MAINTENANCE MANUAL
FOR
APD-500A ASPHALTENE ANALYZER

COSMO TRADE & SERVICE CO., LTD.

October, 2008

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1. Important Notice for Measurements using APD-500A

Before setting about your maintenance work for APD-500A, please remind the following important notice that must be taken into consideration for your daily operation of this asphaltene analyzer.

1) The instrument has been fully calibrated and tuned up before shipment from Japan, so no local equipment calibration is basically needed so long as you do not face to certain specific problem after the initial installation at your site.

2) In principle, never touch the instrument's optical unit. Careless touching (changing a mirror angle, etc.) may give you a fatal problem depending on the case.

3) Never give vibration or electrical voltage instability to the APD-500A, which may cause unstable measurement results.

4) Measurement by APD-500A is not possible for such samples containing elements which cannot be dissolved by Toluene or containing much paraffin or with pour point of 50°C or more. Also, if samples cannot be prepared in uniform quality or in homogeneous distribution, measurement by APD-500A is not possible.

5) An analytical balance to be used should have the capacity to measure up to the unit of 0.1mg.

6) You must use Toluene and Normal Heptane of the 1st grade for analytical purposes.

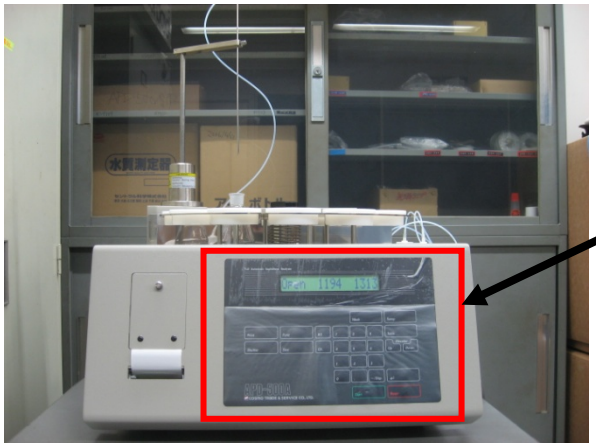
7) Warming your sample up to specified temperature for specified time is very important. Also, cooling down sample's temperature to the room temperature before measurements is important.

8) Be careful of contamination by dust, hair, etc. during your preparation of sample. If such foreign matter comes into glass flasks and cylinders, etc., you may have erroneous measurement results, which may also cause clogging of diaphragm in a suction pump after some period of use.

9) If your measurements of asphaltene standard show good values, you will have to make a working curve for actual measurements of your samples. Please do not forget to save the values into memory whenever you have made a working curve.

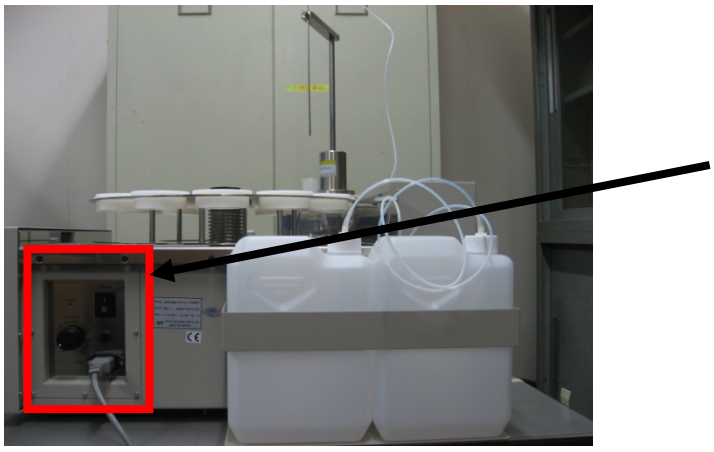
2. Name of parts and how to take off a cover

