

# USE AND MAINTENANCE MANUAL



## Ex filtering unit MiniDygestorium-350/Ex

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## 1. INTRODUCTION

The purpose of the present Use and Maintenance Manual is to supply User with directions within the range of application, assembly, start-up and operational use of the **MiniDygestorium-350/Ex** filtering unit.



**Prior to assembly at the place of operation and use, it is important to get thoroughly acquainted with the contents of the present instruction.**



**With regard to continuity of work carried on improvement of our products, we reserve for ourselves the revision possibility of the draft and technological changes improving their functional features and safety.**

Construction of **MiniDygestorium-350/Ex** meets the requirements of the current state of technology as well as the safety and health assurances included in:

**2006/42/EC Directive** of the European Parliament and of the Council of the 17 May, 2006 on machinery, amending the 95/16/EC Directive (recast) / Official Journal EC L157 of the 09.06.2006, page 24);

**2014/35/EC Directive** of the European Parliament and of the Council of the 26 February, 2014 on the harmonisation of the laws of the Member States, relating to the making available on the market of electrical equipment designed for use within certain voltage limits / Official Journal EC L96 of the 29.03.2014;

**2014/34/EC Directive** of the European Parliament and of the Council of the 26 February, 2014 on the harmonisation of the laws of the Member States, relating to the equipment and protective systems intended for use in potentially explosive atmospheres / Official Journal EC L96 of the 29.03.2014 /

**98/24/EC Directive of the Council** of the 7 April, 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/931/EEC);

**Regulation of the Health Minister of the 30 December, 2004** on Occupational Health and Safety with reference to occurrence of chemical agents at workplaces (Journal of Laws Ne. 11 pos. 86 along with the posterior amendments).

Is in accordance with the subsequent harmonised standards:

**EN ISO-12100:2012** Safety of machinery – General principles of design – Assessment and reduction of hazard

**EN 60204-1:2018-12** Safety of machinery – Electrical equipment of machines – Part 1: General requirements

**EN ISO 13857:2010** Safety of machinery – Safe distances to prevent hazard zones from being reached by upper and lower limbs

**EN 1127-1:2011** Explosive atmospheres – Explosion prevention and protection. Basic terminology and methodology

**EN ISO 80079-36:2016-07** Explosive atmospheres – Part 36: Non-electrical appliances in areas of explosion risk Methodology and requirements

**EN ISO 80079-37:2016-07** Explosive atmospheres – Part 37: Non-electrical appliances in areas of explosion risk Non-electrical type of protection: constructional safety “c”; control of ignition sources “b”; liquid immersion “k”

**HD 60364-6:2016/A12:2017-11** Low-voltage electrical installations – Part 6: Verification

**EN 60079-0:2013/A11:2014-03** Electrical appliances in areas of gas explosion hazard – Part 0: General requirements

## 2. PURPOSE

**MiniDygestorium-350/Ex** is designed for cleaning the air in its process chamber, from gaseous contaminants, emitted in small amounts in such laboratories as: chemical, biological, analytical, in scientific-, research, health care institutions, in chemical workshops in schools and many other places, where noxious gases and vapours arise that are harmful to health.

The appliance can work in areas of explosion hazard, where explosive atmosphere, i.e. a mixture of flammable substances in a form of vapours and gases with the air can occur, whereby after the ignition occurrence the burning mass spreads within the whole not burnt mixture.

MiniDygestorium-350/Ex prevents from spreading the contaminants within the process room.

**CAUTION: Absorptivity of the activated carbon for various vapours and gases is listed in Table No.6.**

The appliances can work within temperature range  $-20^{\circ}\text{C}$  do  $+40^{\circ}\text{C}$ . They are designed for conveying the dry air of dustiness not exceeding  $0,3\text{ g/m}^3$ , without viscous and aggressive contaminants.

