
Operating instructions and spare parts list

PZ Powder center with Gematic control unit



Documentation PZ Powder center with Gematic control unit

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General safety regulations

This chapter sets out the fundamental safety regulations that must be followed by the user and third parties using the PZ Powder center with Gematic control unit.

These safety regulations must be read and understood before the PZ Powder center with Gematic control unit is used.

Safety symbols (pictograms)

The following warnings with their meanings can be found in the ITW Gema operating instructions. The general safety precautions must also be followed as well as the regulations in the operating instructions.

**DANGER!**

Danger due to live electricity or moving parts. Possible consequences: Death or serious injury

**WARNING!**

Improper use of the equipment could damage the machine or cause it to malfunction. Possible consequences: minor injuries or damage to equipment

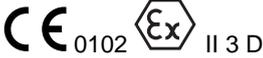
**INFORMATION!**

Useful tips and other information

Conformity of use

1. The PZ Powder center with Gematic control unit is built to the latest specification and conforms to the recognized technical safety regulations. It is designed for the normal application of powder coating.
2. Any other use is considered as non-conform. The manufacturer is not responsible for damage resulting from improper use of this equipment; the end-user alone is responsible. If the PZ Powder center with Gematic control unit is to be used for other purposes or other substances outside of our guidelines, then ITW Gema AG should be consulted.

3. Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of conformity of use. The PZ Powder center with Gematic control unit should only be used, maintained and started up by trained personnel, who are informed about and are familiar with the possible hazards involved.
4. Start-up (i.e. the execution of a particular operation) is forbidden until it has been established that the PZ Powder center with Gematic control unit has been set up and wired according to the guidelines for machinery (98/37 EG). EN 60204-1 (machine safety) must also be observed.
5. Unauthorized modifications to PZ Powder center with Gematic control unit exempts the manufacturer from any liability from resulting damage.
6. The relevant accident prevention regulations, as well as other generally recognized safety regulations, occupational health and structural regulations are to be observed.
7. Furthermore the country-specific safety regulations must be observed.

Explosion protection	Protection type	Temperature class
	IP54	T6 (zone 21) T4 (zone 22)

Technical safety regulations for stationary electrostatic powder spraying equipment

General information

The powder spraying equipment from ITW Gema is designed with safety in mind and is built according to the latest technological specifications. This equipment can be dangerous if it is not used for its specified purpose. Consequently it should be noted that there exists a danger to life and limb of the user or third party, a danger of damage to the equipment and other machinery belonging to the user and a hazard to the efficient operation of the equipment.

1. The powder spraying equipment should only be started up and used once the operating instructions have been carefully studied. Improper use of the controlling device can lead to accidents, malfunction or damage to the control itself.
2. Before every start-up check the equipment for operational safety (regular servicing is essential)!
3. Safety regulations BGI 764 and VDE regulations DIN VDE 0147, Part 1, must be observed for safe operation.
4. Safety precautions specified by local legislation must be observed.
5. The plug must be disconnected before the machine is opened for repair.
6. The plug and socket connection between the powder spraying equipment and the mains network should only be taken out when the power is switched off.

7. The connecting cable between the controlling device and the spray gun must be set up so that it cannot be damaged during operation. Safety precautions specified by local legislation must be observed!
8. Only original ITW-Gema spare parts should be used, because the explosion protection will also be preserved that way. Damage caused by other parts is not covered by guarantee.
9. If ITW-Gema powder spraying equipment is used in conjunction with machinery from other manufacturers then their safety regulations must also be taken into account.
10. Before starting work familiarize yourself with all installations and operating elements, as well as with their functions! Familiarization during operation is too late!
11. Caution must be exercised when working with a powder/air mixture! A powder/air mixture in the right concentration is flammable! Smoking is forbidden in the entire plant area!
12. As a general rule for all powder spraying installations, persons with pacemakers should never enter high voltage areas or areas with electromagnetic fields. Persons with pacemakers should not enter areas with powder spraying installations!



WARNING!