1-1. Front view

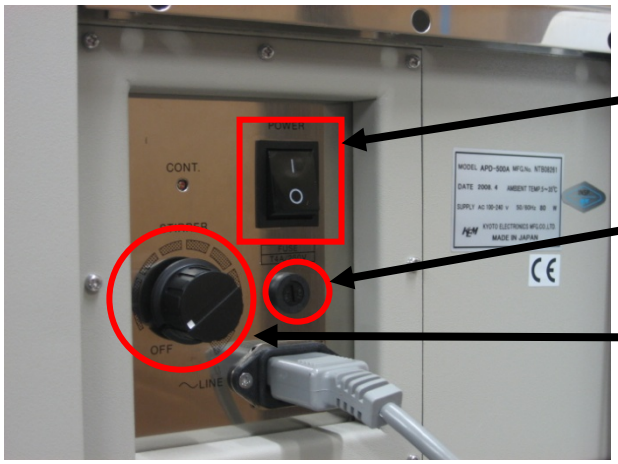


1-2. Operation panel

1-3. Right side view



1-4. Main power switch and stirrer revolution speed controller

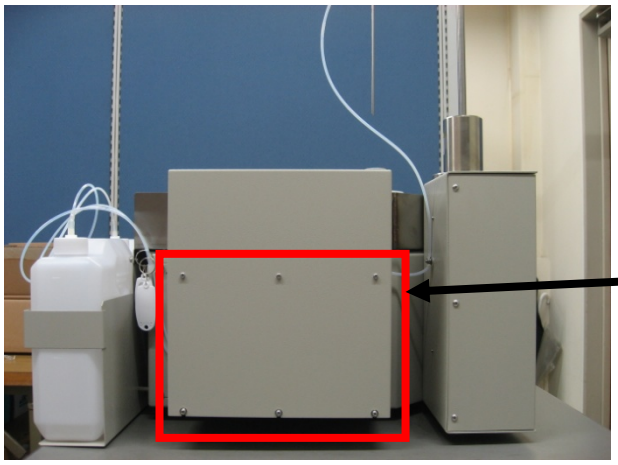


Main power switch

Fuse

Stirrer revolution speed controller

1-5. Rear side

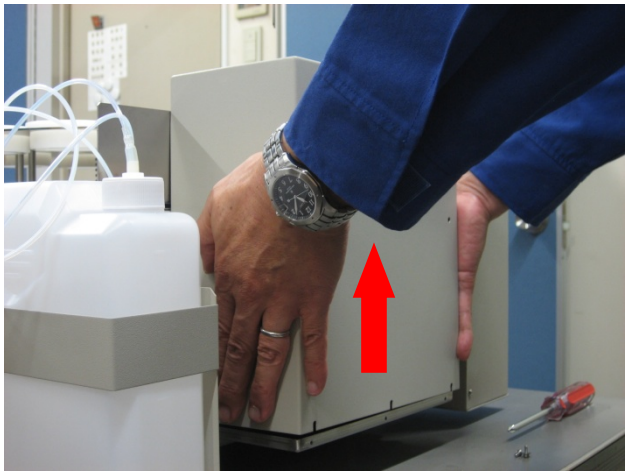


Fixing screws (6 pieces)

1-6. How to take off a rear cover

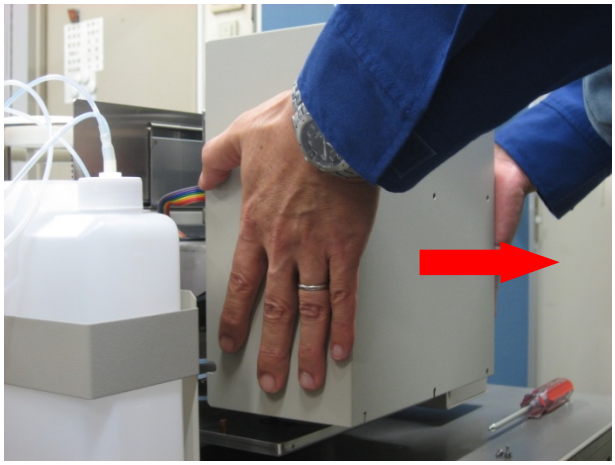
Take off 6 screws.

1-7. Take off a rear cover.



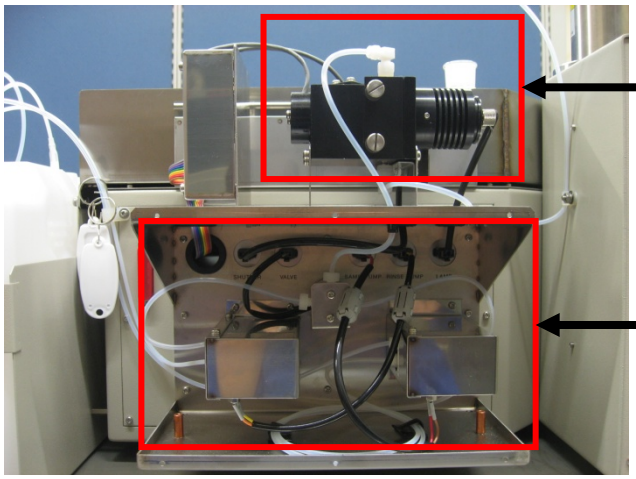
Lift a cover upward.

1-8. Take off a rear cover.



Pull a cover to the fore to take it off entirely.

