

Operating Instructions and Service Manual

Xdc-96Pro Decapper-Recapper



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1. WARNINGS

Please read the following before unpacking or using the unit.

- i. Check voltage before switching ON the Xdc-96pro.
- ii. Only use fuses of the type and current rating specified. Do not use repaired fuses. Do not short-circuit the fuse holder.
- iii. The supplied power cord must be inserted into a power outlet with a protective earth contact (ground). When using an extension cord, ensure the cord also has an earth contact.
- iv. Do not change the external or internal grounding connections. Tampering with, or disconnecting these connections could endanger you and/or damage the Xdc-96pro. The Xdc-96pro is properly grounded in accordance with these regulations when shipped.
- v. Changes to the electrical connections or to the chassis of the Xdc-96pro are not required to ensure safe operation.
- vi. Do not turn the Xdc-96pro on if you suspect that it has incurred any kind of electrical damage. Instead disconnect the power cord and contact a FluidX representative for a product evaluation. Do not attempt to use the Xdc-96pro until it has been evaluated. Electrical damage may have occurred if the Xdc-96pro shows visible signs of damage, or has been transported under severe stress.
- vii. Damage can also result if the Xdc-96pro has been stored for prolonged periods under unfavourable conditions (e.g. subjected to heat, water, etc.).
- viii. Always disconnect the power cord before attempting any type of maintenance. Capacitors inside the Xdc-96pro may still be charged even if the Xdc-96pro is turned off.
- ix. The Xdc-96pro includes a number of integrated circuits. These circuits may be damaged if exposed to excessive line voltage fluctuations and/or power surges.
- x. Never try to repair or replace any components of the Xdc-96pro not described in this manual without the assistance of a FluidX representative.

1.1 SYMBOLS

The following symbols are used within this manual:



Do not touch



Warning, check the manual



High Voltage

2. APPLICABLE RULES

73/23/CEE	Low Voltage Rule
89/336/CEE	Electromagnetic Compatibility Rule
93/68	Rules modification 73/23 e 89/336 CEE

3. GENERAL SPECIFICATIONS

- i. The Xdc-96pro is a decapper/recapper, designed for use with racked tubes supplied by FluidX®, Matrix Technologies®, Micronic® and Abgene®.
- ii. The decapper/recapper will have been configured for use with a specific rack model by a qualified technician.
- iii. The Xdc-96pro can decap and then either dispose of the caps or recap the tubes. A purge option allows the Xdc-96pro to decap and/or recap in an inert atmosphere.
- iv. The instrument can be controlled using a PC, connected via the RS 232 interface, or by using a control panel found at the front of the unit.

4. TECHNICAL SPECIFICATIONS

DIMENSIONS	Control Module Height Width Depth Power Cable Length	350mm 215mm 680mm 2m
WEIGHT	Control Module	15kg
ENVIROMENTAL	Operative Temperature Relative Humidity (not condensing)	15 - 35 °C 5 - 85 % Max.
POWER SUPPLY	Line Voltage Frequency Power	115 - 230 +/-10% Vac 50/60 Hz 160 VA
PURGE VALVE	Pressure Limit Pneumatic Interface	1 BAR (15 PSI or 100 Kpa) Rapid connector tube Ø 4 mm

5. EQUIPMENT DESCRIPTION

Xdc-96pro consists of the following components:

- Loading zone
- Cap unloading zone
- Command panel
- Connection panel
- Mechanical interface

5.1 LOADING ZONE

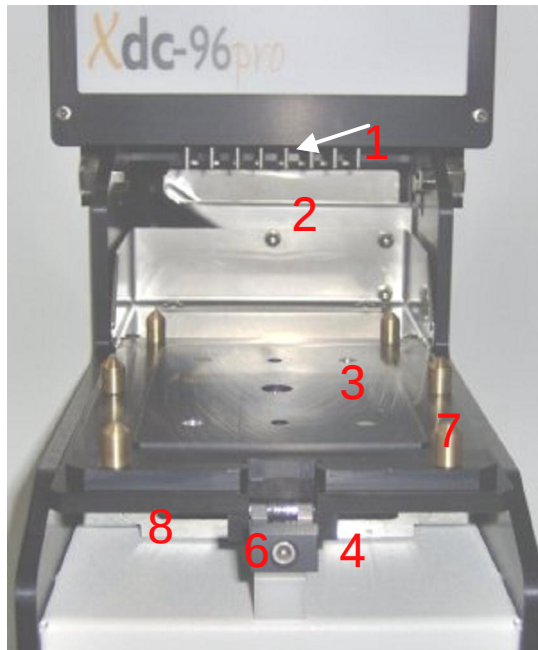


FIG 2.1



FIG 2.2

- The loading zone is composed of:
 - Eight spray nozzles (Fig 2.1 - 1)
 - Caps disposal chute (Fig 2.1 - 2)
 - Mechanical holder (Fig 2.1 - 3 or Figure 2.2 - 3)
 - Locking tooth (Fig 2.1 - 4 / 2.2 - 5, details on Fig 2.8 to 2.10)
 - Locking screw (Fig 2.2 - 5)
 - Locking tooth screw (Fig 2.1 - 6)
 - Rack alignment cones (Fig 2.1 - 7)
- Rack sliding movement (Fig 2.1 - 8)
 - The loading zone is defined by six alignment cones. The mechanical configuration (e.g. adapter, teeth) for the rack type to be used will be positioned in advance.
 - The rack to be decapped/recapped is inserted between the six alignment cones.
 - At the beginning of the run, the rack will slide inside the unit from the loading position and into the decap/recap area. The rack is then locked into position.

- d. At the end of the run the rack is returned to the loading position and the lock is automatically released.
- e. A series of spray nozzles can be used to add inert gas into the decap area and tubes. This can be performed after decapping or prior to recapping.

5.2 CAP UNLOADING ZONE

- i. The outlet for the removed caps (for disposal rather than recapping) is found on the right side of the Xdc-96pro.



FIG 2.2A

- ii. During the decap (with cap disposal) procedure, or cap disposal only procedure, the caps are removed from the unit via a waste chute which leads to the unloading hole (see Fig 2.2A).

WARNING



To prevent caps scattering place a collecting box under cap unloading zone.

5.3 COMMAND PANEL

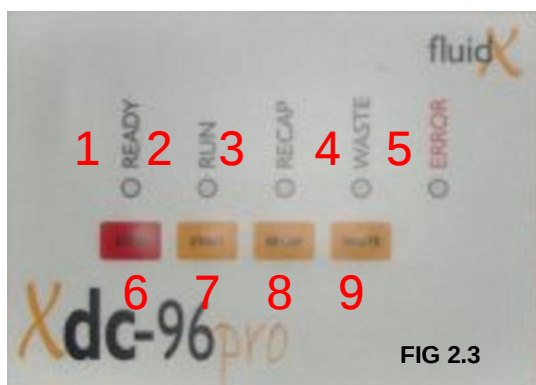


FIG 2.3

- i. The command panel consists of five LEDs, which indicate the unit status, and four keys, used to manage the decap/recap/cap disposal procedures or commence a purge procedure.
- ii. The command panel is made up of:
 - READY LED (Fig 2.3 -1)
 - RUN LED (Fig 2.3 -2)
 - RECAP LED (Fig 2.3 -3)
 - WASTE /disposal LED (Fig 2.3 -4)
 - ERROR LED (Fig 2.3 -5)
 - STOP Key (Fig 2.3 -6)
 - START Key (Fig 2.3 -7)
 - RECAP Key (Fig 2.3 -8)
 - WASTE Key (Fig 2.3 -9)

5.4 CONNECTION PANEL

- i. The connection panel is composed of:
 - Inert gas inlet (see Fig 2.4 - 1)
 - Fuse and Voltage selector box (see Fig 2.4 – 2)
 - Power switch ON/OFF (see Fig 2.4 – 3)
 - Power connector (see Fig 2.4 – 4)
 - RS 232 serial port (see Fig 2.4 - 5)
 - I/O Remote control interface (see Fig 2.4 – 6).



FIG 2.4

6. CONFIGURING THE XDC-96PRO FOR USE WITH SPECIFIC RACK TYPES.

- i. The Xdc-96pro is compatible with racked tubes supplied by FluidX, Matrix Technologies, Abgene and Micronic, when used with the appropriate mechanical configuration, including:
 - High, medium and low profile racked tubes from Matrix Technologies and Abgene.
 - High and medium profile racked tubes from Micronic and FluidX.
- ii. Each rack-specific configuration is composed of:
 - Mechanical adapter
 - Spacer for mechanical adapter
 - Locking tooth
 - Spacer for locking tooth

6.1 CONFIGURATION FOR MATRIX TECHNOLOGIES RACKED TUBES.



FIG 2.5

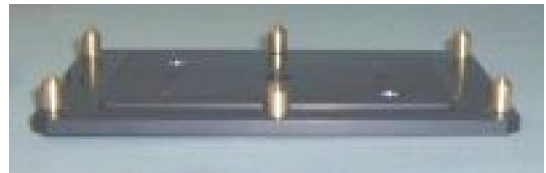


FIG 2.6



FIG 2.7



FIG 2.8



FIG 2.9



FIG 2.10



FIG 2.11

- iii. The mechanical configuration for use with Matrix racks consists of:
- Mechanical holder (see Fig 2.4/2.5)
 - Mechanical adapter, medium profile rack configuration (see Fig 2.6 – 2)
 - Mechanical adapter, low profile rack configuration (see Fig 2.6 – 1)
 - Locking tooth spacer, medium profile rack configuration (see Fig 2.7)
 - Locking tooth spacer, low profile rack configuration (see Fig 2.8)
 - Locking tooth for use with Matrix racks (see Fig 2.10-2.11).

iv. Matrix Technologies rack specifications

TABLE 1

RACK PROFILE TYPE (HEIGHT)	HOLDER HEIGHT (SCREW)	ADAPTER HEIGHT	LOCKING TOOTH HEIGHT (SCREW)	LOCKING TOOTH SPACER
HIGH (29,40) 1.4 ml sepra seal	5.9 (TCC M4x06)	--	12 (TCEI M3X12)	--
MEDIUM (29,40) 0.7 ml sepra seal	5.9 (TCC M4x16)	10.4	12 (TCEI M3X22)	10.4
LOW (14,60) 0.4 ml sepra seal	5.9 (TCC M4x30)	23.1	12 (TCEI M3X35)	19.7

Heights are in mm - Screws are in metric units

TCC : Cross-tip screw with cylindrical head

TCEI : Allen screw with cylindrical head

6.2 CONFIGURATION FOR FLUIDX AND MICRONIC RACKED TUBES.



FIG 2.12

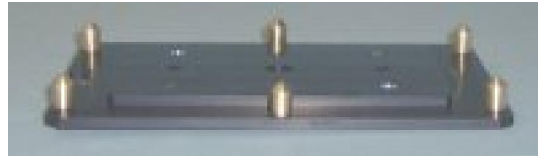


FIG 2.13



FIG 2.14



FIG 2.15



FIG 2.16

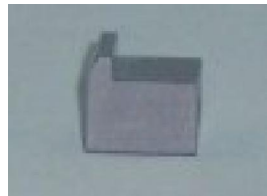


FIG 2.17



FIG 2.18

Mechanical configuration for use with FluidX and Micronic racks consists of:

- Mechanical holder for FluidX and Micronic racks (see Fig 2.12/2.13)
- Mechanical adapter, medium profile rack configuration (see Fig 2.14/2.15)
- Locking tooth spacer, medium profile rack configuration (see Fig 2.16)
- Locking tooth for use with FluidX and Micronic racks (see Fig 2.17/2.18).

v. FluidX and Micronic rack specifications.