We emphasize that the customer himself is responsible for the safe operation of equipment. ITW-Gema is in no way responsible for any resulting damages!

Safety conscious working

Each person responsible for the assembly, start-up, operation, service and repair of powder spraying equipment must have read and understood the operating instructions and the "Safety regulations"-chapter. The operator must ensure that the user has had the appropriate training for powder spraying equipment and is aware of the possible sources of danger.

The control devices for the spray guns must only be set up and used in zone 22. Only the spray gun should be used in zone 21.

The powder spraying equipment should only be used by trained and authorized personnel. This applies to modifications to the electrical equipment, which should only be carried out by a specialist.

The operating instructions and the necessary closing down procedures must be followed before any work is carried out concerning the set-up, start-up, operation, modification, operating conditions, mode of operation, servicing, inspection or repairs.

The powder spray equipment can be turned off by using the main switch or failing that, the emergency shut-down. Individual components can be turned off during operation by using the appropriate switches.

Individual safety regulations for the operating firm and/or operating personnel

1. Any operating method which will negatively influence the technical safety of the powder spraying equipment is to be avoided.
2. The operator should care about no non-authorized personnel works on the powder spraying equipment (e.g. this also includes using the equipment for non-conform work).
3. For dangerous materials, the employer has to provide an operating instructions manual for specifying the dangers arising for humans and environment by handling dangerous materials, as well as the necessary preventive measures and behavior rules. The operating instructions manual has to be written in an understandable form and in the language of the persons employed, and has to be announced in a suitable place in the working area.
4. The operator is under obligation to check the powder spraying equipment at least once every shift for signs of external damage, defects or changes (including the operating characteristics) which could influence safety and to report them immediately.
5. The operator is obliged to check that the powder spraying equipment is only operated when in satisfactory condition.
6. As far as it is necessary, the operating firm must ensure that the operating personnel wear protective clothing (e.g. facemasks).
7. The operating firm must guarantee cleanliness and an overview of the workplace with suitable instructions and checks in and around the powder spraying equipment.
8. No safety devices should be dismantled or put out of operation. If the dismantling of a safety device for set-up, repair or servicing is necessary, reassembly of the safety devices must take place immediately after the maintenance or repair work is finished. The powder spraying device must be turned off while servicing is carried out. The operator must train and commit the responsible personnel to this.
9. Activities such as checking powder fluidization or checking the high-voltage spray gun etc. must be carried out with the powder spraying equipment switched on.

Notes on special types of hazard

Power

It is necessary to refer once more to the danger of life from high-voltage current if the shut-down procedures are not observed. High voltage equipment must not be opened - the plug must first be taken out - otherwise there is danger of electric shock.

Powder

Powder/air mixtures can be ignited by sparks. There must be sufficient ventilation in the powder coating booth. Powder lying on the floor around the powder spraying device is a potentially dangerous source of slipping.

Static charges

Static charges can have the following consequences: Charges to people, electric shocks, sparking. Charging of objects must be avoided - see "Earthing".

Grounding/Earthing

All electricity conducting parts and machinery found in the workplace (according to DIN VDE 0745, part 102) must be earthed 1.5 meters either side and 2.5 meters around each booth opening. The earthing resistance must amount to maximally 1 MOhm. The resistance must be tested on a regular basis. The condition of the machinery surroundings as well as the suspension gear must ensure that the machinery remains earthed. If the earthing of the machinery includes the suspension arrangements, then these must constantly be kept clean in order to guarantee the necessary conductivity. The appropriate measuring devices must be kept ready in the workplace in order to check the earthing.

Compressed air

When there are longer pauses or stand-still times between working, the powder spraying equipment should be drained of compressed air. There is a danger of injury when pneumatic hoses are damaged and from the uncontrolled release and improper use of compressed air.

Crushing and cutting

During operation, moving parts may automatically start to move in the operating area. It must be ensured that only instructed and trained personnel go near these parts. The operator should ensure that barriers comply with the local security regulations.