1-9. Interior of rear part

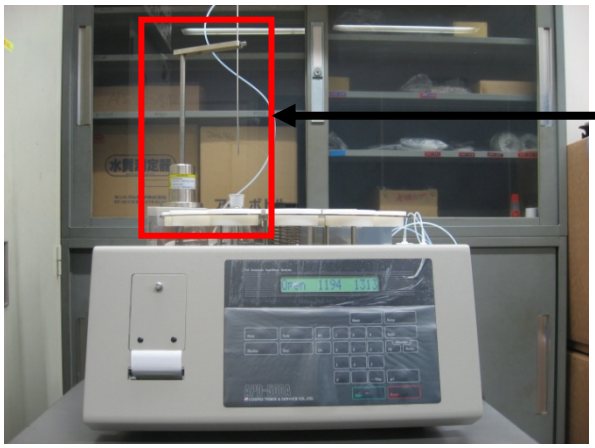


3. Trouble-shooting

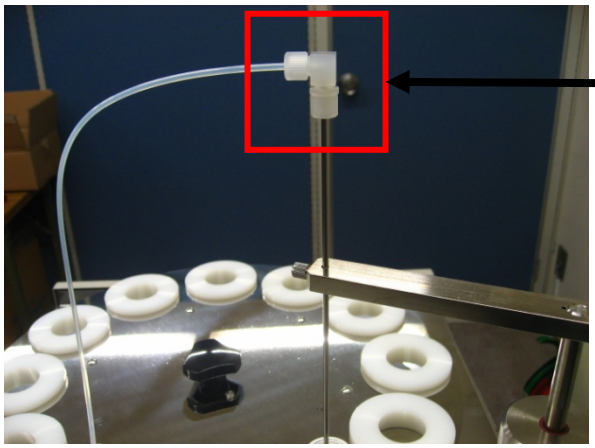
Symptom	Possible cause	Countermeasure
No display indication even if you turned on the power.	• A power cord is not plugged to a wall socket. • A fuse has blown off.	• Check a power cord. • Replace a fuse with a new one.
Potential of a light source becomes 800 or less.	• Deterioration due to a lamp's lifetime • Contamination of cell	• Replace a lamp with a new one. • Clean a cell or replace it with a new one.
Working curve cannot be made nicely.	• Voltage of your power source is not stable.	• Secure the stability of your power source (Voltage is liable to fluctuate if a pump and a heater are connected to the same power source.)
In particular, 5 points of S/L values of your sample for working curve does not become 1.0 to 1.3.	• Cell contamination • Deterioration of a lamp • Suction nozzle is not in the right position.	• Clean a cell or replace it with a new one. • Replace a lamp with a new one. • Make sure the position of a suction nozzle and tightening of a joint.
Measured values of your actual samples are not stable.	• Suction by pump is not in good order. • Instability of potential values due to your touch of an optical mirror.	• Replace a pump with a new one. • Don't touch a mirror at easy option before the above operation・
Factor does not change even if a working curve was made.	• After making a working curve, you have not made factor calculation and memory saving.	• After making a working curve, select "Function 0" immediately, and making "Calibration ON", set "Calib JPI?" ON at "Calibration 3 for JPI".
Air bubbles come into the line from a suction nozzle.	• Air is sucked from a sample suction line. • Revolution speed of a magnetic stirrer is too fast.	• Make sure the position of a suction nozzle and tightening of a joint. • Adjust the revolution speed at your measurement.

Once you measured high concentration samples, measurement values of next samples show higher values.	• Sample suction is not nicely done, and previous sample still remains in the cell. • Due to contamination in the cell, sample for measurement is not replaced with a next one in good order. • Due to disorder of pump suction, sample's flow has become bad.	• Make sure the position of a suction nozzle and tightening of a joint. • Clean the cell or replace it with a new one. • Replace a pump with a new one.
You hear abnormal noise from a pump.	• Deterioration of a pump	• Replace a pump with a new one.

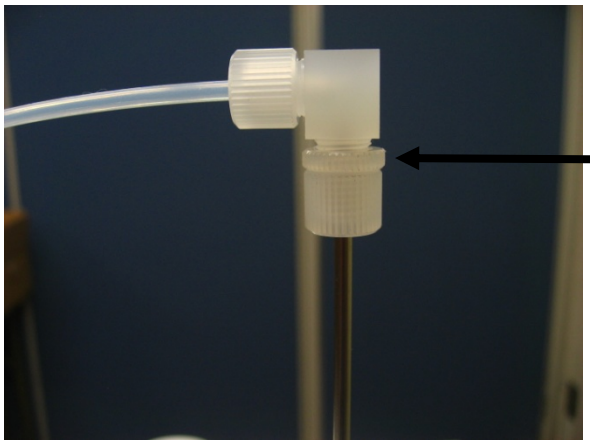
4. Mounting a suction nozzle



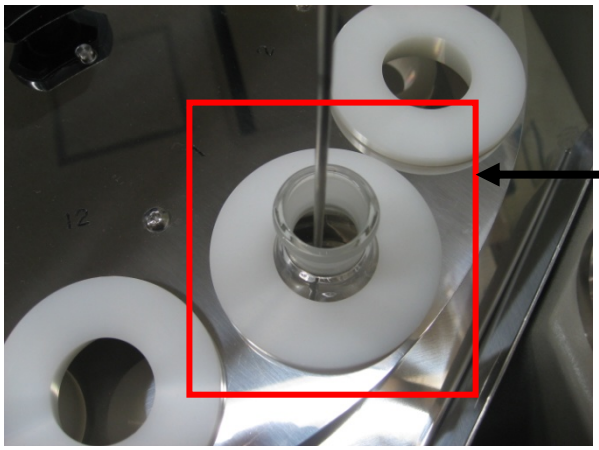
Mounting position of a suction nozzle



Joint

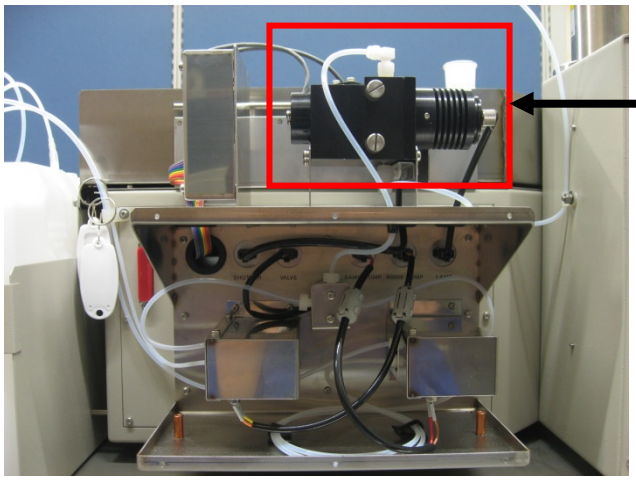


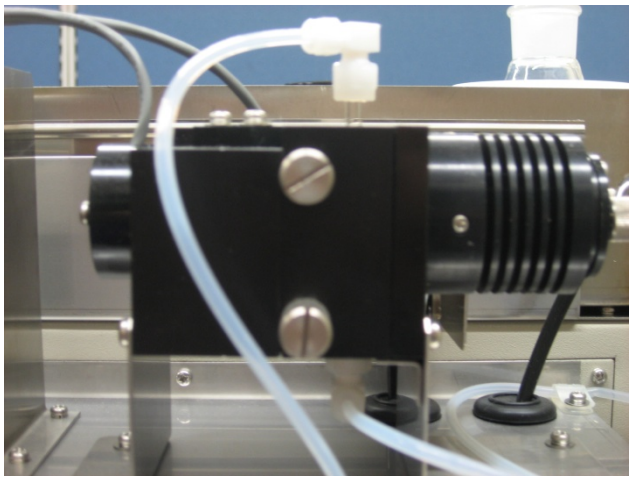
1) Loosen a stopper.
2) Plunge a nozzle into the joint stiffly.
3) Tighten it by fingers.
4) Make sure that a nozzle has been firmly fixed by pulling it by fingers.
5) Tighten a stopper by fingers.

