Arm” folder.
3. Click the "Go Sample" button, then click the correspondent “Down” button. The arm will move to position #1 of the Sample Rack #1, then it will go down until to reach the right height.
4. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Sample Rack #1. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys and click the ‘Save’ button.
5. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the general reset procedure has been completed.
6. Place the instrument front panel screwing its four anchored screws.

6.5.15.2 Alignment and adjustment of the Samples Plate in case of replacement of the Samples Plate pulley

N.B.: in case of replacement of the Samples Plate pulley, align and adjust the Reagents Plate and the Samples Plate with respect to the Sampling Arm.

1. Make sure that the instrument (Ellipse) is turned on.
2. Remove the instrument front panel unscrewing its four anchored screws (Fig. 13).
3. Launch the “Diagnostic” program.
4. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
5. Make sure that the distance between the top edge of the Washing Well and the tip of the Sampling Probe is 25 mm.
6. Select “Plate” folder.
7. Click the "ALL Motors OFF" button.
8. Loosen the two grains of the Samples Plate pulley (Fig. 66).
9. Click the "ALL Motors ON" button. Wait until the reset instrument procedure has been completed.
10. Select “Arm” folder.
11. Click the "Go Sample" button, then click the correspondent “Down” button. The arm will move to position #1 of the Sample Rack #1, then it will go down until to reach the right height.
12. Rotate manually the Samples Plate until to reach the right centering of the position #1 of the Sample Rack #1 with respect to the Sampling Probe, then adjust (if necessary) the positioning of the Sampling Probe by using the ‘+’ and ‘-‘ keys.
13. Tighten the grain at sight of the Samples Plate pulley, then click the ‘Save’ button.
14. Select “Plate” folder and click the "ALL Motors OFF" button.
15. Rotate manually the Samples Plate until to have in view the other grain of the Samples Plate pulley, then tighten it.

16. Click the "ALL Motors ON" button. Wait until the reset instrument procedure has been completed.
17. Select “Arm” folder.
18. Click the "Go Sample" button, then click the correspondent “Down” button. The arm will move to position #1 of the Sample Rack #1, then it will go down until to reach the right height.
19. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Sample Rack #1.
20. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the general reset procedure has been completed.
21. Perform the procedure described into the previous Section 6.5.14.2 from step 7 to step 21.

6.5.15.3 Alignment and adjustment of the Samples Plate in case of replacement of the Samples Plate Home Sensor

N.B.: in case of replacement of the Samples Plate Home Sensor, center the Samples Plate and the Reagents Plate with respect to the Sampling Arm adjusting the position of the relative Plate Home Sensor levers.

1. Make sure that the instrument (Ellipse) is turned on.
2. Make sure that the Reagents protection cover is permanently locked on the Reagents Plate.
3. Remove the instrument front panel unscrewing its four anchored screws (Fig. 13).
4. Launch the “Diagnostic” program.
5. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
6. Make sure that all the Home Sensors of the Sampling Arm (Vertical and Horizontal), Reactions, Samples and Reagents Plates light up in green.
7. Select “Arm” folder.
8. Click the "Go Sample" button, then click the correspondent “Down” button. The arm will move to position #1 of the Sample Rack #1, then it will go down until to reach the right height.

9. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Sample Rack #1. If it not be so:
   a. loosen the Samples Plate Home Sensor lever adjusting screw (Fig. 6.5.17);
   b. turn slightly the Samples Plate Home Sensor lever to the right toward in order to obtain the centering;
   c. tighten the Samples Plate Home Sensor lever adjusting screw;
   d. repeat the steps from 5 to 9.
10. Click the "Go Sample" button, then click the correspondent “Down” button. The arm will move to position #1 of the Sample Rack #1, then it will go down until to reach the right height.
11. Make sure that the Sampling Probe is vertically aligned and centered with respect to position #1 of the Sample Rack #1.
12. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the general reset procedure has been completed.
13. Perform the procedure described into the previous Section 6.5.14.3 from step 7 to step 13.

6.5.16 LIGNMENT AND ADJUSTMENTS OF THE REACTIONS PLATE

6.5.16.1 Alignment and adjustment of the Reactions Plate in case of replacement of the Reactions Plate motor or of the Reactions Plate belt

N.B.: in case of replacement of the Reactions Plate motor or of the Reactions Plate belt, it is necessary control that the Reactions Plate is centered with respect to the Sampling Arm and with respect to the Optic Assembly; then, align and adjust the Samples Plate and the Reagents Plate.

1. Make sure that the instrument (Ellipse) is turned on.
2. Remove the reactions cuvettes front cover.
3. Remove with accuracy the left reactions cuvettes cover (placed under the Washing Station cannulas) unscrewing its three screws.

4. Take a with Reactions Plate Rack with a opaque cuvette #1 and then, substitute the Reactions Plate Rack #1 with this new Rack.
5. Make sure that the distance between the top edge of the Washing Well and the tip of the Sampling Probe is 25 mm.
6. Launch the “Diagnostic” program.
7. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
8. Make sure that all the Home Sensors of the Sampling Arm (Vertical and Horizontal), Reaction, Samples and Reagent Plates light up in green.
9. Make sure that the lamp of the Optic Assembly is turned on.
10. Select “Optic” folder and click the "Spare" button.
11. Make sure that the light beam of the lamp is centered with respect to cuvette #1 of the Reactions Plate. If it not be so: perform the procedure described into the Section 6.5.16.3.
12. Select “Arm” folder.
13. Click the "Go Disp." button, then click the correspondent “Down” button. The arm will move to cuvette #81 of the Reactions Plate, then it will go down until to reach the right height.
14. Make sure that the Sampling Probe is vertically aligned and centered with respect to cuvette #81 of the Reactions Plate. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, then click the ‘Save’ button.
15. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
16. Substitute the Reactions Plate Rack #1 with the previous Rack #1.
17. Replace with accuracy the left reactions cuvettes cover (placed under the Washing Station cannulas) screwing its three screws.
18. Replace the reactions cuvettes front cover.
19. Perform the procedure described into the previous Section 6.5.15.2 from step 6 to step 21.

6.5.16.2 Alignment and adjustment of the Reactions Plate in case of replacement of the Reactions Plate pulley

N.B.: in case of replacement of the Reactions Plate pulley, align and adjust the Reactions Plate, the Samples Plate and the Reagents Plate with respect to the Sampling Arm.

1. Make sure the instrument (Ellipse) is turned on.
2. Remove the instrument front panel unscrewing its four anchored screws.
3. Remove the reactions cuvettes front cover.
4. Remove with accuracy the left reactions cuvettes cover (placed under the Washing Station cannulas) unscrewing its three screws.
5. Take a with Reactions Plate Rack with a opaque cuvette #1 and then, substitute the Reactions Plate Rack #1 with this new Rack.
6. Launch the “Diagnostic” program.
7. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
8. Make sure that all the Home Sensors of the Sampling Arm (Vertical and Horizontal), Reaction, Samples and Reagent Plates light up in green.
9. Select “Plate” folder.
10. Click the "ALL Motors OFF" button.
11. Make sure that the two Reagents pulley grains are locked.
12. Make sure that the three Plate Home Sensor levers (Fig. 67) are centered with respect to the relative index.
13. Loosen the two grains of the Reactions Plate pulley (Fig. 66).
14. Click the "ALL Motors ON" button. Wait until the reset instrument procedure has been completed.
15. Select “Optic” folder and click the "Spare" button.
16. Make sure that the lamp of the Optic Assembly is turned on.

17. Rotate manually the Reactions Plate until to reach the right centering of the cuvette #1 of the Reactions Plate Rack #1 with respect to the light beam of the Optic Assembly.
18. Tighten the grain at sight of the Reactions Plate pulley.
19. Select “Plate” folder and click the "ALL Motors OFF" button.
20. Rotate manually the Reactions Plate until to have in view the other grain of the Reactions Plate pulley, then tighten it.
21. Click the "ALL Motors ON" button. Wait until the reset instrument procedure has been completed.
22. Select “Optic” folder and click the "Spare" button.
23. Make sure that the cuvette #1 of the Reactions Plate Rack #1 is centered with respect to the light beam of the Optic Assembly. If it not be so:
    a. loosen the Reactions Plate Home Sensor lever adjusting screw (Fig. 67);
    b. turn slightly the Reactions Plate Home Sensor lever to the right toward in order to obtain the centering;
    c. tighten the Reactions Plate Home Sensor lever adjusting screw;
    d. select “Plate” folder and click the "Reset" button of the Reactions Plate;
    e. repeat the step 23.
24. Make sure that the Reagents protection cover is permanently locked on the Reagents Plate.
25. Perform the procedure described into the previous Section 6.1.1 from step 4 to step 12.
26. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
27. Select “Arm” folder.
28. Click the "Go Disp." button, then click the correspondent “Down” button. The arm will move to cuvette #81 of the Reactions Plate, then it will go down until to reach the right height.
29. Make sure that the Sampling Probe is vertically aligned and centered with respect to cuvette #81 of the Reactions Plate. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, then click the ‘Save’ button.
30. Substitute the Reactions Plate Rack #1 with the previous Rack #1.

31. Replace with accuracy the left reactions cuvettes cover (placed under the Washing Station cannulas) screwing its three screws.
32. Replace the reactions cuvettes front cover.
33. Perform the procedure described into the previous Section 6.5.15.2 from step 4 to step 21.

6.5.16.3 Alignment and adjustment of the Reactions Plate in case of replacement of the Reactions Plate Home Sensor

N.B.: in case of replacement of the Reactions Plate Home Sensor, center the Reactions Plate, the Samples Plate and the Reagents Plate with respect to the Sampling Arm adjusting the position of the relative Plate Home Sensor levers

1. Make sure the instrument (Ellipse) is turned on.
2. Remove the instrument front panel unscrewing its four anchored screws.
3. Remove the reactions cuvettes front cover.
4. Remove with accuracy the left reactions cuvettes cover (placed under the Washing Station cannulas) unscrewing its three screws.
5. Take a with Reactions Plate Rack with a opaque cuvette #1 and then, substitute the Reactions Plate Rack #1 with this new Rack.
6. Launch the “Diagnostic” program.
7. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.
8. Make sure that all the Home Sensors of the Sampling Arm (Vertical and Horizontal), Reaction, Samples and Reagent Plates light up in green.
9. Select “Optic” folder and click the "Spare" button.
10. Make sure that the cuvette #1 of the Reactions Plate Rack #1 is centered with respect to the light beam of the Optic Assembly. If it not be so:
    a. loosen the Reactions Plate Home Sensor lever adjusting screw (Fig. 67);
    b. turn slightly the Reactions Plate Home Sensor lever to the right toward in order to obtain the centering;

c. tighten the Reactions Plate Home Sensor lever adjusting screw;

d. select “Plate” folder and click the "Reset" button of the Reactions Plate;

e. repeat the step 10.

11. Make sure that the Reagents protection cover is permanently locked on the Reagents Plate.

12. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the reset instrument procedure has been completed.

13. Select “Arm” folder.

14. Click the "Go Disp." button, then click the correspondent “Down” button. The arm will move to cuvette #81 of the Reactions Plate, then it will go down until to reach the right height.

15. Make sure that the Sampling Probe is vertically aligned and centered with respect to cuvette #81 of the Reactions Plate. If it not be so: adjust the positioning by using the ‘+’ and ‘-‘ keys, then click the ‘Save’ button.

16. Substitute the Reactions Plate Rack #1 with the previous Rack #1.

17. Replace with accuracy the left reactions cuvettes cover (placed under the Washing Station cannulas) screwing its three screws.

18. Replace the reactions cuvettes front cover.

19. Select "Miscellaneous” folder and request an Instrument General Reset. Wait until the general reset procedure has been completed.

20. Perform the procedure described into the previous Section 6.5.15.3 from step 7 to step 13

6.6 WASHING STATION ASSEMBLY

6.6.1 SUBSTITUTION OF THE WASHING STATION ASSEMBLY

N.B.: make sure that the *Ellipse* instrument is turned off before performing this substitution procedure.

1. Unscrew the fastening screw and remove the Washing Station protective cover (**Fig. 70**).
2. Remove the top cover of the Washing Station unscrewing the four fastening screws (**Fig. 71**).
3. Disconnect the eight tubes attached to the probes on the Washing Station (**Fig. 72**).
4. Unscrew the two Washing Station fastening screws (**Fig. 71**) and pull out the Washing Station from its housing.
5. Remove the instrument front panel unscrewing the four anchored screws (**Fig. 73**).
6. Remove the J5 and J10 connectors from the Plate Interface Board (**Fig. 74**).
7. Remove the ground wire from the Washing Station.
8. Remove the Washing Station Assembly and replace it with the new one.
9. Remount, repeating the above steps, 7 through 1, in reverse order.
10. After substituting and remounting, carry out the mechanical adjustment and functional check procedures as described in the next pages.

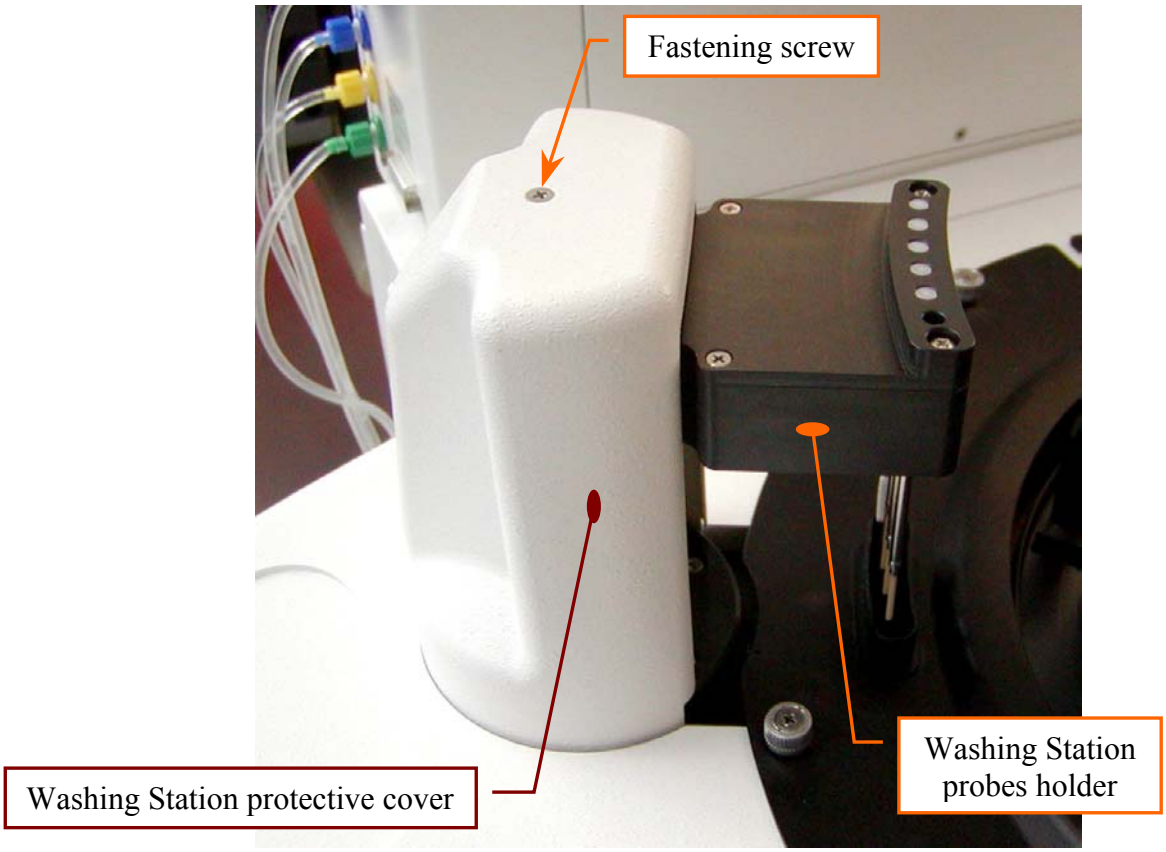


Fig. 70 - Washing Station protective cover

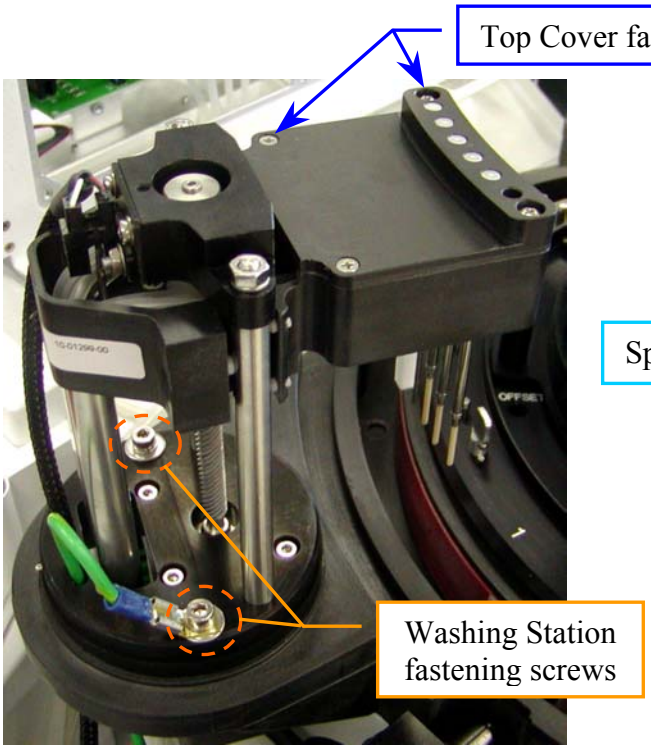


Fig. 71 - Washing Station Assembly [P/N: 10-01299-00]