TABLE 2

RACK PROFILE TYPE (HEIGHT)	HOLDER HEIGHT (SCREW)	ADAPTER HEIGHT	LOCKING TOOTH HEIGHT (SCREW)	LOCKING TOOTH SPACER
HIGH (28.30) 1.4 ml	6.5 (TCC M4x07)	--	14.9 (TCEI M3X16)	--
MEDIUM (11) 0.65 ml	6.5 (TCC M4x25)	18.1	17.9 (TCEI M3X25)	8.9

Heights are in mm - Screws are in metric units

TCC: Cross-tip screw with cylindrical head

TCEI: Allen screw with cylindrical head

6.3 CONFIGURATION FOR ABGENE RACKED TUBES.



FIG 2.19

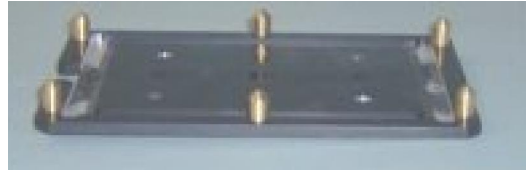


FIG 2.20

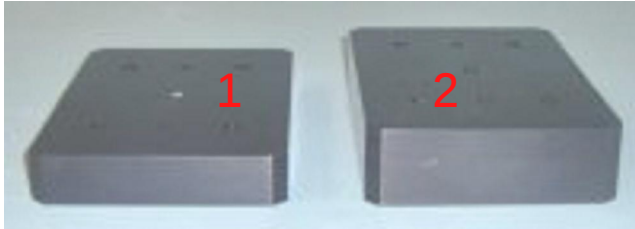


FIG 2.21

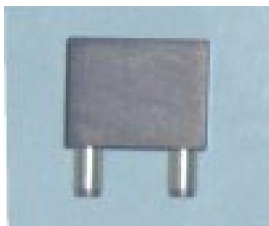


FIG 2.22



FIG 2.23



FIG 2.24



FIG 2.25

vi. Mechanical configuration for use with Abgene racks consists of:

- Mechanical adapter (see Fig 2.17/2.18)
- Spacer for mechanical adapter, medium profile rack configuration (see item 1 of Fig 2.19)
- Spacer for mechanical adapter, low profile rack configuration (see item 2 of Fig 2.19)
- Spacer for locking tooth, medium profile rack configuration (see Fig 2.20)
- Spacer for locking tooth, low profile rack configuration (see Fig 2.21)
- Locking tooth for use with Abgene racks (see Fig 2.24-2.25)

Note. The same locking tooth is used for racks provided by Abgene and Matrix Technologies

vii. Abgene rack specifications

TABLE 3

RACK PROFILE TYPE	HOLDER HEIGHT (SCREW)	ADAPTER HEIGHT	LOCKING TOOTH HEIGHT (SCREW)	LOCKING TOOTH SPACER
HIGH (31.70) 1.4 ml	4.0 (TSC M4x08)	--	12 (TCEI M3X12)	--
MEDIUM (16.60) 0.75 ml	4.0 (TSC M4x25)	17.3	12 (TCEI M3X25)	11.5
LOW (16.60) 0.5 ml	5.9 (TSC M4x35)	26.7	12 (TCEI M3X35)	20.9

Heights are in mm - Screws are in metric units

TSC : Cross-tip screw with cone-shaped head

TCEI: Allen screw with cylindrical head

7. UNPACKING AND PRELIMINARY OPERATION



Use care when unpacking the unit.

- i. First check the integrity of the box to establish whether external damage occurred in transit. If damage is seen please inform your supplier and keep the box as evidence.
- ii. When the Xdc-96pro has been unpacked, check the integrity of the instrument and ensure that all the accessories are provided (compare with delivery note enclosed). Please advise your supplier of any discrepancies.

7.1 INSTALLATION

- i. After unpacking, position the system on a benchtop and ensure that the correct voltage is selected (see Voltage Selection section) and connect cables (see Electrical Connections section).
- ii. The Xdc-96pro is supplied with the mechanical adapter and locking tooth required for use with high profile racks in position. The user must install the following items if medium or low profile racks are to be used:
 - The mechanical adapter is secured beneath the holder, using the screw supplied (see table 1-3)
 - The locking tooth spacer is also secured with a supplied screw (see table 1-3).
- iii. Install the adapter and locking tooth while system is switched off, then place rack on the loading point and switch on.

7.2 VOLTAGE SELECTION



- i. Ensure that the Xdc-96pro is not connected to the main power.
- ii. A connection panel is situated on the reverse of the Xdc-96pro (see Fig 2.3). The voltage required is written in white.
- iii. The decapper is normally set on 230V but can be easily changed to use either 110 or 230V.
- iv. To change voltage:
 - Switch off the equipment.
 - Unplug the power cable.
 - Open fuse box with a screwdriver.
 - With the same screwdriver, extract the fuse compartment.
 - Replace the two fuses with fuses of the required amperage. See table over.

TABLE 4

Power voltage	Fuse Type (EN 60127
115 V	0,8 A T
230 V	0,5 A T

- Insert the fuse with the correct voltage at the top.
- Close the fuse box by pressing gently.
- The selected voltage can be read if the fuse compartment is correctly inserted.
- Plug in the power cable.

7.3 ELECTRICAL CONNECTIONS

- Follow these instructions when connecting.



Warning



Check that the unit is switched OFF

- Plug power cable in to the Xdc-96pro and then insert into the main power supply.
- If serial mode is desired, use the cable supplied to connect the PC RS232 port to the unit.
- The 15 pin connection can be used to interface the instrument with a system to enable a rack to be loaded onto the adapter.

7.4 PNEUMATIC CONNECTION

- Connect the gas inlet for the purge gas to a suitable gas source. The gas line must be regulated. The inlet pressure must not exceed 1 Bar (15 PSI or 100 Kpa).



WARNING

When installing an external pressure regulator, ensure pressure overload is prevented.

4.5 USE WITH MATRIX TECHNOLOGIES RACK TYPES

- i. The instrument is able to decap and recap caps from three types of storage tube racks supplied by Matrix Technologies.

TABLE 5

TYPE	Rack height (mm)	Tube size (ml)	Cap Type
HIGH	29.40	1.4	Matrix Sepra seal
MEDIUM	29.40	0.7	Matrix Sepra seal
LOW	14.60	0.4	Matrix Sepra seal



FIG 3.1
High profile

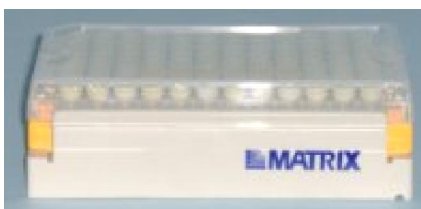


FIG 3.2
Medium profile



FIG 3.3
Low profile

7.6 USE WITH FLUIDX AND MICRONIC RACK TYPES

- i. The instrument is able to decap and recap caps from two types of storage tube racks supplied by FluidX and Micronic.

TABLE 6

TYPE	Rack height (mm)	Tube size (ml)	Cap Type
HIGH	28.30	1.4	Capclusters
MEDIUM	11	0.65/0.75	Capclusters



FIG 3.4
High profile

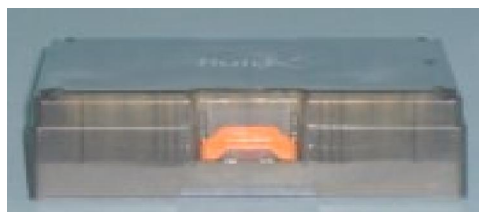


FIG 3.5
Medium profile

7.7 USE WITH ABGENE RACK TYPES

- i. The instrument is able to decap and recap caps three types of storage tube racks supplied by Abgene.

TABLE 7

TYPE	Rack height (mm)	Tube size (ml)	Cap Type
HIGH	31.70	1.4	
MEDIUM	16.60	0.75	
LOW	16.60	0.5	



FIG 3.6
High profile

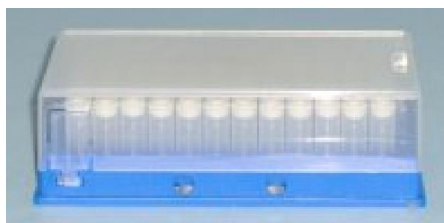


FIG 3.7
Medium profile

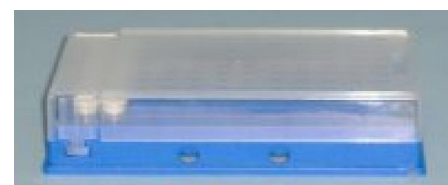


FIG 3.8
Low profile

8. CONFIGURING THE XDC-96PRO FOR USE WITH HIGH, MEDIUM AND LOW PROFILE RACKS.

- i. Initially the unit is usually set up for use with high profile racks.
- ii. To use the Xdc-96pro with medium or low profile racks (from the same manufacturer) only two steps are required:
 - Install the holder, and dedicated adapter, and screw into position.
 - Install associated locking tooth and spacers, and screw into place. (See Table 1.3).
- iii. Once these changes have been made the Xdc-96 pro is ready to use.

8.1 CHANGING CONFIGURATION FOR MEDIUM OR LOW PROFILE RACK USE



WARNING

Xdc-96pro must be turned off before changing configuration.

- iv. To install the mechanical configuration for use with either medium or low profile racks:
 - Remove the locking tooth (Symbol X in Fig 3.9/3.10/3.11).
 - Insert the appropriate tooth spacer for medium/low configuration (Fig 3.12 and Table 1.3).
 - Place the locking tooth on the spacer and fsecure with screw provided (Fig 3.13 and Table 1.3).
 - Remove the holder screw from the adapter (Fig 3.14-1) and remove the mechanical holder (Figure 3.15).
 - Insert the spacer required for medium/low profile rack use (Fig 3.16/3.17).
 - Install the holder. Ensure that the holder is installed with the locking tooth housing placed on the same side as the locking tooth (Fig 3.18).
 - Lock holder in position with screw provided.



FIG 3.9

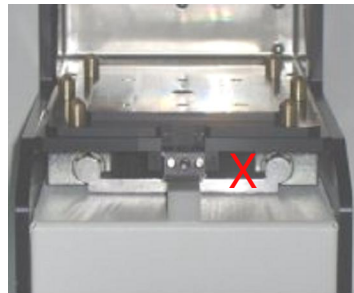


FIG 3.10

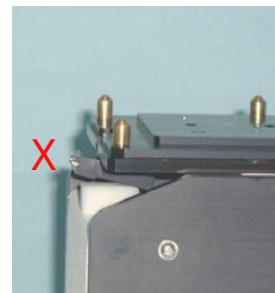


FIG 3.11

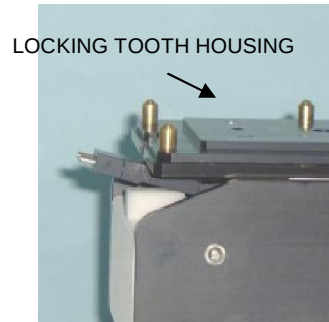


FIG 3.12

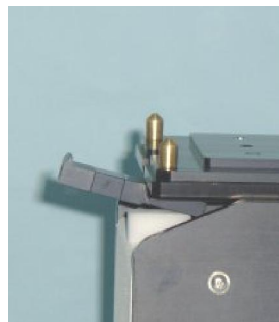


FIG 3.13



FIG 3.14



FIG 3.15



FIG 3.16



FIG 3.17



FIG 3.18

9. RACK PLACEMENT

- i. After completing configuration, place the racked tubes on the adapter without cover.
- ii. The following images show rack positions for high, medium and low profile racks:



FIG 3.19
High profile rack holder ,
ready for use



FIG 3.20
High profile rack holder ,
loading

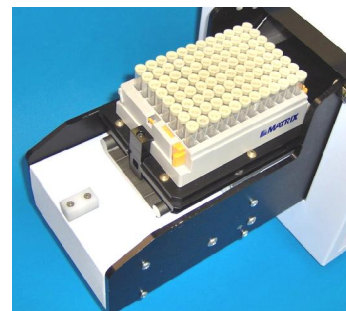


FIG 3.21
High profile rack holder,
lock & run

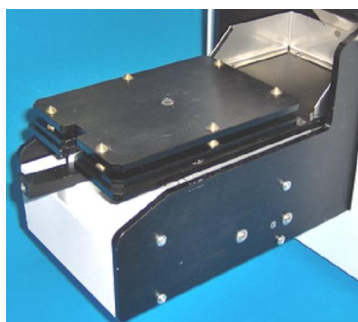


FIG 3.22
Medium profile rack holder,
ready for use

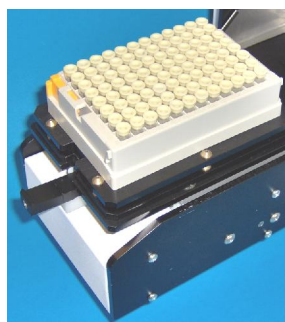


FIG 3.23
Medium profile rack holder,
loading



FIG 3.24
Medium profile rack holder ,
lock & run

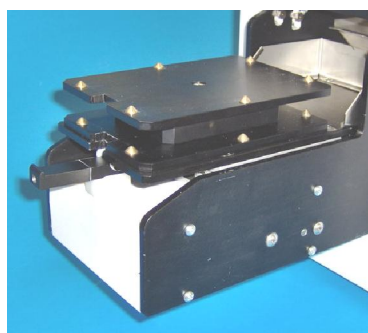


FIG 3.25
Low profile rack holder,
ready for use

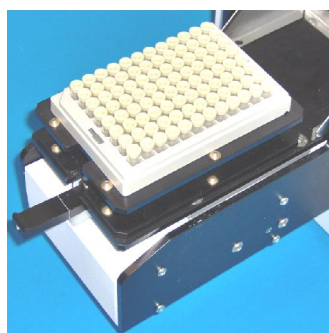


FIG 3.26
Low profile rack holder,
loading



FIG 3.27
Low profile rack holder,
lock & run

10. BASIC FUNCTIONS

- i. The initialising process starts when the instrument is turned on, the “RUN” LED starts blinking. When completed, the Xdc-96pro is ready for use, the “RUN” LED is off and the “READY” and “RECAP” LEDs are on.