Access under exceptional circumstances

The operating firm must ensure that local conditions are met when repairs are made to the electronic parts or when the equipment is restarted so that there are additional measures such as barriers to prevent unauthorized access.

Prohibition of unauthorized conversions and modifications to machines

All unauthorized conversions and modifications to electrostatic spraying equipment are forbidden for safety reasons.

The powder spraying equipment should not be used if damaged, the faulty part must be immediately replaced or repaired. Only original ITW-Gema replacement parts should be used. Damage caused by other parts is not covered by guarantee.

Repairs must only be carried out by specialists or in ITW-Gema workshops. Unauthorized conversions and modifications may lead to injury or damage to machinery. The ITW Gema AG guarantee would no longer be valid.

Safety requirements for electrostatic powder coating

1. This equipment is dangerous if the instructions in this operating manual are not followed.
2. All electrostatic conductive parts, in particular the machinery within 5 meters of the coating equipment, must be earthed.
3. The floor of the coating area must conduct electricity (normal concrete is generally conductive).
4. The operating personnel must wear electricity conducting footwear (e.g. leather soles).
5. The operating personnel should hold the gun with bare hands. If gloves are worn, these must also conduct electricity.
6. The supplied earthing cable (green/yellow) must be connected to the earthing screw of the electrostatic powder spraying hand appliance. The earthing cable must have a good metallic connection with the coating booth, the recovery unit and the conveyor chain and with the suspension arrangement of the objects.
7. The electricity and powder supply to the hand guns must be set up so that they are fully protected against heat and chemical damage.
8. The powder coating device may only be switched on once the booth has been started up. If the booth cuts out then the powder coating device must be switched off.
9. The earthing of all electricity conducting devices (e.g. hooks, conveyor chains) must be checked on a weekly basis. The earthing resistance must amount to maximally 1 MOhm.
10. The control device must be switched off if the hand gun is cleaned or the nozzle is changed.
11. When working with cleaning agents there may be a risk of hazardous fumes. The manufacturers instructions must be observed when using such cleaning agents.
12. The manufacturers instructions and the applicable environmental requirements must be observed when disposing of powder lacquer and cleaning agents.
13. If any part of the spray gun is damaged (broken parts, tears) or missing then it should not be used.
14. For your own safety, only use accessories and attachments listed in the operating instructions. The use of other parts can lead to risk of injury. Only original ITW-Gema replacement parts should be used.
15. Repairs must only be carried out by specialists and under no circumstances should they be carried out in the operating area. The former protection must not be reduced.
16. Conditions leading to dangerous levels of dust concentration in the powder spraying booths or in the powder spraying areas must be avoided. There must be sufficient technical ventilation available, to prevent a dust concentration of more than 50% of the lower explosion limit (UEG) (UEG = max. permissible powder/air concentration). If the UEG is not known then a value of 10 g/m³ should be used.

A summary of the rules and regulations

The following is a list of relevant rules and regulations which are to be observed:

Guidelines and regulations, German professional association

BGV A1	General regulations
BGV A2	Electrical equipment and material
BGI 764	Electrostatic coating
BGR 132	Guidelines for the avoidance of the dangers of ignition due to electrostatic charging (Guideline "Static Electricity")
VDMA 24371	Guidelines for electrostatic coating with synthetic powder ¹⁾ - Part 1 General requirements - Part 2 Examples of use

EN European standards

RL94/9/EC	The approximation of the laws of the Member States relating to apparatus and safety systems for their intended use in potentially explosive atmospheres
EN 292-1 EN 292-2	Machine safety ²⁾
EN 50 014 to EN 50 020, identical: DIN VDE 0170/0171	Electrical equipment for locations where there is danger of explosion ³⁾
EN 50 050	Electrical apparatus for potentially explosive atmospheres - Electrostatic hand-held spraying equipment ²⁾
EN 50 053, part 2	Requirements for the selection, installation and use of electrostatic spraying equipment for flammable materials - Hand-held electrostatic powder spray guns ²⁾
EN 50 177	Stationary electrostatic spraying equipment for flammable coating powder ²⁾
PR EN 12981	Coating plants - Spray booths for application of organic powder coating material - Safety requirements
EN 60 529, identical: DIN 40050	IP-Type protection: contact, foreign bodies and water protection for electrical equipment ²⁾
EN 60 204 identical: DIN VDE 0113	VDE regulations for the setting up of high-voltage electrical machine tools and processing machines with nominal voltages up to 1000 V ³⁾

