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## 0. Introduction

#### Dear customer,

we are pleased, that you have decided for a Zubler extraction system and hope it will enhance your work. The continuous development of our technology is based on the co-operation with experienced

dental technicians. The focus lies on the aim to optimize the extraction technology in the fields of performance, noise and reliability.

Please read this operating manual carefully in order to ensure a problem-free operation.

### 0.1 Declaration of conformity

We, Zubler Gerätebau GmbH

Buchbrunnenweg 26 89081 Ulm Jungingen

declare, that the product autom. opener

### AP 600

### AP 600-R

conforms to the health and safety requirements set out in the directives

2014/30/EC EMV-Directive 2014/35/EC Low-Voltage Directive 2006/42/EC Machines Directive

Any modification not specifically approved by us voids the validity of this declaration.

Kurt Zubler ceo



#### 0.2 Workstation with AP600



Fig. 1: Workstation Layout with central suction

1	AP 600 control unit	
2	power cord	
3	handpiece power cord	
5	pipe system	
6	port valve	
7	pressure hose port valve	
9	pressure supply (max. 1.0bar)	
50	handpiece control unit	
51	handpiece	
52	funnel	

53 rectangular pipe

- The automatic port opener AP 600 / AP600-R consists of the control unit (1) and port valve (6).
- By operating the handpiece control unit (50) or another working device at the workstation the port valve (6) is opened, which is connected to the pipe system (5).
- The port valve (6) is connected via a hose and a rectangular pipe (53) with a funnel (52) or a working device.
- Once the port valve (6) is opened, the suction is started immediately, since there is either already vacuum available in the pipe system (central suction) or the control unit (1) is starting the suction unit simultaneously (multi station suction).
- If the working device is stopped, the port opener will stay open for a preset run-out-time (3s) in order to remove remaining dust.

#### 0.2.1 Port valve



Fig. 2



### 0.2.2 Control unit

line is opened.

The control unit (Fig. 3) is usually electrically coupled with the working device, to open the port valve automatically when the device is started.

■ The port valve (Fig. 2) is opening and

closing the suction line.
An internal rubber membrane is inflated by compressed air which is keeping the suction line closed.
By venting the port valve, the suction

## Therfore the following start signals are available:

- Current measurement with switch-on threshold (e.g. handpiece)
- 24V signal (e.g. milling machine)
- switching contact (e.g. manual switch or relay)
- Manual operation via the control panel (Fig. 4)



#### Attention!

In standby, as well as in the de-energized state of the control unit, the port valve is closed as long as the compressor is switched on, or still compressed air in the laboratory network. If the central suction system is switched on without or before compressed air is applied, all valves are open and it sucks at all positions.



# 

Fig. 4

#### 0.2.3 Intake system

Basic system requirements include optimal particle flow, minimal noise production and ergonomic posture promotion.

The following criteria promote these basic requirements and are specifically adapted to Zubler suction systems.

- Suction funnel R1200,
- Rectangular pipe R1000, R1300
- Rectangular silencer R1100



- A Suction funnel R1200 B Rectangular pipe R1300
- C Rectangular pipe R1000
- The R1200 suction funnel (21) was tested according to GS-IFA-M20 test no. 1305026 for a minimum suction performance of 20 l/s.
- Sitting in the upright position in a posture preserving ergonomically designed chair.
- Workpiece as close as possible to the suction funnel 21; no dust cloud may be visible. Trails of dust must be drawn into the hopper.
- Direction of viewing of the workpiece perpendicular to the protective screen.

## 1. Installation

## 1.1 Scope of delivery and accessories





Handpiece power cord C13/C14



Pressure reducer DM06



Suction control wire SL-AP 5m

### **Special accessories**

	Control panel compact	<b>BestNr.</b> 822-0641
Banyan.	Control panel for integration	822-0642
Ð	Power adapter C14 / CEE	012-00701
g)))())	SL-AP control wire 10m VL-AP extension wire 5m Z1 Adapter E2 Z1 Adapter K50 Z1 Adapter DC	825-25644 825-25645 825-256-18 825-256-19 825-256-17
<b>MD</b>	SL-AP-R 2,5m	825-25640
<b>M</b>	special wires SL24 page 17	825-256xx
SL230	Relay adapter SL 230V	825-256SL
	Pressure reducer DM 06	822-06xx

#### 1.2 Assembly of the automatic port opener



Mount the control unit (1), with at least 2 screws, underneath the table or close to the handpiece control unit, working device or milling machine. Ensure, that all connections are easily accessible.