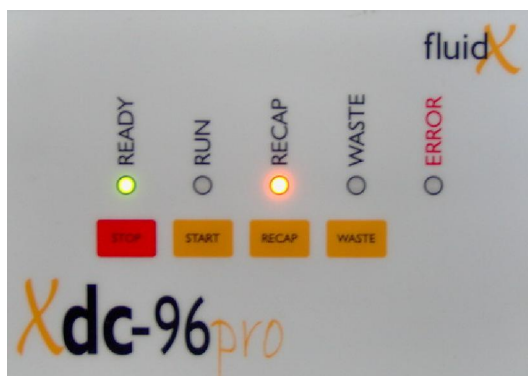


FIG 4.1 Xdc-96pro ready for use with recapping option selected.

10.1 PERFORMING DECAPPING WITH CAP DISPOSAL

- i. After initialising, place rack on rack holder.
- ii. Press “RECAP” key and ensure RECAP LED is off.



FIG 4.2 Xdc-96pro ready for use without recapping option chosen.

- iii. While the procedure is in progress the “READY” LED is off, and the “RUN” LED will be lit.
- iv. At the end of the procedure the rack will be decapped and the caps are disposed of through the window placed at right side of the instrument.

10.2 PERFORMING DECAPPING WITHOUT CAP DISPOSAL

- i. After initializing, place rack on the rack holder.
- ii. Press the “RECAP” key.

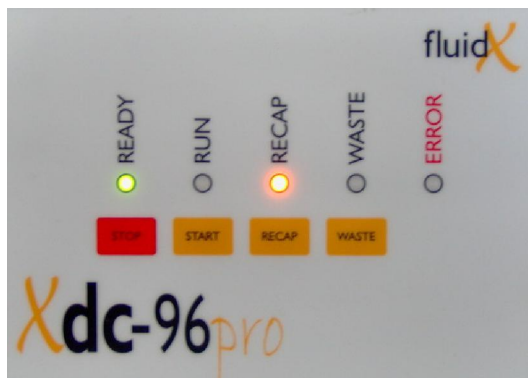


FIG 4.3 Xdc-96pro ready for use with recapping option selected

- iii. Press “START” key to commence decapping procedure.
- iv. The rack is decapped and the caps retained on Xdc-96pro internal harpoons, ready for rack recapping in the future.
- v. The “RECAP” LED will blink to indicate that caps are retained on the internal harpoons.

10.3 TO RECAPPING TUBES

- i. After decapping with recapping option selected the “RECAP” LED will blink and the caps retained on internal harpoons. It is then possible to recap the previously decapped racked tubes.
- ii. Press “START” key to commence recapping procedure.

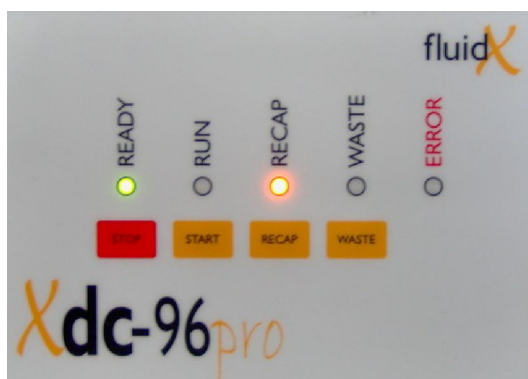


FIG 4.4 Xdc-96pro ready to use with recapping option selected.

- iii. While procedure is in progress, the “RUN” LED will be lit and the “RECAP” LED will blink.

10.4 DISPOSAL OF CAPS AFTER DECAPPING

- i. With Xdc-96 pro ready for use (see Fig 4.1/4.2/4.3) press WASTE key for 2 seconds to start the cap disposal procedure.

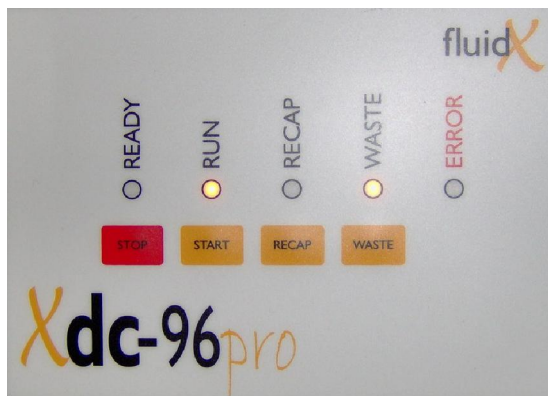


Fig 4.5 Cap disposal procedure running

10.5 PERFORMING A PURGE

- i. With Xdc-96 pro ready to use (see Fig 4.1/4.2/4.3/4.4) press “STOP” key for two seconds to commence purge procedure.
- ii. The procedure will only start if the initial purge time is greater than zero (set by serial interface).
- iii. Purge Ev is activated for the initial purge time.
- iv. During purge process the “RUN” and “WASTE” LEDs will blink.
- v. The purge procedure can be aborted by pressing the “STOP” key for two seconds.
- vi. The initial purge time will be set by a qualified technician, please contact supplier to modify.

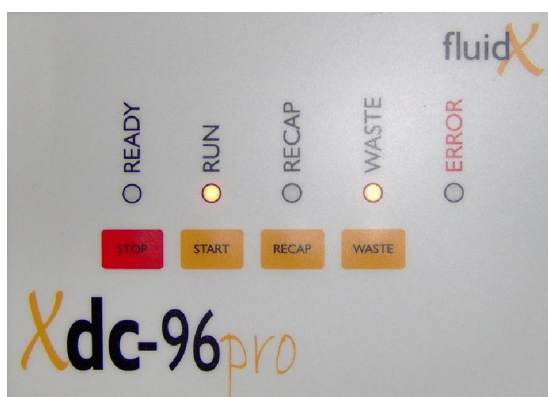


Fig 4.6 Purge process in progress



WARNING Place Xdc-96pro under aspirating hood if gas used is considered dangerous. Use external regulator if gas pressure is too high.

10.6 ERROR INDICATION

- i. The red "ERROR" LED will blink to indicate error detection.
- ii. To cancel press "STOP" key.

10.7 LED STATUS SPECIFICATIONS

- i. Please note that these specifications remain under development.

		LED STATUS				
STATUS	DESCRIPTION	READY	RUN	RECAP	WASTE	ERROR
BOOTING FIRST PHASE	PROGRAM BOOT WAITING PC LINK	OFF	ON	ON	OFF	OFF
BOOTING SECOND PHASE	PROGRAM BOOTING	OFF	OFF	ON	OFF	OFF
INITIALIZE	SYSTEM INITIALIZATION	OFF	BLINK	OFF	OFF	OFF
READY TO RECAP	READY TO RUN	ON	OFF	OFF	OFF	OFF
READY (OPTION RECAP SELECT)	READY TO RUN	ON	OFF	ON	OFF	OFF
READY WAIT RECAPPING	READY TO RUN (CAPS ON HARPOONS)	ON	OFF	BLINK	OFF	OFF
RUNNING (OPTION RECAP)	RUNNING CAP DECAP PROCEDURE	OFF	ON	ON	OFF	OFF
RUNNING (NO OPTION RECAP)	RUNNING CAP DECAP PROCEDURE	OFF	ON	OFF	OFF	OFF
RUNNING PURGE(1) (OPTION RECAPPING)	RUNNING PURGE LINE	OFF	BLINK	ON	BLINK	OFF
RUNNING PURGE(1) (NO OPTION RECAPPING)	RUNNING PURGE LINE	OFF	BLINK	OFF	BLINK	OFF
WASTE RUNNING	RUNNING WASTE PROCEDURE	OFF	ON	ON	OFF	OFF
STOP PRESSED WAITING START (NO OPTION RECAPPING SELECTED)	WAITING START	OFF	QUICK	OFF	OFF	OFF
STOP PRESSED WAITING START (OPTION RECAPPING SELECTED)	WAITING START	OFF	QUICK	ON	OFF	OFF
ERROR DURING RACK IN (OPTION RECAP SELECT)	ERROR CAPS NOT INSERTED	OFF	OFF	ON	OFF	QUICK
ERROR DURING RACK IN (NO OPTION RECAP SELECT)	ERROR CAPS NOT INSERTED	OFF	OFF	OFF	OFF	QUICK
WARNING DURING RACK OUT (NO OPTION RECAP SELECT)	WARNING ON CAPS / VIAL	OFF	OFF	OFF	OFF	SLOW (10 SEC)
ERROR DURING RACK IN (OPTION RECAP SELECT STOP PRESSED)	ERROR CAPS NOT INSERTED (HANDS SAFE SENSOR)	OFF	QUICK	QUICK	OFF	QUICK
ERROR DURING RACK IN	ERROR CAPS NOT INSERTED	OFF	QUICKZ	OFF	QUICK	QUICK

(OPTION RECAP SELECT STOP PRESSED)	(HANDS SAFE SENSOR)					
---------------------------------------	------------------------	--	--	--	--	--

OFF - LED is always off

ON - LED is always on

BLINK - Blink rate ~ 500 msec

QUICK - Fast blink rate ~ 250 msec

SLOW - Slow blink rate ~ 2000 msec

1. Can be activated only if initial purge time is greater than zero.

11. DECAPPING A SINGLE ROW

11.1 SELECTING A ROW TO BE DECAPPED



FIG 5.1



FIG 5.2

- i. The Xdc-96pro can be equipped with a harpoon mechanism able to decap/recap single rows from racks.
- ii. The row to be decapped is chosen by using the selector dial placed on the front end panel (see Fig A.1-1) or by a serial interface command.



WARNING

The caps retained on the harpoons are always recapped to the same row they were removed from.

11.2 DECAPPING A SINGLE ROW WITH CAP DISPOSAL

- i. Placerack on the holder and select the row to decap using the dial.
- ii. With Xdc96-pro ready to use, the procedure is commenced by selecting the recapping option using the "RECAP" key, the "RECAP" LED will be off.
- iii. Press "START" key to commence the decap and waste/disposal procedure for the chosen row.

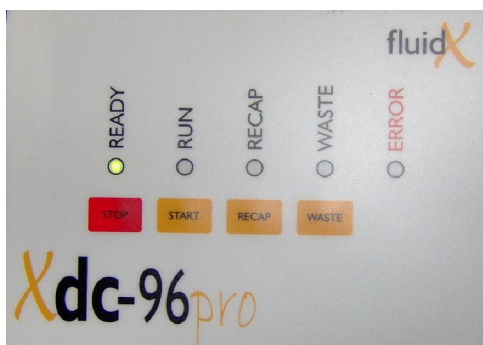


Fig 5.3 Xdc-96pro ready to use

- iv. While running the “READY” LED will be off and the “RUN” LED lit.
- v. At the end of the procedure the selected row is decapped and the caps are disposed of via the window situated at the right side of the instrument.

11.3 DECAPPING A SINGLE ROW WITHOUT CAP DISPOSAL

- i. With Xdc96-pro ready for use set the recapping option by pressing the “RECAP” key.

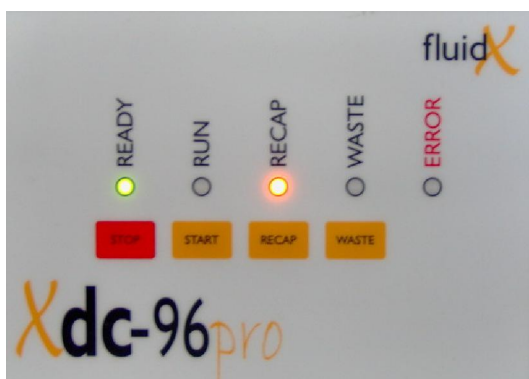


Fig 5.4 Xdc-96pro ready to use with recapping option selected.

- ii. Use the row selector dial to indicate which row to decap.
- iii. Press “START” key to commence the row decapping procedure.
- iv. At the end of the procedure the selected row is decapped and the caps are retained on Xdc-96pro internal harpoons, ready for future row recapping.
- v. The “RECAP” LED will blink to indicate that caps are retained.