**According to the 2014/34/EC ATEX Directive and EN ISO 80079-36 the device carries the level of protection: “HIGH” – as a device classified for Group II, Category 2, and it can work in areas where explosive atmospheres are likely to occur. The fan can be applied in zones 1, 2 (G).**

The appliance is marked on the nominal data plate:



**II 2 G c Ex e II T3**

**Marking of the operational conditions of the device: group / category / hazard / class**

-  marking for explosion proof properties of the appliance,
- **group II** – the device is designed for on-ground work, in factories, in areas of explosion hazard, **but this cannot be methane (firedamp) hazard** neither carbon dust occurrence,
- **category 2** – the device is designed for application in areas where **explosive atmospheres are likely to occur**,
- **gas hazard G**,
- “c” – constructional protection,
- **Ex** – mark of the electrical device – constructed and tested according to the European Standards for work in areas of explosion hazard,
- **execution “e”** – type of construction of the motor (a motor of increased safety)
- gas explosion **group II** – occurring in on-ground factories – the appliances are constructed according to the PN-EN 14986:2009, whereby they can be applied for gases in explosion groups II,
- **temperature class T3** – the surface temperature of any part of the appliance should not exceed **200°C** (during the normal operation). The device can be used safely in explosive atmospheres belonging to temperature classes **T3, T2, T1**.

**3. RESERVATIONS OF MANUFACTURER**

- Manufacturer accepts no liability for any consequences following from the operational use that is in contradiction to the purpose of application.
- Installing of any additional elements that are not belonging to the normal device structure (or accessory set) is not acceptable.
- Do not introduce any structural or constructional modifications on the device on one’s own.
- Maintenance and any repair can be performed exclusively by an authorised person after the instructions.
- The appliance cannot be used for conveying the air containing aggressive contaminants and viscous compounds that could damage the filters.
- **In the course of operational use, any ignition sources, i.e. cigarettebutts / embers must not get drawn into the filtration chamber.**

**4. TECHNICAL DATA**

Table No.1

Type	Maximum volume flow [m <sup>3</sup> /h]	Maximum vacuum [Pa]	Motor rate [kW]	Supply voltage [V / Hz]	Acoustic pressure level [dB(A)]*	Weight [kg]
MiniDygestorium-350/Ex	350	220	0,12	3x400 / 50	53	96

\* Acoustic pressure level has been measured from distance of 1 metre of the device

Table No.2 – High-efficiency HEPA filter

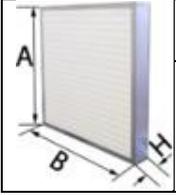
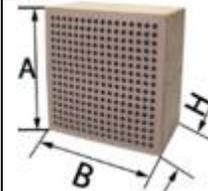
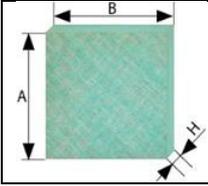
	Type	Weight [kg]	Dimensions AxBxH [mm]	Class	Filtration material
	FA-292/KL	11	535x535x292	H13	hydrophobic glass paper 99,95%

Table No.3 – Cassette with activated carbon

	Type	Weight [kg]	Dimensions AxBxH [mm]	Caution
	WA-ECO-20	24*	534x534x155	cassette of cardboard and plywood

\* Weight of the activated carbon 20 kg

Table No.4 – Paint-stop nonwoven (spunbond)

	Type	Weight [kg]	Dimensions AxBxH [mm]	Class	Caution
	PS-MD-350	0,5	535x535x50	G3	glass fibre nonwoven of progressive growing density

## 5. STRUCTURE AND FUNCTION

The housing is of stainless steel sheet and consists of three segments joint together by means of clasp hooks.

MiniDygestorium-350/Ex consists of subsequent elements:

- work chamber – a glass extraction case of acid-proof steel with two holes for operator's hands, providing convenient area for manoeuvring on the desktop
- filtration nonwoven (spunbond) Paint-stop
- HEPA high-efficiency filter – class H13
- gas absorber – a cassette with granular activated carbon
- radial fan in a housing of Ex execution
- control unit – located beyond the explosion hazard area
- terminal box on the device – Ex execution
- antistatic castor wheels – 4 pieces (2 pieces with a brake)

