

[Diener electronic GmbH + Co. KG • Nagolder Str. 61 • D-72224 Ebhausen](#)

UAB „Labostera“  
Mr Vytautas Aikevicius  
Chemijos str. 13  
51327 Kaunas  
LITHUANIA

Contact: Alessia Guglielmi

E-mail: [alessia.guglielmi@plasma.com](mailto:alessia.guglielmi@plasma.com)  
Phone: +49 7458 / 999 31-636

**QUOTATION NO. AQ18-1832 AGU**  
**PLASMA SYSTEM TYPE „PICO“**  
**Project: “CENTER FOR PHYSICAL SCIENCES AND TECHNOLOGY**  
**(FTMC), Lithuania”**

**We suggest the following equipment for your application (for example cleaning / activation / etching / coating of surfaces with plasma polymerization)**

**Purchasing Quotation standard system:**

**Model 1, standard system, photoresist cleaning**

Pos.	Description
1.3	BASIC PC-Control (Windows CE) in basic unit type B (approx. w 560 mm x d 600 mm x h 460 mm)
1.3,1	3,5" TFT-display
2.3	Gas supply / Gas channel type B (2 pcs. MFC's, Vögtlin)
3.1	Pressure gauge / Pirani sensor (shows the pressure in the vacuum chamber)
4.1	Connections plasma system PICO (230 V / 16 A)
5.3	Vacuum chamber / Recipient type C (round, borosilicate glass, hinged door)
6.2	Tray type B (borosilicate glass)
7.2	Standard electrode type B (aluminium)
8.6	Generator type F (13.56 MHz, 0 – 200 W, automatic matching)
9.1	Vacuum pump type A incl. tubing, oil and flushing system for O <sub>2</sub> -operation (Pfeiffer DUO 5M – approx. 5 m <sup>3</sup> /h)

## 1. CONTROL IN BASIC UNIT

### Remark:

Standard wiring, electrical components, tubing, ... are included in the basic unit. The height of the basic unit may vary with several additional options!

### Remark controls:

You find a more detailed description regarding our different control variations on our homepage at:  
<http://www.plasma.de/de/plasmaanlagen/steuerung.html>

### 1.1 SEMIAUTOMATIC CONTROL

#### DESCRIPTION SEMIAUTOMATIC CONTROL:

- The control of the expiries follows semi automatically.
- The vacuum pump, the gas flow, the plasma process and ventilating need to be started manually.
- Free parameters: process time, power, gas type, pressure.

#### INCL BASIC UNIT TYPE B (TABLE TOP)

- Dimensions: width approx. 560 mm  
depth approx. 600 mm (750 mm incl. plugs)  
height approx. 460 mm



### 1.2 ROTARY SWITCH CONTROL

#### DESCRIPTION ROTARY SWITCH CONTROL:

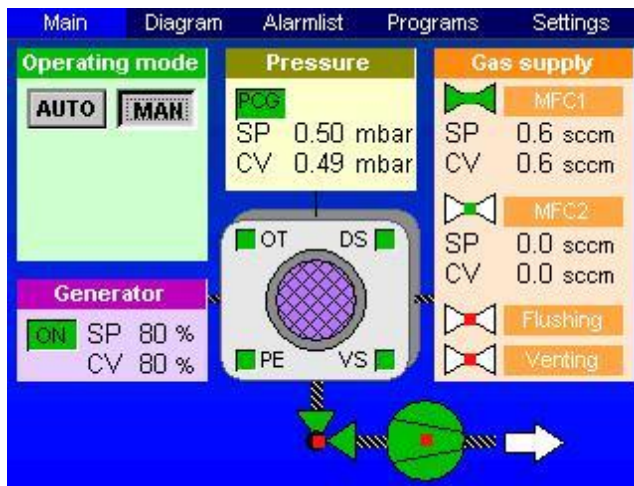
- An especially simple using of plasma system with a rotary knob.
- The control can be used fully or semi-automatically (until plasma treatment).
- The ventilation of the plasma system will be done manually (Flood position).
- Free parameters: process time, power, gas, pressure
- If you turn right till PROCESS, the system works automatically.