11.4 RECAPPING A SINGLE ROW

- i. If the “RECAP” LED blinks to indicate that caps have been retained, it is then possible to recap the rack tube row. The Xdc96-pro will **recap the previously decapped** row.
- ii. Press “START” key to begin the row recapping process.

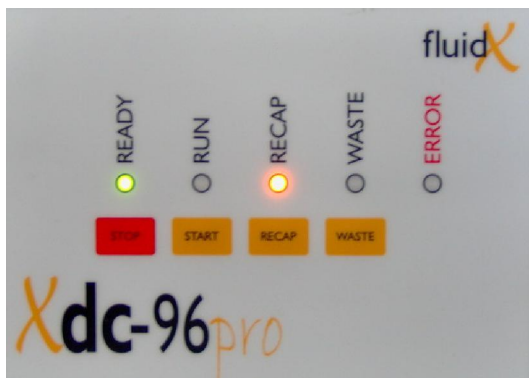


Fig 5.5 Xdc-96pro ready to use with recapping option chosen.

- iii. While recapping is in progress, the “RUN” LED will be lit and the “RECAP” LED will blink.

11.5 DECAPPING A SINGLE ROW WITH CAP DISPOSAL

- i. With Xdc-96 pro ready for use (see Fig 4.1/4.2/4.3) following decapping of a single row, press the “WASTE” key for 2 seconds to commence the cap disposal process.

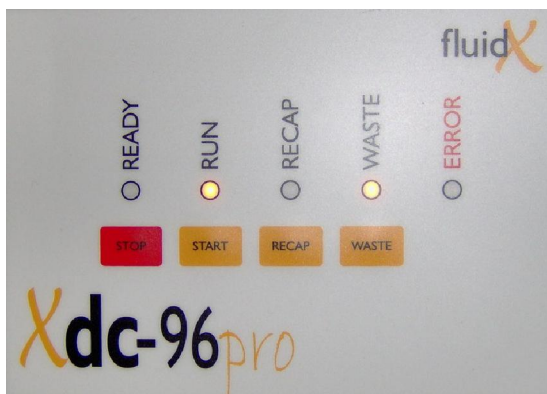


Fig 5.6 Xdc-96pro Cap disposal in progress.

11.6 SINGLE ROW PURGE

- i. With Xdc-96 pro ready for use (see Fig A.3/A.4/A.5) press the “STOP” key for 2 seconds to commence the Purging process.
- ii. Purging will only start if the initial purge time and row purge time are set to more than zero.
- iii. Purge Ev is activated for the initial purge time for room saturation.
- iv. During purging both the “RUN” and “WASTE” LEDs will blink.
- v. The purge procedure can be aborted by pressing the “STOP” key for 2 seconds.
- vi. The initial purge time (“room saturation”) and the row time (“vial saturation”) must be set by a qualified technician. Please contact the supplier to change these settings.

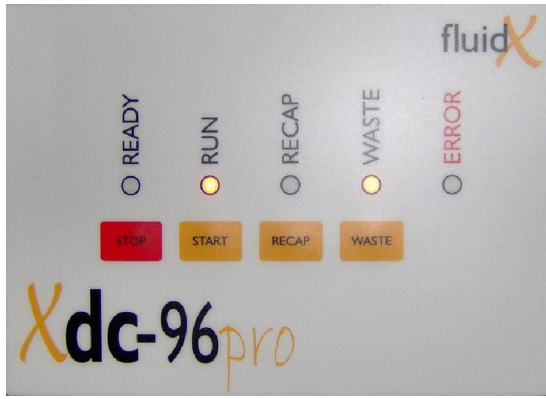


Fig 5.7 Xdc-96pro Purging in progress.



high.

WARNING

Place the Xdc-96pro under an aspirating hood if the gas used for purging is considered dangerous. Use an external pressure regulator if gas pressure is

12. Single Row "Harpoon" type Selection Procedure

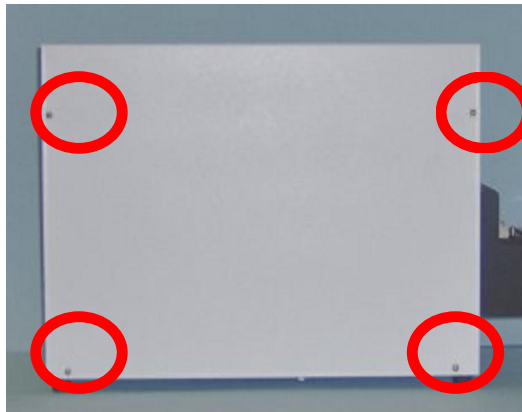


FIG 6.1

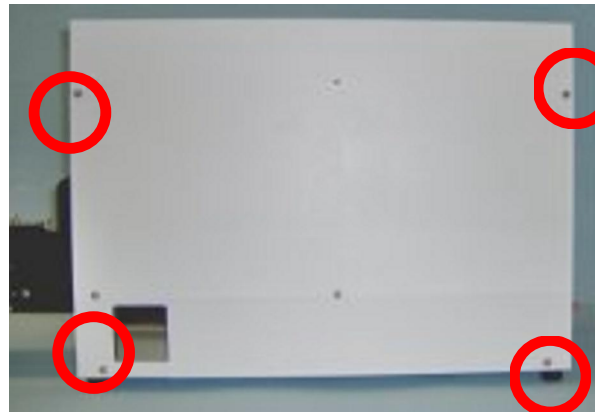


FIG 6.2

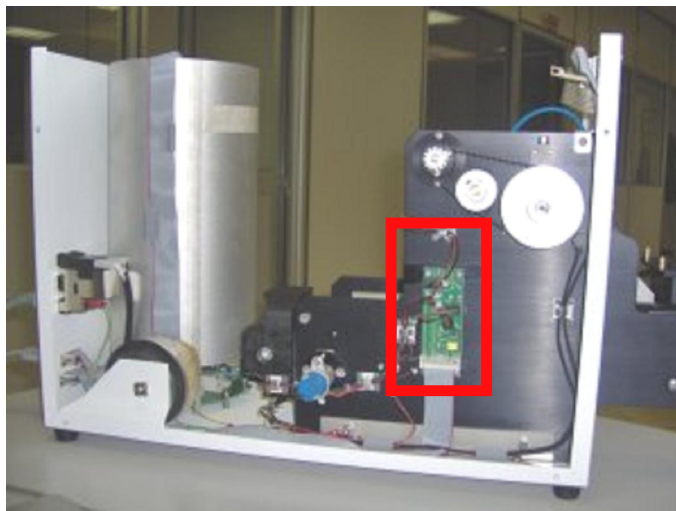


FIG 6.3

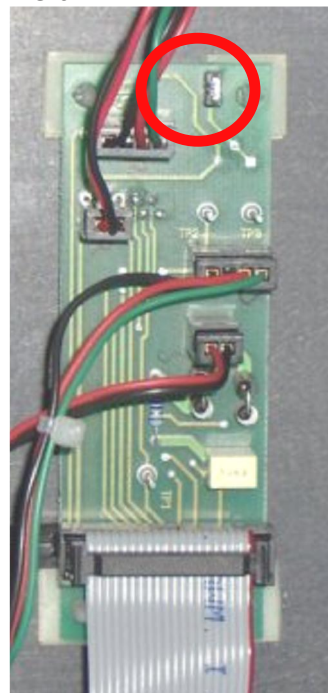


FIG 6.4

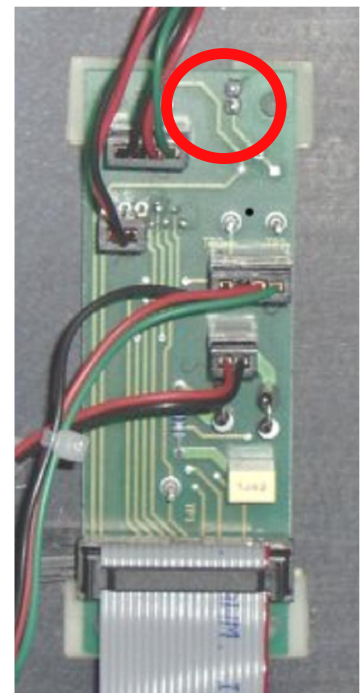


FIG 6.5

- i. The Xdc-96pro is able to decap and recap racked tubes supplied by FluidX, Matrix Technologies, Abgene and Micronic.
- ii. As different internal harpoons are required, two configurations are available. One for use with Matrix and Abgene racks, the other for racks provided by FluidX and Micronic.
- iii. Procedure to modify harpoon configuration:
 - Open the cover of Xdc-96pro and remove screws (Fig 6.1/6.2)
 - Find board in the left side of the system (shown in Fig 6.3)
 - Install/remove the jumper to/from on the board.
- iv. **Matrix/Abgene configuration**
 - Insert the jumper, see Fig 6.4.
- v. **FluidX / Micronic configuration**
 - Remove the jumper, see Figure 6.5.
 - Install the cover of Xdc-96pro, and close it using previously removed screws.

13. DECLARATION OF EU COMPLIANCE



We, fluidx Ltd
Monks Heath Hall Farm
Chelford Road, Nether Alderley
Cheshire SK10 4SY UK

certify and declare under our sole responsibility that the following equipment(s) :

Commercial name: De-Capper Re-Capper
Model name: XDC-96, XDC-96pro, HT 112E

Is (are) in conformity with the requirements of the following Council Directive.

73/23/CEE	<i>LOW VOLTAGE DIRECTIVE</i>
89/336/CEE	<i>ELECTROMAGNETIC COMPATIBILITY DIRECTIVE</i>
93/68	<i>CHANGES IN 73/23 AND 89/336 DIRECTIVES</i>
98/37/EC	<i>MACHINERY DIRECTIVE</i>

The manufacturer HTA s.r.l. and partner fluidX Ltd, guarantees the purchaser against defects of construction of product XDC-96 for 15 months from the shipment and 12 months from the installation date.

The guarantee does not include: consumable materials; damages by shipment; damages by external causes not imputable to the manufacturer; damages by an improper use of the instrument (e.g.: the Operations prohibited and/or not allowed in the user manual). These operations are only reserved to authorized personal.

IMPORTANT: This product is designed and constructed to be safe when properly used, in accordance with the supplied documentation, and when the operating precautions outlined in the manual are fully observed.

Manufactured by:

HTA s.r.l.
via del Mella 77-79
25131 BRESCIA (BS)
ITALY

Director – Quality Control

Manufactured for:

fluidX Ltd
Monks Heath Hall Workshops
Chelford Road
Nether Alderley
CHESHIRE
SK10 4SY
UK
Director

14. INSTRUMENT MAINTENANCE

- i. Maintenance of the Xdc-96pro should be performed by trained technicians only. If in doubt about any procedure please contact your supplier, the supplier should also be contacted before using any tools not provided with the unit, or stated in the manual. 
- ii. Most of the pictures have been reduced to fit on to the page and can be rescaled up to give a clearer image if required.
- iii. All the procedures must be performed with the unit disconnected from the mains voltage (main power).
- iv. Care should be taken when unpacking or handling the instrument.

15. GENERAL TROUBLESHOOTING TIPS

- i. If a fault occurs, and help is required, please contact your supplier stating the unit serial number and as much information about the fault as possible.
- ii. Below is a list of possible problems and their potential solutions. As some of these faults have not yet occurred the solutions remain hypothetical.

PROBLEM	CAUSE	SOLUTION	DIFFICULTY
No power (no boot up)	Blown Fuse	Replace fuse	*
Unit power on but motors do not move	Incorrect voltage	Change from 220 to 110V	**
Hedgehog communication failure	Incorrect port settings	Change port communication	*
Mechanical Limit	Incorrect mechanical limit	Calibrate the unit	***
Unit powers up into "Border Mark out"	Unit has lost calibration	Calibrate the unit	***
Incorrect decap or recap cycle	Incorrect calibration	Realign the unit	***
Sledge hardening	Motor is not in right position	Motor repositioning	***

Approximate difficulty rating:

- * Easy (End User)
- ** Moderate (Experienced user)
- *** **Average (trained technician required)**
- **** Hard.
- ***** Very hard. May require 5 volt power supply, not recommended to be attempted at customer site.

16. SWITCHING BETWEEN 115v AND 230v

- i. Always check that unit is unplugged from the main power and the switch is in the off position. (Cable socket is positioned on the reverse of the instrument).
- ii. The input voltage is displayed on the top left hand side. The unit is normally set on 230V but can be modified to either 115 or 230V by simply turning the fuse compartment upside down.
- iii. To replace the fuses:
 - Open fuse compartment with a screwdriver (see Fig M1). It is easier to extract when the switch is in the off position.
 - Extract the fuse compartment (as shown in Fig M2).