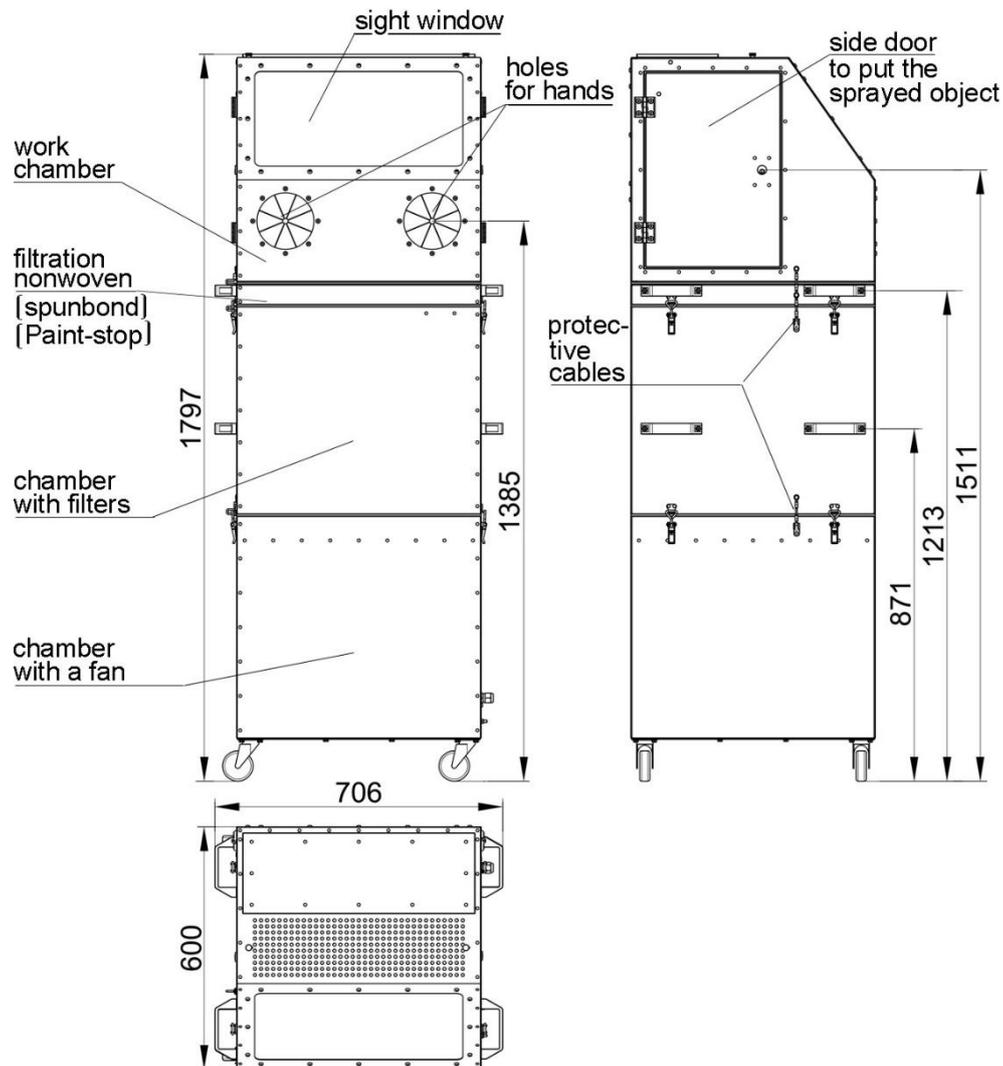


Fig. No.1 – MiniDygestorium-350/Ex – Structure and dimensions

**All the elements of the device are connected with protective cables, against accumulating of the electrostatic charges on the device.**

The appliance is equipped with a M6 screw to connect the grounding cable. To switch ON and OFF is provided a control unit that should be installed beyond the area of explosion hazard. The A2 terminal box (in Ex execution) is installed on the device and is connected with the fan located inside the device.

After the front door is opened, User can put the element for spraying (along with the emission source) on the desktop in the work chamber. Subsequently, close the front door and insert the hands and spray the agent onto the element's surface. After a while, the sprayed element can be removed.