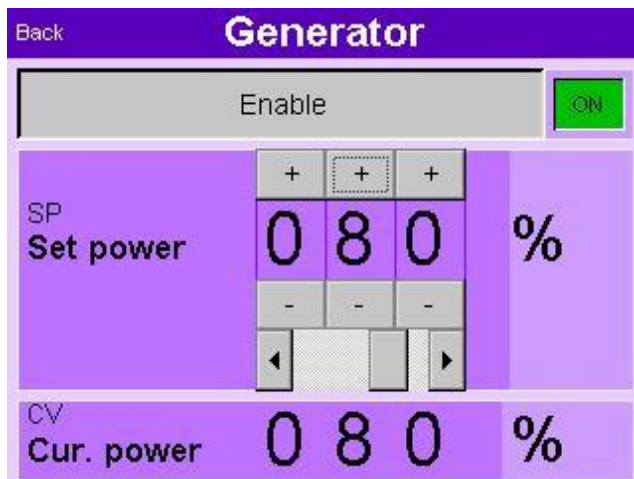
### 1.3 BASIC PC CONTROL (PCCE-CONTROL)

#### DISCRIPTION BASIC PC-CONTROL (PCCE-CONTROL)

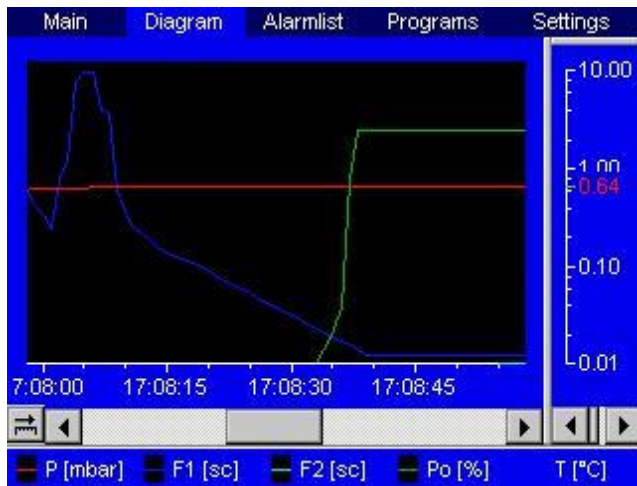
- The plasma system has a 3,5" TFT-display with touch screen (optional 7"). With its **fully graphical color interface** and Windows look & feel a simple **intuitive operation** is possible. Contrary to the normal LCD without touch screen function no keypad is required, e. g. with function keys for multi-level operation.
- System software **Windows CE**.
- We have two modes available: **automatic and manual**.
- Manual mode:**



- Switching on and off of **individual units**, e. g. valves, is possible by simply tapping on the corresponding icon.
- The input of set point values can be done by tapping a group, e. g. the generator.
- A dialog context displays in which the set points on the touch screen can be changed with virtual + / - buttons.



- **Automatic-mode:**
- Places for **programming** of 50 programs are available.
- The programming will be done directly on the touch screen. An **external** programming device or PC is **not** needed.
- A program name can be assigned to each program.
- The time course of relevant process parameters will be shown in the curve diagram.



- The current process step and the process time expired will be shown in the **main picture**.
- The **alarms** will be shown via blinking LED and alarm list for easy fault diagnosis.
- **Multi language** (German / English), other languages on request.
- **Ethernet network** remote access
- With an existing **USB connection**, which stores programs, alarms, process values, etc. the data can be used on **USB sticks**.
- The control has no moving parts, this means no hard drive and no fan and therefore it is **free of maintenance**.
- The **boot time** of the device is very short.
- Collected process data can be **saved** in text-format on a **memory card** in the device and can be copied manually to a USB-disk. **Saved Data** can be **read** by other programs, e. g. Excel. (Only available if option **data logging** is ordered).
- The Touch panel PC can be operated by remote control from an external PC via internal **Ethernet port** (only available if option **remote control** is ordered).
- Obligatory configuration PCCE controlled system:
  - The system can be equipped with MFC's and also with needle valves (see gas supply point 2).
  - This control is not suitable / designed for plasma polymerisations processes.
  - A generator with a PC interface is required (see point 8 generator).
  - We recommend for MHz generators the FULL PC control.




