ECHO PC

EI0002A

MAINTENANCE MANUAL

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Model	:	Echo PC
Version	:	
Serial Number	:	
Installation Date	:	
Warranty	:	YES / NO
Servicing Agreement	:	YES / NO
Technical Service Address	:	

SUMMARY

ECHO PC ACCESSORY BOX

	EDIF CODE	OLD CODE	
1	EI0703CV1	P10 0000 0023	Halogen lamp (MATE-N-LOCK connector)
1	EI0801B	P10 0000 0008	Tubes kit
1	EI0802A	P10 0000 0010	Sampling and Aspiration Needles kit
1	EI0710A	P10 1000 0001	Reagent bottles 25 ml (27 pos.) pack (30 pcs)
1	EI0711A	P10 1000 0002	Reagent bottle caps 25 ml (27pos.) pack (30 pcs)
1	EI0714A	P10 0000 0003	Needle cleaning filters pack
1	EI0715A	P10 0000 0004	Reaction segments pack (100 pcs)
1	EI0716A	P10 0000 0005	Serum cups pack (1000 pcs)
1	EI0717A	P10 0000 0006	Thermal paper pack (3 pcs)
1	EI0702B	P10 0000 0012	Fuses kit (230V)
1	EI0721A	P10 0000 0017	Water charge bottle
1	EI0722A	P10 0000 0018	Waste bottle
1	EE0203A	S10 2100 0009	Null modem host cable
1	EI0702B	P10 0000 0012	Fuses kit 230V
1	EI1126A		Brief user manual
1	EI0732A		Documentation CD
1	EE0202B		Power cord

MINIMUM QUANTITY OF SPARE PARTS & CONSUMABLES

	EDIF CODE	OLD CODE	
1	EI0703CV1	P10 0000 0023	Halogen lamp (MATE-N-LOCK connector)
	EI0703C	P10 0000 0011	Halogen lamp (old MX396 connector)
1	EI0801B	P10 0000 0008	Tubes kit
		P10 0000 0007	Tubes kit (old cover with vertical diluter)
1	EI0802A	P10 0000 0010	Sampling and Aspiration Needles kit
1	EI0719A	P10 0000 0013	Diluter Syringe

ECHO PC CONSUMABLES & SPARE PARTS

ECHO PC CONSUMABLES

EDIF CODE	OLD CODE	DESCRIPTION	PACK
EI0710A	P10 1000 0001	Reagent bottles 25 ml (27 pos.) pack	30
EI0711A	P10 1000 0002	Reagent bottle caps 25 ml (27pos.) pack	30
EI0712A	P10 0000 0001	Reagent bottles 40 ml (18 pos.) pack	20
EI0713A	P10 0000 0002	Reagent bottle caps 40 ml (18 pos.) pack	25
EI0714A	P10 0000 0003	Needle cleaning filters pack	25
EI0715A	P10 0000 0004	Reaction segments pack	100
EI0716A	P10 0000 0005	Serum cups pack	1000
EI0717A	P10 0000 0006	Thermal paper pack	3
	P10 0000 0007	Tubes kit (old over with vertical diluter)	1
EI0801B	P10 0000 0008	Tubes kit	1
EI0822A	P10 2000 0003	Flow cell (new model, 10 x 10 mm)	1
EI0802A	P10 0000 0010	Sampling and Aspiration needles kit	1
EI0703CV1	P10 0000 0023	Halogen calibrated lamp with support (MATE-N-LOCK connector)	1
EI0703C	P10 0000 0011	Halogen calibrated lamp with support (old MX396 connector)	
EI0701B	nd	Fuses kit (115V)	1
EI0702B	P10 0000 0012	Fuses kit (230V)	
EI0719A	P10 0000 0013	Diluter Syringe complete of plunger	1
EI0832A	P10 0000 0015	Flow cell quartz + O-ring kit (old flow cell)	2
EI0102A	P10 0000 0016	Heating reel	1
EI0721A	P10 0000 0017	Water charge bottle	1
EI0722A	P10 0000 0018	Waste bottle	1