In case when the sprayed element is larger and does not fit in the work chamber, open both side doors and insert the element, shut the air inlet (close the front window) and, subsequently follow the above mentioned guidelines. The fan chamber walls are clad with sound-absorbing material to reduce the noise additionally. The outlet is equipped with a perforated sheet (perforation 25%).

## 6. ASSEMBLY AND STARTUP

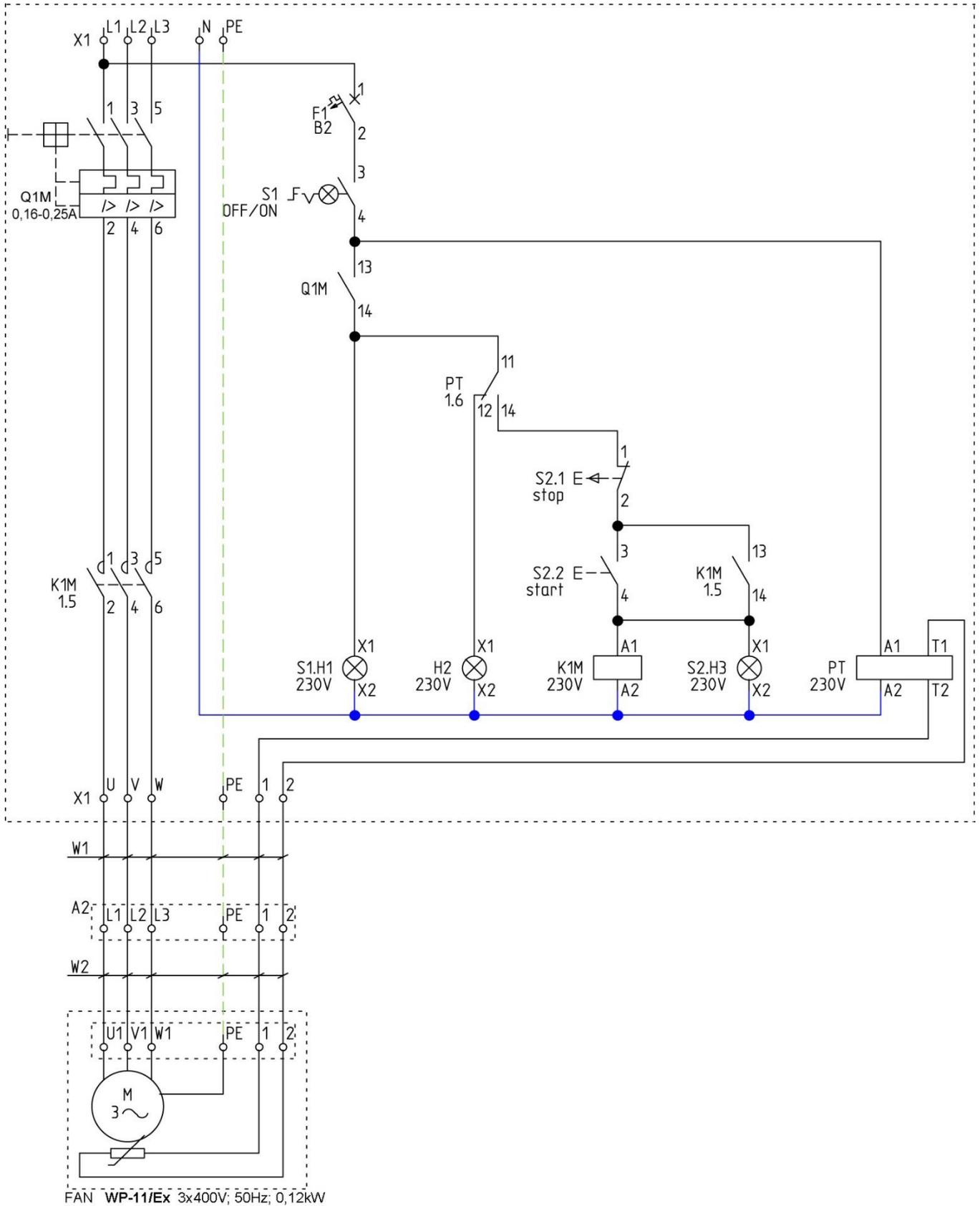
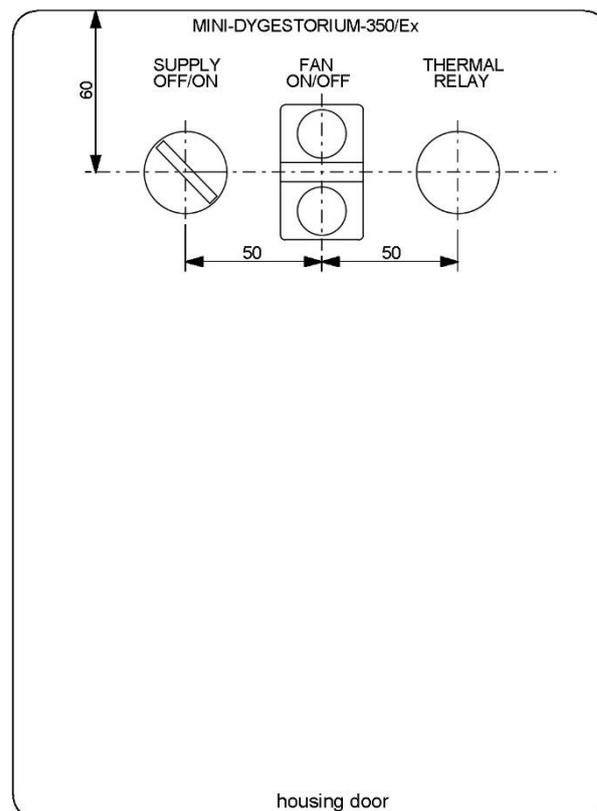
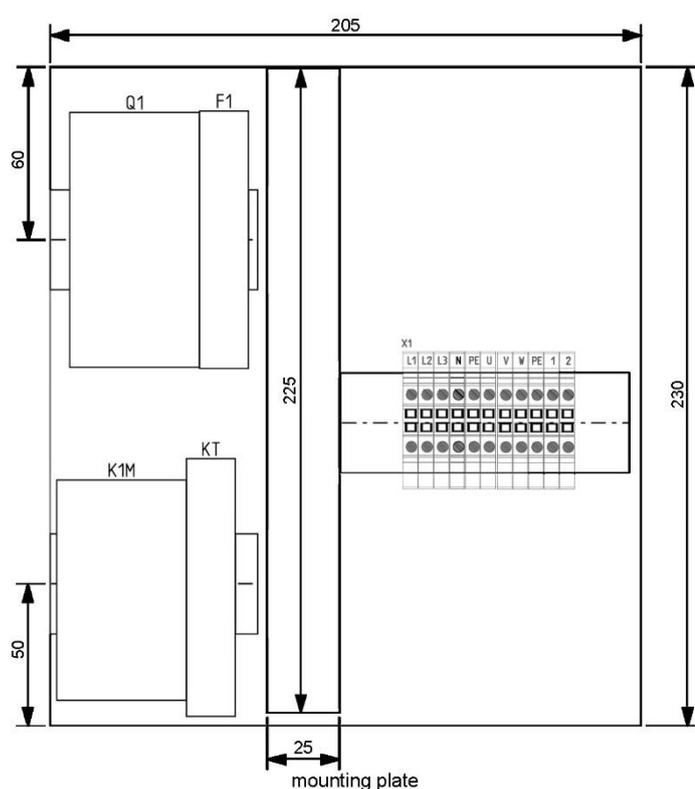