## COMPARISON BETWEEN BASIC PC AND FULL PC CONTROL (STANDARD AND OPTIONS)

	<b>BASIC PC (previously PCCE)</b>	<b>FULL PC (previously PC)</b>
<b>Display dimension / Decomposition</b>	3,5" Touch 320 x 240 QVGA or 7" Touch 800 x 600 QVGA (Option)	15" Touch 1024 x 768 XGA or 7" Touch 800 x 600 QVGA (Option)
<b>Operating system</b>	Windows CE 5.0 (ARM)	Windows 7 professional
<b>Gas channels</b>	max. 3	Standard: 1 - 4, max. ca. 10 (more on request)
<b>MFC-quantity</b>	max. 3	Standard: 1 - 4, max. ca. 10 (more on request)
<b>Needle valves for process gases</b>	max. 3	no
<b>Angle valves</b>	yes	yes
<b>Softpump</b>	no	yes
<b>Rootspump</b>	no	yes
<b>Turbopump</b>	no	yes
<b>Vaporizer (1-valve without or with PWM)</b>	no	yes
<b>Monomer dosage (2-valves)</b>	no	yes
<b>Heater(s)</b>	max. 1	max. 4 (more on request)
<b>Temperature control</b>	max. 1 (2 point-regulator)	max. 4 (2-point-regulator or PWM regulator) max. 4 (more on request)
<b>Temperature gauge</b>	max. one control point	max. 4 control point (more on request)
<b>Pressure gauge Pirani sensor</b>	yes	yes
<b>Capacitance manometer</b>	yes	yes
<b>External pressure gauge (analog)</b>	no	yes
<b>External pressure gauge (serial, RS232)</b>	no	yes, on request
<b>External pressure regulator (MKS651 for Butterfly-Valve)</b>	no	yes
<b>Rotary drive</b>	yes	yes
<b>Rotary drive-positioning</b>	no	yes
<b>Rotary drive rotary speed can be pre selected</b>	no	yes
<b>Number of generators (LF / MW / RF) total</b>	max. 1	1 to 10 (more on request)
<b>Different generator types in eon system (e. g. LF / RF)</b>	no	yes
<b>LF-generator(s)</b>	max. 1	yes
<b>MW-generator(s)</b>	max. 1	yes
<b>RF-generator(s)</b>	max. 1	yes

Auto-Matching for RF	no	yes
Pulsing LF / RF / MW (on / off)	yes, on request	yes
Pulsing LF / RF / MW (PWM)	no	yes
External start / stop button	yes	yes
Barcode scanner	no	yes
Number of programs	50	100
Subprograms possible	no	yes
Number of subprograms	-	10
Chart	yes	yes
Archive	no	yes
Data export	option	yes
Alarm list simple	yes	-
Alarm list detailed	no	yes
Maintenance picture (maintenance interval, hours of operating, etc.)	no	yes
Leak rate measurement	yes	yes
Remote control (in local LAN)	Option (Remote Control Client)	Yes, about VNC (Freeware) possible
Remote maintenance (via internet or modem or ISDN)	no	Option (ISDN-Modem+pcAnywhere)
Connection to superior material pursuit system (ODBC, XML, TCP/IP, DLL, COM, OPC, etc.)	no	yes, on request
Special system (Roll-Roll, short tact, Endpoint-Detection, Balances for monomer dosage, etc.)	no	yes, on request

## 2. GAS SUPPLY

**Remark:** Our systems are available with needle valves or Mass-Flow-Controllers (MFCs)  
(standard of plasma system type Pico are 1 - 3 pieces, more on request).

SELECTION GAS SUPPLY	2.1 TYPE A	2.2 TYE B	2.3 TYPE C
maximum of gas channels	3	3	3
Material	stainless steel	stainless steel	aluminium
Description	needle valve	MFC	MFC
Manufacturer	Vögtlin	variable	Vögtlin
Available flow values in sccm	on request	on request	on request
Control	Semi automatic	BASIC PC / FULL PC	BASIC PC / FULL PC
Tolerance	5 %	1 %	~ 1 %
Figure			
Price EUR / Piece	900.00	1,650.00	1,050.00
Corrosive gas version / FFKM sealing Price EUR / Piece	1,100.00	1,750.00	-

**Remark:** The Vögtlin MFC's are not suitable for applications with corrosive gases.

### 3. PRESSURE GAUGE

#### 3.1 PIRANI SENSOR

- Pirani sensor is standard in the PICO system.
- Shows the pressure in the vacuum chamber.