FIG M1

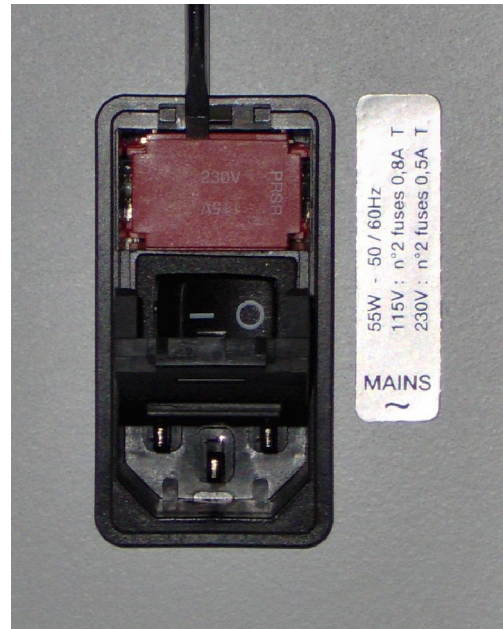


FIG M2

- Replace the two fuses to coincide with voltages as shown below:

Voltage	Fuse (EN 60127)
115V	0.80 A
230V	0.50 A

- Insert fuse compartment keeping the voltage label on top.
- Close the compartment, pushing gently and firmly.

17. HEDGEHOG COMMUNICATION FAILURE

- Ensure that the correct COM port is selected within the Hedgehog software.
- Open the hedgehog software and insert the correct COM number in the field "Comm Port n°".



- If run-time error "8002 Invalid port number" is displayed this indicates that the serial port number set in the software does not match the serial port number on which the decapper unit is connected.

iv. To rectify:

- Obtain port number on which the Xdc-96 de-capper is connected from Windows. Open Control Panel.
- Find and open System Icon and select Hardware (tab).
- Select Peripheral Management. In the new window open COM Port (item).
- List of your current COM Ports will be displayed. Identify the COM port number on which the Xdc-96 de-capper is connected.
- Open the HedgeHog.ini in Notepad and edit port number (2nd row). Open the Hedgehog software and try again

18. CALIBRATION

18.1 INTRODUCTION

- Connect the unit to power supply and to the PC using the RS232 cable.
- Start the PC application “HedgeHog”

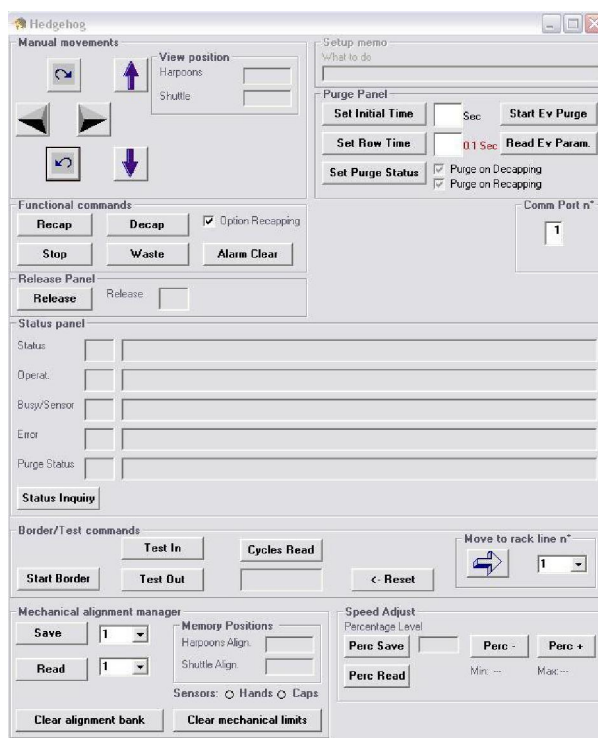


Fig. M4

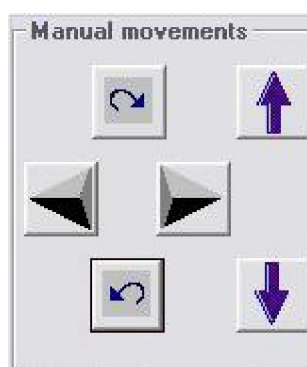


Fig M.5

Manual Movement buttons:

- The 1st row of the plate is the one on the outside of the unit.
- P button moves the harpoon clockwise (refer to right side of the unit)
- Q button moves the harpoon contraclockwise (refer to right side of the unit)
- f button moves the sledge outside
- g button moves the sledge inside
- h button moves both motors inside
- i buttons move both motors outside.

18.2 MOTOR LIMITS

- i. Press “START” and “STOP” buttons simultaneously and turn on the unit.
- ii. Release the two buttons.
- iii. Select “Clear alignment bank” and “Clear mechanical limits” on PC.
- iv. Select “Status Inquiry” on PC and verify on the line “Status” that appears the message “BORDER WAITING START”.
- v. Select “Start Border” and wait untill the unit moves the harpoon and the sledge motors in order to find their limits.

18.3 ALIGNMENT

- i. Verify the line “Status” became “BORDER WAITING LINE 1-12 ALIGN/SAVE” at the end of the cycle.
- ii. Place a rack of uncapped tubes (with tubes on only the 1st and 12th row) on the unit.



Fig M.6

- iii. Align the 1st row of tubes with the 1st row of harpoon using the PC cursor buttons.
- iv. Move the harpoon perpendicular to the plane, and ensure the sledge is in center of the harpoon.
- v. On PC select the 1st row and press "Save".

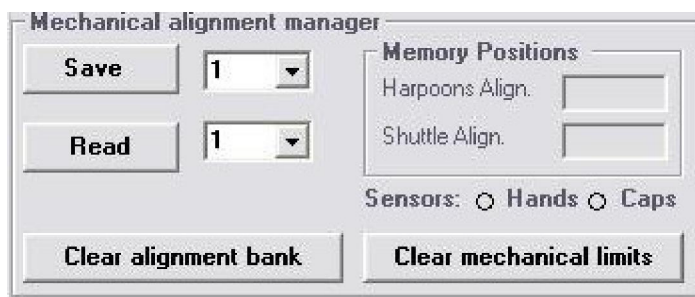


Fig. M.7

- vi. Next align the 12th row using the PC cursor buttons.



Fig. M.8

- vii. Move the harpoon perpendicular to the plane, and the sledge to the centre of the harpoon
- viii. On PC select 12th row and press "Save".
- ix. By using the cursor buttons, remove the plate and take out the rack.
- x. Select "Start Border" on PC and the unit will return to the home position.
- xi. Test to check that the unit is aligned.

18.4 ADJUSTING ALIGNMENT

- i. If the unit needs further adjustments, first remove the plate.
- ii. Select the row to be adjusted (either 1st or 12th) in the "Move to rack line n°" area and press button " â " on the left.



Fig. M.9

- iii. Using the PC cursor buttons, adjust the sledge or the harpoons (it is advisable to move only 3-5 steps at time).
- iv. Using the PC select the row adjusted (1th or 12th) and press "Save".
- v. Test decapping and recapping and continue adjustments as necessary.

18.5 SLEDGE MOTOR POSITIONING

- i. Ensure that the Xdc-96pro is turned off and not connected to a power supply.
- ii. Remove the four panel screws placed at the right side of the instrument and remove earth connection.

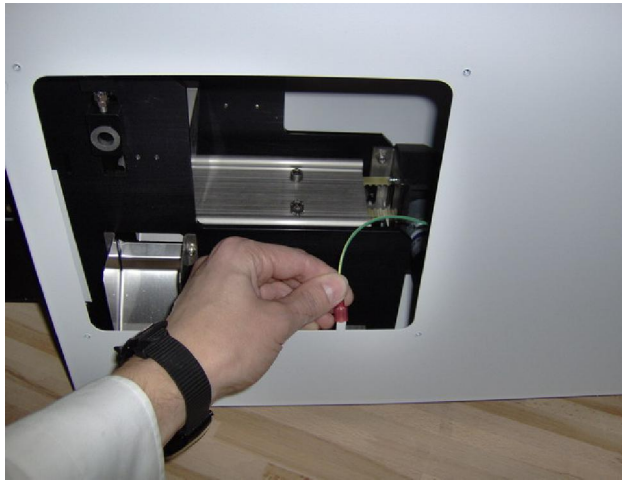


Fig M.10

- iii. Remove the eight screws and the cover of the unit.
- iv. Pull out the sledge motor a little as shown in next image.

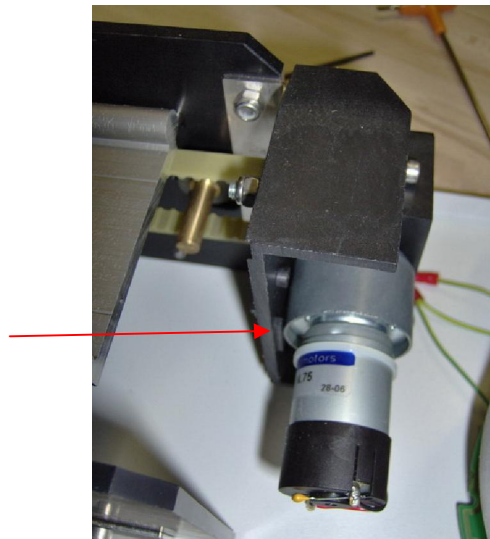


Fig M.11

- v. Loosen the two screws on the cover of the motor.

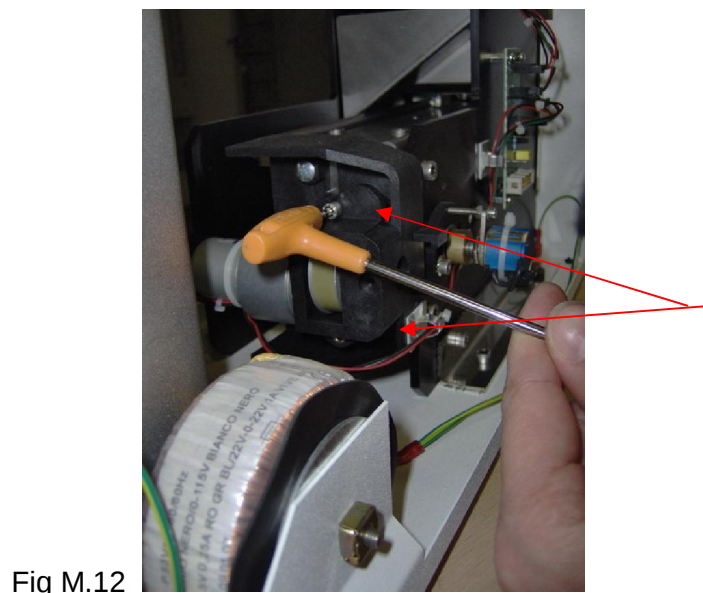


Fig M.12

- vi. Remove the motor cover as shown.

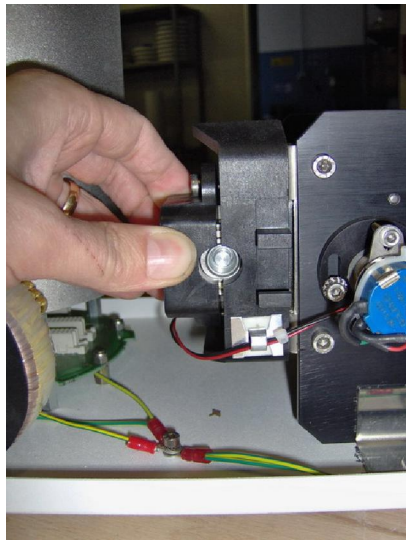


Fig. M.13

- vii. Push the motor into place, support the motor support bracket while doing so.

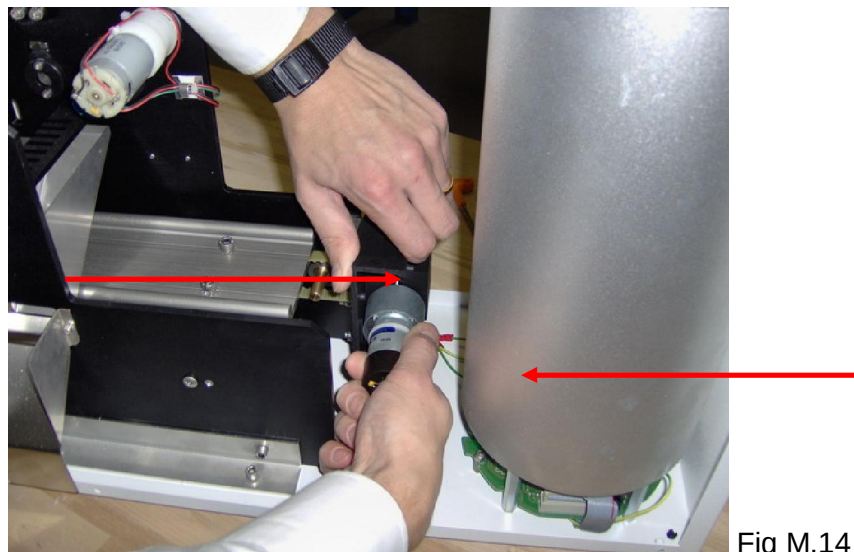


Fig M.14

- viii. Put in the screws using moderate force.
- ix. If pushed, the sledge should move with less force than before.
- x. Connect power to the unit and test decapping and recapping cycles.
- xi. Mount the unit cover with the 8 screws. Insert the earth connector.
- xii. Mount the side panel with the 4 screws.