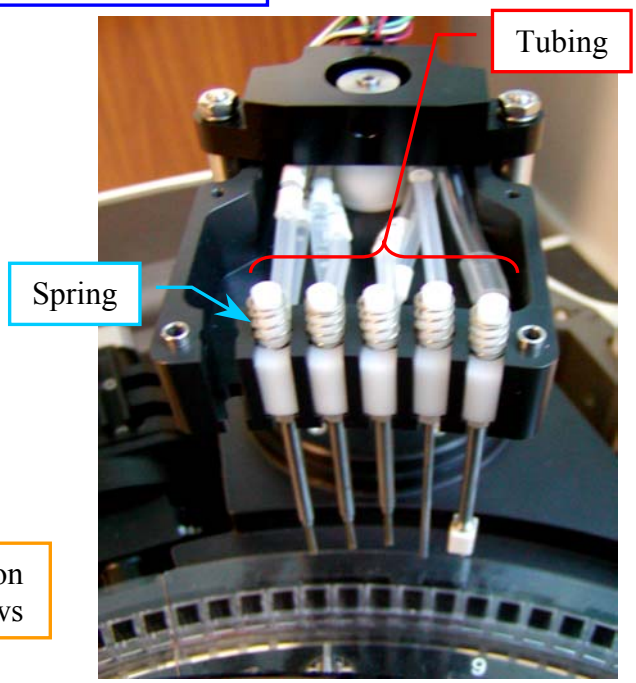


Fig. 72 - Washing Station probes

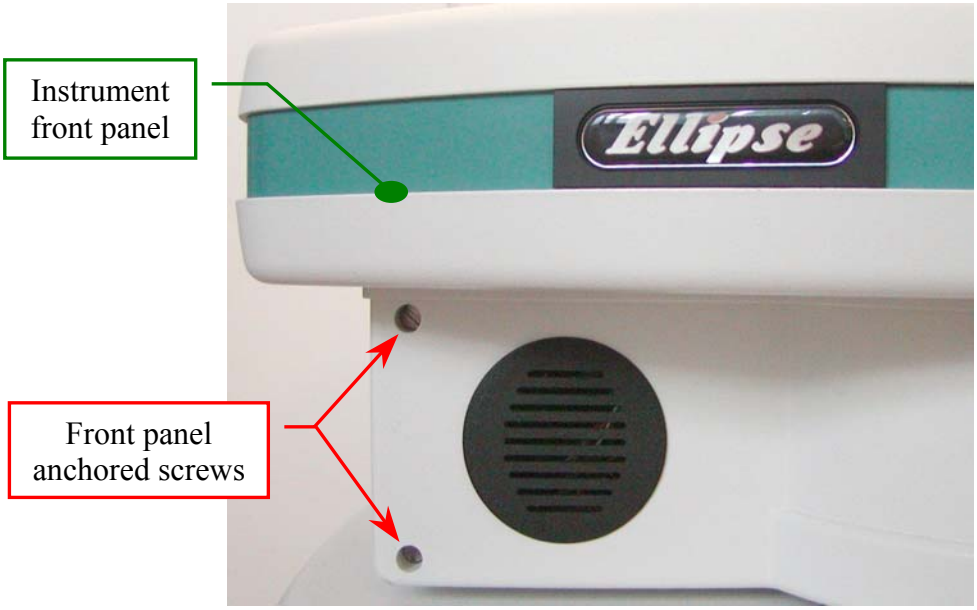


Fig. 73 - Front panel anchored screws

6.6.2 SUBSTITUTION OF THE WASHING STATION HOME SENSOR

N.B.: make sure that the *Ellipse* instrument is turned off before performing this substitution procedure.

1. Unscrew the fastening screw and remove the Washing Station protective cover (**Fig. 70**).
2. Remove the instrument front panel unscrewing the four anchored screws (**Fig. 73**).
3. Remove the two fastening screws from the Home Sensor Assy (**Fig. 75**), unplug the J10 connector from the Plate Interface Board (**Fig. 74**), take out the entire assy and replace it with the new one.
4. To remount, repeat the above steps in inverse order: from 3 to 1.
5. After substituting and remounting, carry out the mechanical adjustment and functional check procedures as described in the next pages.

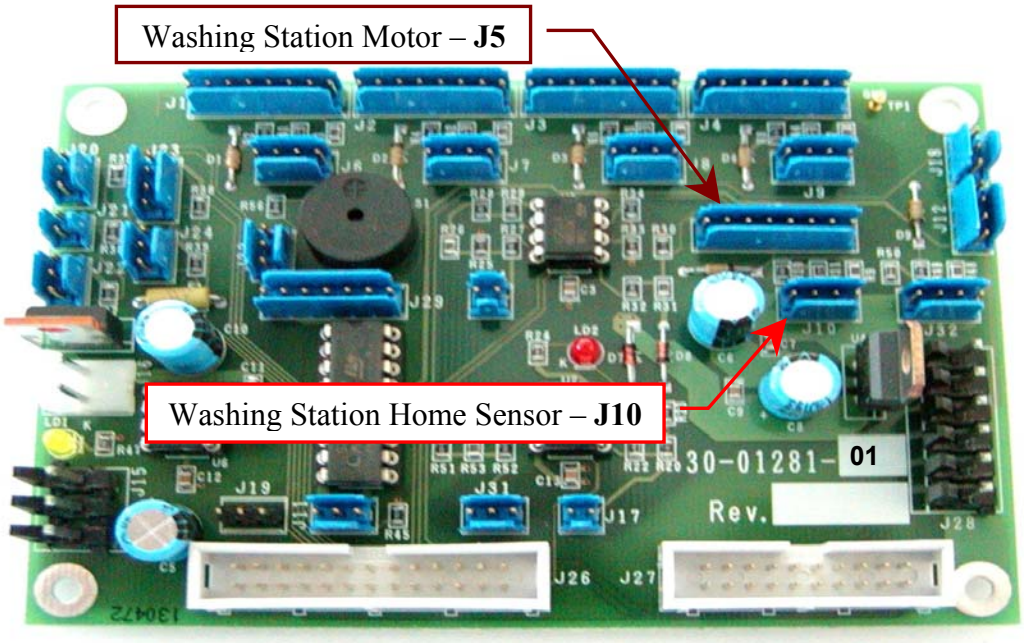


Fig. 74 - Plate Interface Board [P/N: 30-01281-01]

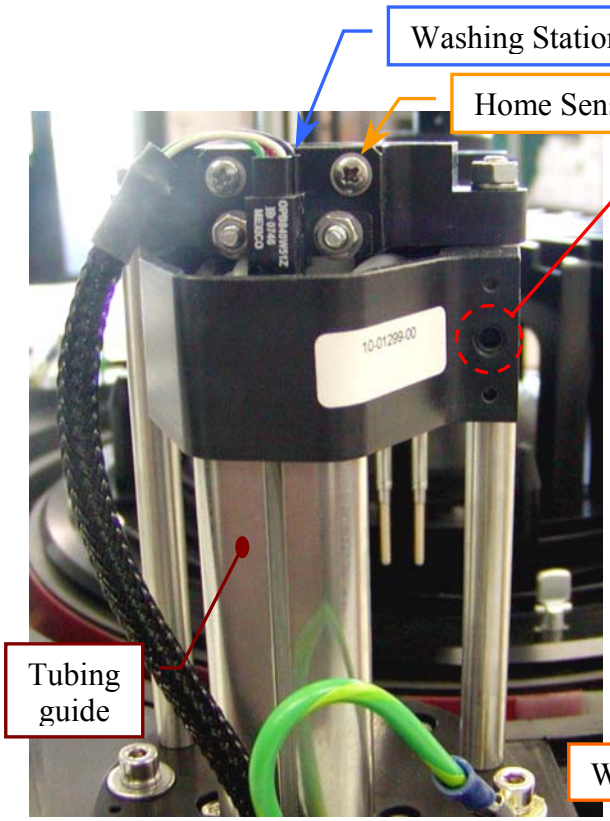


Fig. 75 - Washing Station Home Sensor [Assy P/N: 9-10-0023-60]

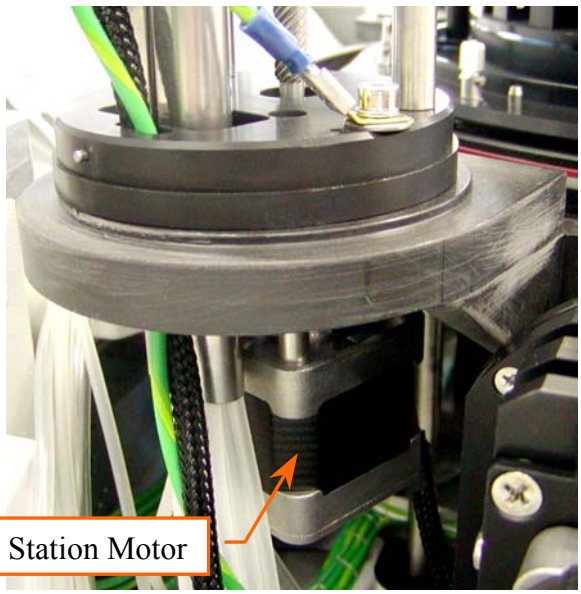


Fig. 76 - Washing Station Motor [Assy P/N: 10-00399-01]

6.6.3 SUBSTITUTION OF THE WASHING STATION MOTOR

N.B.: make sure that the Ellipse instrument is turned off before performing this substitution procedure.

1. Unscrew the fastening screw and remove the Washing station protective cover (**Fig. 70**).
2. Unscrew the two Washing Station fastening screws (**Fig. 71**) and pull out the Washing station from its housing.
3. Remove the instrument front panel unscrewing the four anchored screws (**Fig. 73**).
4. Remove the J5 connector from the Plate Interface Board (**Fig. 74**).
5. Loosen the two flywheel and motor joint screws.
6. Unscrew the four fastening screws on the motor (**Fig. 76**), take out it and replace it with the new one.
7. Remount, repeating the above steps, 6 through 1, in reverse order.
8. After substituting and remounting, carry out the mechanical adjustment and functional check procedures as described in the next pages.

6.6.4 WASHING STATION ASSEMBLY - MECHANICAL ADJUSTMENT

1. Make sure that the cuvette #1 of the Reactions Plate is centered with respect to the light beam of the Photometer reading channel.
2. Turn on the *Ellipse* instrument, unscrew the fastening screw of the Washing Station protective cover (**Fig. 70**) and remove the cover from its place.
3. Launch the *Diagnostic* program, select "Wash" folder and click the "Home" button. Wait until the reset Washing Station procedure has been completed.
4. Make sure that the Home Sensor of the Washing Station light up in green.
5. Click the "Down to Adjust" button in the "Wash" folder. The Washing Station will go down until to reach the right height for the adjusting.
6. Make sure that the five probes of the Washing Station are centered with respect to the five correspondent cuvettes of the Reactions Plate. If it not be so, adjust in the following way:
    a. loosen the two Washing Station fastening screws (**Fig. 71**);
    b. shift horizontally – carefully – the Washing Station in order to obtain the centering of the five probes with respect to the five correspondent cuvettes;
    c. tighten the two Washing Station fastening screws (**Fig. 71**);
    d. click the "Home" button in the "Wash" folder and wait until the reset Washing Station procedure has been completed;
    e. make sure that the Home Sensor of the Washing Station light up in green;
    f. click the "Down to Adjust" button in the "Wash" folder and wait until the request movement has been completed;
    g. repeat the above step 6.
7. Click the "Home" button in the "Wash" folder. Wait until the reset Washing Station procedure has been completed.
8. Click the "Down (Full)" button in the "Wash" folder. The Washing Station will go down until to reach the cuvettes of the Reactions Plate.
9. Make sure that the five probes of the Washing Station are centered with respect to the five correspondent cuvettes of the Reactions Plate and, in particular, that the Drying Pad run freely along the walls of the correspondent cuvette.
10. Make sure that the five probes of the Washing Station are slightly raised. If it not be so, adjust in the following way:
    a. click the "Home" button in the "Wash" folder and wait until the reset Washing Station procedure has been completed;
    b. make sure that the Home Sensor of the Washing Station light up in green;
    c. loosen the two fastening screws of the Washing Station Home Sensor (**Fig. 75**);
    d. move slightly the Washing Station Home Sensor to the right vertically toward in order to obtain the positioning of the Washing Station probes to the correct height;
    e. tighten the two fastening screws of the Washing Station Home Sensor (**Fig. 75**);
    f. click the "Home" button in the "Wash" folder and wait until the reset Washing Station procedure has been completed;
    g. make sure that the Home Sensor of the Washing Station light up in green;

h. ick the “Down (Full)” button in the “Wash” folder and wait until the Washing Station has been reach the cuvettes of the Reactions Plate;

i. repeat the above step 10.

11. Click the “Home” button in the “Wash” folder. Wait until the reset Washing Station procedure has been completed.
12. Make sure that the Home Sensor of the Washing Station light up in green.
13. Replace the Washing Station protective cover on the Washing Station and screw its fastening screw (**Fig. 70**).

Additional information: make sure that the Sampling Probe is centered with respect to the Reactions Plate cuvette. If it not be so, perform the relative adjusting procedure.

Adjusting set screw	If the horizontal backlash of the Washing Station probes holder (**Fig. 70**) is excessive, then adjust it acting on the **adjusting set screw** (**Fig. 75**).

6.6.5 WASHING STATION - FUNCTIONAL CHECK

1. Turn on the *Ellipse* system and launch the “Analyzer” program.
2. Launch the *Diagnostic* program and select the "Wash " folder.
3. Click on the “Washing Cycle” button and perform the functional check of the Washing Station through the following steps:
4. Select, in the “Cycle #” field, the number of washing cycles to be performed from 1 to 10 and press the “Washing Cycle” button.

   Attention: if there are doubts about the right washing system functionality, select only one washing cycle in order to avoid cuvettes overflow.
5. Remove the reaction rack cover and the left side reaction rack cover unscrewing the three anchored screws.
6. Put one reaction rack below the Washing Station, permitting at the cannulas to reach the bottom of the cuvettes (as shown in **Fig. 77**).

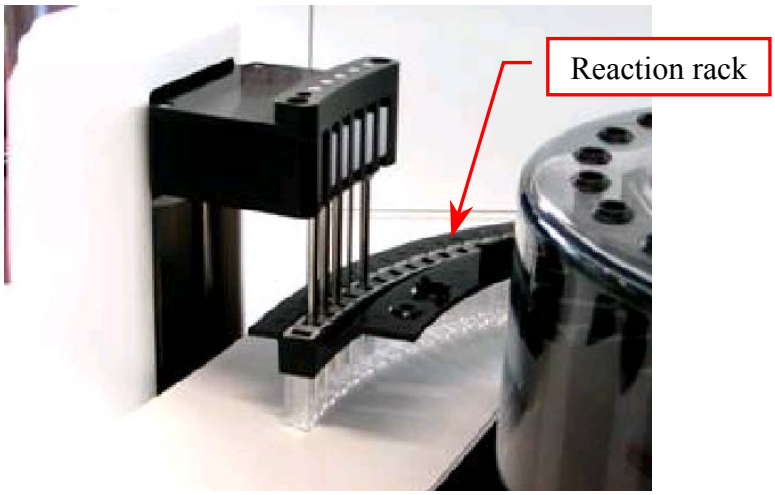


Fig. 77 - Washing Station and reaction rack

7. By referring to the "Washing Test" window, push the "OK" button to start the Washing Cycle.

8. Check that the cuvettes are correctly filled and emptied (**Fig. 77**):

   - Dispensed volumes shall be: → 300 µL ± 50 into the first cuvette, two cycles
     → 300 µL ± 50 into the second cuvette, two cycles
     → 300 µL ± 50 into the third cuvette, two cycles plus one third cycle where the dispensed volume shall be 400 µL ± 50

   If not, check and clean in case the relevant hydraulic line including micro-pump and valve, taking reference in the Hydraulic Diagram (SI-16-00571-01).

9. Remove the reaction rack below the Washing Station and remount the reaction rack covers.

10. Exit from the *Diagnostic* program by pressing the "Diagnostic" button.

11. Exit from the "Analyzer" program by pressing the "Shutdown" button.

6.7 WASH PUMP ASSEMBLY

6.7.1 SUBSTITUTION OF THE WASH PUMP ASSEMBLY

N.B.: make sure that the *Ellipse* instrument is turned off before performing this substitution procedure.