ECHO PC SPARE PARTS

EDIF CODE	OLD CODE	DESCRIPTION	QTY ON BOARD
EI0201A	S1001000001	Optical limit switch	7
EI0202A	S1001000002	Cooling fan for power board	2
EI0244A	nd	Bottom cooling fan	1
EI0203A	S1001000003	Diluter solenoid valve	1
EI0204A	S1001000004	Peltier cell for optics	1
EI0205A	S1001000005	Heating etched foil resistance (outer plate)	1
EI0206A	S1001000006	Heating etched foil resistance (pre-heating reel)	1
EI0207A	S1001000007	Sampling and aspiration needle step motors	2
EI0208A	S1001000008	RP, IP, OP, FS. PM stepper motors	5
EI0210A	S1001000011	Flow cell temperature sensor	1
EI0211A	S1001000010	Outer (reaction) plate temperature sensor	1
EI0212A	S1001000009	Diluter stepper motor	1
EI0213A	S1001000012	Optical pre-amplifier assembly	1
EI0218A	S1001000017 (2)	Boards interconnection flat cable	2
EI0220A	S1001000019	Reagents plate rotating wiring kit	1
EI0222A	S1001000021	Optical signal cable	1
EI0223C	nd	Low-voltage wiring assembly (AMPMODU, MATE-N-LOCK)	1
EI0223B	S1001000022	Low-voltage wiring assembly (old MX396 connectors)	==
EI0224B	S1001000023	High - voltage wiring assembly	1
EI0226A	S1001000025	Stepper motors protection diodes modules	8
EI0301B2 V1	nd	Power board (AMPMODU green connectors)	1
EI0301B2	S1001000026	Power board (MX396 old white connectors)	==
EI0302B1 V1	S1001000027	CPU board	1
EI0302B1	nd	CPU board (old version with CRT controller)	==
EI0214A	S1001000013	Internal printer assembly	1
EI0307B	S1001000028	Power supply transformer assembly	1
EI0401A	S1001000031	Power supply for reagent cooling	1
EI0245B	S1021000013	Level sensor module	1
EI0109C	S10 2100 0012	Internal PC PC104 assembly	1

ERROR AND WARNING MESSAGES

ERROR ON SAMPLING NEEDLE	The home positioning of the sampling needle failed. Check the motor, the limit switch, the mechanics, the electronic drive.
ERROR ON ASPIRATION NEEDLE	The home positioning of the aspiration needle failed. Check the motor, the limit switch, the mechanics, the electronic drive.
ERROR ON REAGENT PLATE	The home positioning of the reagent plate failed. Check the motor, the limit switch, the mechanics, the electronic drive.
ERROR ON INNER PLATE	The home positioning of the sample plate failed. Check the motor, the limit switch, the mechanics, the electronic drive.
ERROR ON OUTER PLATE	The home positioning of the reaction plate failed. Check the motor, the limit switch, the mechanics, the electronic drive.
ERROR ON DILUTER SYRINGE	The home positioning of the diluter syringe failed. Check the motor, the limit switch, the mechanics, the electronic drive.
ERROR ON FILTER WHEEL	The home positioning of the filter wheel failed. Check the motor, the limit switch, the mechanics, the electronic drive.
Error during Auto-Zero: OVER	The autozero value of the black (filter 0) is over 100.0 mV Check the optical preamplifier, try to adjust the offset

RESULT CALCULATION ERRORS AND MESSAGES

RESULT NON -LINEAR	**Result out of linearity** The result exceeds the linearity limit defined in the test programming menu (CHEMISTRY)
BLANK OUT OF RANGE	**Blank absorbance error** The Blank limit defined in the test programming menu (CHEMISTRY) is exceeded
> H or < L	**Result out of the reference range** The result is higher or lower than the reference values that were defined in the test programming menu (CHEMISTRY).
SUBSTRATE DEPLETION	**Result error** Substrate depletion limit that is defined in the test programming is exceeded. Repeat the measurement with pre-diluted sample (RERUN)
ERROR IN READING SMP.xx	**The reaction Optical Density is negative** The OD of the reading is negative, that is the reaction has an absorbance lower than water. It is necessary to repeat the auto-zero or there is a problem in the optics.
ERROR: INVALID STANDARD	**It is not possible to calculate the results** The OD of the standard iz zero
INTERP. ERROR: CURVE	The calibration curve is unusable The curve is not strictly monotonic or the standards are not sorted in increasing order.
ERROR: NULL FACTOR	**It is not possible to calculate the result from the OD** The factor value is zero in the test programming menu (CHEMISTRY).

TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSES
No sampling and no dispensing of reagent and sample	- syringe module not connected - sampling tube broken - sampling tube not connected - pinch valve not functioning
Washing solution not dispensed	- empty bottle - defective valve - control the tubes connections
The syringe has difficulties in filling and / or emptying	- verify the washing solution - verify the valve - control the piston (losses, blocks) - execute a washing of the tubes - disconnect and clean the syringe
Not repetitive analysis	- the sampling probe is dirty - control the washing solution - change the needle cleaning filter - air bubble in the syringe - the flow cell is dirty - the reaction segments reused (**mono use**) - peristaltic pump tube consumed (**change periodically**)
Non constant aspiration in the flow cell	- control the aspiration tube - control the peristaltic pump tube - control the flow cell probe mechanism
Air bubbles in the flow cell	- tube broken or not connected correctly - loss in the flow cell (control the flow cell holder)

TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSES
Autozero error	- flow cell empty - bubbles in the flow cell - losses in the connection tubes - dirty washing solution - halogen lamp expired - halogen lamp burned - peristaltic pump tube
Controls out of range	- compare the method with the control values - respect the correct working conditions and control the method - verify the water used for the reconstruction of the lyophilised reagents, serum controls - verify the reagent preparation in accordance with the instructions of the producer
Aspiration arm going down without aspiration	- control the peristaltic pump tube and eventually substitute the same - control that the tubes are not broken or clogged - control the pump assembly
The instrument is not executing its initialisation	- shut down the instrument and turn it on after few seconds - call the technical assistance
The internal printer is not functioning	- verify the thermal paper, its insert and the absence of blocks

MAINTENANCE DATA SHEET

Daily :

⇨ Check volume in the charge bottle and fill it with distilled water if necessary
⇨ Check volume in the discharge bottle and empty it if necessary.

Caution:
Liquid waste is potentially infectious and can be hazardous to health. It must be disposed of according to national and international instructions for the safe disposal of Bio-hazardous waste.

⇨ Hold on the little wheel to squeeze the silicon tube from the peristaltic pump. (maintenance data sheet n°1)
⇨ Check the level of aspiration and adjust the aspiration step if necessary (maintenance data sheet n°2)
⇨ Check the thermal paper

At the end of the day

⇨ Loose the little wheel to move away the silicon tube from the peristaltic pump (maintenance data sheet n°1)
⇨ Print the patient results and cancel the work list

Every Run:

Check the incubation tubes segment and change it if necessary
Check the filter needle and change it if it is wet or dirty
Check the reagent volume

Weekly :

⇨ Clean the sample plate with non corrosive detergent
⇨ Clean the instrument with non corrosive detergent

Quarterly :

⇨ Clean the charge and discharge bottle with Sodium chloride at 0,1N and rinse carefully (several times) with distilled water

Semi-annual :

⇨ Instrument washing procedure (maintenance data sheet n°3 and n°4)

If needed :

☞ Replace the syringe (maintenance data sheet n°5)
☞ Replace the sample aspiration tubing and needle (heating reel).
☞ Replace the aspiration and peristaltic pump tubing and needle.
☞ Replace the lamp. (maintenance data sheet n°6)
☞ Replace the thermal paper (maintenance datasheetn°7)