#### 3.2 CAPACITANCE MANOMETER



### 4. CONNECTIONS








#### 4.1 CONNECTIONS FOR PLASMA SYSTEM PICO (TABLE TOP)

- Gas: 6 mm Swagelok
- Power: 230 V / 16 A, cable connection length: 2 m
- Exhaust: 10 mm (inner diameter) flexible tube, length: 5 m







## 5. VACUUM CHAMBER

**Remark:** Our systems have been measured (window pane)  
concerning irradiation according to DIN 12198.  
**Result:** non-hazardous

SELECTION VACUUM CHAMBER	5.1 TYPE A	5.2 TYPE B	5.3 TYPE C	5.4 TYPE D	5.5 TYPE E	5.6 TYPE F	5.7 TYPE G
<b>Chamber configuration</b>	round	round	round	round	round	rectangular	rectangular
<b>Material: vacuum chamber</b>	stainless steel	borosilicate glass	borosilicate glass	quartz glass	quartz glass	stainless steel	aluminium
<b>Chamber cover</b>	cap	cap	hinged door	cap	hinged door	hinged door	hinged door
<b>Covering material</b>	aluminium, glass pane	aluminium, glass pane	aluminium, glass pane	aluminium, glass pane	aluminium, glass pane	aluminium, glass pane	aluminium, glass pane
<b>Inner diameters</b>	Dia. 150 mm D 320 mm	Dia. 130 mm D 300 mm	Dia. 130 mm D 300 mm	Dia. 130 mm D 300 mm	Dia. 130 mm D 300 mm	W 160 mm D 325 mm H 160 mm	W 150 mm D 325 mm H 160 mm
<b>Opening diameter of recipient</b>	Dia. 150 mm	Dia. 125 mm	Dia. 125 mm	Dia. 125 mm	Dia. 125 mm	W 160 mm H 160 mm	W 150 mm H 160 mm
<b>Chamber volume</b>	approx. 5 litres	approx. 5 litres	approx. 5 litres	approx. 5 litres	approx. 5 litres	approx. 8 litres	approx. 7 litres
<b>Application areas</b>	standard plasma processes,  small batch- and laboratry equipment	for pure Plasma processes,  small batch- and laboratry equipment	for pure Plasma processes, bulk production and manufacturing	For ultra pure plasma processes,  small batch- and laboratry equipment	for ultra pure Plasma processes,  bulk production and manufacturing	standard plasma processes,  bulk production and manufacturing	standard plasma processes,  bulk production and manufacturing
<b>Figure</b>							

## 6. TRAYS / ROTARY DRUM



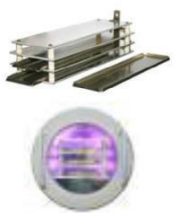



**Remark:** Our systems will be delivered with one tray for standard.  
Further trays or other constructions can be produced after  
consulting Diener electronic.

SELECTION TRAYS	6.1 TYPE A	6.2 TYPE B	6.3 TYPE C	6.4 TYPE D
<b>Description</b>	flat tray	flat tray	flat tray	flat tray
<b>Adapted for the following chamber configuration</b>	round	round	round	rectangular
<b>Material</b>	aluminium	borosilicate glass	quartz glass	stainless steel / aluminium
<b>Dimensions</b>	W 300 mm D 149 mm H 3 mm	W 123 mm D 325 mm H 5 mm	W 123 mm D 325 mm H 5 mm	W 149 mm D 300 mm H 3 mm
<b>Qty. of possible trays</b>	on request	1 piece	1 piece	on request
<b>Application areas</b>	standard plasma processes	pure plasma processes	ultra pure plasma processes	standard plasma processes
<b>Figure</b>				

SELECTION TRAYS	6.5 TYPE E	6.6 TYPE F	6.7 TYPE G	6.8 TYPE H
Description	flat tray	rotary drum	quartz glass boat	quartz glass boat
Adapted for the following chamber configuration	rectangular / floor electrode	round / rectangular	round	round
Material	stainless steel / bevelled and perforated sheet	stainless steel	quartz glass	quartz glass
Dimensions	W 149 mm D 300 mm H 3 mm	Ø 110 mm L: 250 mm	3 " L 200 mm for 15 pcs. Wafer	4 " L 200 mm for 15 pcs. Wafer
Qty. of possible trays	on request	1 piece	1 piece	1 piece
Application areas	standard plasma processes	for handling with bulk materials	ultra pure plasma processes, Wafer treatment	ultra pure plasma processes, Wafer treatment
Figure				

## 7. ELECTRODE

**Remark:** Please consult Diener electronic regarding the exact design of your individual electrode as well as other materials for the manufacturing of your trays.