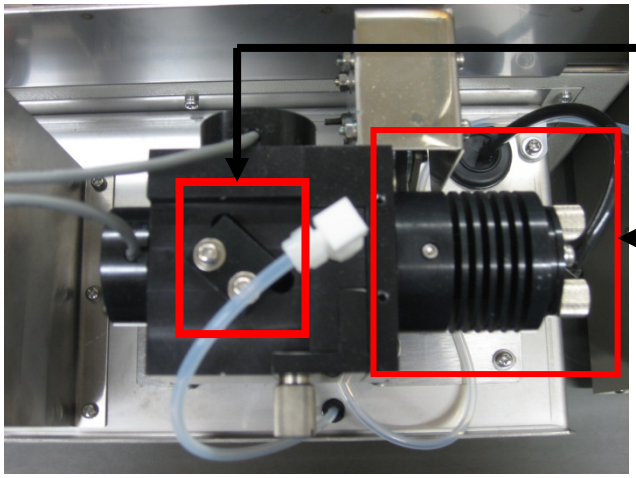


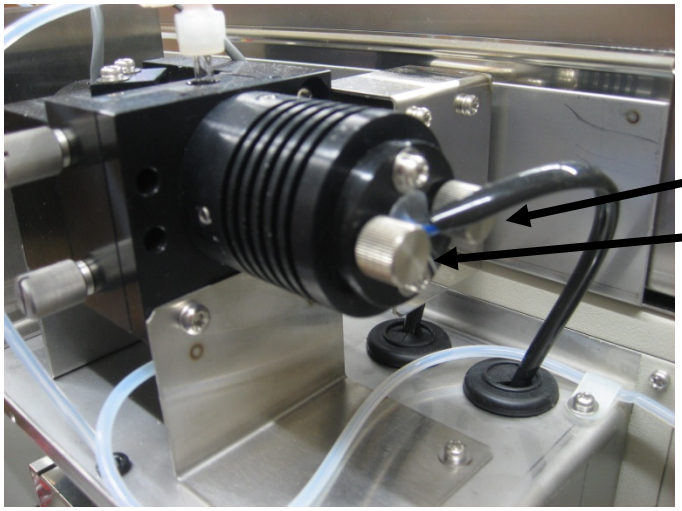
Set a nozzle in place so that its tip is placed in a position between the center and the edge of a flask.

5. Replacement of a light source lamp

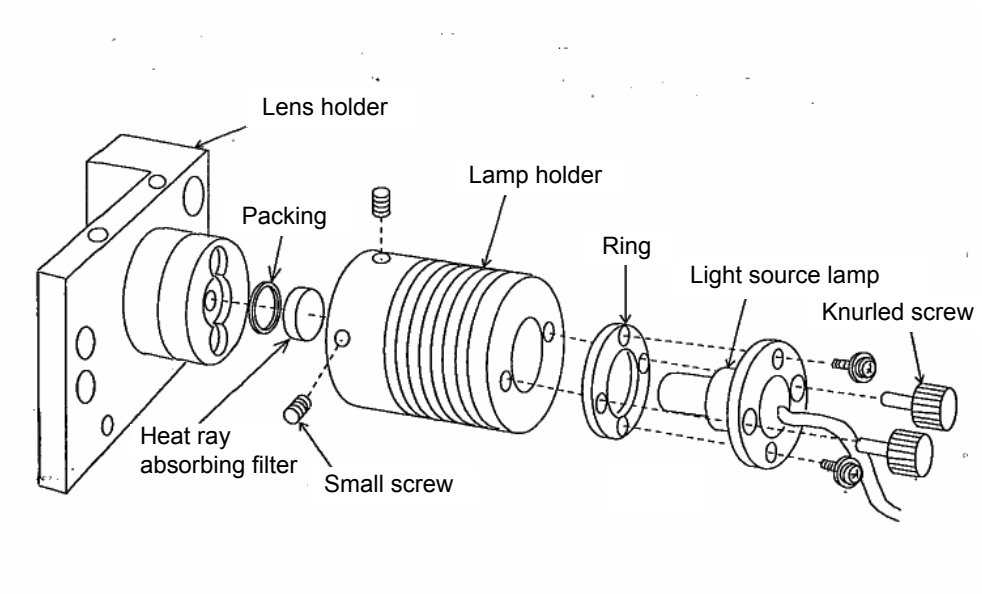








Take off a lamp by turning 2 knurled screws by fingers.