19. REGULAR MAINTENANCE/SERVICE

- i. This section provides operation instruction for the periodical maintenance and functionality testing for the Xdc-96pro.
- ii. Suggested instrument - Screwdriver cross Phillips PH1. Please note that no Xdc-96pro parts should be routinely replaced.
- iii. Maintenance should be performed yearly, and adjusted according to workload and process importance.

19.1 COVER REMOVAL

- i. Remove the racked tubes from the unit.



i. Warning



Check unit is switched OFF

- ii. Undo the four screws fixing the cover plate on the right of the unit, and remove.
- iii. Disconnect the earth cable from the cover.
- iv. Remove the eight screws securing the instrument cover and remove.

19.2 GENERAL INSPECTION

- i. Verify that the CPU and Analogue board are correctly inserted onto the motherboard.
- ii. Verify that all the connectors are correctly plugged in (keyboard, motor, potentiometer, sensor, earth, etc.).
- iii. Remove any tubes and caps lost within the unit.

19.3 SLEDGE INSPECTION

- i. Manually move the sledge in and out of the instrument and note if the force required is excessive.
- ii. Check belt tension, the potentiometer pulley should not rotate freely.
- iii. Verify that the sledge slack does not exceed 3 mm.

19.4 HARPOON INSPECTION

- i. Check integrity of the harpoon pawl.
- ii. Check belt tension, the potentiometer pulley should not rotate freely.
- iii. Ensure that the pulley mounted on the harpoon shaft does not have any slack.

19.5 COVER MOUNTING

- i. Mount the cover and fix with the eight screws.
- ii. Plug the earth cable to the cover.
- iii. Mount the cover plate and fix with the four screws.

19.6 KEYBOARD AND SENSOR TEST

- i. Switch the instrument ON. When green "READY" light is ON, press the "RECAP" key and check that the yellow "RECAP" LED light is OFF.
- ii. Press the "RECAP" key and check that the yellow "RECAP" LED light is ON. Then press the "START" key.
- iii. During the decap movement verify that the yellow "RUN" LED light is ON and the green "READY" LED light is OFF. Wait until the decap cycle has ended, then press the "WASTE" key for 2 seconds.
- iv. During the waste/disposal movement check that the yellow "WASTE" LED light is ON. Then press the "START" key.
- v. During the decap movement keep the cap sensor (placed furthest from the operator) obscured with a screwdriver.
- vi. At the end of the movement check that the red "ERROR" LED is blinking. Remove the screwdriver from the cap sensor.
- vii. Press the "STOP" key and verify that the "ERROR" LED light is OFF. Then press "START".
- viii. During the recap movement obscure the hand safe sensor (nearest the operator). Check that the recap movement is interrupted and home position resumed.
- ix. Verify that the red "ERROR" LED is blinking. Press the "STOP" key and verify that the "ERROR" LED light is OFF, then press "START" to complete the recap movement.

19.7 DECAPPING TEST

- i. Place the racked tubes on the mechanical adapter without the cover.
- ii. Press "START" key for decapping run, and check:
 - o The rack does not lift at the back while the Harpoons are inserted into the front row.
 - o The harpoons must enter the caps without crushing the cap border.
 - o The rack does not lift excessively at the back while the last row is de-capped.
 - o All tubes are correctly decapped.
 - o All the caps must remain on the harpoons.

19.8 RECAPPING TEST

- i. Press “START” key for recapping run, and check:
 - o The caps must be inserted into the tubes without causing any crushing.
 - o The rack does not lift excessively at the back while the first row is being re-capped.
 - o All the tubes must be recapped.
 - o All the caps must perfectly inserted into tubes.

19.9 CAP DISPOSAL TEST

- i. Press “START” key to decap racked tubes.



WARNING

To prevent caps scattering install a collecting box under caps unloading zone.

- ii. Press “WASTE” key for 2 seconds, and verify:
 - o All the caps must rbe removed from the harpoons.
 - o All the caps must be disposed of through the waste slide.

19.10 OPTIONAL TESTS - GAS LINE

- i. This test is available only if the unit contains a “gas option”, and the “initial time purge time” (line purge) is set to above zero seconds. Ensure that gas pressure is present in circuit.



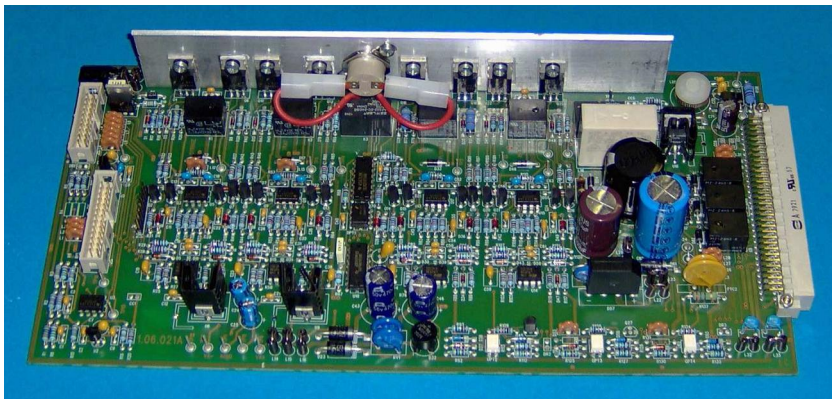
WARNING

Place the unit under aspirating hood if the purging gas is particularly dangerous.

- ii. Remove the racked tubes from the unit and press the “STOP” key for 2 seconds.
- iii. Check that the valve “clicks”. Verify the purge flow exit from the nozzle.

20. SPARE PARTS

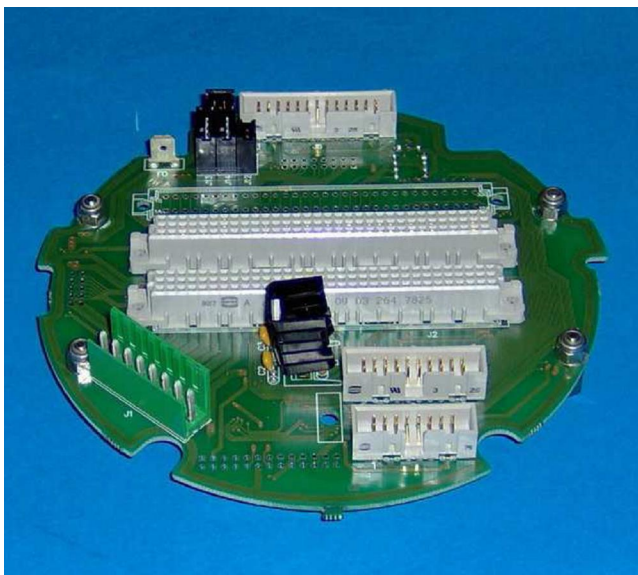
20.1 Boards and cables



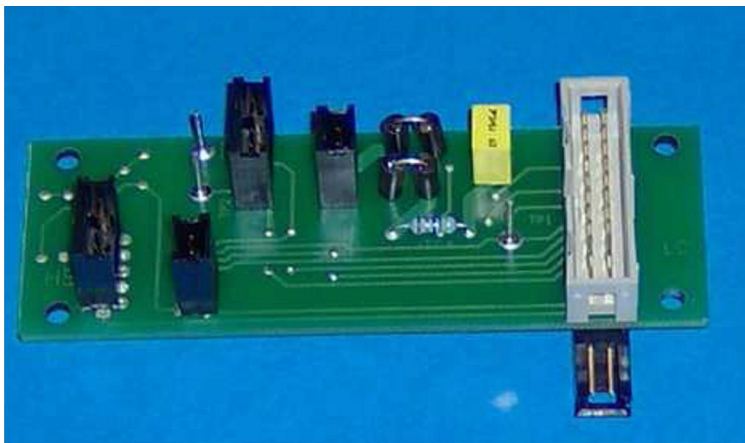
Cat. No. 6.08.010
Analogue board group



Cat. No. 1.05.020
CPU board group



Cat. No. 6.08.309
Motherboard group



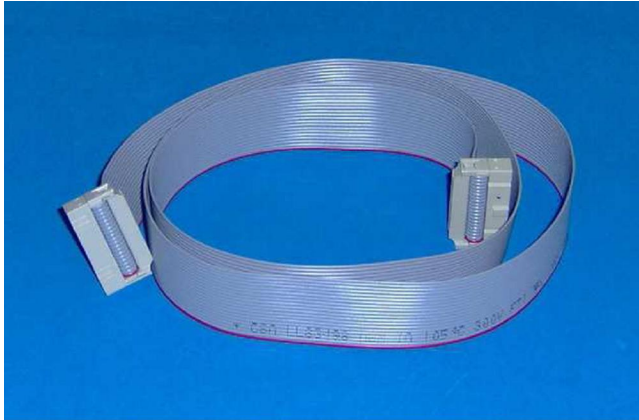
Cat. No. 6.08.122
Motherboard



Cat. No. 6.08.310
Keyboard group



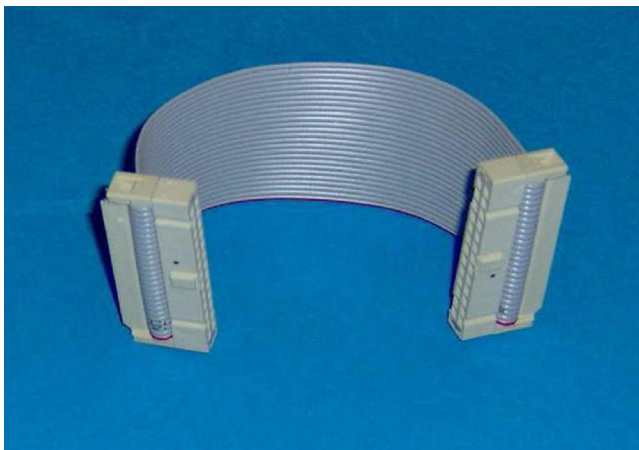
Cat. No. 6.08.307
Ribbon cable for connections



Cat. No. 6.08.013
Ribbon cable for motors



Cat. No. 6.08.012
Ribbon cable for keyboard



Cat. No. 1.05.110
Ribbon cable CPU-analogue board

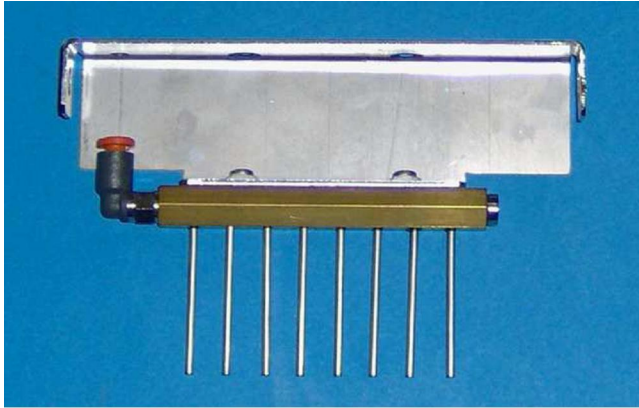


Cat. No. 6.08.313
RS232 cable

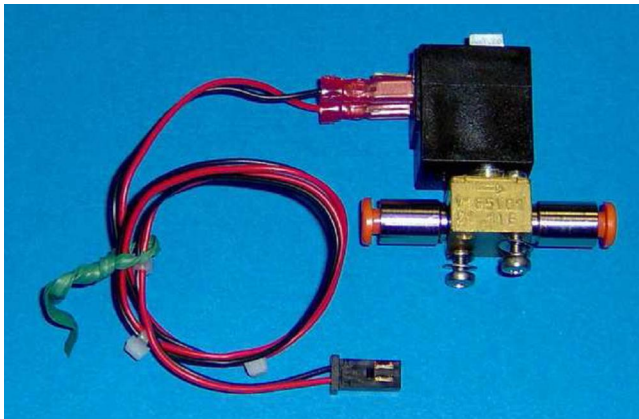
20.2 Spare parts – gas option



Cat. No. 6.08.315
Gas junction



Cat. No. 6.08.314
Dispensing manifold group



Cat. No. 6.08.188
Electro valve group

20.3 Spare parts - miscellaneous



Cat. No. 6.08.176
Packaging



Cat. No. 6.08.305
Fuse kit for 230V



Cat. No. 6.08.306
Fuse kit for 110V

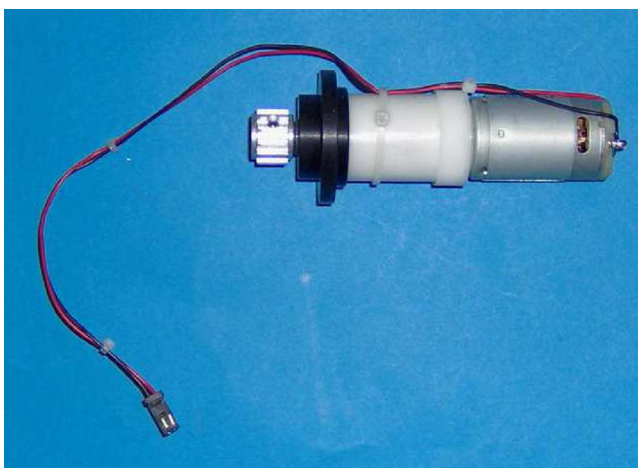


Cat. No. 6.08.316
Rubber feet (pack of 4)