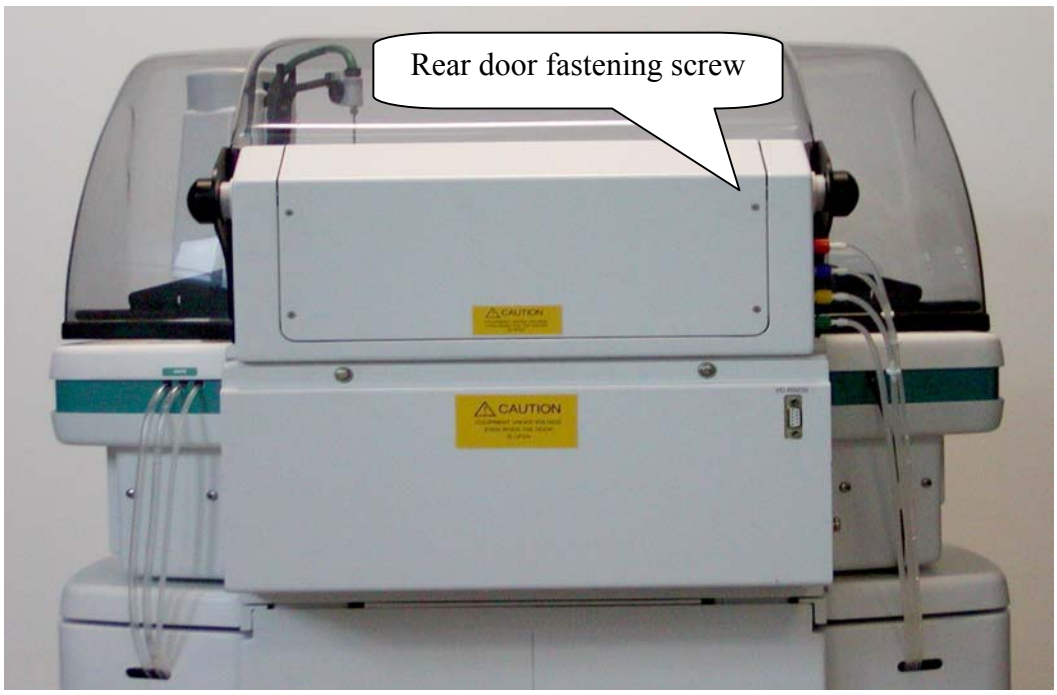


Fig. 78 Instrument rear view

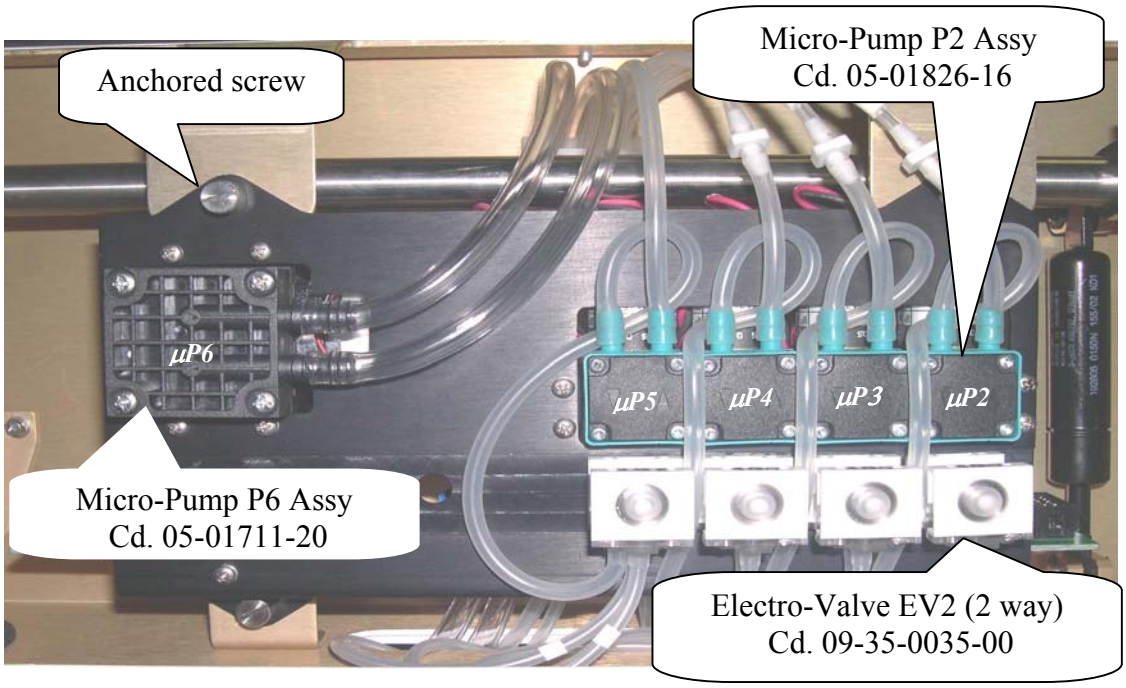


Fig. 79 Wash Pump Assembly Cd. 05-01488-00

Unscrew the four fastening screws to remove the door located on the instrument rear side to access the Wash Pump Assembly (Fig. 78) .

Disconnect the air tubes from µP6 and the tubes arriving on the Electro-Valves and Micro-Pumps (Fig. 79).

Unscrew the four anchored screws indicated which hold the Wash Pump Assembly (Fig. 79).

Disconnect connectors J1, J2 e J6 from the Hydraulics Interface board (Fig. 81).

Remove the Wash Pump Assembly from its site and replace it with the new one.

Remount, repeating the above steps, 4 through 1, in reverse order.

After mounting the new module, carry out the function check as described in the next pages.

N.B:. If power loss is experienced in the filling or emptying of liquid (after a period of instrument activity), perform the following operations before substituting or servicing any part(s):

- Disconnect the liquid input tube from the malfunctioning pump.
- Insert a small amount of liquid using a syringe from the disconnected ends in order to wet the membranes (Fig. 80).

  Remove the syringe and reconnect the tube(s); perform functioning check as described in the next points.

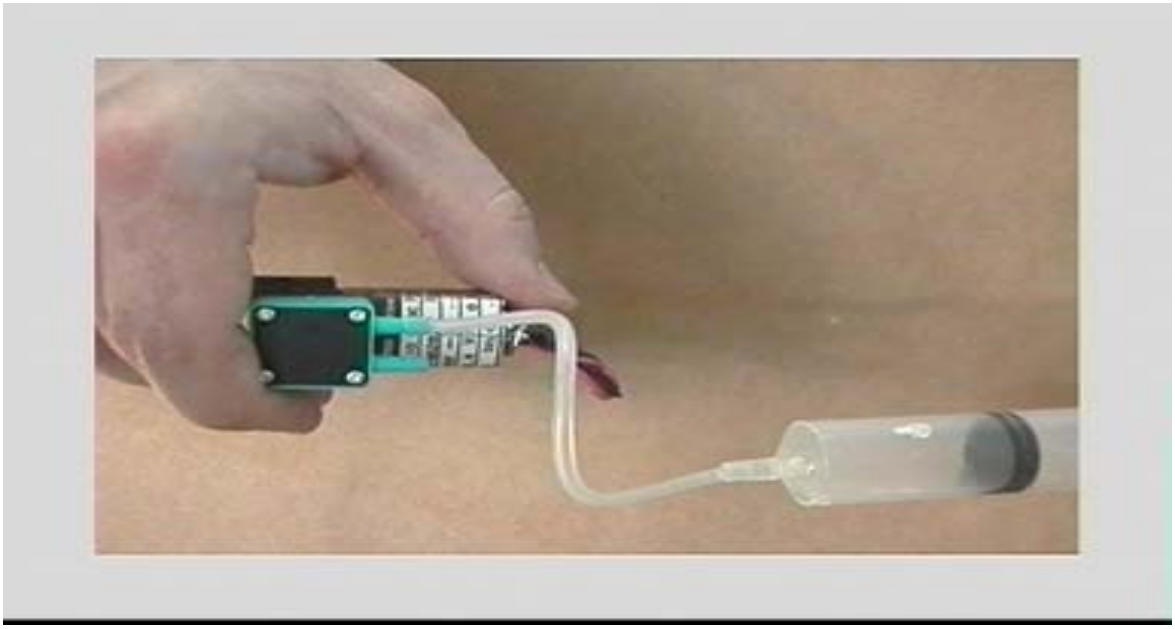


Fig. 80

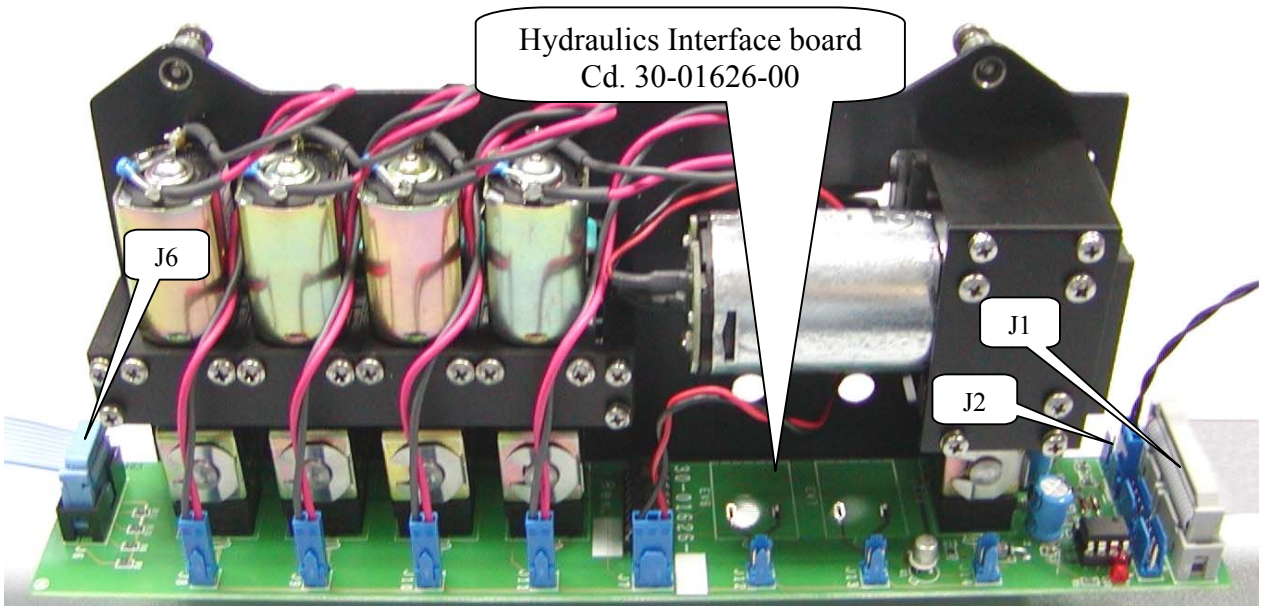


Fig. 81 Wash Pump Assembly (Rear view)

6.7.2 SUBSTITUTION OF PART(S)

N.B.: Make sure the instrument (Ellipse) is turned off before performing this substitution procedure.

1. Unscrew the four fastening screws to remove the door located on the instrument rear side to access the Wash Pump Assembly (Fig. 78) .
2. For each part to be replaced, if necessary, disconnect the relative electrical power connection, the hydraulic tubes and the fastening screws.
3. If necessary, unscrew the four anchored screws of the assembly and turn it ahead (Fig.81).
4. Remount, repeating the above steps, 3 through 1, in reverse order.
5. After mounting the new part, carry out the function check as described in the next pages.

6.7.3 FUNCTION CHECK FOR THE WASH PUMP ASSEMBLY

1. Turn on the "Ellipse" system and launch the “Analyzer” program.
2. Launch the diagnostic program and select the "Wash " function.
3. Click on the “Washing Cycle” key and perform the functional check of the Washing Station through the following steps:
4. Select, in the “Cycle #” field, the number of washing cycles to be performed from 1 to 10 and press the “Washing Cycle” key.

Attention: if there are doubts about the right washing system functionality, select only one washing cycle in order to avoid cuvettes overflow

5. Remoe the reaction rack cover and the left side reaction rack cover unscrewing the three anchored screws.
6. Put one reaction rack below the washing station, permitting to the cannulas to reach the cuvettes button (Fig. 82).

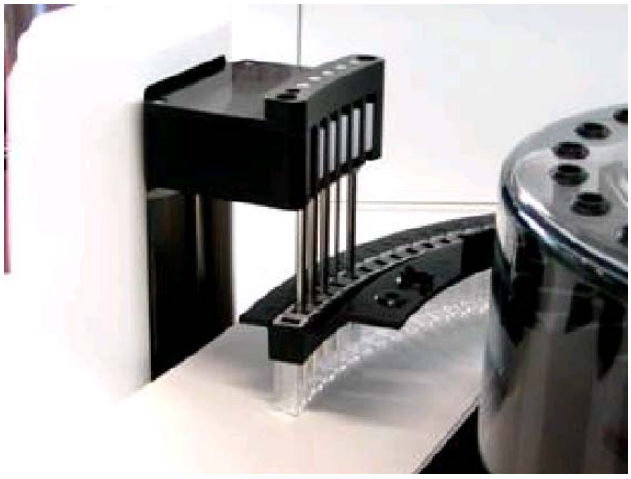


Fig. 82 Washing station

7. By referring to the window here below, push the "OK" key to start the Washing Cycle

Check that the cuvettes are correctly filled and emptied (Fig. 82)

- Dispensed volumes shall be: 300 µL ± 50 into the first cuvette, two cycles
  300 µL ± 50 into the second cuvette, two cycles
  300 µL ± 50 into the third cuvette, two cycles plus one third cycle where the dispensed volume shall be 400 µL ± 50

If not, check and clean in case the relevant hydraulic line including micro-pump and valve, taking reference in the Hydraulic Diagram (SI 16-00571-01).
Remove the reaction rack below the washing station and remount the reaction rack covers.
Exit the Diagnostic program by pressing the "Diagnostic" key.
Exit the Analyzer program press "Shutdown" key.

6.8 PERISTALTIC PUMP ASSEMBLY

6.8.1 SUBSTITUTION OF THE PERISTALTIC PUMP ASSEMBLY

Fig. 83 Instrument right view

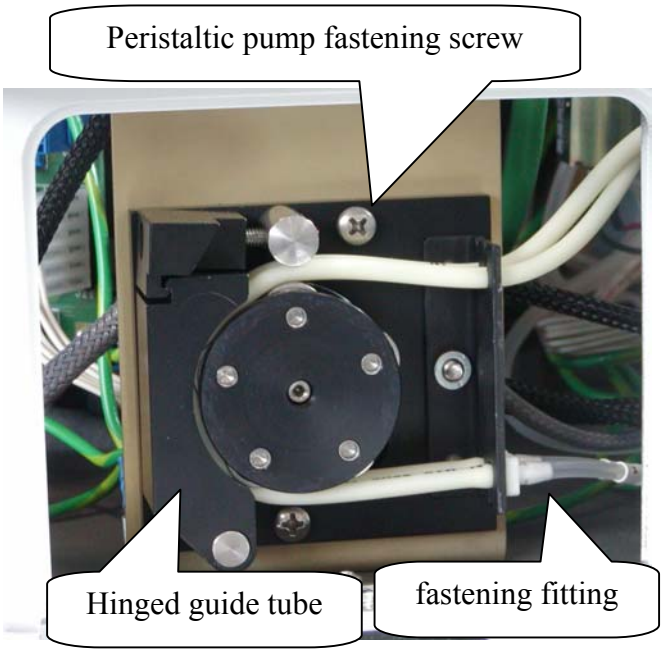


Fig. 84 Peristaltic Pump Assy
Cd. 05-01489-00

1. Open the door located on the right side of the instrument Fig. 83.
2. Unhook the hinged guide by pushing its up side toward the left and up, as reported in Fig. 85.
3. Pull out the tubes off their relative nipples unscrewing the fastening fittings (Fig. 84).
4. Remove the front panel unscrewing the four anchored screws (Fig. 87).
5. Unplug the J3 connector from the Sampling Interface Board. (Fig. 88).
6. Unscrew the two fastening screws (Fig. 84), remove the Peristaltic Pump module and substitute it with the new one.
7. To remount, repeat the above steps in reverse order: from 6 to 1.
8. After mounting the new module, carry out the function check for the peristaltic pump module as described in the next pages.

6.8.2 SUBSTITUTION OF THE PERISTALTIC PUMP TUBES

1. Open the door located on the right side of the instrument Fig. 83.
2. Unhook the hinged guide by pushing its up side toward the left and up, as reported in Fig. 85.
3. Pull out the tubes off their relative nipples unscrewing the fastening fittings (Fig. 84) and substitute with new ones.
4. Remount, repeating the above steps in reverse order: from 3 to 1.

- Always use original replacement parts; never lubricate the peristaltic pump roller bearings.
- After prolonged instrument inactivity: verify the efficiency of the peristaltic pump tubes.

Please note: if the instrument is not able to completely empty the washing well, check the condition of the tube and make sure that there are not obstruction into the hydraulic lines.