VDE (Association of German Engineers) Regulations

DIN VDE 0100	Regulations for setting-up high voltage equipment with nominal voltages up to 1000V ⁴⁾
DIN VDE 0105 part 1 part 4	VDE regulations for the operation of high voltage equipment ⁴⁾ General regulations Supplementary definitions for stationary electrical spraying equipment
DIN VDE 0147 part 1	Setting up stationary electrostatic spraying equipment ⁴⁾
DIN VDE 0165	Setting up electrical equipment in locations in areas with danger of explosion ⁴⁾

*Sources:

¹⁾ Carl Heymanns Verlag KG, Luxemburger Strasse 449, 5000 Köln 41, or from the appropriate employers association

²⁾ Beuth Verlag GmbH, Burggrafenstrasse 4, 1000 Berlin 30

³⁾ General secretariat, Rue Bréderode 2, B-1000 Bruxelles, or the appropriate national committee

⁴⁾ VDE Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12

Product specific security measures

- The installation work, to be done by the customer, must be carried out according to local regulations
- Before starting up the plant a check must be made that no foreign objects are in the booth or in the ducting (input and exhaust air)
- It must be observed, that all components are grounded according to the local regulations, before start-up

Installation

Installation work to be done by the customer must be carried out according to local safety regulations.

Grounding

Check the booth and the powder center grounding before every start-up. The grounding connections are customer specific, and are fitted on the booth basement, on the cyclone separator and on the powder center housing. The grounding of the work pieces and other plant units must also be checked.

Operating the equipment

In order to be able to operate the equipment safely, it is necessary to be familiar with the safety regulations, the operational characteristics and functioning of the various plant units.

For this purpose, read the safety notes, this operating manual and the operating instructions of the Gematic control unit and/or Touch panel, before starting up the plant.

In addition, all further equipment-specific operating instructions, e.g. the OptiFlex, OptiMatic or APS series and all additional components should also be studied.

To obtain practice in operating the plant it is absolutely essential to start the operation according to the operating instructions. Also later on, they serve as a useful aid on possible malfunctions or uncertainty and will make many enquiries unnecessary. For this reason, the operating manual must always be available at the equipment.

Should difficulties arise, however, your ITW Gema service center is always ready to assist.

Inspection check

The following points are to be checked at every booth start-up:

- No foreign material in the central suction unit in the booth and in the powder suction
- The sieve machine is connected to the cyclone separator (the clamps tightly locked)
- Pneumatic hoses and powder hose are connected to the dense phase conveyor
- The filter elements door is closed, the waste container is fitted and pressed on

Repairs

Repairs must be carried out by trained personnel only. Unauthorized conversions and modifications can lead to injuries and damage to the equipment. The ITW Gema AG guarantee would no longer be valid.



Note:

We point out that the customer himself is responsible for the safe operation of the equipment. ITW Gema AG is in no way responsible for any resulting damage!

By carrying out repairs, the powder center must be disconnected from the mains, according to the local safety regulations!

Only original ITW Gema spare parts may be used, damages caused by use of foreign parts excludes any warranty claim.

About this manual

General information

This operating manual contains all important information which you require for the working with the PZ Powder center with Gematic control unit. It will safely guide you through the start-up process and give you references and tips for the optimal use of your new powder coating system.

Information about the function mode of the individual system components - booth, gun control unit, manual gun or powder injector - you will find in the corresponding enclosed documentations.

Design and function

Field of application

The PZ Powder center with Gematic control unit is conceived for simple and clean handling of the coating powder and enables a quick color change. The coating powder can optionally be processed either from powder containers, as delivered from the powder manufacturer, or from a special fluidized container.