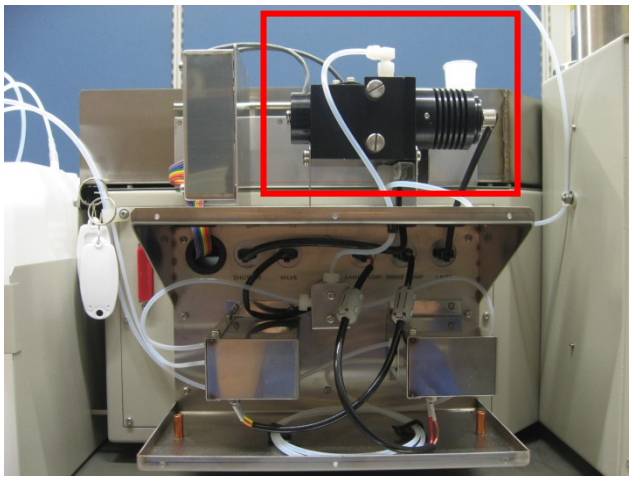
*** REMARKS:**

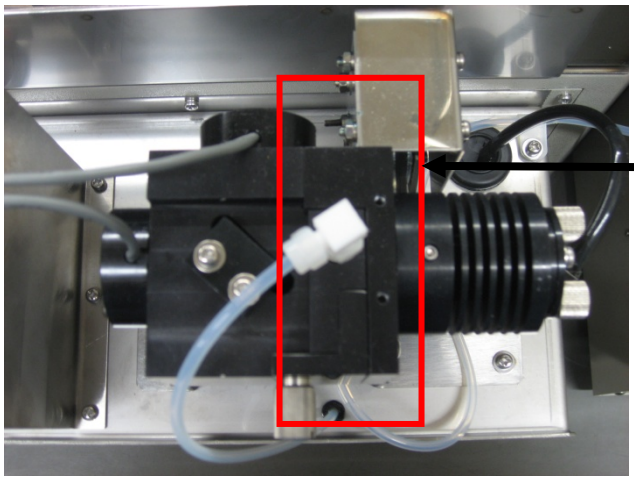
Never touch an optical mirror except the following case.
Otherwise, at the worst case, its recovery to the original position becomes impossible, and your APD-500A will have to be returned to the factory in Japan for re-adjustment.

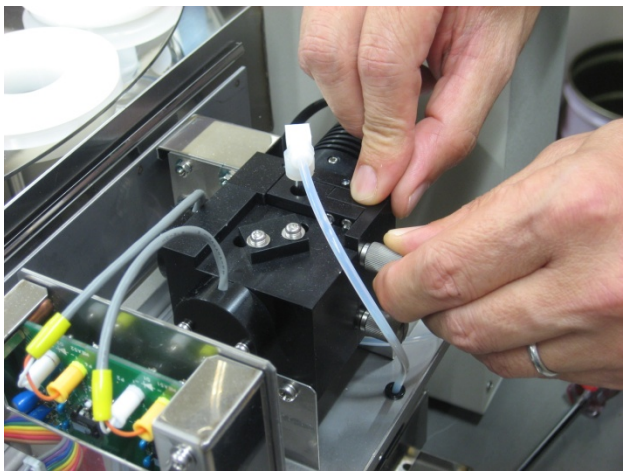
After your replacement of a lamp to a new one, you can adjust an angle of this optical mirror only in case either of the right or left potential value does not become more than 800, or both of those values become more than 800.

To make this adjustment, loosen the screws and fine adjust the mirror's angle so as to get the potential value at more than 800. However, never forget to firmly tighten the screws after your adjustment.