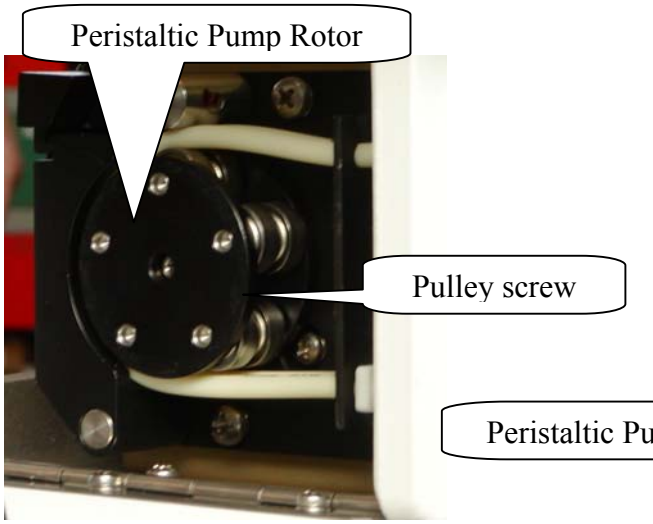


Fig. 85 P.Pump Rotor Cd.05-01512-00

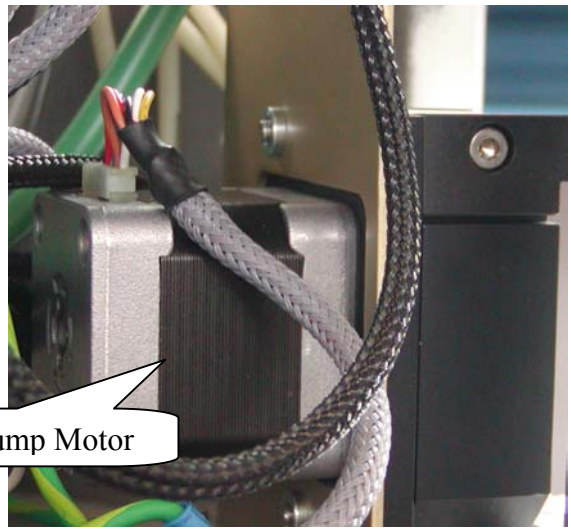


Fig.86 P.Pump Motor Cd. 10-00399-01

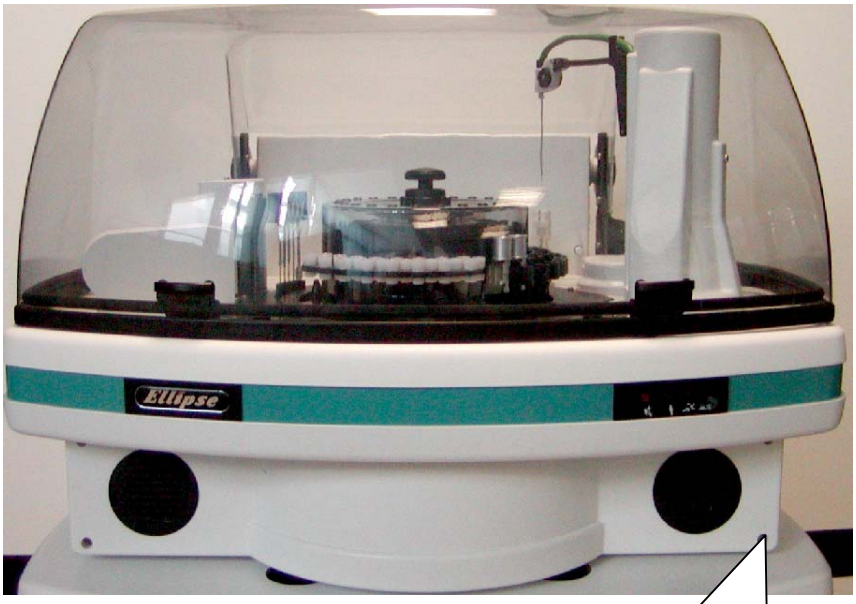


Fig. 87 Instrument front view

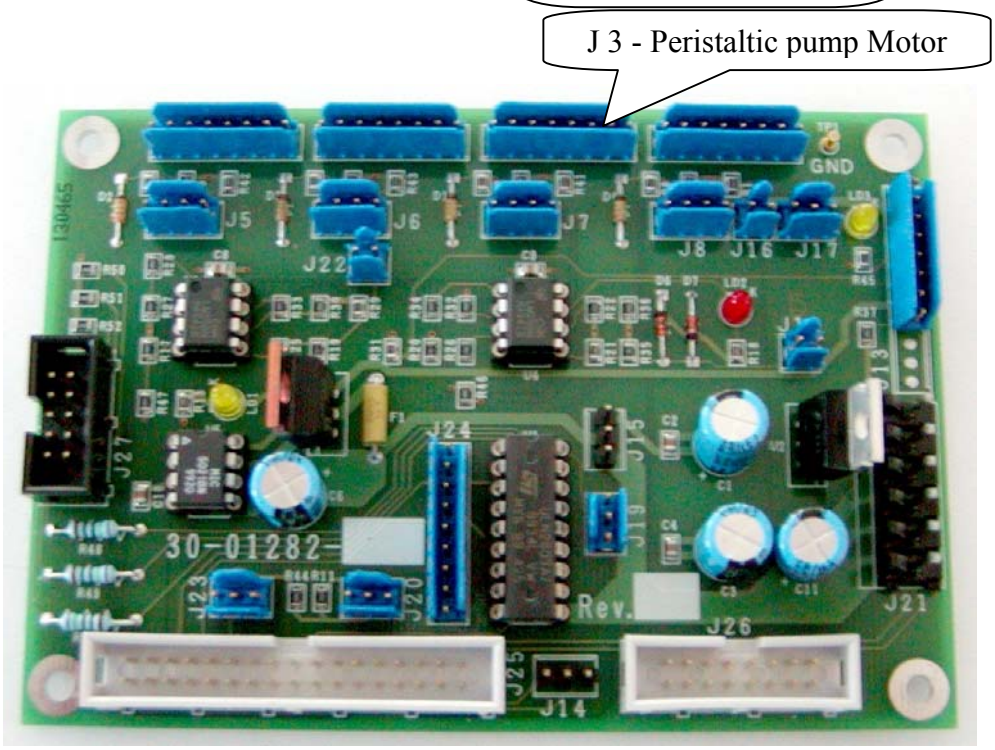


Fig. 88 Arm Interface board Cd. 30-01282-01

6.8.3 SUBSTITUTION OF THE PERISTALTIC PUMP MOTOR

1. Open the door located on the right side of the instrument Fig. 83.
2. Unhook the hinged guide by pushing its up side toward the left and up, as reported in Fig. 85.
3. Pull out the tubes off their relative nipples unscrewing the fastening fittings (Fig. 84).
4. Remove the front panel unscrewing the four anchored screws (Fig. 87).
5. Unscrew the two fastening screws (Fig. 84), unplug the J3 connector from the Sampling Interface Board (Fig. 88) and remove the Peristaltic Pump module from his housing.
6. Unscrew the four motor fastening screws and loosen the two motor pulley screws which hold the peristaltic pump rotor(Fig. 85).
7. Take out the motor and substitute it with the new one.
8. To remount, repeat the above steps in reverse order: from 6 to 1.
9. After mounting the new motor, carry out the function check for the peristaltic pump module as described in the next pages.

6.8.4 FUNCTION CHECK FOR THE PERISTALTIC PUMP

1. Turn on the Ellipse system (instrument and computer) and launch the “Analyzer” program. Select "Start Work" and perform one or more cuvette washing cycles. Make sure that the sampling probe washing well empties completely without any leakage of liquid. If leakage should occur, replace the Peristaltic Pump tubes as illustrated in the previous points.
2. Close the "Ellipse" program by clicking on "Shutdown".

6.9 SUBSTITUTION OF THE ELECTRONICS BOARDS

6.9.1 ANALYTICAL CONTROL BOARD Cd. 30-01283-01

N.B.: Make sure the instrument (Ellipse) is turned off before performing this substitution procedure.

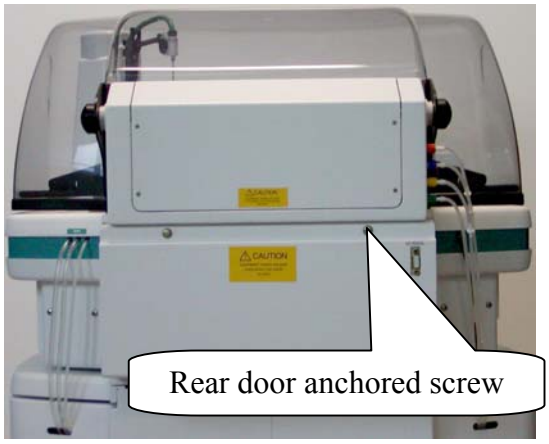


Fig. 89 Instrument rear view

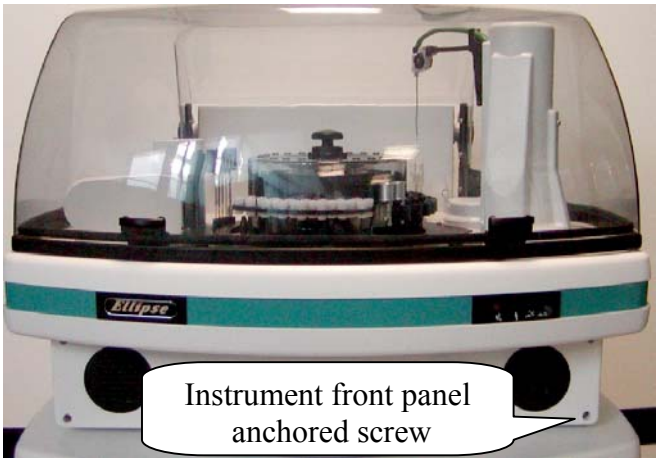


Fig. 90 Instrument front view

1. Unscrew the two anchored screws to open the door located on the rear side of the instrument to access the Electronic Assy (Fig. 89) .
2. Take out the Electronic Assy as showed (Fig. 3), disconnect connectors J1, J6, J8, J9, J10, J11, J13, J20 and the ground wire from the Analytical Control board (Fig. 91).
3. Unscrew the four fastening screws on the Analytical Control board, disconnect it from the Stepper Motors Driver Board and replace it with the new one.
4. Remount, repeating the above steps, 3 through 1, in reverse order.
5. After mounting the new board, turn on the Ellipse system and launch the “Diagnostic program” in order to transfer all the previous instrument settings to the new Analytical control board.
6. To exit the diagnostic program, press the “Diagnostic” key.
7. To exit the analyzer program, press the “Shutdown” key.

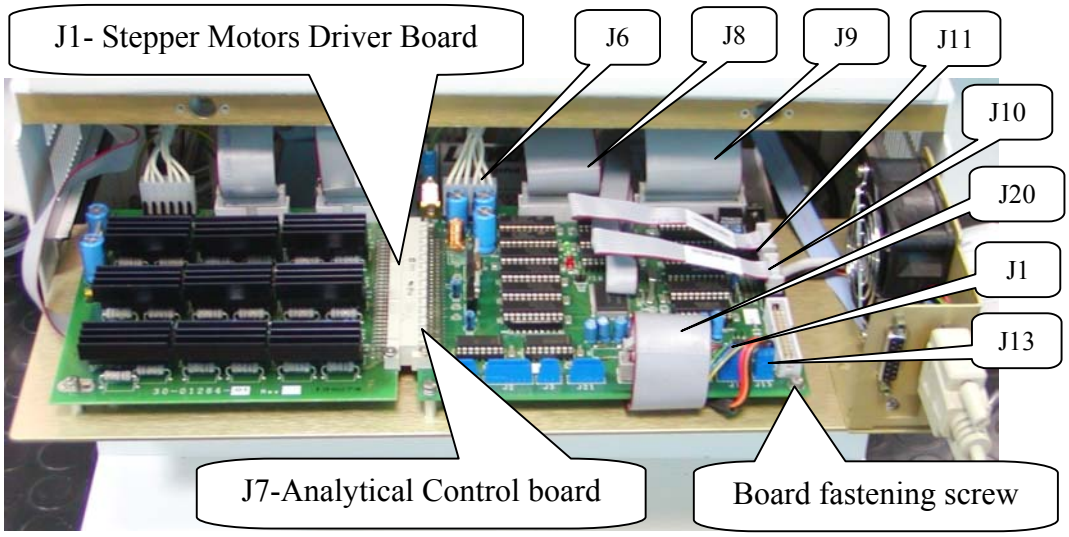


Fig. 91 Electronic Assy

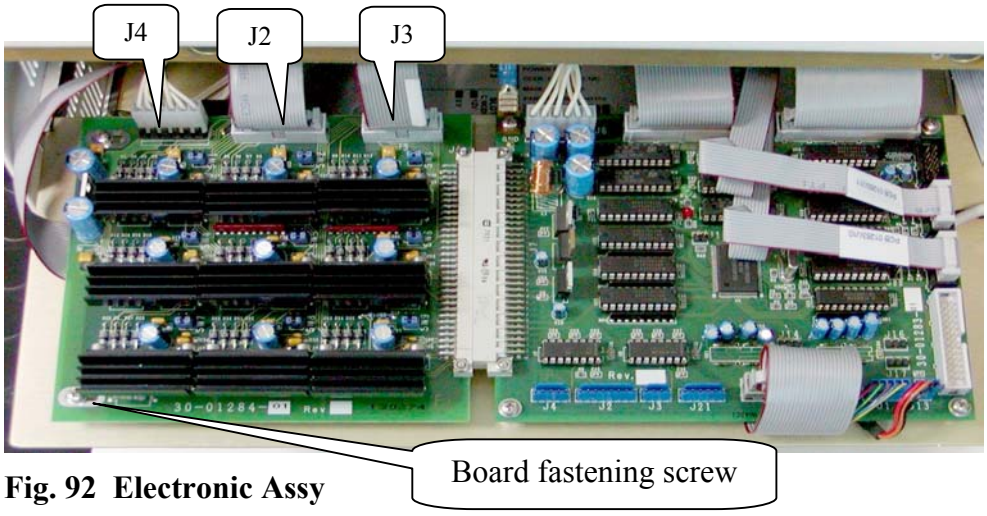


Fig. 92 Electronic Assy

6.9.2 STEPPER MOTORS DRIVER BOARD Cd. 30-01284-01

N.B.: Make sure the instrument (Ellipse) is turned off before performing this substitution procedure.

1. Unscrew the two anchored screws to open the door located on the rear side of the instrument to access the Electronic Assy (Fig. 89) .
2. Take out the Electronic Assy as showed (Fig. 91) and disconnect connectors J2, J3, J4 (Fig.92).
3. Unscrew the two fastening screws on the Stepper Motors Driver Board, disconnect it from the Analytical Control board and replace it with the new one.
4. Remount, repeating the above steps, 3 through 1, in reverse order.

6.9.3 ARM INTERFACE BOARD Cd. 30-01282-01

N.B.: Make sure the instrument (Ellipse) is turned off before performing this substitution procedure.

1. Remove the front panel unscrewing the four anchored screws (Fig. 90).
2. Unplug the J1, J2, J3, J4, J5, J6, J8, J13, J16, J17, J21, J23, J25, J26 J27connectors and the ground wire from the Arm Interface board (Fig. 93).
3. Unscrew the four fastening screws of the Arm Interface board and replace it with the new one.
4. Remount, repeating the above steps, 3 through 1, in reverse order.

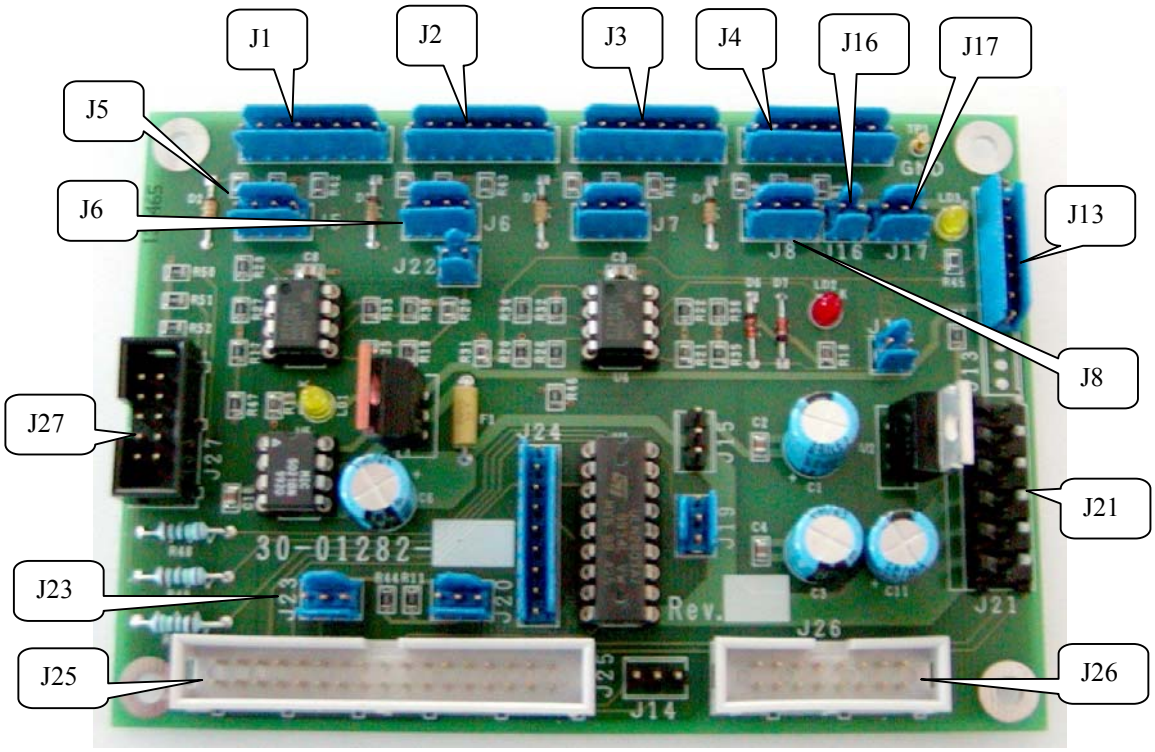


Fig. 93

6.9.4 PLATE INTERFACE BOARD Cd. 30-01281-01

N.B.: Make sure the instrument (Ellipse) is turned off before performing this substitution procedure.