ECHO maintenance data sheet N°1

Peristaltic pump activation and deactivation

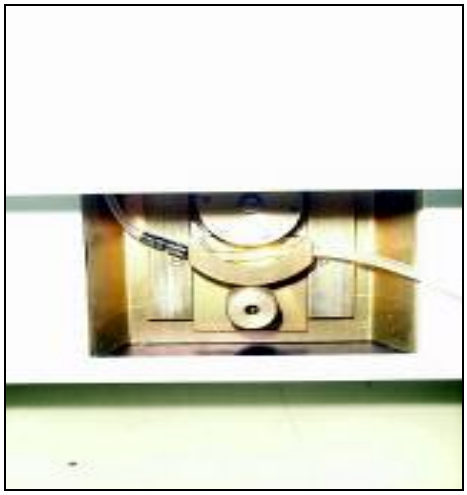
FREQUENCE: Daily

SUBJECT: Prevent the Silicon tube of the peristaltic pump

PROCEDURE :

Deactivation (when the instrument is not used)
Loose the little wheel to move away the silicon tube from the peristaltic pump.

Activation (when the instrument has to operate)
Crush the silicon waste tube on the peristaltic pump by lifting the metal half-moon shaped piece. Hold on to it by turning the little wheel. (see pictures below).



ECHO maintenance data sheet N°2

Aspiration in flow cell level check and adjust

FREQUENCE: After activation of the peristaltic pump to prevent bubbles in flow cell during reading

PROCEDURE:

Check : Check the level of aspiration in the flow cell

RUN 2 WASHING :
From MAIN MENU :
F5 Menu SERVICE
F2 Menu washing
F2 Menu Washes Number of washes : 2

At the end of the procedure check the level of water in the tubing between needle and flow cell.

Adjustment : If the level is too far or too close from the flow cell, change it in

From MAIN MENU :
F5 Menu SERVICE
F1 Menu EDIT PARAMETER

2nd line : Aspiration step Change the value as follow
Decrease the value if the level is too close to the flow cell
Increase the value if the level is too far to the flow cell

Check again and run 2 more washes.

ECHO maintenance data sheet N°3

Washing procedure

FREQUENCE: Semi-annual or if the tubing are colorized

Solution : Alcohol or isopropyl alcohol or sodium hypochlorite solution at 10% (if tubing are coloured)

PROCEDURE:

Remove the Silicon tubing coming from the syringe out of the charge bottle.

Put the tube in alcohol or sodium hypochlorite solution

Run 15 washing :
From MAIN MENU :
F5 Menu SERVICE
F2 Menu Washing
F2 Menu Washes Number of washes : 15

Remove the silicon tube and run wash with air.

Run 2 washes (air)

Put distillated water into the small bottle and insert the tube coming from the syringe inside .

Run 20 washes

NOTES : If you used sodium hypochlorite solution add 20 washes more .

Cautions : the quality of distilled water guarantees the quality of analysis. Use only high quality distilled water

ECHO maintenance data sheet N°4

Flow cell washing procedure

FREQUENCE: as needed in case of dirty or clog flow cell

Solution : Alcohol or isopropyl alcohol or sodium hypochlorite solution at 10% (if tubing are coloured)

PROCEDURE:

Unscrew the fixation of the sample needle (tubing comes from the flow cell) and remove the needle from the arm

Insert the needle in container with alcohol

Run 15 washing :
From MAIN MENU :
F5 Menu SERVICE
F2 Menu Washing
F4 Menu cuvette Wash Number of washes : 15

Remove the needle from the alcohol

Run 2 washes (air)

Insert in distilled water.

Run 10 washes

Replace the needle on the arm and fixed it

Run 6 washing
From MAIN MENU :
F5 Menu SERVICE
F2 Menu Washing
F2 Menu Washes Number of washes : 6

NOTES : If you used sodium hypochlorite solution add 20 washes more

ECHO maintenance data sheet N°5

Replace syringe procedure

FREQUENCE: as needed : if some water is leaking along the syringe plunger or if some big and mobile bubble come close to the Teflon tips or if some water leaks from the needle

PROCEDURE :

Disconnect the tubing on each side of the syringe.
Unscrew the screw (with screw-driver) on the top of the syringe.
Unscrew the plunger fixation on the bottom of the syringe
Put the new syringe in the same position.