3	power socket handpiece
9	connector compr. air supply (max. 1.0bar)
11	fuse
12	mains plug
13	connector port valve
15	interface 24V
16	interlink suction unit
17	interface switch signal
19	interlink control panel (RJ12)
20	USB-connector
21	interlink A (RJ45)
22	interlink B (RJ45)











#### pneumatic connections:

Connect the port valve connector (13) with the enclosed 6mm pressure hose to the port valve.
Trim the base to the pressure does the point of the port valve.

Trim the hose to the required length.

- Connect the compr. air supply connector (9) with the enclosed 8mm pressure hose to the compressed air supply (max. 1.0bar!). If no more AP600(-R) are chained up, the T-connector must be sealed with a stopper plug.
- Ensure, that the compressed air supply is reduced to 1.0bar or use the optional available pressure reducer DM06 which is factory set to 1.0bar (Order-No. 822/06xx).
- The automatic port opener AP600-R is already equipped with a pressure reducer DM06 (Fig.8) The pressure reducer DM06 can supply up to six AP600(-R) with compressed air.

#### electrical connections:

- Use the enclosed power cord (2) to connect the control unit (1) to the mains power supply. Plug the power cord into the mains plug (12) and the other side into a local power socket.
- Unless the handpiece control unit (50) or working device is equipped with an IEC C14 power socket, it can be directly connected to power socket
   (3), using the enclosed IEC connection cable. The original power cord of the device is not needed.
- Otherwise an optional power adapter matching your local power plug is required. (see special acessories)
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#### 1.3 AP600 with central suction



- 1 control unit
- 2 Power cord AP600
- 3A Handpice power cord
- 5 pipe system
- 6 port valve
- 7 pressure port valve
- 9 pressure connector max. 1,0bar
- 50 handpiece control unit
- 51 handpiece
- 52 suction funnel
- 53 rectangular pipe

- The port valve can be directly plugged into a DN40/45° Y-junction (Ø40mm) of the main pipeline.
- Install the automatic port opener as described in section 1.2

#### 1.4 AP600-R with multi suction unit



- 1 control unit
- 2 Power cord AP600
- 3A handpiece power cord
- 4 interlink port opener
- 5 pipe system
- 6 port valve
- 7 pressure port valve
- 8 clean air
- 9 pressure connector max. 1,0bar
- 50 handpiece control unit
- 51 handpiece
- 52 suction funnel
- 53 rectangular pipe
- 55 multi station suction unit (e.g. FZ1/FZ2)

The control unit (1) must be connected to the suction unit in order to start the suction.

Therfore interlink suction unit (16) of the control unit (1) must be connected to interlink port opener (4) of the suction unit.

### 1.5 AP600-R with milling machines







Fig. 12

Abb. 12: Schematic structure of an AP600R with devices and milling machines

- 1 Conrol unit
- 2 Power cord AP600
- 4 control line suction unit
- 5 pipe system
- 6 port valve
- 7 pressure port valve
- 9 pressure connector max. 1,0bar
- 10 SL230 Relais-Adapter
- 15 24V interface
- 16 connector suction unit
- 17 entrance control unit
- 18 special cables SL-24 s.S.15

- Connect the control unit (1) according to section 1.2.
- If using the AP600-R especially for overnight milling with a central suction system, the AP600-R and the central suction unit must be connected with an interlink, to prevent the central suction from beeing switched off. Therefore a cable (min. 2x2x0.8mm<sup>2</sup>) must be installed from the central suction area to the milling area. To connect the AP600-R with the central suction unit a SL-AP cable will be required.

(see special accessory, page 9) Connect interlink suction unit (16) of the control unit (1) with interlink milling machine of the central suction unit.

 If the milling machine is equipped with a power socket for dust extractors only, an additional relay adapter SL110 (100-120V) or SL230 (220-240V) must be used. (see special accessories)

Connect the relay adapter (SL110/230) to the interface switch signal (17).