SELECTION ELECTRODE	7.1 TYPE A	7.2 TYPE B	7.3 TYPE C	7.4 TYPE D	7.5 TYPE E	7.6 TYPE F
<b>Description</b>	standard electrode	standard electrode	floor electrode	floor electrode	RIE-electrode	RIE-electrode with gas shower
<b>Adapted for the following chamber configuration</b>	round	rectangular	round	rectangular	round / rectangular	rectangular
<b>Material</b>	Aluminium / stainless steel	aluminium	stainless steel / aluminium	stainless steel / aluminium	stainless steel	stainless steel or aluminium
<b>Equipment</b>	removable tray made of stainless steel	removable tray made of stainless steel	removable tray made of stainless steel	removable tray made of stainless steel	removable tray made of stainless steel	-
<b>Application areas</b>	standard plasma processes	standard plasma processes	standard plasma processes	standard plasma processes	anisotropic and isotropic etching	anisotropic etching
<b>Miscellaneous</b>	included in delivery	included in delivery	more parts can be treated per process	more parts can be treated per process	upper etching rates	upper etching rates because of a homogeneous gas distribution
<b>Figure</b>						

### 7.7 SWITCHABLE CONFIGURATION OF TRAY / ROTARY DRUM / DEVICE FOR POWDER TREATMENT

- With this option your system can work either with trays or rotary drum.

\* Rotary drum / rotary drum powder and tray options are required.

## 8. GENERATOR






Remark: To compliance DIN EN 55011, all our 13.56 MHz are quartz-stabilized.





SELECTION GENERATOR	8.1 TYPE A	8.2 TYPE B	8.3 TYPE C	8.4 TYPE D
Frequency	40 kHz	100 kHz	13.56 MHz	13.56 MHz
Power	0 - 200 W	0 - 500 W	0 - 50 W	0 - 100 W
Pulse function	-	-	-	✓
Impedance matching	automatic	automatic	fixed	manual
Display of forward power	-	-	✓	✓
Display of reflected power	-	-	-	✓
Safety switches: vacuum safety switch and door safety switch	✓	✓	✓	✓
Quartz stabilized frequency (+/- 0,05 %)	-	-	✓	✓
PC Interface	-	✓	✓	✓
Main applications	activation, cleaning, etching, semi-conductor (back-end), plasma polymerization	activation, cleaning, etching, semi-conductor (back-end), plasma polymerization	activation, cleaning, etching, semi-conductor (front-end), Semi-conductor (back-end), plasma polymerization	activation, cleaning, etching, semi-conductor (front-end), Semi-conductor (back-end), plasma polymerization

SELECTION GENERATOR	8.5 TYPE E	8.6 TYPE F	8.7 TYPE G	8.8 TYPE H
Frequency	13.56 MHz	13.56 MHz	13.56 MHz	2.45 GHz
Power	0 – 100 W	0 – 200 W	0 - 300 W	0 - 300 W
Pulse function	✓	✓	✓	-
Impedance matching	automatic	automatic	automatic	-
Display of forward power	✓	✓	✓	✓
Display of reflected power	✓	-	✓	-
Safety switches: vacuum safety switch and door safety switch	✓	✓	✓	✓
Quartz stabilized frequency (+/- 0,05 %)	✓	✓	✓	-
PC Interface	✓	✓	✓	✓
Main applications	activation, cleaning, etching, semi-conductor (front-end), Semi-conductor (back-end), Plasma polymerization	activation, cleaning, etching, semi-conductor (front-end), Semi-conductor (back-end), Plasma polymerization	activation, cleaning, etching, semi-conductor (front-end), Semi-conductor (back-end), Plasma polymerization	activation, cleaning, etching, semi-conductor (front-end), Semi-conductor (back-end), Plasma polymerization

## 9. VACUUM PUMP / ACCESSORIES

**Remark:** Our pumps are available with mineral oil and PFPE oil also.  
The pumps will be delivered already filled with oil.