Fig. No.2 – MiniDigestorium-350/Ex – Connection Diagram



**Fig. No.3 – MiniDygestorium-350/Ex – Control unit**

- A1** – housing of the control unit
- X1** – contact joint
- Q1M** – motor switch
- F1** – over-current disconnector
- S1** – illuminated two-position switch – OFF / ON of the system
- S1.H1** – LED lamp – signalling that the system supply is switched on
- S2** – illuminated double switch – START / STOP of the fan
- S2.H3** – LED lamp – fan “RUN”
- H2** – red signalling lamp – the fan is disconnected after the PTC activation
- PT** – resistance relay
- K1M** – contactor
- A2** – terminal box on the device

### Guidelines to the installing



#### ELECTRICAL INSTALLATION

– a system to which the device is connected, ought to be designed and carried out in accordance with being in force valid regulations and standards – with reference to the local hazard of explosion

- Prior to connection – make sure if the parameters of the existing system is compatible with the parameters on the nominal data plate. In case of inconsistency, connection cannot be carried out.
- Connection should be performed exclusively by an authorised person with confirmed qualifications, according to the valid regulations and standards.
- Control unit has to be installed in a place beyond the area of explosion hazard.

### 6.2 Safety control before the startup

- a/ Check if all mechanical connections have been carried out correctly
- b/ Examine the correctness of the electrical connections and the sequence of phases
- c/ Check the correctness of the connection to the grounding cable

Overload protection of the motor should feature such current-time performances that provide disconnection of the motor (from the power supply) in time that is shorter than the specified for this system tE, whereby the current equals the inrush current of the motor.

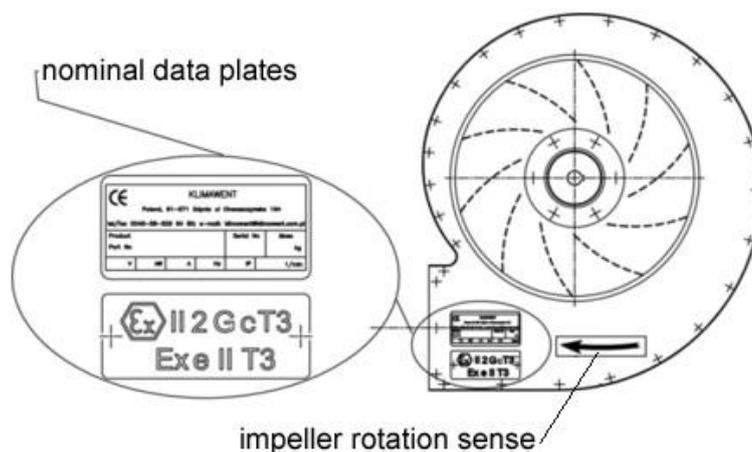


Fig. No. 5 – Placement of the nominal data plates and the arrow of the correct impeller rotation sense

## 7. OPERATIONAL USE

The appliance constitutes an individual mobile work station. After it is switched on, the emission source has to be placed on the desktop inside the work chamber. This is a vacuum area, so the contaminants would not get outside during the spraying.

(Paint-stop) nonwoven / spunbond absorbs the varnish-, lacquer mist, whereby the dust particles are captured within the HEPA high-efficiency filter, and the majority of gaseous contaminants, chemical compounds such as: styrene, toluene, alcohols, phenol and many other agents are absorbed in the cassette with activated carbon. The air is supplied into the fume hood through the perforated top surface (of the extraction chamber) and through the holes for operator's hands, in the front surface. The air is discharged through the perforated outlet underneath the appliance.

Absorptivity of the activated carbon for most of the vapours and gases is listed in Table No.6.

### Incorrect use:

- forwarding of media exceeding the admissible temperature +60°C
- forwarding of aggressive media
- forwarding of media of high dustiness and content of contamination particles
- operational use in a place, where the ambient temperature is higher than +40°C

### Consequences of improper use:

- damage of bearings
- damage caused due to corrosion
- loss of balance of the rotary elements
- vibrations
- deformations
- damages caused by friction

### Hazards that could occur due to incorrect use:

- breakage of the impeller
- crack of the shaft
- material fatigue crack
- fire and explosion caused by sparks

In case when symptoms of device malfunction are spotted (increased noise, vibrations, lowered flow efficiency) necessarily disconnect the fan from the power supply and undertake revision to find the reason of malfunction / failure.

**WARNING** Every repair or replacement of the spare part (according to the ATEX 2014/34/EC Directive) should be followed by a notice on an additional place or information applied in the accompanying documentation (a log of repairs, etc.). This is the duty of User!