The powder center is an essential part of the color change system and is largely responsible for the end product quality. As a part of the process controlled coating plant, it is laid out for fully automatic operation.

The most important characteristics of the powder center are:

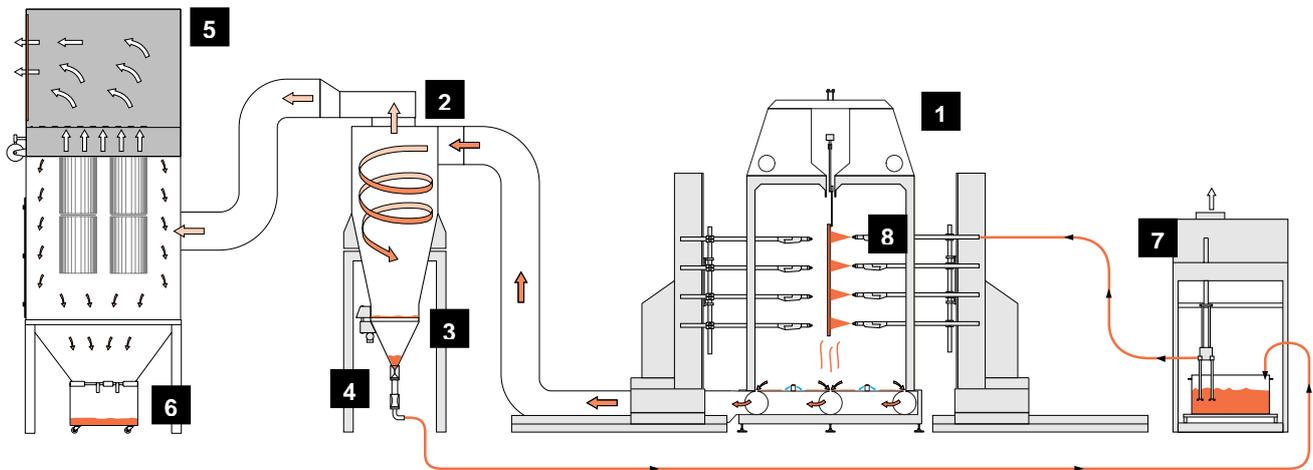
- Processing powder from the original container or from the fluidized container
- Functional unit with its own exhaust system
- Integrated electrical and pneumatic control units
- Powder level monitoring through level sensor
- Level controlled raising and lowering station with built-in injectors and fluidizing equipment
- Automatic internal cleaning of the suction tubes, injectors, powder hoses and guns
- Return of the recovered powder through a sieve machine or directly into the powder container
- A built-in exhaust unit prevents the escape of powder particles during the coating process and during cleaning

General operating sequence

Powder flow

With the typical operation of the powder center (7), the powder container is placed on the vibration table. The injectors move downwards into the powder through the level sensor, and fluidize the area around the suction tubes. The fluidized powder is sucked up by the injectors and fed through the powder hoses to the spray nozzles (8). The powder, which does not adhere to the workpieces, is absorbed by the exhaust air of the booth and separated from the air in the cyclone separator (2).

The separated powder is cleaned passing through the integrated sieve (3) and transported back into the powder container by the dense phase conveyor (4), where it can be reused for coating operation.



Powder flow in the plant

- | | |
|------------------------|--------------------|
| 1 Booth | 5 After Filter |
| 2 Cyclone separator | 6 Refuse container |
| 3 Sieve | 7 Powder center |
| 4 Dense phase conveyor | 8 Automatic guns |

Cleaning procedure for color change

If a color change is necessary, the injectors are moved out from the powder container, and the powder container is removed.

The cleaning procedure is released now, and the injectors and suction tubes are transported into the cleaning position, i.e. they move onto the blow-off nozzles below the vibration table. The powder in the hose lines is now blown out automatically by the pre-rinsing. The following rinsing procedure at full system pressure cleans the suction tubes, injectors, powder hoses and guns internally. These parts are blown off externally by hand, in preparation for the next color.