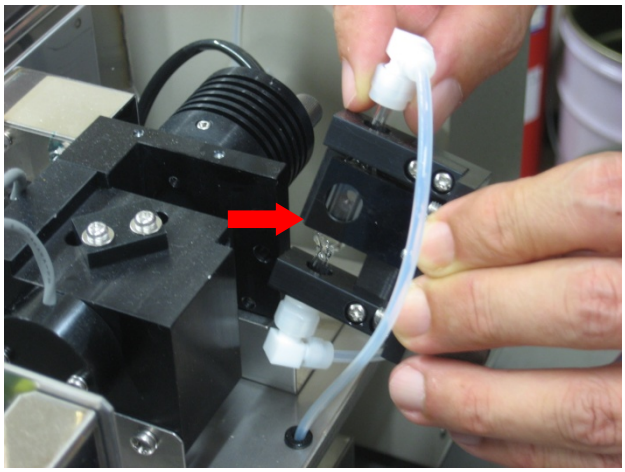
6. Cell replacement



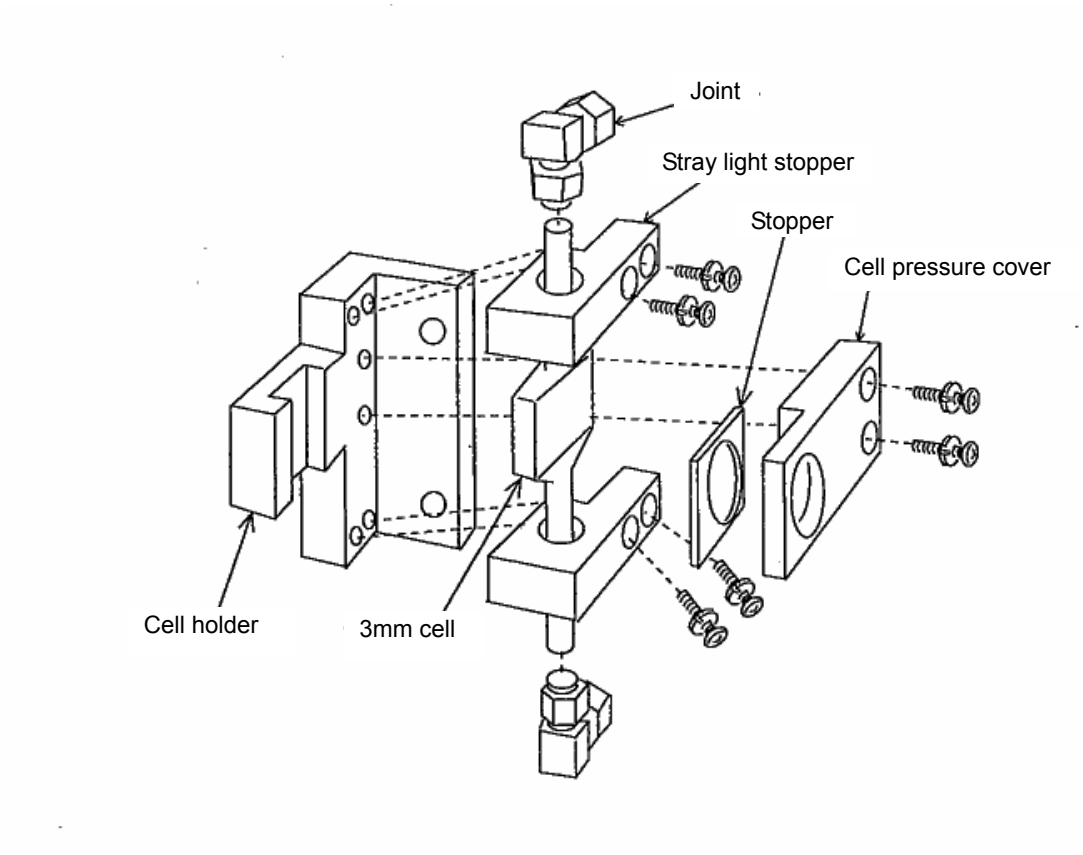




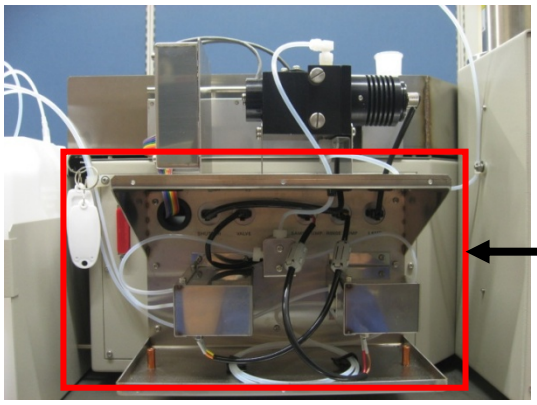
Take off a knurled screw at the side by fingers.

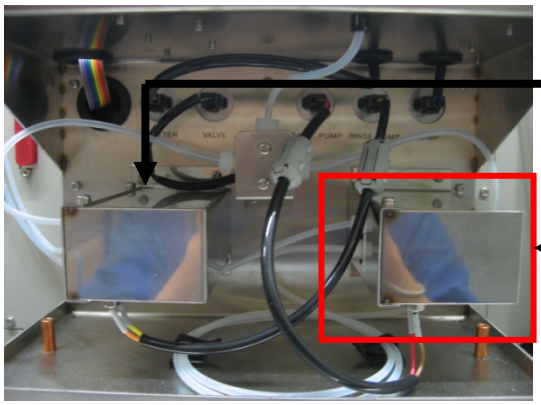


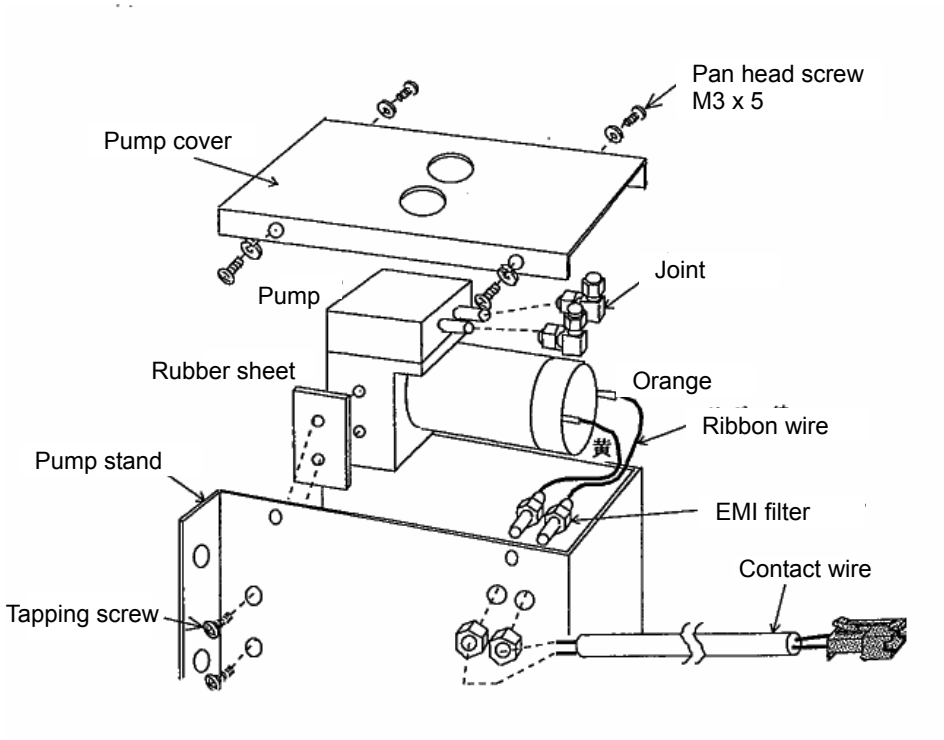
Take it off slowly so as not to touch a cell.