Maintenance consists in subsequent steps:

- periodical replacement of the filtration Paint-stop nonwoven (spunbond) – when the efficiency decreases
- periodical replacement of the HEPA filter – in case when the flow efficiency of the fan drops
- generally it is recommended that first replace the filtration nonwoven (spunbond), if this would not improve the efficiency – next, replace the HEPA filter
- periodical replacement of the carbon cassette – after the organoleptic evaluation.

**CAUTION:**

Cassettes with activated carbon ought to be disposed in accordance with the regulations of the country.

**8. TROUBLESHOOTING GUIDE**

Table No.4 – Typical malfunctions, reasons and corrective measures

	Problem	Possible reason	Corrective action
1.	the flow capacity of the fan decreases	filtration nonwoven (spunbond)	replace the nonwoven (spunbond)
		Paint-stop is excessively polluted	
		the high-efficiency filter is excessively polluted	replace the high-efficiency filter
2.	unpleasant smell is perceptible near the device	the carbon bed is saturated	replace the activated carbon bed in the filtration cassette
3.	sudden vibrations of the device are occurring	failure of the fan impeller	replace the impeller for new

**CAUTION:** Upon replacement of the filters, follow the rules of Occupational Health and Safety included in the corresponding regulations regarding the work with noxious agents.

**9. MAINTENANCE**

Within the scope of technical revisions, every 12 months check the technical state of the fan, strictly according to the specific rules of operational use of the electrical driving devices. During the maintenance examine the mechanical and electrical connections. **Revisions ought to be carried out exclusively after the appliance is disconnected from the power supply system.**

**CAUTION:** During the maintenance do not use the MiniDygestorium-350.

**10. OCCUPATIONAL HEALTH AND SAFETY**

MiniDygestorium-350/Ex can exclusively be operated after getting acquainted with the contents of the present Use and Maintenance Manual. **Circuits of the plugs ought to be equipped with short-circuit- and differential current protections (see Connection Diagram). The appliance meets the requirements of the 2006/42/EC Directive and do not require additional protections for a safe operational use.**

**CAUTION:** Any repair ought to be performed after the fan is switched off and disconnected from the power supply system.

**11. TRANSPORT AND STORAGE**

MiniDygestorium-350/Ex is transported on a pallet, in foil and protected against atmospheric factors. During the transport the appliance must be kept in vertical position and protected from displacement / slide and from being overturned. The filtering unit ought to be stored in dry rooms and areas of efficient ventilation.

**12. TERMS OF WARRANTY**

The period of warranty for the purchased device is indicated in the **Card of Warranty**. The warranty does not comprise:

- mechanical damage and malfunctions caused by User,
- device failures caused during the use which is in contradiction with the purpose of application and with the present Use and Maintenance Manual,
- malfunctions resulting from the improper transport, storage or incorrect maintenance.

Infringement of the Section 3 "Reservations of Producer" of the present Use and Maintenance Manual and, especially modifications undertaken by User on one's own or use in contradiction with the purpose of application – shall result in the loss of warranty validity.