The powder, which is still in the recovery system, is caught in a waste container. The powder recovery line from the cyclone is also cleaned by back flushing.



The booth and the cyclone have also to be cleaned, when a color change takes place. These cleaning procedures are described in the corresponding user manuals.

After this cleaning process a new powder container can be used and the coating with the next color can continue. During the first minutes of operation with the new powder, it is recommended to collect the recovered powder in a waste container and not to reuse.

PZ Powder center

The PZ powder center is an independently functioning unit with its own powder preparation unit, powder transport equipment with blow-off equipment, an exhaust air system, an electrical control unit and pneumatic control unit.

The powder center is designed for a quick color change concept and replaces the usual powder coating from fluidized powder containers. Instead of fluidized powder containers, powder boxes or powder manufacturer's containers are supplied for direct use. After using, these containers can be kept in the powder storage room.

In order to avoid color change problems, well known from practical experience, a fundamental difference is made in the powder center between light and dark colors, to achieve a quick and qualitatively good changeover from light to dark colors or vice versa. This means, that an own set of powder hoses for light and dark colors is provided.

Powder preparation unit

In the powder preparation unit the recovered powder and also the fresh powder are prepared for the transport to the spray guns. The powder box or the powder container, from which the guns are supplied, is positioned on the vibrating table. An additional, local fluidization enables the powder transport.

Powder transport equipment

In this collective term, the injectors with the suction tubes, the powder hoses and powder level regulation with fluidization are included. The complete powder transport equipment is fitted on a pneumatic linear cylinder.

Blow-off equipment

The blow-off equipment enables the automatical cleaning or blowing off of the injector suction tubes, injectors, powder hoses and spray guns.

The blow-off nozzles required for this, are fitted below the vibration table. One blow-off nozzle is required for each injector. The cleaning procedure must be initiated manually by activating the cleaning key on the powder center. Starting from this time, the cleaning procedure takes place automatically.

Cleaning operation

The booth is stopped on the booth control unit, switched to cleaning operation and the booth doors are closed. The powder container or powder box are removed from the powder center. Now, the activation of the cleaning function can take place on the powder center. The powder transport equipment moves down into the cleaning position. The injector suction tubes, the injectors, the powder hoses and the guns are rinsed in pulses with compressed air.

During the cleaning sequence, the powder transport equipment is cleaned manually on the exterior with a compressed air gun.

Detailed information about the commands mentioned in this manual you will find in the Gematic control unit operating manual.

Emptying the waste powder container



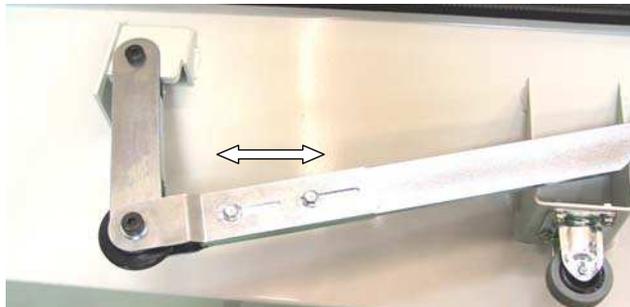
Waste powder container

The waste powder container is fitted under the powder center and is emptied in accordance to following steps:

1. Pull the handle upwards and move it outwards
2. Put the handle in the rear notch
3. Move the waste powder container outwards and empty it
4. Move the empty waste powder container under the powder center
5. Pull the handle upwards and move it inward
6. Put the handle in the front notch



**The waste powder container must be fitted tightly under the powder center, so that no additional air can be aspirated!
The stroke for fitting the container is adjusted on both sides of the handle.**



Waste container - setting the stroke on the handle



The minimum space requirement for emptying the waste powder container is 1000 mm. The minimum space requirement for moving out and removing the waste powder container is 1500 mm!

Functional procedure during coating operation

Basically, two operation types are possible with the powder transport equipment; the operation with or without fresh powder supply.

Without fresh powder supply

Normally, the multiple color operation takes place without automatic fresh powder supply.