1. Remove the front panel unscrewing the four anchored screws (Fig. 90).
2. Unplug the J1, J2, J3, J4, J5, J6, J7, J8, J9, J10, J11, J14, J15, J16, J26, J27, J28 connectors and the ground wire from the Plate Interface board (Fig. 94).
3. Unscrew the four fastening screws of the Plate Interface board and replace it with the new one.
4. Remount, repeating the above steps, 3 through 1, in reverse order.

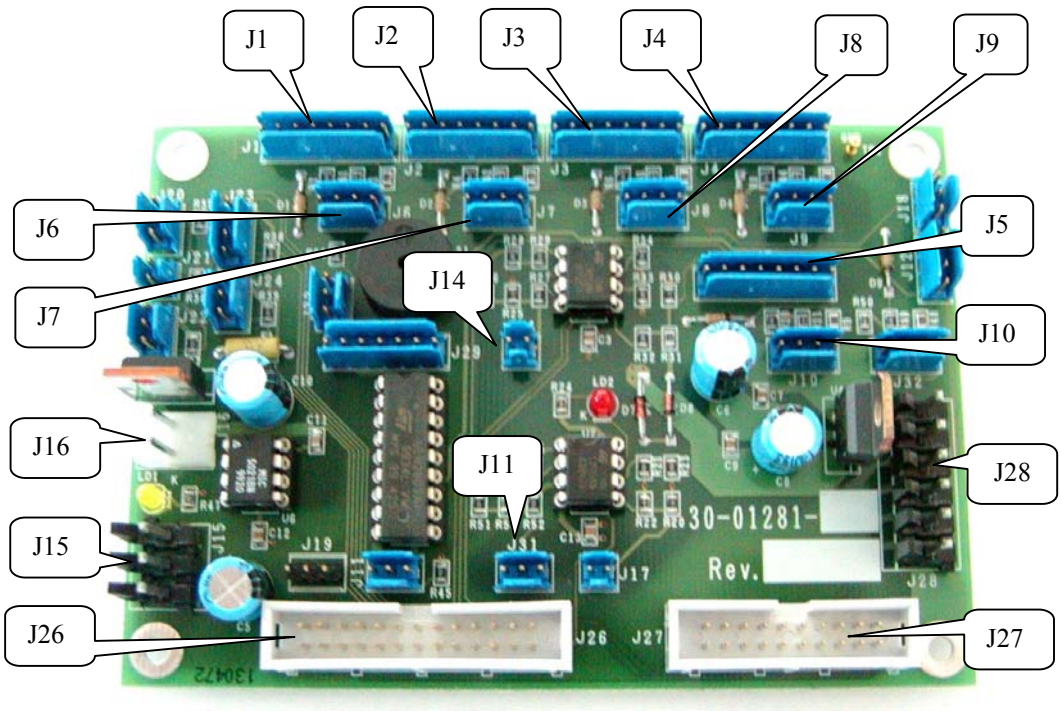


Fig. 94 Plate Interface board

CHAPTER 07

- MAINTENANCE -

INDEX

7 MAINTENANCE

This chapter contains all those routine operations, which concern instrument maintenance. Said procedures, listed and described below, should be carefully and scrupulously followed in order to guarantee the manufacturer's specifications and the perfect working order of the instrument over time.

7.1 PREVENTIVE MAINTENANCE

MAINTENANCE SCHEDULE

Table A, illustrated below, lists all those procedures to be carried out by the user/operator and the relative frequency schedule. Strict adherence to said schedule will guarantee the optimal operative efficiency of the instrument.

TABLE A – MAINTENANCE SCHEDULE

FREQUENCY	PROCEDURE	NOTES
DAILY – Before launching "Start Work"	Check the levels of all the wash solutions (Rinse, Water and Cleaning)	See Table B
DAILY – Before launching "Start Work"	Check the levels of Reagents, Standards and Controls	See Table B
DAILY – Before launching "Start Work"	Check the levels of the Waste Bottles and, if necessary, empty them	
DAILY – Before launching "Start Work"	Carry out a WBL cycle	See the User's Manual, Chapter 03– Description of Instrument Software
DAILY – After Shutdown	Clean the Sampling Probe using either paper towelling or gauze	See Procedure 7.3

TABLE B – MAINTENANCE SCHEDULE

FREQUENCY	PROCEDURE	NOTES
EVERY TWO WEEKS	Clean the Wash Station's four cannulas	See Procedure 7.4
EVERY TWO WEEKS	Clean the wash solution bottles (Rinse, Water and Cleaning)	See Procedure 7.5
ONCE A MONTH	Clean the Tip	See Procedure 7.6
ONCE A MONTH	Clean the Hydraulic Circuit	See Procedure 7.7
EVERY THREE MONTHS	Change the Reaction Cuvettes	See Procedure 7.10
EVERY SIX MONTHS	Change the Peristaltic Pump Tubes	See Procedure 7.8
EVERY SIX MONTHS	Change the Tip	See Procedure 7.6
ONCE A YEAR	Change all the tubes (Tube Kit)	See Procedure 7.11
EVERY 2000 HOURS	Change the Photometer lamp	See Procedure 7.9

- N. B.: the above-described maintenance schedule refers to that situation in which the workload of the *Analyzer* is approximately 500 tests per day. The interval frequency may vary according to the individual instrument's daily workload.

7.2 LIST OF PARTS SUBJECT TO WEAR AND USAGE

Description	Type	Quantity	Code
Reagents containers	35 ml	12	C101-00190-00
Reagents containers	6 ml	12	C101-00191-00
Samples cups	0.8 ml	1000	AS-65-0002
Short samples cups	1 ml	1000	AS-65-0100
Adapter for short samples cups		1	9-01-0609-00
Reaction sectors		6	C101-00217-00
Washing solution bottle	2 lt	1	9-35-0041-00
Bottle level sensor		1	9-05-0078-00
Tubing Kit for peristaltic pump		3	65-01835-00
Tubing Kit – complete		1	65-01836-00
Cleaning solution	250 ml	2	ASRN0020
Rinse solution	50 ml	1	ASRN0021
Sampling probe (internal needle)		1	05-00707-00
Complete Sampling probe		1	10-00703-00
Drying Pad		1	01-01920-00
Halogen Lamp (6 V - 10 W)		1	9-35-0016-00
Interferential filters Kit		1	9-65-0029-00
Fuse 6,3 A-T	5x20	10	C130-01238-08
Inlet/outlet fitting for Rinse & Clean conts		1	01-01224-00
Cuvettes protection cover		1	05-01249-00
Reagent protection cover		1	10-00584-00
Reagent plate		1	10-00585-00
Samples rack		1	05-01829-00
Washing station, first or second cannulas (A)		1	05-01633-00
Washing station, third cannula (B)		1	05-01633-01
Washing station, fourth cannula (C)		1	05-01638-00
Washing station, fifth cannula without pad (D)		1	05-01919-00
Diluter Micro-Pump		1	05-01710-40
Air Micro-Pump (µP 6)		1	05-01711-20
Micro-Pump (µP 2 ÷5)		1	05-01826-16
Predilution rack		1	05-01735-00
Solenoid Valve –2 way		1	9-35-0035-00
Solenoid Valve –3 way		1	9-35-0036-00

7.3 SAMPLING PROBE – CLEANING PROCEDURE

1) Turn off the *Analyzer*

2) Use only lint-free paper towelling or gauze

3) Dampen the gauze or paper towelling with distilled water and clean the outside of the sampling probe. Wipe the probe from the top downwards only! This is to avoid that any bits of cloth, paper or lint fibres accidentally enter the probe itself.

4) The manufacturer suggests that once weekly the above-described cleaning procedure be performed using, instead of only simple distilled water, a 5% sodium hypochlorite solution to dampen the gauze and then be repeated using distilled water.

7.4 WASH STATION CANNULAS – CLEANING PROCEDURE

1) Turn off the *Analyzer*.

2) Place a sheet of paper under the wash station cannulas in order to keep any extraneous material from accidentally falling into the cuvettes.

3) Use only lint-free paper towelling or gauze.

4) Dampen the gauze or paper towelling with distilled water and clean the outside of the cannulas. Wipe the cannulas from the top downwards only! This is to avoid that any bits of cloth, paper or lint fibres accidentally enter the cannulas themselves.

5) The manufacturer suggests that once weekly the above-described cleaning procedure be performed using, instead of only simple distilled water, a 5% sodium hypochlorite solution to dampen the gauze and then be repeated using distilled water.

7.5 WASH SOLUTION BOTTLES – CLEANING

During normal use and over time, mold and dust can build up inside the wash solution bottles.

For this reason, it is extremely important that they be periodically washed. Said cleaning must be thorough and meticulous in order to insure that every trace of mold or residue be removed.

How often the bottles must be cleaned depends on their use and on the quality of the distilled water used in that particular laboratory. However, the manufacturer recommends thorough washing at least once every two weeks.

It is extremely important that the user not underestimate the risks associated with mold and dust particles. They are to be regarded as a serious hazard as they can be the cause of instrument malfunction.

The wash solution bottles are located on the right side of the analyzer.

7.5.1 WASH SOLUTION BOTTLES - CLEANING PROCEDURE

1) Turn off the *Analyzer*.
2) Pull the level sensor connectors out from the bottle caps.
3) Take the caps off the bottles and empty them.
4) Fill each bottle with a 5% sodium hypochlorite solution.
5) Clean the inside of each bottle using a bottlebrush in order to remove all traces of mold and/or residue.
6) Leave the sodium hypochlorite solution stand in the bottles for at least ten minutes.
7) Empty the bottles, rinse them repeatedly and well with tap water, and then twice more using distilled water.
8) Dry the bottles.
9) Fill the bottles with their proper solutions.
10) Replace the bottles in their respective housings.
11) Close the bottles and reconnect the level sensors.
12) Carry out two 'Wash Cuvettes' cycles and two 'WBL' cycles. Check system efficiency by comparing the WBL values and the test results obtained against the laboratory's quality control values.

7.6 TIP WASHING

The Tip is used to dry the cuvettes after they have been washed. This drying process is carried out via aspiration and therefore, over time, the Tip will necessarily absorb various contaminating particles.

The manufacturer suggests that the Tip be replaced every six months. Said frequency may vary depending on the workload of the individual laboratory and the operating conditions/environment of the single instrument.

The Tip must be washed regularly in order to guarantee proper functioning and must be replaced with a new Tip as necessary.

7.6.1 TIP - CLEANING PROCEDURE

1. Turn off the *Analyzer*.
2. Unscrew the fastening screw and remove the Washing station protective cover (Fig. 1).
3. Remove the top cover of the washing station unscrewing the four fastening screws (Fig. 2).
4. Remove the cannula that contains the Tip (the 5th cannula) and the spring (Fig. 3).
5. Disconnect the aspiration tube (Fig. 4).
6. Once the cannula has been removed, immerge it in a 5% solution of sodium hypochlorite for at least 15 minutes (Fig. 5).
7. Attach a 10 ml syringe to the cannula and aspirate and dispense the hypochlorite solution through the cannula (and the Tip) until the latter is completely clean (Fig. 6). This aspirating and dispensing forces the liquid through the Tip fibers in both directions
8. Once the Tip is clean, repeat the aspirating and dispensing cycle 10 more times using distilled water, then disconnect the syringe.
9. Re-connect the aspiration tube to the cannula (Fig. 7).
10. Re-position the cannula in its housing being careful to not kink the aspiration tube
11. Re-position the spring on the cannula's cylindrical axel.
12. Re-position the top cover of the washing station, making sure that the cylindrical tops of the cannulas fit into the corresponding holes on it.
13. Manually move the wash station downwards and centre the tip with the cuvette turning it.
14. Remount the Washing station protective cover (Fig. 1).

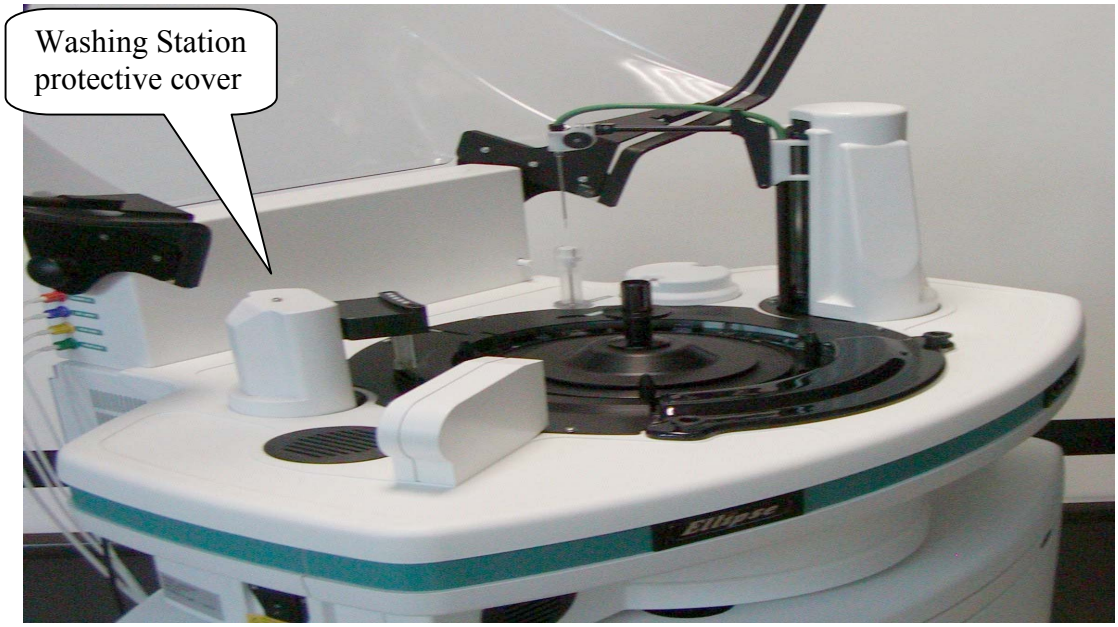


Fig.1 Instrument Top view

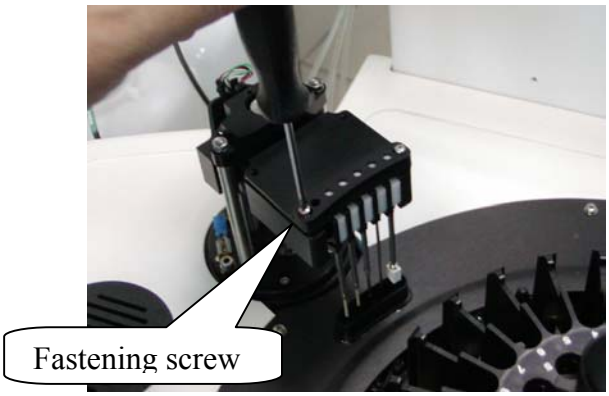


Fig. 2

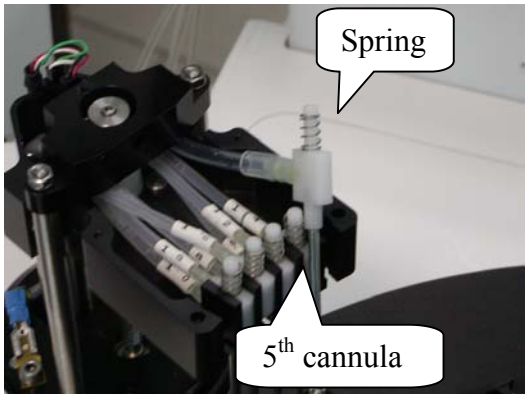


Fig. 3

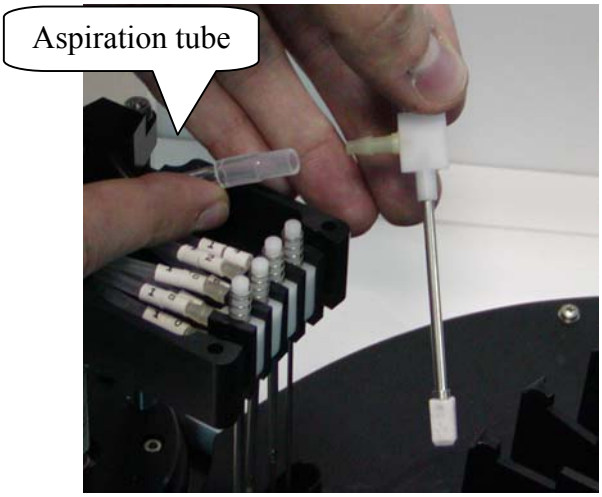


Fig. 4

Fig. 5

Sodium hypochlorite

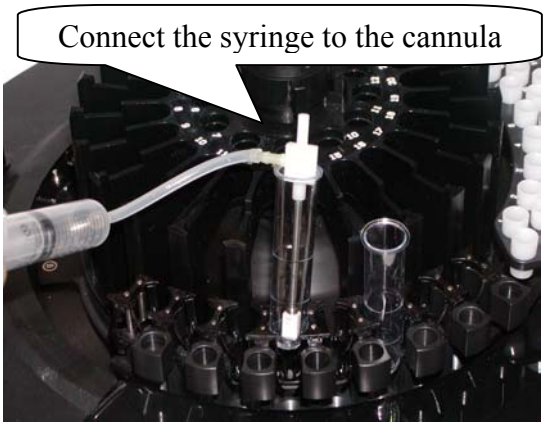


Fig. 6

Fig.