SELECTION VACUUM PUMPS	9.1 TYPE A	9.2 TYPE B	9.3 TYPE C	9.4 TYPE D	9.5 TYPE E
Description	DUO 5M	DUO 5MC	D4B LVO 100	D8B LVO 100	Scrollvac 7 plus
Description	rotary vane pump	rotary vane pump	rotary vane pump	rotary vane pump	dry pump
Exhaust filter	✓	✓	✓	✓	-
Al <sub>2</sub> O <sub>3</sub> -oil filter	-	-	-	-	-
Manufacturer	Pfeiffer	Pfeiffer	Leybold	Leybold	Leybold
Suction power (m <sup>3</sup> /hour)	5 m <sup>3</sup> /h	5 m <sup>3</sup> /h	4 m <sup>3</sup> /h	8 m <sup>3</sup> /h	6 m <sup>3</sup> /h
Oil type	mineral oil	PFPE oil	mineral oil	mineral oil	-
Can work with oxygen, argon and all other usual process gases	✓	✓	✓	✓	✓
The pump can work with corrosive gases	-	✓*	-	-	-
Figure					
Vacuum	2·10 <sup>-2</sup> mbar	2·10 <sup>-2</sup> mbar			

SELECTION VACUUM PUMPS	9.6 TYPE F	9.7 TYPE G	9.8 TYPE H	9.9 TYPE I
Description	D16B LVO 100	D16BCS LVO 100	D16BCS PFPE	D16BCS PFPE-Al <sub>2</sub> O <sub>3</sub>
Description	rotary vane pump	rotary vane pump	rotary vane pump	rotary vane pump
Exhaust filter	✓	✓	✓	✓
Al <sub>2</sub> O <sub>3</sub> -oil filter	-	-	-	✓*
Manufacturer	Leybold	Leybold	Leybold	Leybold
Suction power (m <sup>3</sup> /hour)	16 m <sup>3</sup> /h	16 m <sup>3</sup> /h	16 m <sup>3</sup> /h	16 m <sup>3</sup> /h
Oil type	mineral oil	mineral oil	PFPE oil	PFPE oil
Can work with oxygen, argon and all other usual process gases	✓	✓	✓	✓
The pump can work with corrosive gases	-	✓*	✓*	✓*
Figure				

- \* the pump has a strongly limited lifetime when using CF<sub>4</sub> / O<sub>2</sub> or SF<sub>6</sub>  
\* will be needed for etching processes with CF<sub>4</sub> / SF<sub>6</sub>

Diener electronic GmbH + Co. KG  
Nagolder Straße 61 D - 72224  
Ebhausen Germany

Tel.: + 49 (0) 7458-99931-0  
Fax: + 49 (0) 7458-99931-50



**diener**<sup>electronic</sup>  
Plasma-Surface-Technology

E-Mail: [info@plasma.com](mailto:info@plasma.com)  
Internet: [www.plasma.com](http://www.plasma.com)

## 10. INCLUDED OPTIONS

### 10.1 ACTIVE CARBON FILTER

Active carbon can be changed easily. KF16 (usable till 8 m<sup>3</sup>/h)

### 10.2 OXYGEN GENERATOR

Oxygen will be produced out of ambient air.

Type: Kröber 4.0

**Flow adjustment**

0 to 2 l/min in 0.1 steps

2 to 4 l/min in 0.2 steps

4 to 5 l/min in 0.5 steps

**O<sub>2</sub>-concentration (±3%)**

1 up to 4 l/min 95%

4 up to 5 l/min 90%

5 up to 6 l/min 85 %



### 10.3 VACUUM CHAMBER MADE OF BOROSILICSTE 5.3 Vacuum chamber / Recipient type C

Vacuum chambers made of borosilicate glass are for high-purity plasma processes. Vacuum chambers made of quartz glass are for ultra-high purity plasma processes.



### 10.4 TRAYS / ROTARY DRUM Tray type B (borosilicate glass) 4 pcs.

W 123 mm D 325 mm H 5 mm

### 10.5 STANDARD ELECTRODE 7.2 TYPE B (aluminum) 3 pcs.