If the milling machine is equipped with a 24V connector, a suitable SL-24 adapter cable is required (see 24V interface cable, page 17)



Fig. 13: PIN assignment Connector 15

Pin	Cabel	assignment plan
1	white	Input 1 (+)
2	brown	Input 1 (-)
3	green	Input 2 (+)
4	yellow	Input 2 (-)
5	grey	Output 1 (+)
6	pink	Output 1 (-)
7	blue	Output 2 (+)
8	red	Output 2 (-)

#### 1.5.1 24V - Interface (15)

A galvanically isolated interface is available for communication with CAM systems and machines with PLC or 24V connection.

The suction point opener can be coupled with the dust-generating machine for automatic start via this 8-pin connection. Status information of the suction point opener can also be received by the machine.

Voltage for the inputs and pull-up voltage for the outputs must be provided by the machine. The voltage is possible from 12V to 24V. The outputs are designed as potential-free optocoupler switching outputs with 120 Ohm series resistor. The maximum current must be limited to 10mA.

 Input 1	Input 2	Function
0V	0V	valve closed
24V	0V	valve closed
0V	24V	-
24V	24V	-

Output 1	Output 2	Status
0V	0V	Extraction not ready / OFF
24V	0V	-
0V	24V	-
24V	24V	Extraction ready / Standby

#### 1.5.2 Interface cable (accessory)

Ready-made adaptor cables are available for some common CAM systems (only start signal for suction system)

Cable plug	CAM system	<b>Pin-configu</b> Extraction	<b>Iration</b> Cam	order no.
3 4	imes icore	1 (+)	4	825-25616
	ceramill motion	2 GND	3	
3 4	Amann-Girrbach	1 (+)	3	825-25612
		2 GND	4	
	Vhf 4pol.	1 (+)	1	825-25610
		2 GND	4	
6	Vhf 6pol.	1 (+)	1	825-25611
		2 GND	6	
2	Sirona	1 (+)	2	825-25615
			7	
			10	
		2 GND	11	
2 1 3	Roland	1 (+)	1	825-25613
		2 GND	2	
without	Other	1 (+)		825-25614
		2 GND		

#### Universal cable 825/25614

This cable can be fitted with a suitable plug. Contact the machine supplier about the plug type and pin configuration.

Pay attention to the correct selection of the contacts on the machine and the suction system (see page 11).

Note! The cable may only be used for control voltages up to 24 V!



Abb. 14: PIN assignment connector 16

Pin	Cabel	assignment plan	
1		-	
2		-	
3	white	Enable	(IN)
4	brown	GND	
5	green	Start	(OUT)
6	yellow	GND	

#### 1.5.3 interface suction

If the automatic port opener AP600-R is connected with a central suction system via the interface suction unit (16), the milling machine connected to the automatic port opener is keeping the central suction unit activated during the milling process. This is done independently of the main switch for the central suction unit in the laboratory.

Several machines or automatic port openers can be combined by connecting the wires green (pin 5) and yellow (pin 6) in parallel.

For multi suction systems FZ1/FZ2 the connection can be made with the cables SL-AP (5m/10m).

If the suction system is not ready or is currently cleaning the filter, the port valve and the working device are blocked to prevent working without suction.



Abb. 15: PIN assignment connector 17

Pin	Cabel	assignment plan
1	grey	Start 2 (IN)
2	(pink)	NC
3	white	Enable ( <b>out</b> )
4	brown	GND
5	green	Start (IN)
6	yellow	GND

#### 1.5.4 interface handpiece

Some handpiece controls, e.g. the Zubler K50, Kavo K-Control or Schick Qube can also be coupled with the suction port opener via a control line instead of the power supply. Matching adapter cables are under chapter 1.1. listed. In conjunction with the SL 230 relay adapter (optional accessory), devices or milling machines with a 230V output for extraction can be coupled to the switching input of the interface (17).

## 2. **H**Functions

## 2.1 Control unit



For automatic operation, the control panel is not mandatory, but can be permanently mounted on each workstation. However, you need at least one control unit to set up and check the control unit AP 600 and should keep this handy.