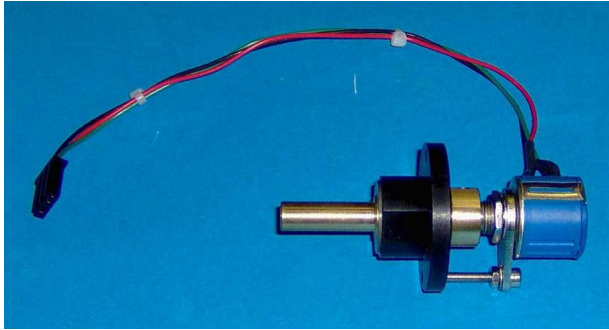


Cat. No. 6.08.177
Tool pocket

20.4 Spare parts - motors

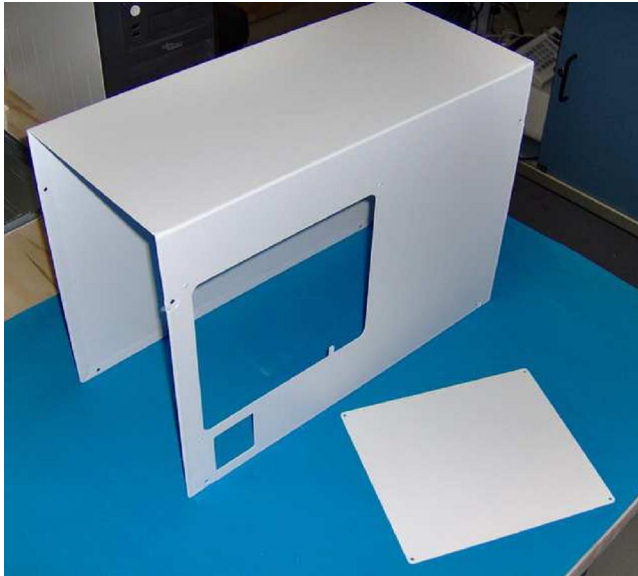


Cat. No. 6.08.016
Harpoon motor group



Cat. No. 6.08.312
Potentiometer group for harpoon or sledge

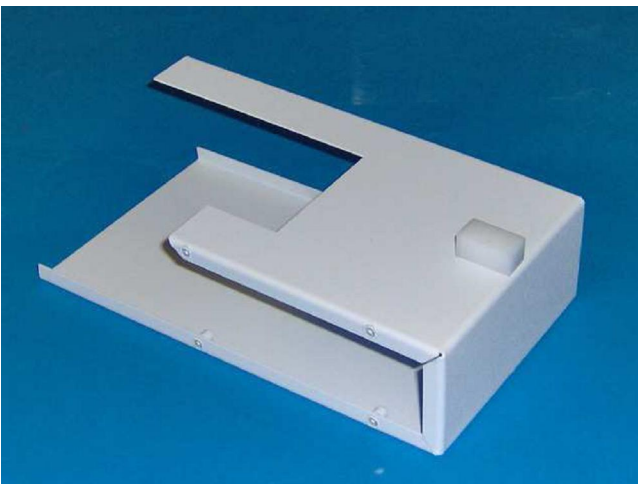
20.5 Spare parts – standard unit



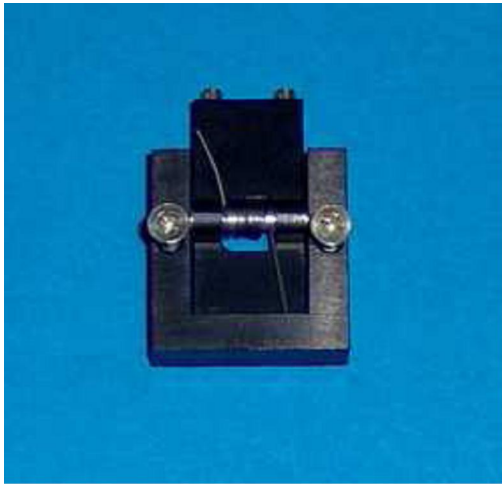
Cat. No. 6.08.301
Chasis unit cover, no screws



Cat. No. 6.08.302
Screw kit for chasis unit cover



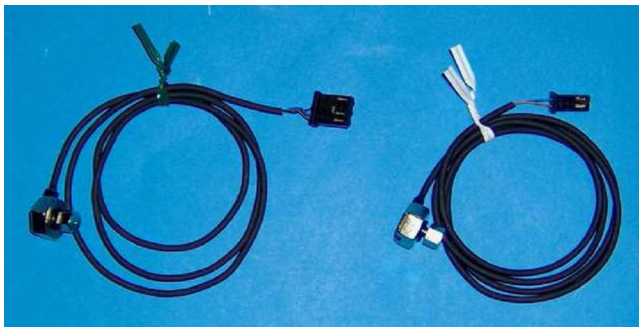
Cat. No. 6.08.303
Chasis front cover



Cat. No. 6.08.311
Front hook group



Cat. No. 1.03.110
Transformer



Cat. No. 60.08.308
Sensor group (1 pair of left and right part)



Cat. No. 6.08.304
Power supply and voltage selector box

21. SERIAL PROTOCOL

This document provides detailed information on the serial communication protocol for χ dc-96pro .

COMMAND FORMAT

\$ Op₁Op₂ E₁...E₄ S₁...S₄ L₁...L₄ D₁...D_n C₁C₂ cr

\$ = opening frame marker
 Op₁Op₂
 E₁...E₄ = error field
 S₁...S₄ = status field
 L₁...L₄ = length field from Op₁ to C_k
 D₁...D_n = data field
 C₁C₂ = or-exclusive check sum module 256 of characters from Op₁ to D_n
 cr = closing frame marker

Op₁,Op₂, E₁..E₄,S₁..S₄, L₁..L₄, D₁...D_n,C_k,C_k = ASCII 0..9 A..F

Example : Send (status Inquiry) : \$25000000000001006
 (32_{hex}xor35_{hex}xor30_{hex}xor...31_{hex}xor30_{hex} = 6 =30_{hex} +36_{hex})
 Receive (status) : \$25000000000001E02170000C60F1075

Serial port parameters are: 9600,N,8,1 **RTS-CTS HANDSHAKE Xon Xoff disable**

Error format

E₁E₂ bit

7	
6	
5	
4	wrong data
3	wrong command
2	not executable command
1	wrong length
0	wrong check sum

E₃E₄ bit

7
6
5
4
3
2
1
0

Status format

S₁S₂

S₃S₄

0	0 = Twelve lines harpoon
1	1 = Single Tooth release

N.B.: Character LF (ascii 10) comes leaked

SERIAL COMMAND SPECIFICATIONS

COMMAND 10: Uncap single rack line.

Command 10 allows to uncap rack line for Matrix or Micronics rack type.

It's executable only by single row harpoon decapper.

It's not executable if device is "waiting restart" (set by e previous STOP command) during a cap/waste task.

Command : \$10000000000016zzrrtt<checksum>cr

Reply : \$10EEEESSSS0016zzrrtt<checksum>cr

Parameters : zz 00 = option recapping OFF

<> 00 = option recapping ON

rr 01..0B = row to Uncap

tt 0 = use Matrix harpoon to uncap

≠0 = use Micronics harpoon to uncap

COMMAND 11: Stop cap/uncap cycle

Command 11 stops current operation.

Command: \$11000000000010<checksum>cr

Reply : \$11EEEESSSS0010<checksum>cr

COMMAND 12: Get Single row decapper status

Command 12 reads **χdc-96pro** STATUS for single row decapper version .

Command : \$12000000000010<checksum>cr

Reply : \$12EEEESSSS0024ssmmbbbnnnnssssddrrtt<checksum>cr

Parameters: ss Status (hex value)

01 = INIT ACTIVE

02 = BORDER ACTIVE

03 = MECHANICAL BLOCK

04 = NORMAL OPERATIONS

mm Operation (hex value)

00 = STANDBY

01 = CAP RUNNING

02 = DECAP RUNNING

03 = WASTE RUNNING

04 = ALIGNMENT RUNNING

	05	=	ALARM ACTIVE	
	06	=	PURGE RUNNING	
	11	=	CAP	WAITING RESTART
	12	=	DECAP	WAITING RESTART
	13	=	WASTE	WAITING RESTART
	14	=	ALIGNMENT	WAITING RESTART
	20	=	BORDER	WAITING START
	21	=	BORDER FINDING	HARPOONS LIMIT
	22	=	BORDER FINDING	SLEDGE LIMIT
	23	=	BORDER WAITING	LINE 1-12 ALIGN/SAVE
	24	=	BORDER TEST	ALIGN ACTIVE
	25	=	HANDSAFE	SENSOR DETECTED!
bb	bit 0	0 =	χdc-96pro Ready	
1 =	task running	(busy)		
	bit 1	0 =	χdc-96pro movement executed	
1 =	movement running			
	bit 2	1 =	Purge On	
	bit 3	1 =	caps sensor active	
	bit 4	1 =	caps on matrix too high (CAP PROCEDURE ALARM during slide insertion)	
	bit 5	1 =	bad recapping on matrix (CAP PROCEDURE ALARM during slide ejection)	
	bit 6	1 =	bad uncapping on matrix (UNCAP PROCEDURE ALARM during slide ejection)	
	bit 7	1 =	mechanical blockage	
nnnn	harpoons position (electrical steps)			
ssss	sledge position (electrical steps)			
dd	Sensor status	bit 0	1	= hands
sensor active				
		bit	1	1 = caps
sensor active				
rr	uncapping row	FF	no selection	
		01..0B		
tt	using harpoon type	0	Matrix harpoon	
		≠0	Micronics harpoon	
		FF	no selection	

COMMAND 13: Set Initial Purge Time .

Command 13 sets the Initial Purge time.

During RECAPPING phase the decapper waits this time with EV active then starts the recapping cycle.

Command : \$13000000000012ii<checksum>cr
Reply : \$13EEEESSSS0012ii<checksum>cr
Parameters : ii 0..FF (FF=255_{dec}) 1 unit = 1 sec
range 0...255 secs

COMMAND 14: Set Row Purge Time .

Command 14 sets the Row Purge time.

During RECAPPING phase the decapper align each rack line under purge device waits for Row Purge Time,

recap the rack line then goes to next row.

Command : \$14000000000012rr<checksum>cr
Reply : \$14EEEESSSS0012 rr <checksum>cr
Parameters : rr 0..FF (FF=255_{dec}) 1 unit = 0.1 sec
range 0...25.5 secs

COMMAND 15: Read Status and Initial-Row Purge Time .

Command 15 reads Initial and Row Purge time.

Command : \$15000000000010<checksum>cr
Reply : \$15EEEESSSS0016iirpp<checksum>cr
Parameters : ii 0..FF (FF=255_{dec}) 1 unit = 1 sec
range 0...255 secs

rr 0..FF (FF=255_{dec}) 1 unit = 0.1 sec
range 0...25.5 secs

pp BIT 0 0 = Purge Not enabled on DECAPPING
<>0 = Purge enabled on DECAPPING
BIT 1 0 = Purge Not enabled on CAPPING
<>0 = Purge enabled on

CAPPING

COMMAND 16: Purge the line.