7.6.2 PROCEDURE FOR REPLACING THE TIP

1. Turn off the *Analyzer*.
2. Unscrew the fastening screw and remove the Washing station protective cover (Fig. 1).
3. Remove the top cover of the washing station unscrewing the four fastening screws (Fig. 2).
4. Remove the cannula that contains the Tip (the 5th cannula) and the spring (Fig. 3).
5. Disconnect the aspiration tube (Fig. 4), remove the used Tip and replace it with a new one. Press lightly to push the new Tip into place – be careful to not press too hard as this could deform the Tip (Fig. 8).
6. Insert the cannula containing the new Tip into a cuvette, pushing it down inside until it takes on the shape of the inside of the cuvette (Fig. 9).
7. Remove the cuvette, connect the aspiration tube to the cannula and reposition the cannula back into its proper housing in the wash station. Be careful to not kink the aspiration tube while doing so.
8. Reposition the spring in its proper housing. Remount the wash station coverlid making sure that the cylindrical tops of the cannulas fit into the corresponding holes on the wash station coverlid.
9. Manually move the wash station downwards and centre the tip with the cuvette turning it.
10. Remount the Washing station protective cover (Fig. 1).

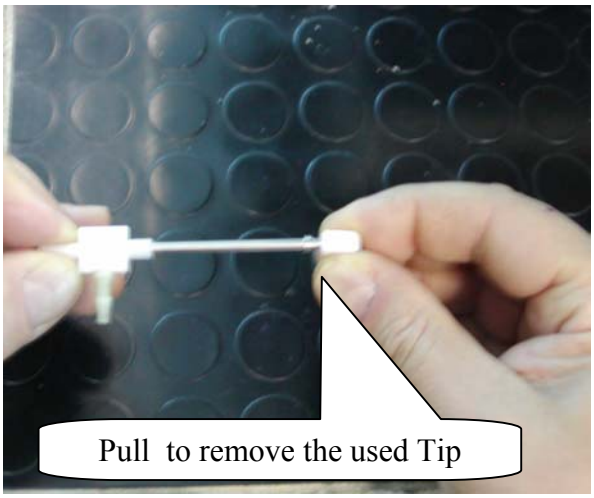


Fig. 8

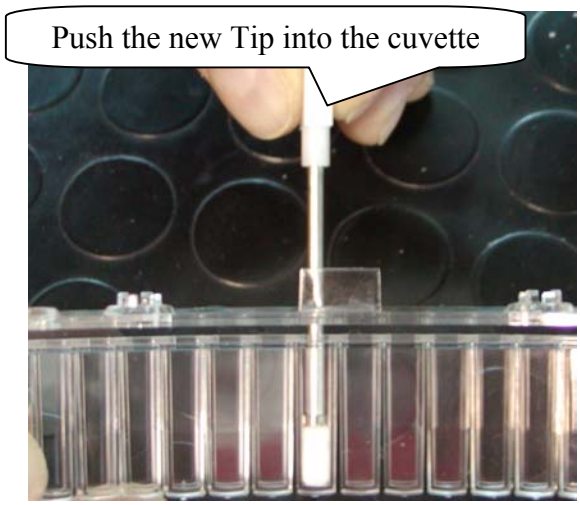


Fig. 9

7.7 HYDRAULIC CIRCUIT WASHING

During normal use and over time, mold and dust can build up inside the wash bottles and can have a negative effect on the hydraulic circuit, compromising the correct functioning of the micro-pump and valves. This, in turn, can lead to inefficiency in the sampling probe and cuvette washing system.

For this reason, it is extremely important that the hydraulic circuit be periodically washed. Said cleaning must be thorough and meticulous in order to assure that every trace of mold or residue be removed.

How often the hydraulic circuit must be washed depends on the operating conditions/environment of the single instrument and the quality of the distilled water used in that particular laboratory. The manufacturer recommends thorough washing at least once a month.

It is extremely important that the user not underestimate the risks associated with mold and dust particles. They are to be regarded as a serious hazard as they can be the cause of instrument malfunction.

The hydraulic circuit input cannulas are located inside the bottles on the left side of the *Analyzer*.

7.7.1 HYDRAULIC CIRCUIT - CLEANING PROCEDURE

1) Turn on the *Analyzer*.

2) Prepare a bottle containing 500 ml of a 5% sodium hypochlorite solution

3) Insert the four aspiration cannulas, located inside the liquids bottles, into the bottle containing the sodium hypochlorite solution.

4) Have the instrument carry out a ‘WBL’ cycle and then a ‘Wash cuvettes’ cycle.

5) Wait for fifteen minutes. Clean and dry the three cannulas and then insert them into a bottle containing distilled water.

6) Have the instrument carry out a ‘WBL’ cycle and then a ‘Wash cuvettes’ cycle.

7) Insert the four aspiration cannulas back into their respective bottles. Said bottles should have, in the meantime, been cleaned and filled with a fresh supply of the required solution.

8) Have the instrument carry out a ‘WBL’ cycle and then a ‘Wash cuvettes’ cycle. Check system efficiency by comparing the WBL values and the test results obtained against the laboratory’s quality control values.

7.8 CHANGING THE PERISTALTIC PUMP TUBES

The manufacturer recommends that the Peristaltic Pump tubes be replaced every six months. Said frequency may vary depending on the workload of the individual laboratory. The quality and reliability of these tubes is fundamental to a correct emptying of the cuvettes.

7.8.1 PROCEDURE FOR REPLACING THE PERISTALTIC PUMP TUBES

1. Open the panel located on the right side of the instrument pushing down the looking door(Fig. 1).
2. Unhook the hinged guide by pushing the pin toward to the left (Fig. 2).
3. Pull the tubes off their relative nipples and substitute with new ones (Fig. 2).
4. After having unlooked the hinged guide, disconnect the tubes from their nipples
5. Remount, repeating the above steps, 4 through 2, in reverse order. Turn clock wise the peristaltic pump rotor, in manual way, in order to be sure that tubes are right positioned inside the guide.

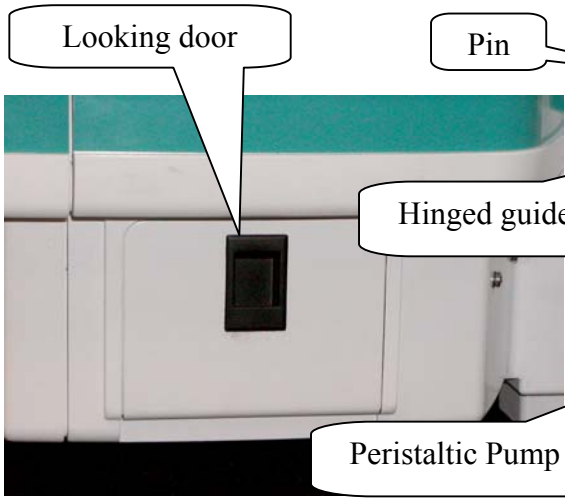


Fig. 1 Instrument right side

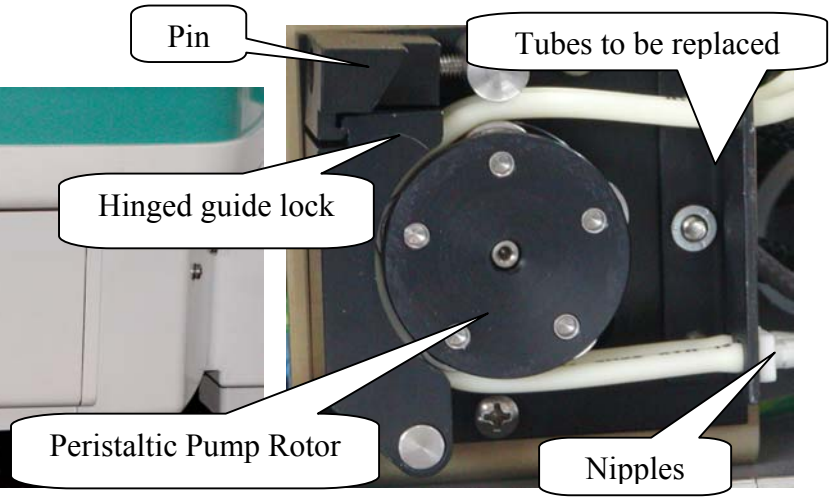


Fig. 2 Peristaltic Pump Assembly

6. Turn on the *Analyzer* and wait until the instrument has reached its proper operating temperature.
7. Have the instrument carry out a 'Wash cuvettes' cycle and then a 'WBL' cycle. Check system efficiency by comparing the WBL values and the test results obtained against the laboratory's quality control values.
8. Make sure that there is no leakage and then close back the panel.

- Always use original replacement parts; never lubricate the peristaltic pump roller bearings.
- After prolonged instrument inactivity: verify the efficiency of the peristaltic pump tubes.

Please note: if the instrument is not able to completely empty the washing well, check the condition of the tube and make sure that there are not obstruction into the hydraulic lines.

7.9 CHANGING THE PHOTOMETER LAMP

The manufacturer suggests that the lamp be replaced after approximately 2000 hours of use.

Figure 2 illustrates the photometer lamp, its support base and its power supply wires. There is a small hole on the lamp base useful for its mechanical alignment. The lamp is mounted on the photometer, which is located on the left-hand side of the reaction plate.

7.9.1 PROCEDURE FOR REPLACING THE PHOTOMETER LAMP

1) Turn off the *Analyzer*.
2) Remove the front panel unscrewing the four anchored screws (Fig. 2).
3) Disconnect the power supply wires from the Lamp Regulator Board by loosening the clamp screws on the M1 connector (Fig. 3).
4) Unscrew the lamp's fastening screw and remove the lamp from its housing (Fig. 3)
5) Replace the old lamp with a new one making sure that the pin is correctly inserted in the alignment hole (Fig. 3). Remount the assembly by repeating the above steps 4 through 1 in inverse order.
6) Turn the *Analyzer* on and wait until the instrument has reached its proper operating temperature.
7) Have the instrument carry out a 'WBL' cycle. Check system efficiency by comparing the WBL values and the test results obtained against the laboratory's quality control values.

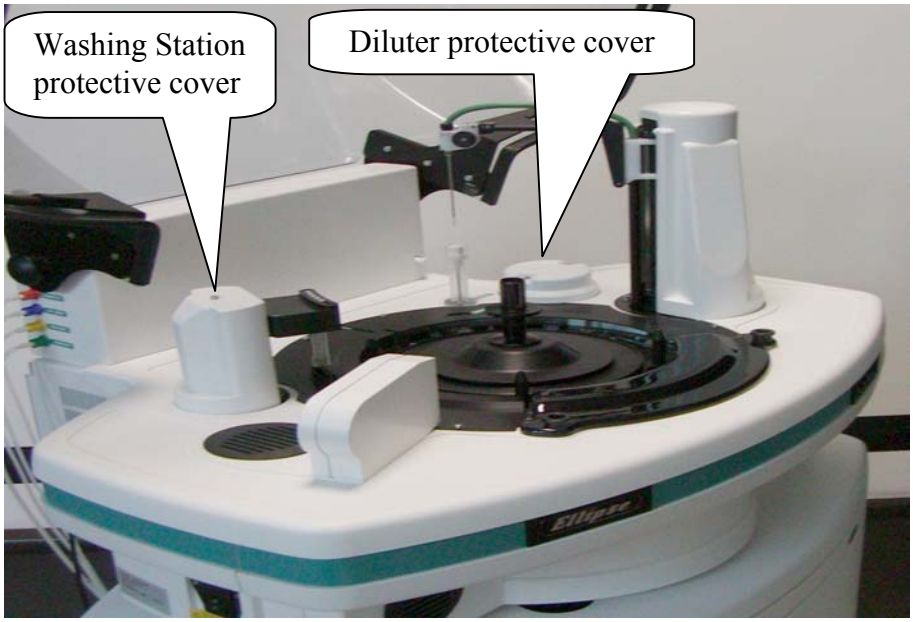


Fig.1 Instrument Top view

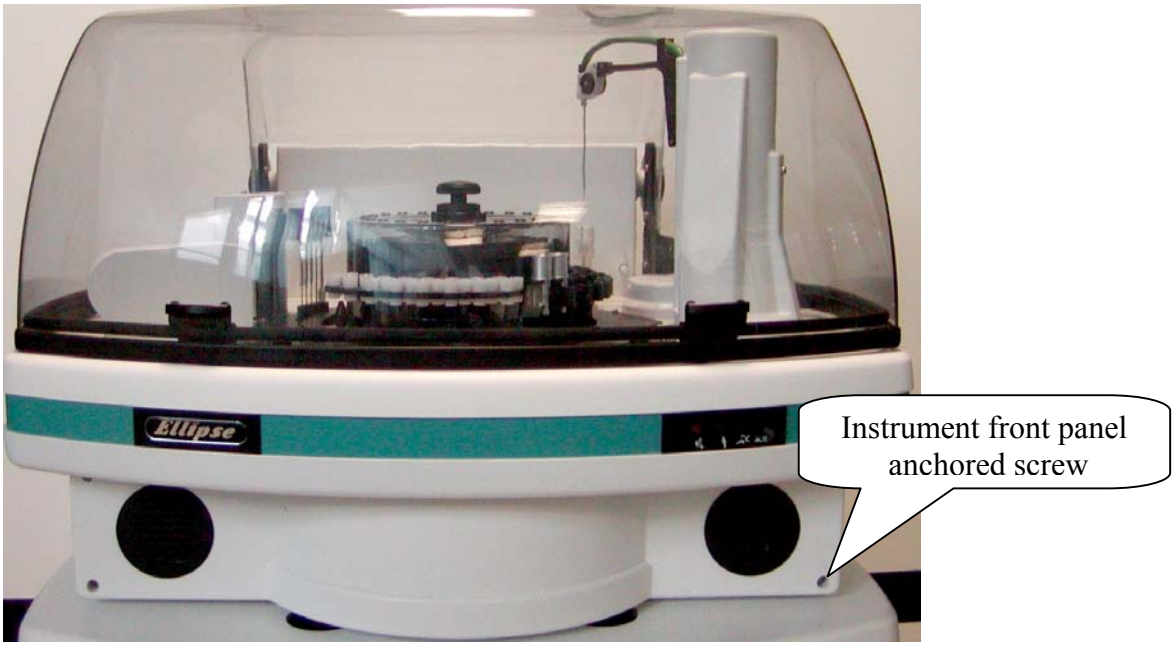


Fig. 2 Instrument front view

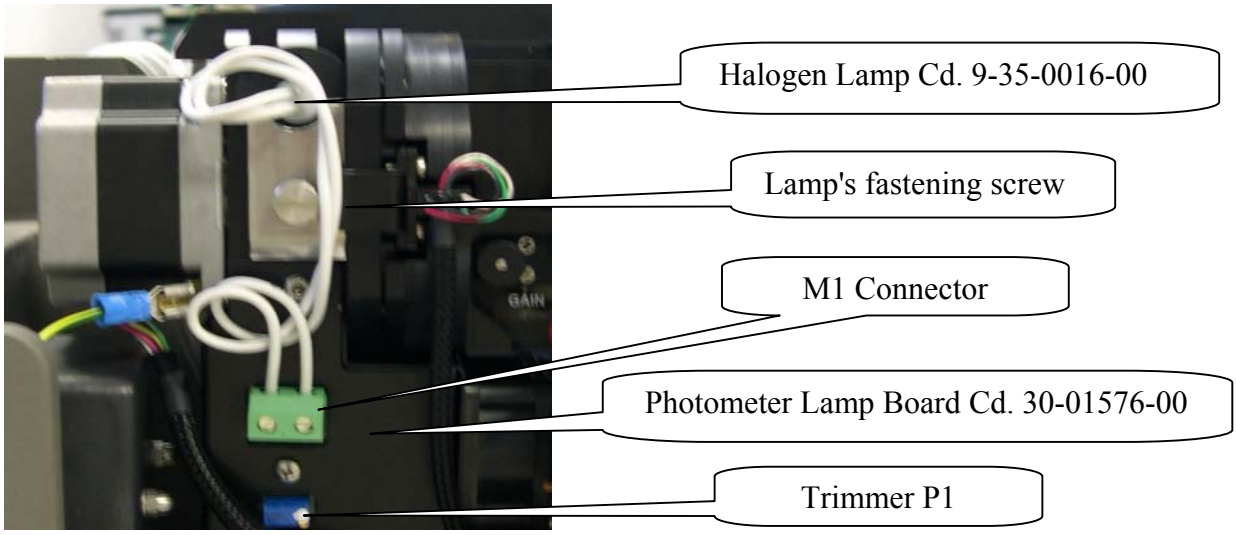


Fig. 3

WARNING! DO NOT TOUCH THE GLASS PART OF THE LAMP WITH YOUR FINGERS!
IF NECESSARY, USE A CLEAN CLOTH TO REMOVE DUST, OR ALCOHOL TO REMOVE MORE STUBBORN DIRT.