	<b>POORLY ABSORBED GASES</b>
urea – CH <sub>4</sub> N <sub>2</sub> O	acetaldehyde – C <sub>2</sub> H <sub>4</sub> O
kerosene	ammonia – NH <sub>3</sub>
nicotyne – C <sub>10</sub> H <sub>14</sub> N <sub>2</sub>	hydrogen bromide – HBr
nitrobenzene – C <sub>6</sub> H <sub>5</sub> NO <sub>2</sub>	butane – C <sub>4</sub> H <sub>10</sub>
nitroethane – C <sub>2</sub> H <sub>5</sub> NO <sub>2</sub>	butanone – C <sub>4</sub> H <sub>8</sub> O
nitroglicerine – C <sub>3</sub> H <sub>5</sub> N <sub>3</sub> O <sub>9</sub>	butylene – C <sub>4</sub> H <sub>8</sub>
nitropropane – C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub>	butyne – C <sub>4</sub> H <sub>6</sub>
nitrotoluene – C <sub>7</sub> H <sub>7</sub> NO <sub>2</sub>	methyl chloride – CH <sub>3</sub> Cl
nonane – C <sub>9</sub> H <sub>20</sub>	hydrogen chloride – HCl
amyl acetate – C <sub>7</sub> H <sub>14</sub> O <sub>2</sub>	hydrogen cyanide – HCN
butyl acetate – C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	nitrogen dioxide – NO <sub>2</sub>
ethyl acetate – C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	sulphur dioxide – SO <sub>2</sub>
isopropyl acetate – C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	hydrogen fluoride – HF
propyl acetate – C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	formaldehyde – CH <sub>2</sub> O
octalene – C <sub>12</sub> H <sub>8</sub> Cl <sub>6</sub>	propane – C <sub>3</sub> H <sub>8</sub>
octane – C <sub>8</sub> H <sub>18</sub>	propylene – C <sub>3</sub> H <sub>6</sub>
putrescent vapours – putrescine – C <sub>4</sub> H <sub>12</sub> N <sub>2</sub>	propyne – C <sub>3</sub> H <sub>4</sub>
ozone – O <sub>3</sub>	hydrogen selenide – H <sub>2</sub> Se
– paradichlorobenzene – C <sub>6</sub> H <sub>4</sub> Cl <sub>2</sub>	hydrogen sulphide – H <sub>2</sub> S
– pentanone – C <sub>5</sub> H <sub>10</sub> O	sulphur trioxide – SO <sub>3</sub>
perchloroethylene – C <sub>2</sub> Cl <sub>4</sub>	
pirydyna – pyridine – C <sub>5</sub> H <sub>5</sub> N	
siarczan dimetylu – dimethylsulphate – C <sub>2</sub> H <sub>6</sub> O <sub>4</sub> S	
skatol – skatole – C <sub>9</sub> H <sub>9</sub> N	
styren – styrene monomer – C <sub>8</sub> H <sub>8</sub>	
terpentyna – turpentine – C <sub>10</sub> H <sub>16</sub>	
tlenek mezytylu – mesityl oxide – C <sub>6</sub> H <sub>10</sub> O	
toluen – toluene – C <sub>7</sub> H <sub>8</sub>	
toluidyna – toluidine – C <sub>7</sub> H <sub>9</sub> N	
trójchloroetylen – trichloroethylene – C <sub>2</sub> HCl <sub>3</sub>	

## 14. DECLARATION OF CONFORMITY



### DECLARATION OF CONFORMITY EC No. \_\_\_\_\_

Manufacturer (eventually also the authorised representative / importer):

*name:* KLIMAWENT S.A.

*address:* 81-571 GDYNIA, ul. Chwaszczyńska 194

A person, authorised for issuing the technical documentation:

*name and address:* Teodor Świrbutowicz, KLIMAWENT S.A.

hereby declares that the product: **Ex filtering unit**

*type / model:* **MiniDygestorium-350/Ex**

*serial number:* \_\_\_\_\_

*year of production:* \_\_\_\_\_

Meets the requirements of the subsequent European Directives:

**2006/42/EC Directive** of the European Parliament and of the Council of the 17 May, 2006 on machinery, amending the 95/16/EC Directive (recast) / Official Journal EC L157 of the 09.06.2006, page 24);

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Meets the requirements of the following harmonised standards:

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**EN ISO 13857:2010** Safety of machinery – Safe distances to prevent hazard zones from being reached by upper and lower limbs

**EN 1127-1:2011** Explosive atmospheres – Explosion prevention and protection. Basic terminology and methodology

**EN ISO 80079-36:2016-07** Explosive atmospheres – Part 36: Non-electrical appliances in areas of explosion risk Methodology and requirements

**EN ISO 80079-37:2016-07** Explosive atmospheres – Part 37: Non-electrical appliances in areas of explosion risk; Sort of non-electrical type of protection: constructional safety “c”; control of ignition sources “b”; liquid immersion “k”

**HD 60364-6:2016/A12:2017-11** Low-voltage electrical installations – Part 6: Verification

**EN 60079-0:2013/A11:2014-03** Electrical appliances in areas of gas explosion hazard – Part 0: General requirements

*place, date*

*signature of the  
authorised person*

*name, surname,  
function of the signatory*

**NOTICE:**