Sampling circuit re-charge:

From MAIN MENU :
F5 Menu SERVICE
F2 Menu Washing
F2 Menu Washes Number of washes : 6

NOTES : Sometime syringe cleaning (Teflon tips) is sufficient. Check before changing.

ECHO maintenance data sheet N°6

Replace lamp procedure

FREQUENCE: as needed

PROCEDURE :

Switch the instrument off
Open the h flow cell and lamp hinge
Unscrew the fixation of the lamp
Disconnect the cable.
Install the fixation screw on the new lamp holder

Attention : Do not touch the glass part of the lamp with your fingers. Fat, dust and humidity shorten the life of the lamp and limits function
Install the new lamp and reconnect the optical cable.
Switch on the instrument and **run AUTOZERO** procedure after 20 minutes (lamp pre-heating lag time)

AUTOZERO PROCEDURE:

From MAIN MENU :
F5 Menu SERVICE
F2 Menu Washing
F5 AUTOZERO

The Auto-zero procedure is used to store in memory the autozero values, which are the optical reading values of the distilled water, for all the filters.
If the stored value is different from the previous stored one for more than +/- 5 %, ECHO generates an audio-alarm and waits for a key.
F1 : rerun autozero
ANY ELSE : accept new value
ESCAPE: abort and stop the autozero
Optical reading of the filter n° 1, 3, 4, 5, 6,7 , 8, 9 et 10 has to be between **500 et 1800.**
The Offset optical Reading (F0) has generally around 1.000 (but it's not necessary)
The F3 optical value is 0 (free position no filter)
After changing lamp (and **only in this case**) you can accept the value of the new filter even the value are more than +/- 5% than previous one.
Rerun the autozero procedure to be sure that the optical density are stable.

NOTES : the instrument runs an autozero at each run procedure ; if the new values are different for more than 5% than the previous one do not accept before check :

- The level and quality of distilled water in charge bottle
- The aspiration level in the flow cell
- There is no bubble in the flow cell
- The flow cell is in correct position (push on the top of the flow cell)
- The flow cell isn't dirty
- The lamp function

If the optical value are 0 the lamp is out of order

ECHO maintenance data sheet N°7

Procedure for the change and feed of the paper

FREQUENCE: if needed

PROCEDURE :

Lift up the protection cover of the instrument
Lift up the cover of the paper holder
Take the new paper roll and lift up the initial ending
Position the paper roll into the holder and introduce the paper ending into the access hole of the printer
On the keyboard press CLR+FEED to start the mechanism of the paper moving
If necessary push the paper towards the mechanism until it hooks the paper properly.

ECHO maintenance data sheet N°8

Optical reading test and adjust procedure

FREQUENCE: if needed : when the optical value of autozero does not seem stable or when one value has to be adjusted

PROCEDURE :

Unscrew the fixation of the sample needle (tubing comes from the flow cell) and remove the needle from the arm

Insert the needle in container with distilled water

Run OPTICAL READING TEST :

From MAIN MENU :
F5 Menu SERVICE
F2 Menu Diagnostics
F4 Menu Reading test

Follow the instruction given by the instrument

Press a key to aspirate distilled water
Select a filer
Read the optical value in mV
The value have to be stable

Remove the needle from the distilled water
Replace the needle on the arm and fixed it

TO ADJUST THE GAIN OR THE OFFSET CALL THE TECHNICAL SERVICE.

ECHO MAINTENANCE Month :

DAILY MAINTENANCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Activate the peristaltic pump																															
Fill up the charge bottle with D. water																															
Empty the discharge bottle																															
Check and adjust the aspiration step																															
Check the thermal printer																															
Deactivate the peristaltic pump																															
Technician initials																															

WEEKLY MAINTENANCE	Date	Date	Date	Date
Check the syringe				
Sample plate washing				
Instrument washing				
Technician initials				

QUARTERLY MAINTENANCE	Date
Charge bottle washing	
Discharge bottle washing	
Technician initials	

SEMI-ANNUAL MAINTENANCE	Date
Instrument tubing washing	
Technician initials	