7.10 CHANGING THE REACTION CUVETTES

Over time and through normal use the perfect transparency of the cuvettes diminishes. This less-than-perfect transparency has a negative impact on the quality of the optical readings. The manufacturer suggests that the cuvettes be replaced after three months of use. The cuvettes racks are located inside the reaction plate.

7.10.1 PROCEDURE FOR REPLACING THE REACTION CUVETTES

1. Turn on the *Analyzer* and wait until the instrument has reached its proper operating temperature.

2. Click on the change cuvettes rack button  , located under the work program (Please see Chapter 03 – Description of Instrument Software).

3. A pull-down menu will appear. Click on the rack number 1 and then on **OK**, in order to have the selected rack accessible (Fig. 1)

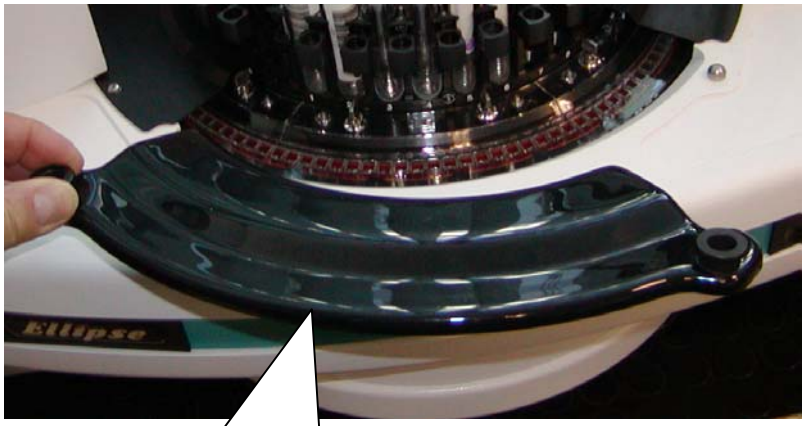


Fig. 1

4. Remove the reaction rack cover from its housing (Fig. 1).
5. Turn the two locking pins making free the reaction rack.
6. Remove the reaction rack from its housing and replace it with a new one (Fig. 2).
7. Make sure to reinsert the new rack **VERTICALLY**. Turn the two locking pins in order to fix the rack. **Be especially careful to not touch the external surface of the cuvettes dedicated to photometric reading.**
8. Repeat the procedure from point 2 to 7 in order to replace the reaction racks from 2 to 6.
9. Have the instrument carry out a 'WBL' cycle. Check system efficiency by comparing the WBL values and the test results obtained against the laboratory's quality control values.

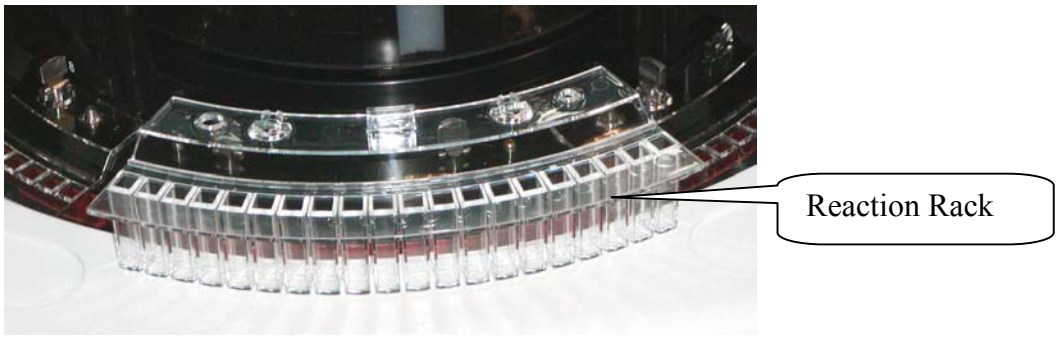


Fig. 2

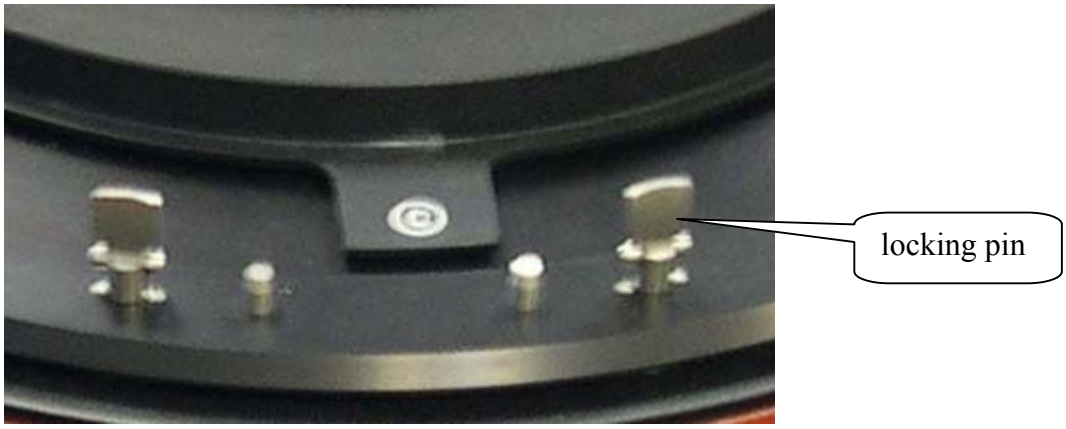


Fig. 3

7.11 CHANGING THE TUBES KIT

Over time and through normal use, the tubes become worn.

The manufacturer suggests that the tubes be replaced at least once a year. These tubes are located inside the instrument to link the Washing Station, the Peristaltic Pump and the Washing Well to the Washing Pump Assembly.

7.11.1 PROCEDURE FOR REPLACING THE TUBES KIT

2. Turn off the *Analyzer*.
3. Unscrew the four screws to remove the panel located on the rear side of the instrument to access the washing pump assembly (Fig. 1 and Fig 2).
4. Replace the tubes following the indications provided in the hydraulic diagram (SI-00571-XX).
5. Turn on the *Analyzer* and wait until the instrument has reached its proper operating temperature.
6. Have the instrument carry out a 'Wash cuvettes' cycle and then a 'WBL' cycle. Make sure that there is no leakage.
7. Check system efficiency by comparing the WBL values and the test results obtained against the laboratory's quality control values.

Fig. 1 Instrument rear view

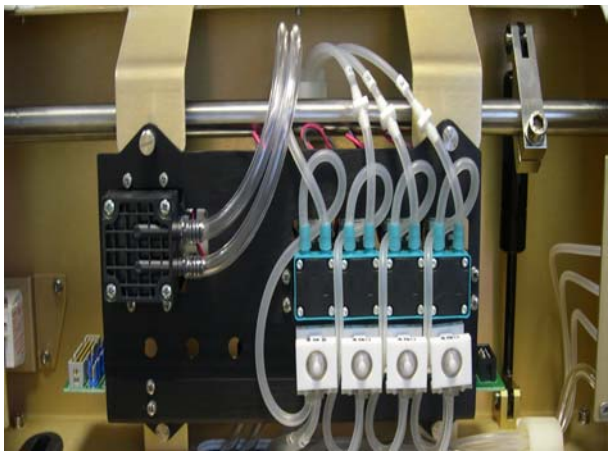


Fig.2 Pumps module

7.12 TABLE C – LIST OF THOSE MAINTENANCE PROCEDURES THAT CAN BE PERFORMED BY THE USER AND/OR BY THE MAINTENANCE TECHNICIAN

PROCEDURE	FREQUENCY (*)	EFFECTUATED BY
CLEANING THE SAMPLING PROBE	DAILY	OPERATOR
CLEANING THE FOUR WASH STATION CANNULAS	EVERY TWO WEEKS	OPERATOR
CLEANING THE WASH SOLUTION BOTTLES	EVERY TWO WEEKS	OPERATOR
REPLACING REACTION CUVETTES	EVERY THREE MONTHS	OPERATOR
CLEANING THE TIP	ONCE A MONTH	OPERATOR
REPLACING THE TIP	AS NEEDED	OPERATOR
REPLACING THE PERISTALTIC PUMP TUBES	EVERY SIX MONTHS	OPERATOR
REPLACING THE PHOTOMETER BULB	AFTER 2000 HOURS OF USE	OPERATOR

PROCEDURE	FREQUENCY (*)	EFFECTUATED BY
REPLACING THE SAMPLING PROBE	AS NEEDED	OPERATOR
CLEANING THE HYDRAULIC CIRCUIT	AS NEEDED	OPERATOR
REPLACING THE TUBES (Tubes Kit)	ONCE A YEAR	MAINTENANCE TECH
REPLACING THE PRE-HEATER AND THE SENSOR LEVEL	AS NEEDED	MAINTENANCE TECH
MECHANICAL ALIGNMENT OF THE SAMPLING ARM	AS NEEDED	MAINTENANCE TECH
REPLACING OR ADJUSTING THE OPTIC SENSORS	AS NEEDED	MAINTENANCE TECH
REPLACING THE BELT	AS NEEDED	MAINTENANCE TECH
REPLACING A MOTOR	AS NEEDED	MAINTENANCE TECH
ALIGNING THE WASH STATION/REACTION PLATE	AS NEEDED	MAINTENANCE TECH
ALIGNING THE REACTION OR REAGENT OR SAMPLE PLATE	AS NEEDED	MAINTENANCE TECH
REPLACING THE PHOTOMETER	AS NEEDED	MAINTENANCE TECH
ADJUSTING THE PHOTOMETER	AS NEEDED	MAINTENANCE TECH
REPLACING THE ELECTRONIC BOARDS/CARDS AND THE MECHANICAL MODULES	AS NEEDED	MAINTENANCE TECH

N. B.: the above-indicated frequency intervals may vary according to the individual instrument's daily workload.

7.13 DECONTAMINATION PROCEDURE

Before replacing any instrument parts, repairing any defective items or performing any instrument maintenance procedure(s), the operator or maintenance technician must carry out the below-described decontamination procedure of the instrument part(s) involved in the operation(s).

This procedure can be performed on:

- the entire *Analyzer*
- those part(s) of the instrument subject to possible contamination

Material necessary

- an *ESOFENOL* solution diluted to 6% (60 cc in one liter of distilled water). *ESOFENOL* is an antibacterial and antiviral substance.
- Rubber gloves
- Mask
- Lab coat

External surfaces and individual parts

➔ Spray the solution all over the instrument, paying particular attention to wetting:

- the sampling arm
- the reaction plate (including the cuvettes)
- the reagent and standard and control plate
- the sample plate (including the racks)
- the instrument chassis

➔ Allow the solution to stand for approximately 30 minutes

➔ Wipe the solution off the instrument and the various components using a sponge dampened with distilled water

Carry out a decontamination of the internal hydraulic circuit.

Hydraulic circuit (Entire Instrument)

- ➔ Fill a container with a 5% sodium hypochlorite solution.
- ➔ Disconnect the three silicon aspiration tubes from the nipples on the caps of their respective tanks.
- ➔ Immerge all three tubes into the container filled with the 5% sodium hypochlorite solution and have the instrument carry out two 'Wash cuvettes' cycles and then two 'WBL' cycles.
- ➔ Remove the three tubes from the 5% sodium hypochlorite solution and immerge them in another container containing the instrument Rinse Solution.
- ➔ Have the instrument carry out one 'Wash cuvettes' cycle and then one 'WBL' cycle.
- ➔ Reconnect the three aspiration tubes to the nipples on their respective tanks.

CHAPTER 08

– HOST COMMUNICATION –

INDEX

8.1 COMMUNICATION WITH THE HOST COMPUTER

The *Ellipse* can be connected to a host computer for the purpose of facilitating results print-out and patient management.

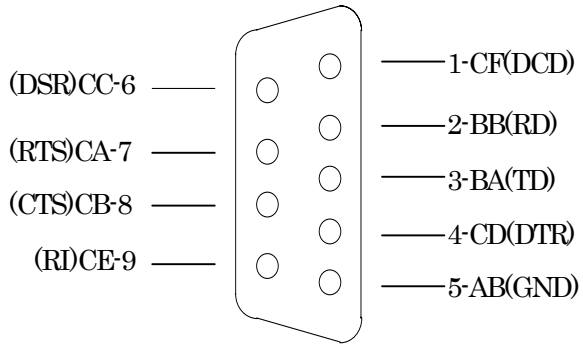
In order to enable communication between the *Ellipse* and the host computer, select the **Host Link** field under **Options** in the **Parameters** menu.

To activate communication between the *Ellipse* and the host computer, select **Host–Tx** (please see the software description in Chapter 03 of the User's Manual)

8.1.1 COMMUNICATION PARAMETERS

Communication parameters can be modified in the *Parameters.ini* file into the Analyzer 140 folder for every need.
The *Ellipse* PC is linked to the HOST computer using RS-232C serial connector having as default communication parameters the following specifications:

- Transmission method : Asynchronous, half duplex
- Baud Rate : 9600 Bit/sec.
- Data bits: : 8
- Parity : None
- Stop bit : 1
- Connector : 9 pin type D (male output from the Ellipse computer)



Serial connector

ELLIPSE PC DB 9 F		HOST PC DB 25 F		HOST PC DB 9 F
3 Txd	⟶	Rxd	3	2
2 Rxd	⟵	Txd	2	3
5 SG	⟶	SG	7	5

8.2 PROTOCOL SPECIFICATIONS

This part of Help (**Protocol Specifications**) contains information for the laboratory computer and analyzer. This exchange of data follows specific **ASTM** protocols:

> **E 1381-95** Standard Specification for Low-Level Protocol to Transfer Messages between Clinical Laboratory Instruments and Computer Systems;
> **E 1394-97** Standard Specification for Transferring Information between Clinical Instruments and Computer Systems.

ASTM uses a number of different terms to indicate the way it groups data.

- **Field:** an individual piece of data often referred to as a data field or a data element.
- **Record:** a number of logically related data fields grouped together to form one part of a complete message.
- **Repeat field:** a data field of the same type as the one immediately preceding it. A delimiter separates one instance of a repeat field from the next.
- **Component field:** part of data field that might contain more than one piece of data.

The default communication configuration for the *Analyzer* is the following: **"9600,N, 8,1"**.

ASTM uses record types that are common and familiar to all laboratory personnel. It uses the following record types:

- **Header Record (H):** contains identifying information about the sending station, conventions that the device uses for field recognition, and the date and time of send station transmission.

- **Patient Record (P):** contains patient information and identification number.
- **Test Order Record (O):** contains information about the assay or requests themselves and includes other data.
- **Result Record (R):** contains information about the outcome of individual tests for an individual patient and follows a sample program record. The results contain the actual measurements derived from the test and a comparison of the individual result to certain ranges specified as norms for the laboratory.
- **Message Terminator Record (L):** although the ASTM protocol supports three additional record types - a Request for Information Record, a Scientific Record and a Manufacturer's Information Record - the *Analyzer* is not implementing these in the first release and will ignore them.
- **Request Information Record (Q):** is used by either clinical instruments or computer systems for a remote request for information from its reciprocal system.

The instrument does not send or accept comment records.

8.3 HEADER RECORD (H)

Field	Field Title	Down Load	Up Load	Max Len	Description and Valid Values
1	Record Type ID	**R**	**A**	1	This is a required field that contains an "H" identifying it as a header record.
2	Delimiters	**I**	**A**	4	The *Analyzer* System uses only the four default values shown here. Delimiters may not be duplicated. The field delimiter follows the escape character to separate the delimiter specification from a subsequent field in the header record. Using default values, the first six characters of the header record will appear using the following characters: H I\^&I Field Delimiter I Repeat Delimiter \ Component Delimiter ^

					Escape Delimiter &
3	Message Control ID	**I**	**N**		
4	Access Password	**I**	**N**		
5	Sender Name or ID	**I**	**A**	**10**	'SHAnalyzer': This is the name of the device that is sending the data.
6	Sender Street Address	**I**	**N**		
7	Reserved Field	**I**	**N**		
8	Sender Tel. Number	**I**	**N**		
9	Characteristics of Sender	**I**	**N**		
10	Receiver ID	**I**	**N**		
11	Comments or Special Instructions	**I**	**N**		
12	Processing	**I**	**N**		
13	**ASTM** Version No.	**I**	**N**		
14	Date and Time	**I**	**A**	14	Date and Time of transmission: formatted as YYYYMMDDHHMMSS. For example: 3:35 PM on March 1, 1995 would be represented using the following characters: 19950301153500.