## 2.2 Commissioning

- L1 LED Power level display
- L2 LED Bluetoothanzeige
- L3 LED "ON"
- L4 LED Filter
- L5 LED Service
- L6 LED "OFF"
- T1 minus-button
- T2 plus-button
- T3 Enter-button
- T4 ON / OFF button
- 29 Main switch

- As soon as the power cord is connected to a socket and the mains connection (12) the control unit is connected, the AP 600 is ready. The blue LED (L2) lights up.
- At the mains connection Dust generator (3) connected devices should be voltage have and be turned on. Turn off the connected device.
- Connect a control unit (Fig. 16) to the RJ12 socket (19).
- To test, press the fan button T4 on the control panel to manually open the suction port. The green LED L3 on T4 should light up. Switch off the vacuum again by pressing T4 again.
- Drive to set up the automatic Continue with section 2.3.

### 2.3 Automatic operation:

#### 2.3.1 Automatic sensitivity setup

If a dust producing appliance is connected to the socket (3) of AP600, the sensitivity must be adjusted for an automatic opening.

The following steps are necessary in order to teach the appliance:

- The appliance (max. 10A, 120V:1000W, 240V:2000W) must be connected to the socket of the suction.
- Preselect the handpiece speed at which the suction should be started.
- Start the appliance or the handpiece and keep it running.
- While the appliance is running, press and hold the buttons T1 (minus) and T2 (plus) at the same time for at least 3 seconds until a signal sounds and the LEDs of the display L1 light up.
- Still keep the appliance running.
- As soon as another signal sounds and the LEDs of the display L1 start flashing, switch off the appliance or stop the handpiece immediately.
- Wait until a final signal sounds and the LEDs of the display L1 show the preselected suction level again.
- Measuring error will be indicated by 4 short beeps. In this case please repeat the procedure.





#### 2.3.2 Fine tuning of the automatic mode

Has the automatic sensitivity adjustment of the dust generator with the Extraction system according to section 1 not yet can lead to an optimal result the switchon threshold of the extraction can still be readjusted manually.

- Keep the button T1 pressed for at least 3 seconds until only the middle LED of the display L1 lights up
- with the T1 key, the switch-on threshold becomes lower (extraction starts sooner / easier, problem solving when the suction system despite dust generation shuts off or does not start immediately)
- the button T2 increases the switch-on threshold (suction starts later / harder, problem solving when the exhaust system from time to time by itself starts running (ghosting) or already running on standby.)
- Pressing the Enter key T3 saves the new value
- Pressing the fan button T4 stops the process without saving.
- By repeating the procedure, the switchon threshold can be increased or decreased even further.

### 2.4 Display of the signal source



If the suction port is activated, the green LED L3 on the fan button T4 lights up. In addition, the display L1 shows the cause of the activation of the suction point.

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### 2.5 Setting the suction delay time

For the extraction of the residual dust in the air, it is possible to extend the time the extraction system should continue to run during breaks or after the end of dust production. The factory setting is 3 seconds.





- press and hold the plus button T2 for at least 3 seconds until only the middle LED of display L1 is lit
- the suction time can be reduced by 1 sec per LED jump to the left with the T1 (-) button or increased by 1 sec per LED jump to the right with the T2 (+) button.
- press the Enter button T3 to save the new value
- press the fan button T4 to abort the procedure without saving
- the suction overrun time can be prolonged by a further 2 sec by repeating the procedure.

### 2.6 Advanced settings



Absaugtechnik

The Zubler suction technology APP, which can be installed on Android tablets or smartphones, offers extended setting possibilities. Please note the instructions "Zubler suction technology app" Download on www.zubler de. The AP600 / AP600-R vacuum opener can only connect via USB cable. For this a USB cable 2.0 A / Mini 2.0 B, as well as an OTG Adapter 2.0 A Micro / 2.0 B is needed.

## 3. Maintenance

The control unit AP600 / AP600R is maintenance-free.

The suction port valve is subject to constant alternating load and should be replaced after approx. 3 years.

Please note, that every suction point should be perfect in a technically state.

For any subsequent let the suction power or on extra-ordinary noise at the funnel should be respected daily at work. Compare different suction points or leave the Suction in case of doubt by another have assess the person.

In terms of preventive health protection, at least one annual efficacy control of the suction must be carried out and documented. You can find help and information in the document "Safety Information suction technologie", which you can obtain from

www.zubler.de can download.

Zubler also offers maintenance contracts or individual maintenance of your extraction technology in order to maintain the technically perfect condition of the extraction system and components in the long term.