Command 16 Starts an EV purge cycle for an Initial Purge Time .

Command : \$16000000000010<checksum>cr

Reply : \$16EEEESSSS0010<checksum>cr

Parameters :

COMMAND 17: Set Purge Status .

Command 17 sets the Purge Status.

The purge function is enabled or disabled during CAPPING/RECAPPING phase.

Command : \$17000000000012pp<checksum>cr

Reply : \$17EEEESSSS0012pp<checksum>cr

**Parameters : pp BIT 0 0 = Purge Not enabled on
DECAPPING**

<>0 = Purge enabled on DECAPPING

BIT 1 0 = Purge Not enabled on CAPPING

<>0 = Purge enabled on CAPPING

COMMAND 18: Move harpoon clock wise

Command 18 moves harpoons clock wise (watching from bin side).

Command : \$18000000000014ssss<checksum>cr

Reply : \$18EEEESSSS0010<checksum>cr

**Parameters : ssss number of electrical steps from current position
RANGE 0...0FFF**

COMMAND 19: Move harpoon counter clock wise

Command 19 moves harpoons counter clock wise (watching from bin side).

Command : \$19000000000014ssss<checksum>cr

Reply : \$19EEEESSSS0010<checksum>cr

**Parameters : ssss number of electrical steps from current position
RANGE 0...0FFF**

COMMAND 1A: Push rack in

Command 1A push rack in by synchronous movement for sledge and harpoons.

Command : \$1A000000000014ssss<checksum>cr

Reply : \$1AEEEESSSS0010<checksum>cr

**Parameters : ssss number of sledge insertion steps from current
position RANGE 0...0FFF**

**The “synchronous steps” for harpoons is automatically
calculated by decapper.**

COMMAND 1B: Pull rack out

Command 1B pull rack out by synchronous movement for sledge and harpoons.

Command : \$1B000000000014ssss<checksum>cr

Reply : \$1BEEEESSSS0010<checksum>cr

Parameters : ssss number of sledge insertion steps from current position RANGE 0...0FFF

The “synchronous steps” for harpoons is automatically calculated by decapper.

COMMAND 1C: Move sledge forward

Command 1C moves sledge in.

Command : \$1C000000000014ssss<checksum>cr

Reply : \$1CEEEEESSSS0010<checksum>cr

Parameters : ssss number of electrical steps from current position RANGE 0...0FFF

COMMAND 1D: Move sledge backward.

Command 1D moves sledge out.

Command : \$1D000000000014ssss<checksum>cr

Reply : \$1DEEEEESSSS0010<checksum>cr

Parameters : ssss number of electrical steps from current position RANGE 0...0FFF

COMMAND 1E: Align sledge and harpoons on rack line.

Command 1E aligns, by synchronous movement, sledge and harpoons to rack line.

Command : \$1E000000000012pp<checksum>cr

Reply : \$1EEEESSSS001Annnnssss<checksum>cr

Parameters : pp line position 1..12

nnnn harpoons position (electrical steps)

ssss sledge position (electrical steps)

COMMAND 1F: Cap rack.

Command 1F allows to cap rack. It's not executable if device is “waiting restart” (set by e previous STOP command) during an uncap/waste task.

Command : \$1F000000000010<checksum>cr

Reply : \$1FEEEESSSS0010<checksum>cr

Parameters :

COMMAND 20: Uncap rack.

Command 20 allows to uncap rack. It's not executable if device is “waiting restart” (set by e previous STOP command) during a cap/waste task.

Command : \$20000000000012zz<checksum>cr

Reply : \$20EEEESSSS0012zz<checksum>cr
Parameters : zz 00 = option recapping OFF
<> 00 = option recapping ON

COMMAND 21: Waste caps.

Command 21 allows to waste caps from harpoons. It's not executable if device is "waiting restart" (set by e previous STOP command) during a cap/uncap task.

Command : \$21000000000010<checksum>cr
Reply : \$21EEEESSSS0010<checksum>cr
Parameters :

COMMAND 22: Read Memory alignment position.

Command 22 reads the information about the sledge & harpoon setting from memory alignment bank.

In the memory alignment bank there are information about the 12 hook point (sledge & harpoon steps couples) of the matrix rack.

Command : \$22000000000012pp<checksum>cr
Reply : \$2200000000001Appnnnnssss <checksum>cr
Parameters : pp line position 1..12
nnnn harpoons position (electrical steps)
ssss sledge position (electrical steps)

COMMAND 23: Write Memory alignment position.

Command 23 writes the actual sledge & harpoon position into memory alignment bank position 1 or 12.

In the memory alignment bank there are information about the 12 hook point (sledge & harpoon steps couples) of the matrix rack.

Command is executed only if sledge/harpoons relative alignment match "right relative alignment" for position 1 or 12 .

Command : \$23000000000012pp<checksum>cr
Reply : \$2300000000001Appnnnnssss <checksum>cr
Parameters : pp line position 1 or 12
nnnn harpoons position (electrical steps)
ssss sledge position (electrical steps)

COMMAND 24: Clear memory alignment bank

Command 24 allows to clear memory alignment bank.

This is a command used to reset mechanical alignment table of χ dc-96pro.

The command is executable only if border mark-out procedure is active (non with mechanical checking running) waiting start or line alignment state.

Command : \$24000000000010<checksum>cr

Reply : \$24000000000010 <checksum>cr

Parameters :

COMMAND 25: Get Status

Command 25 reads χ dc-96pro STATUS.

Command : \$25000000000010<checksum>cr

Reply : \$25EEEESSSS0020ssmmbbbnnnnssssdd<checksum>cr

Parameters:	ss	Status (hex value)
	01	= INIT ACTIVE
	02	= BORDER ACTIVE
	03	= MECHANICAL BLOCK
	04	= NORMAL OPERATIONS
mm	Operation (hex value)	
	00	= STANDBY
	01	= CAP RUNNING
	02	= DECAP RUNNING
	03	= WASTE RUNNING
	04	= ALIGNMENT RUNNING
	05	= ALARM ACTIVE
	06	= PURGE RUNNING
	11	= CAP WAITING RESTART
	12	= DECAP WAITING RESTART
	13	= WASTE WAITING RESTART
	14	= ALIGNMENT WAITING RESTART
	20	= BORDER WAITING START
	21	= BORDER FINDING HARPOONS LIMIT
	22	= BORDER FINDING SLEDGE LIMIT
	23	= BORDER WAITING LINE 1-12 ALIGN/SAVE
	24	= BORDER TEST ALIGN ACTIVE
	25	= HANDSAFE SENSOR DETECTED!
bb	bit 0	0 = χ dc-96pro Ready
	1	= task running (busy)

	bit 1	0	=	χ dc-96pro movement executed
	1		=	movement running
	bit 2	1	=	Purge On
	bit 3	1	=	caps sensor active
	bit 4	1	=	caps on matrix too high
				(CAP PROCEDURE ALARM during slide insertion)
	bit 5	1	=	bad recapping on matrix
				(CAP PROCEDURE ALARM during slide ejection)
	bit 6	1	=	bad uncapping on matrix
				(UNCAP PROCEDURE ALARM during slide ejection)
	bit 7	1	=	mechanical blockage
nnnn				harpoons position (electrical steps)
ssss				sledge position (electrical steps)
dd				Sensor status
sensor active	bit	0	1	= hands
sensor active	bit		1	1 = caps

COMMAND 26: Clear mechanical limits

Command 26 allows to clear χ dc-96pro mechanical limit.

The command is executable only if border mark-out procedure is active.

This command is used to recalculate mechanical limit of χ dc-96pro. Use of this command automatically switch χ dc-96pro into border mark-out procedure (mechanical search sub procedure).

Command : \$26000000000010<checksum>cr

Reply : \$26EEEESSSS0010<checksum>cr

Parameters:

COMMAND 27: Read Release

Command 27 reads the software version and configuration parameters.

Command : \$27000000000010<checksum>cr

Reply : \$27EEEESSSS0020MMRRRRrrRRRRKKKK<checksum>cr

Parameters: MM Instrument model χ dc-96pro = 70hex (112 dec)

RRRRrrRRRR
ASCII characters

Software Release

xyy.zzk

KKKK

EPROM CHECKSUM

hex value

COMMAND 28: Start /Skip/ Exit Border

Command 28 force execution of border mark-out procedure if not running.

Otherwise exit from border mark-out procedure if all steps are done.

If **χdc-96pro** is already in border mark-out, status “waiting start”, this command starts the border mark-out procedure.

Command : \$28000000000010<checksum>cr

Reply : \$28EEEESSSS0010<checksum>cr

Parameters:

COMMAND 29: Start test alignment with rack insertion

Command 29 in executable if border mark-out function is active.

It sets an alignment to rack, from actual line alignment to next line until line 12.

Command : \$29000000000010<checksum>cr

Reply : \$29EEEESSSS0010<checksum>cr

Parameters:

COMMAND 2A: Start test alignment with rack ejection

Command 2A in executable if border mark-out function is active.

It sets an alignment to rack, from actual line alignment to previous line until line 1.

Command : \$2A000000000010<checksum>cr

Reply : \$2AEEEESSSS0010<checksum>cr

Parameters:

COMMAND 2B: Alarm reset

Command 2B resets alarm status.

Command : \$2B000000000010<checksum>cr

Reply : \$2BEEEESSSS0010<checksum>cr

Parameters:

COMMAND 2C: Clear cap decap counter

Command 2C allows to clear **χdc-96pro** cap decap cycle “lifetime” counter.

Command : **\$2C000000000010<checksum>cr**
Reply : **\$2CEEEESSSS0010<checksum>cr**
Parameters:

COMMAND 2D: Read cap decap counter

Command 2D allows to read **χdc-96pro** cap decap cycle “lifetime” counter.

Command : **\$2D000000000010<checksum>cr**
Reply : **\$2DEEEESSSS0016CCCCC<checksum>cr**
Parameters:
cccccc Cap Decap cycle counter

COMMAND 32: Increment Cap Decap Speed percentage

Command 32 allows to increment **χdc-96pro** cap decap speed percentage up to higher limit.

Command : **\$32000000000010<checksum>cr**
Reply : **\$32EEESSSS0016PPmmMM<checksum>cr**
Parameters:
PP % LEVEL
mm min settable percentage level
MM max settable percentage level
NOTE:
SPEED CHANGES TAKE PLACE ONLY ON NEXT DECAP CYCLE

COMMAND 33: Decrement Cap Decap Speed percentage

Command 33 allows to decrement **χdc-96pro** cap decap speed percentage up to lower limit.

Command : **\$33000000000010<checksum>cr**
Reply : **\$33EEESSSS0016PPmmMM<checksum>cr**
Parameters:
PP % LEVEL
mm min settable percentage level
MM max settable percentage level

NOTE:

SPEED CHANGES TAKE PLACE ONLY ON NEXT DECAP CYCLE

COMMAND 34: Save Cap Decap Speed percentage

Command 34 allows to save **χdc-96pro** cap decap speed percentage.

Command : **\$34000000000010<checksum>cr**

Reply : **\$34EEEESSSS0016PPmmMM<checksum>cr**

Parameters:

PP	% LEVEL
mm	min settable percentage level
MM	max settable percentage level

COMMAND 35: Set Cap Decap Speed percentage

Command 35 allows Set **χdc-96pro** cap decap speed percentage within lower and higher limit.

Command : **\$35000000000012pp<checksum>cr**

Reply : **\$35EEEESSSS0016PPmmMM<checksum>cr**

Parameters:

PP	SPEED LEVEL PERCENTAGE
mm	min settable percentage level
MM	max settable percentage level

If speed percentage level PP is lower mm or higher MM, speed doesn't change.

NOTE:

SPEED CHANGES TAKE PLACE ONLY ON NEXT DECAP CYCLE

COMMAND 36: Read Cap Decap Speed percentage

Command 36 allows Read **χdc-96pro** cap decap speed percentage within lower and higher limit.

Command : **\$36000000000010<checksum>cr**

Reply : **\$36EEEESSSS0016PPmmMM<checksum>cr**

Parameters:

PP	SPEED LEVEL PERCENTAGE
mm	min settable percentage level
MM	max settable percentage level

SERIAL CONNECTOR INTERFACE

Specifications for the serial connector RS232 Interface: **DB9 Female**
(Link to PC with a point to point DB9/DB9 Male-Female Cable)

1	N.C.	n.c.
2	TX	Transmission
3	RX	Receiving
4	DSR	Internally connected with DSR signal
5	DGND	
6	DTR	Internally connected with DTR signal
7	CTS	Clear to send
8	RTS	Ready to send
9	N.C.	