Legend:		
	R Required	**D** Down Load
	O Optional	**U** Up Load
	I Ignored	**N** Never
	A Always	**S** Sometimes

Example Header Record Layouts (H)

Download	
Host	H I \ ^ I I I HOST I I I I I I I I I19950301153500<CR>
Upload	
***Analyzer* System**	H | \ ^ & | | | SHAnalyzer | | | | | | | | | 19950301154000<CR>

8.4 PATIENT RECORD (P)

Field	Field Title	Down Load	Up Load	Max Len	Description and Valid Values
1	Record Type ID	**R**	**A**	1	This is a required field that contains a "P" identifying it as a patient record.
2	Sequence Number	**R**	**A**	3	This field starts with a "1" for the patient and is incremented by 1 for each additional patient within the transmission.
3	Practice Assigned Patient ID	**R**	**A**	15	This field can be assigned by the instrument with no corresponding download.
4	Laboratory Assigned Patient ID	**I**	**N**		
5	Patient ID No. 3	**I**	**N**		
6	Patient Name	**O**	**S**	36	This field has two components: • Last Name (up to 20 characters) • First Name (up to 15 characters).
7	Mother's Maiden Name	**I**	**N**		
8	Birth Date	**O**	**S**	8	Formatted as YYYYMMDD: For example, a birth date of December 1, 1980 would be represented as: 19801201
9	Patient Sex	**R**	**A**	1	The valid values are: • M for Male • F for Female
10	Patient Race/Ethnic Origin	**I**	**N**		The *Analyzer* System will ignore this field at launch.

11	Patient Address	**O**	**S**	60	For ***Analyzer***, this is a four- component field: • Address (25 characters) • City (25 characters) • State (2 characters e.g.: NY, IT) • Zip (5 characters)
12	Reserved Field	**I**	**N**		
13	Patient Tel Number	**I**	**N**		
14	Attending Physician ID	**I**	**N**		
15	Special Field 1	**I**	**N**		
16	Special Field 2	**I**	**N**		
17	Patient Height	**I**	**N**		
18	Patient Weight	**I**	**N**		
19	Patient Known or Suspected Diagnosis	**I**	**N**		
20	Patient Active Medications	**I**	**N**		
21	Patient's Diet	**I**	**N**		
22	Practice Field No. 1	**I**	**N**		
23	Practice Field No. 2	**I**	**N**		
24	Admission Date and Discharge Date (if desired)	**O**	**S**	8	Admission date only. Formatted as YYYYMMDD.
25	Admission Status	**I**	**N**		
26	Location	**O**	**S**	20	
27	Nature of Alternative Diagnostic Code and classifiers	**I**	**N**		
28	Alternative Diagnostic Code and classification	**I**	**N**		
29	Patient Religion	**I**	**N**		
30	Marital Status	**I**	**N**		

31	Isolation Status	**I**	**N**		
32	Language	**I**	**N**		
33	Hospital Service	**I**	**N**		
34	Hospital Institution	**I**	**N**		
35	Dosage Category	**I**	**N**		

Legend:		
	R Required	**D** Down Load
	O Optional	**U** Up Load
	I Ignored	**N** Never
	A Always	**S** Sometimes

Example Patient Record (P)

	Download
Host	P | 1 | B108K | | | MW5910^Smith | | 19861002 | M | | Park Avenue^New York^NY^10002 | | | | | | | | | | | 20020923 | | Hematology | | | | | | | | |
***Analyzer* System**	P | 1 | B108K | | | MW5910^Smith | | 19861002 | M | | Park Avenue^New York^NY^10002 | | | | | | | | | | | 20020923 | | Hematology | | | | | | | |

8.5 TEST ORDER RECORD (O)

Field	**Field Title**	**Down Load**	**Up Load**	**Max Length**	**Description and Valid Values**
1	Record Type ID	**R**	**A**	1	This is required field that contains an "O" identifying it as an order
2	Sequence Number	**R**	**A**	3	This field starts with "1" for the first Test Order Record and is incremented by 1 for each additional Test Order Record within the record. This will be reset to "1" whenever another patient record is transmitted.
3	Specimen ID	**R**	**A**	15	Although the operator can manually edit this field at any time, the value of this field is usually assigned by the laboratory computer before down loading. The *Analyzer* uses and reports its results based on the assigned specimen ID.

4	Instrument Specimen ID	**I**	**N**		
5	Universal Test ID	**I** **I** **I** **R**	**N** **N** **N** **A**	9	This is a four-component field: • Universal Test ID Code (not used) • Universal Test ID Name (not used) • Universal Test ID Type (not used) • Manufacturer's or local code (6 characters): This is the code defined in the *Analyzer*.
6	Priority	**I**	**N**		
7	Request Ordered Date/Time	**I**	**N**		
8	Specimen Collected Date/Time	**I**	**N**		
9	Collection End Time	**I**	**N**		
10	Collection Volume/Units	**I**	**N**		
11	Collector ID	**I**	**N**		
12	Action Code	**I**	**N**		
13	Danger Code	**I**	**N**		
14	Relevant Clinical Info.	**I**	**N**		
15	Date/Time Specimen Received	**I**	**N**		

16	Specimen Type	**R**	**A**	1	This is a numeric field indicating the type of specimen: The Imm. System uses the following ASCII characters: **0=** Serum **1=** Urine
17	Ordering Physician	**I**	**N**		
18	Physician Tel. Number	**I**	**N**		
19	User Field No. 1	**I**	**N**		
20	User Field No. 2	**I**	**N**		
21	Lab Field No. 1	**I**	**N**		
22	Lab Field No. 2	**I**	**N**		
23	Date /Time Result Reported Last or Modified	**I**	**N**		
24	Instrument Charge	**I**	**N**		
25	Instrument Section ID	**I**	**N**		
26	Record Type	**I**	**A**	1	The field indicates the direction of the transmission: **O** - Down Loading **F** - Up Loading
27	Reserved Field	**I**	**N**		
28	Location or Ward of Specimen Collection	**I**	**N**		
29	Nosocomial Infection Flag	**I**	**N**		
30	Specimen Service	**I**	**N**		
31	Specimen Institution	**I**	**N**		

Legend :	**R** Required	**D** Down Load
	O Optional	**U** Up Load
	I Ignored	**N** Never
	A Always	**S** Sometimes

Example Test Order Record Layouts (O)

	Download
Host	O | 1 | AR102 | | ^^^GLU | | | | | | | | | | | 0 | | | | | | | | | | O | | | | |
***Analyzer* System**	O | 1 | AR102 | | ^^^GLU | | | | | | | | | | | 0 | | | | | | | | | | F | | | | |

8.6 RESULTS RECORD (R)

Field	Field Title	Down Load	Up Load	Max Len	
1	Record Type ID		**A**	1	This is a required field that contains an "R" identifying it as a Results Record.
2	Sequence Number		**A**	3	This field starts with "1" for the first result and is incremented by 1 for each additional result within the record. This will be reset to "1" when the results from another test order record are transmitted to the laboratory computer.
3	Universal Test ID	**I** **I** **I** **R**	**N** **N** **N** **A**	9	This is a four-component field: • Universal Test ID Code (not used) • Universal Test ID Name (not used) • Universal Test ID Type (not used) • Local Manufacturer's or local code (6 characters) this is the code defined in the *Analyzer*.
4	Data or Measurement value		**A**	10	'Data' is a 10-character, floating point field that includes the decimal point. The number of precision point digits will vary according to the test and is configurable on the *Analyzer*.

5	Units of Measure		**A**	6	This is a field for up to 6 characters that the operator defines for analytic measurement.
6	Reference Ranges		**A**	21	This field has two components; one giving the lower limit and the other the upper limit of the range. The format for this field is N^N.
7	Result Abnormal Flags		**A**	2	This field indicates the normal status of the result. The following codes are valid values: L - Below Low normal H - Above High normal LL - Below Panic normal HH - Above Panic normal < - Below absolute low (under linearity) > - Above absolute high (over linearity) N - Normal A - Abnormal E – Edited
8	Nature of Abnormality Testing		**N**		
9	Result Status		**A**	1	The Imm. System currently implements only two valid values: F - final results; V - operator verified/approved result.
10	Date of Change in Instrument Normative Values or Units		**N**		
11	Operator ID		**N**		
12	Date/Time Test Started		**N**		
13	Date/Time Test Completed		**A**	14	Date and Time of test completion: formatted as YYYYMMDDHHMMSS.

14	Instrument ID		**N**		

Legend:	**R** Required **O** Optional **I** Ignored **A** Always	**D** Down Load **U** Up Load **N** Never **S** Sometimes

Example Result Record Layouts (R)

Upload	
Analyzer System	R | 1 | ^^^GLU | 70.97 | UL | 70^105 | N | | F | | | | 20020923114302 |

8.7 MESSAGE TERMINATOR RECORD (L)

Field	Field Title	Down Load	Up Load	Max Len	Description and Valid Values
1	Record Type ID	**R**	**A**	1	This is a required field that contains an "L" identifying it as an Message Terminator Record.
2	Sequence Number	**R**	**A**	1	For a message terminator, this message should always be "1".
3	Termination Code	**R**	**A**	1	This indicates the cause of termination. The following codes are valid values for the *Analyzer* : Null or **N**-normal termination

Legend:	**R** Required **O** Optional **I** Ignored **A** Always	**D** Down Load **U** Up Load **N** Never **S** Sometimes

Example Message Terminator Record Layout (L)

Host	L I 1 I N
***Analyzer* System**	L I 1 I N

8.8 REQUEST INFORMATION RECORD (Q):

Field	Field Title	Down Load	Up Load	Max Len	Description and Valid Values
1	Record Type ID		**A**	**1**	This is a required field that contains a "Q" identifying it as a request.

2	Sequence Number		**A**	**1**	It is always “1”.
3	Starting Range ID Number		**A**	**31**	This field can either be: "ALL" - to mean all demographics and tests being ordered should be sent to the instrument at this time, or can have two components: • Computer system patient ID No. (up to 15 characters); • Computer system specimen ID No. (up to 15 characters).
4	Ending Range ID Number		**N**		
5	Universal Test ID		**N**		
6	Nature of Request Time Limits		**N**		
7	Beginning Request Results Date and Time		**N**		
8	Ending Request Results Date and Time		**N**		
9	Requesting Physician Name		**N**		
10	Requesting Physician Telephone Number		**N**		
11	User Field No. 1		**N**		
12	User Field No. 2		**N**		
13	Request Information Status Codes		**A**	**1**	It is always "O" (requesting test orders and demographics only).

Example Request Information Record Layouts (Q)

	Download To
Analyzer System	H | \^& | | | SHAnalyzer | | | | | | | | | 20020927100402 Q | 1 | ALL | | | | | | | | | | O L | 1 | N

CHAPTER 09 - ERROR SIGNALING AND TROUBLESHOOTING

INDEX

9.1 ERROR SIGNALING

This chapter is dedicated to a description of the **error** signalling which may occur during the programming or carrying out of the various operations. Error signals can be divided into the following two groups:

- ➢ System Errors
- ➢ Result Flags

9.1.1 SYSTEM ERRORS

Whenever a system error is detected, it is signalled via the activation of the below-listed warning lights/buttons:

➢ **Warning** Light: a triangle-shape located in the upper, right-hand portion of the System Monitor screen. It lights up yellow when activated.

If this yellow triangle does light up, the operator need simply click on it to access the relative visual text warning message indicating the cause of the signalled anomaly (said window will open in that area dedicated to viewing data).

Following is a list of possible visual text "Warning!" messages:

- Liquid Alarm I (Rinse Solution)
- Liquid Alarm II (Distilled Water)
- Liquid Alarm III (Cleaning Solution)
- Liquid Alarm IV (Optional Solution)
- Temperature Out-of-Range
- Host Serial Port cannot be opened

➢ **Fatal Error**: an "X"-shape located in the upper, right-hand portion of the System Monitor mask. It lights up red when activated.

If this red "X" lights up, the operator need simply click on it to access the relative visual text message explaining the cause of the Fatal Error (said window will open in that area of the mask dedicated to viewing data).

Following is a list of possible Fatal Error visual text messages:

- Horizontal Arm Error
- Sample Tray Error
- Filter Error

- ADC Error – Sample Channel
- ADC Error – Reference Channel
- Reaction Tray Position Error
- Plate Error (Home sensor not found)
- Vertical Arm error
- Reagent Tray Error
- Wash System Error
- Diluter Error
- Interlock Open while Instrument is running
- Macro send Error
- Overflow Rx Buffer Micro
- Time out Error (Generic error)
- Invalid command error
- Invalid parameter error
- Check sum error

9.1.2 RESULT FLAGS

Result Flags are categorized under the following group headings, Each group is identified by a symbol, as listed here-below:

X	**PHYSICAL ERRORS**
R	**CONCENTRATION ERRORS**
C	**CALIBRATION ERRORS**
A	**OPTIC DENSITY ERRORS**
E	**RESULTS EDITED MANUALLY**
?	**PROGRAMMING ERRORS**

Every Result Flag, signalling an error, is accompanied by a symbol representing the group it is part of. The operator need only click on the small red square ( ) next to the Result Flag symbol to access the visual text message explaining the cause(s) of the signalled error.
In the central column of the following tables, the user will find those symbols which signal the type of error encounter, as used in the print-out of the final report. These symbols can be modified by the operator, in the **Parameters** section, under **print options**.

WARNING! The use of the Error Symbols in the print-out of the results (inclusion and/or exclusion) **IS UNDER THE DIRECT AND SOLE RESPONSIBILITY OF THE USER**

9.1.3 DESCRIPTION OF RESULT FLAGS

➢ X Physical Errors

Temperature Error:	**T**	Reaction temperature (Reaction Plate) is out-of-range.
No Sample	**S**	Either no sample or sample serum quantity below minimum or above maximum level for the declared container.
No Reagent:	**R**	Either no reagent or reagent level below minimum or above maximum level for the declared container.
No Rack:	*****	No Rack present during sampling.

➢ R Concentration Errors

Very Low and Very High:	**L-H**	Flags determined by test results out-of-range as setup in the Methods.
Low Alert and High Alert:	**A**	Flags determined by test results out-of-range as setup in the Methods.
Low and High Linearity Limit:	**G**	Flags determined by test results out-of-range as
Calculation Error:	**C**	Concentration calculation error due to foreseeable causes (Asymptote).

➢ C Calibration Errors

RBL missing:	*	No Reagent Blank Level.
Calibration missing:	*	No Standard or no Calibration curve.
STD Replicate insufficient:	*	Insufficient number of valid Standard Replicates.
STD Replicate outside CV%:	*	Coefficient of Variation Percentage in the Standard Replicates over the set value.
Invalid Calibration:	*	Calibration curve not valid – either because it is not monotonic or because the Fit is above the set value.

➢ A Optic Density Errors

Inversion:	**I**	Reaction direction not in line with that set-up.
End Point Limit:	**P**	Values over the limits setup in the Methods Parameters
Depletion Limit:	**D**	Values over the limits setup in the Methods Parameters.
First Limit:	*	Values over the limits setup in the Methods Parameters.
FIT:	**F**	Values over the limits setup in the Methods Parameters.
RBL out-of-range:	*	Reagent Blank Levels outside the range Setup.
Sample outside Standard:	#	Sample absorbance outside the calibration curve.

➢ E Results Edited Manually

Results Edited:	**E**	This symbol automatically appears whenever the operator has manually modified the obtained results. This operation annuls all the symbols indicating errors which, in this case, will not be viewed.

➢ ? Programming Errors

All those software errors which are deemed unforeseeable are indicated using this symbol.

➢ Result Asterisks

In the event that the following situations and/or error conditions occur, the system will notify the user via a visualization of two asterisks **(**)** in the Results field:

PHYSICAL ERRORS

1 – very little or no sample

2 – very little or no reagent

3 – no rack

CONCENTRATION ERRORS

4 – calculation error

5 – signalling depletion limit

PROGRAMMING ERROR

6 – all cases

In the following situations and/or error conditions, the results field will contain a "0":

1 – if the result is less than zero

2 – if the result is equal to zero

OPTIC DENSITY ERRORS

3 – Flag signalling inversion

9.2 TROUBLESHOOTING GUIDE

PROBLEM	➢ **POSSIBLE CAUSE**	❖ **SOLUTION**
Repeatability of results insufficient	➢ Sample Probe dirty ❖ Clean the Sample Probe as described in Chapter 07 Maintenance ➢ Hydraulic leak and/or air bubble in the hydraulic circuit (sampling) ❖ Check Sample Probe fit ❖ Check the fit of the hydraulic tubes and their connection: if necessary, substitute the tubes and/or adjust their connections/fittings ➢ Wash solution is contaminated. If the wash solution contains contaminating particles (e.g.: mold, dust, lint), these micro-particles can cause errors during the WBL running. ❖ Change the wash solution ❖ Clean the Wash Solution Bottle(s) and carry out the Hydraulic Circuit wash procedure as described in Chapter 07 – Maintenance ➢ Deterioration of the Reagent(s) ❖ Substitute the bad reagent(s) ➢ Reaction cuvettes not dried correctly after being washed ❖ Check the Tip used to dry the cuvettes after washing to make sure it is in good working condition. If necessary, clean the Tip or change it, following the procedure described in Chapter 07 – Maintenance ➢ Light bulb not stable ❖ Light bulb nearing the end of its 2000-hour life cycle duration, or premature deterioration. In both cases, change the light bulb following the substitution procedure described in Chapter 07 – Maintenance.	
Insufficient volume/quantity of the various Rinse, Cleaning and Distilled Water solutions.	➢ This type of problem can present itself either when the instrument is first turned on due to a lack of liquid in one or more bottles, or during test running whenever the involved liquid has been finished ❖ Refill the required bottle. If the instrument is running tests, it will automatically **Pause**. Wait until sampling is suspended, then refill the involved bottle with the required liquid (Rinse/Cleaning/ Distilled Water). Press *Start* to continue running the rest of the programmed tests. This operation will not adversely affect the already run tests.	