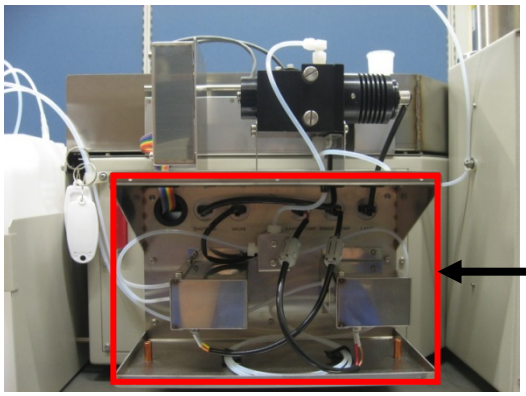
7. Replacement of a pump



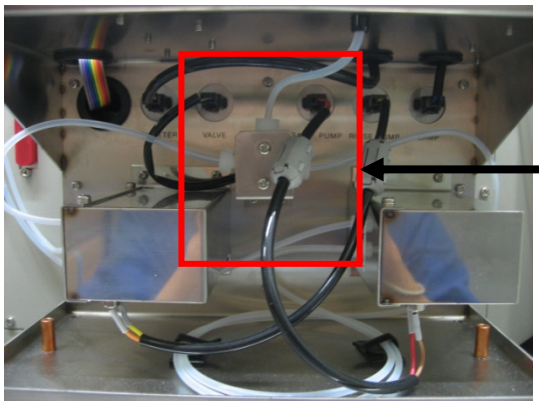




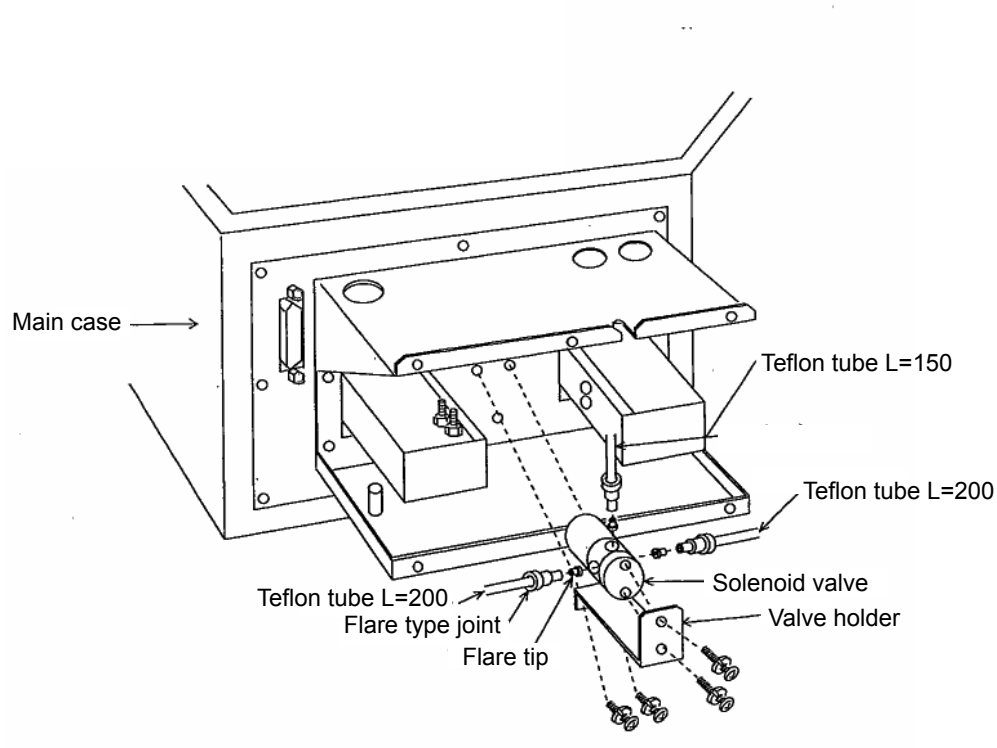
8. Replacement of a solenoid valve



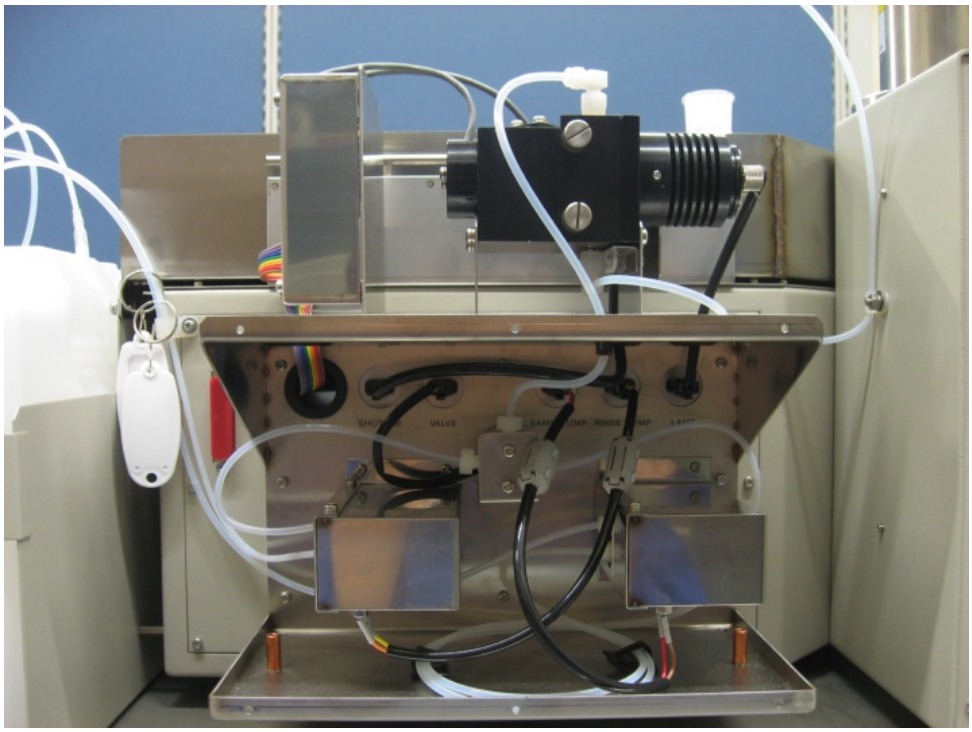
Pump unit

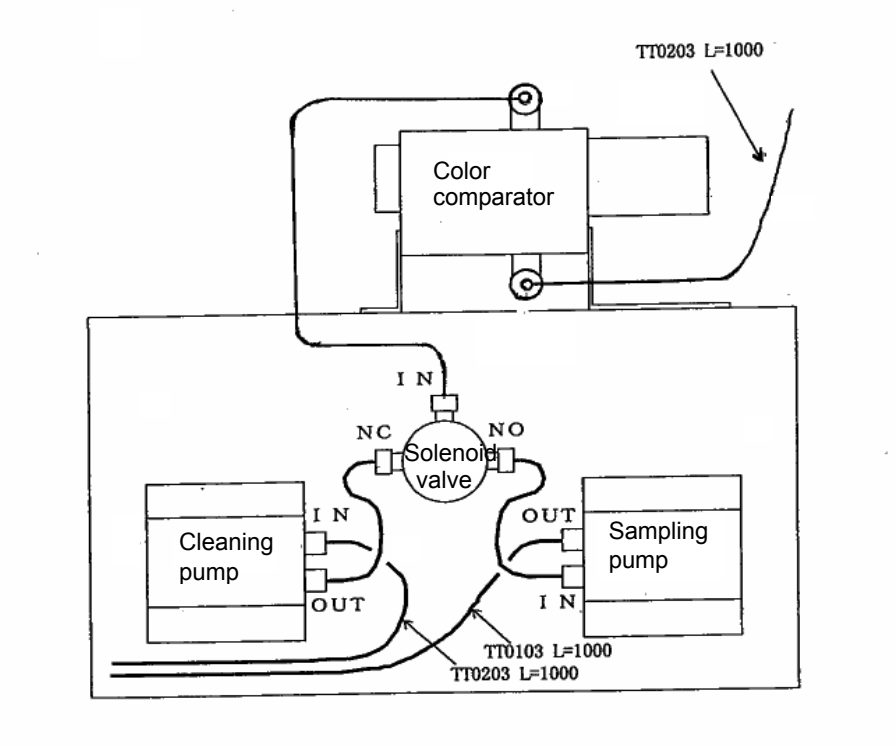


Position to install a solenoid valve



9. Unit piping diagram





10. List of major spare parts for APD-500A

No.	Parts Code	Description
1	APD-001	Allen wrench
2	APD-003	Light source lamp
3	APD-006	Standard material for calibration
4	APD-501	Cross head driver (No.2)
5	APD-502	Printer paper holder
6	APD-505	Printer tape (12 rolls)
7	APD-512	Sample suction & rinsing unit (including APD-526)
8	APD-514	Flow cell, 3mm
9	APD-521	Operation manual
10	APD-523	Sample carousel
11	APD-524	Tank holder
12	APD-525	Arm
13	APD-526	Connector for cell
14	APD-527	Connector for sampling pipe
15	APD-528	3-way solenoid switch
16	APD-531	Flare type joint
17	APD-532	Suction nozzle
18	APD-533	Printer unit
19	APD-534	Rotary solenoid switch
20	APD-535	Knob nut
21	APD-536	Stirrer for sample preparation
22	APD-537	Fuse, 4A (5 pieces./set)
23	APD-538	Interference filter (800 nm)
24	APD-539	Interference filter (750 nm)