Contact us with questions over the internet or by phone.

www.zubler.de info@zubler.de Tel.: 0731-1452-0

## 4. Error Codes

Error indication	Cause	Remedy
Suction port valve always open	No compressed air supply connected Continuous signal is present at the control unit	Check compressed air sup- ply, check signal source on control panel (section 2.4.) Possibly. Set up automatic mode again (Section 2.3.)
Suction point valve does not open when the device is connected via the socket (12)	Insufficient current signal	Set up automatic mode again (Section 2.3.)
Suction port does not open when device is connected via 24V interface (15) or interface (17)	No signal or contact via the plug connections of the interfaces	Cable and plug, check pin assignment. Measure whether 24V arrive from the machine. If necessary, check the input contacts at the 24V interface (15) with a foreign voltage source or short-circuit the contacts 5 and 6 at connection 17.
The handpiece controller or device connected to the AP600 has no power.	No mains connection to AP600 or automatic circuit breaker (11) triggered.	Check power supply and fuse. To the Test other de- vice to the Mains connecti- on (3) of the AP600
Keypad does not operate at the push of a button, no LED	No voltage at the AP600 or defective control panel or RJ12 cable defective or incorrectly plugged in.	Check voltage supply Check connections on both sides, if available, with control panel of other suction port opener.
Continuous air noise despite closed suction point	Valve leaking or membrane defective	Replace suction port valve or temporarily close com- pressed air hose 6 mm in front of the valve and close suction point, eg. with tape.
Strong noise at the suction port or minimum or mini- mum suction power	Blockage in the suction line from the device / suction funnel to the valve or valve membrane overstretched, no generation of vacuum at the valve opening	Pull off the hose at the valve, check the valve, if necessary eliminate obstruc- tion in the hose. Replace suction port valve.

If the problem can not be solved, contact Zubler Customer Service. If necessary, you will receive an exchange module and you would have to send in your automatic switching system for service. Whether troubleshooting is possible through telephone support can be assessed more quickly if they have already performed the checks and tests listed in the troubleshooting guide.

## 5. **Technical Data**



Fig. 17

Dimensions		
Length:		230mm
Hight:		56mm
Width:		150mm
Weight:		1kg
Voltage:	110 - 230V AC ±5%,	50-60Hz
Input power		5W
Automatic socket:	110V	1000W
	230V	2000W
Fuse:	automatic cutout	T10A

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## 6. **Warranty**

In case of an appropriate usage, according to the operating manual, we, Zubler GmbH, are granting a warranty of 2 years upon all parts of the suction unit, except wear parts.

Wear parts are carbon brushes and dust filtering elements as filterbags, filter cartridges.

Zubler additionally is granting a motor lifetime of 3 years or 5000h (ECO) and 3000h (CAM) unless the carbon brushes were replaced as requested independant on condition or lenght of the preceding carbon brushes.

We, Zubler GmbH are standing for professional and qualified repairs with original spare parts. Therefore we are granting a warranty of 6 months upon every repair performed by us or a certified retailer unless all necessary repairs were performed to enable an unrestricted function.

A warranty can not be claimed in case of:

- Inappropriate usage
- Usage beyond operating conditions
- Violation of operating- or connecting instructions
- Missing regular cleaning, servicing and efficiency testing
- Repairs performed by non-certified personnel
- Usage of non-original spare parts

## 7. Disposal instructions

## 7.1 Disposal of consumables

Full dust containers, filters or filter bags are to be disposed of in accordance with the regulations of the specific country or region that governs those laws where the unit is in service. Personal protective equipment is to be worn depending on the degree of contamination of the filter.

## 7.2 Disposal of the appliance

The appliance must be disposed of by a company that specializes in removal of equipment. The removal company must be informed about any residues in the appliance that could be harmful to health.

#### 7.2.1 Disposal instructions for EU member states



'In order to maintain and protect the environment, prevent environmental pollution and improve the reuse of raw materials (recycling), the European Commission has passed a directive according to which electrical and electronic appliances are taken back by the manufacturer in order to dispose of them properly or recycle them. Appliances marked with this symbol may therefore not be disposed of in the unsorted domestic waste within the European Union. Please enquire to your local authorities regarding proper disposal.

#### 7.2.2 Special information for customers in Germany

Zubler electrical appliances are appliances for commercial use. These appliances may not be taken to municipal collection points for electrical appliances; instead, they are taken back directly by Zubler. You can find out more about current return options online at: www.zubler.de



CE



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