25	APD-540	Convex lens
26	APD-541	Beam separator
27	APD-542	Gear head for rotation
28	APD-543	Motor for rotation & up and down
29	APD-544	Electromagnetic brake
30	APD-545	Photo-interrupter
31	APD-546	Gear head for up and down
32	APD-548	Timing belt
33	APD-549	Sheet key
34	APD-550	LCD module
35	APD-551	Flexible tube, 1m (BT-2)
36	APD-552	Tube, φ3 × φ1mm, 1m (TT0103)
37	APD-553	Tube, φ3 × φ2mm, 1m (TT0203)
38	APD-554	Control board for rotation/SIS
39	APD-555	Driver board
40	APD-556	Interface board
41	APD-557	CPU board
42	APD-558	Printer driver board

No.	Parts Code	Description
43	APD-559	I-V board
44	APD-560	Preamplifier board
45	APD-561	SW-regulator for DC 24V
46	APD-562	SW-regulator for DC 5V
47	APD-563	Printer connector board
48	APD-564	KEY connector board
49	APD-565	Magnetic stirring bar, 20mm (5pcs./set)
50	APD-566	Connector for suction nozzle
51	CHG-002	Erlenmeyer flask with stopper (12 pieces./set)
52	CHG-003	Flask holder (12 pieces./set)
53	COM-001	UL cord set with adaptor
54	COM-003	Grounding wire
55	COM-502	Container, polyethylene (2L)

Maintenance Manual for APD-500A Asphaltene Analyzer

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