In this main function, the powder transport equipment moves constantly downwards with the sinking powder level in the powder box or powder container. The powder level to be fluidized is adjusted by the level sensor.

If the powder transport equipment reaches the lowest powder level, a powder lack signal takes place. The used powder container must be replaced with a full one. The coating process can now be restarted.

If coating is done with the powder box, a new powder bag is to be put into the powder box after the powder lack signal has initiated. By pressing the "Refill fresh powder" key, the powder transport equipment moves on the upper powder level in the powder box. The coating procedure is not interrupted, in comparison to the preceding coating procedure.

With fresh powder supply

If coating is done with an automatic fresh powder supply, e.g. with one main color and fresh powder supply from a Big Bag, then the powder transport equipment in the powder box does not move.

In this application case, the fresh powder supply is initiated by level sensor. As soon as the level sensor is no longer covered with powder, the fresh powder supply is initiated and new powder is fed into the powder box.

In both application cases, a continuous powder output to the guns is ensured, because the immersion depth of the injector suction tubes into the powder is kept constant.

Technical Data

PZ Powder center with Gematic control unit

Electrical data

PZ Powder center/Gematic	
Input voltage	3x400 V
Frequency	50/60 Hz
Power consumption	3,5 kW
Protection type	IP54

Pneumatical data

PZ Powder center/Gematic	
Input pressure	min. 6 bar / max. 10 bar
Compressed air consumption during operation	25 Nm ³ /h
Compressed air consumption during cleaning	150 Nm ³ /h
Water vapor content in compressed air	max. 1,3 g/m ³
Oil content in compressed air	max. 0,1 mg/kg

Dimensions

PZ Powder center/Gematic	
Base area (width x depth)	1330 mm x 1790 mm
Overall height	2370 mm
Weight	starting from 740 kg, depending on the version

Exhaust air unit

PZ Powder center/Gematic	
Air volume	ca. 3000 Nm ³ /h

Powder transport

PZ Powder center/Gematic	
Conveying performance	150 kg/h

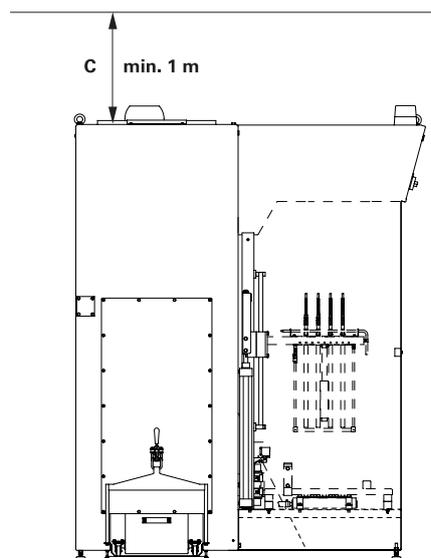
Start-up

Setting up and mounting

Assembly notes

When assembling a PZ Powder center, the following points are to be observed:

- The powder center is set up on 4 leveling pads
- The vibration table must be leveled exactly on assembly
- In order to prevent the powder center from moving during operation, the leveling pads must be fixed with screws to the floor
- The powder center must be grounded according to the local regulations
- To avoid disturbing air turbulences at the exhaust air opening, there must be a free space (**C**) of min. 1 m



PZ1 Powder center - free space on exhaust air opening

Hose connections

When laying out the hose connections, the largest radii as possible (if possible, at least 300 mm) are to be used. This reduces pressure losses in the lines and avoids wear and depositing in the powder hose.

A proper hose layout improves the overview, increases operating safety, and simplifies the search for faults.



Installation work to be done by the customer must be carried out according to local safety regulations!

Preparation for start-up

Before the start-up of the powder center must be considered, that the powder center is already parameterized on delivery, however, it can be adapted according to client's plant specifications.



All changed values have absolutely to be entered into the parameter table!

Check cable and hose connections

All cable and hose connections must be checked for perfect layout and tight fitting of the connection elements.

Electrical wiring and screening concept

All CAN bus users are to be wired in accordance to the enclosed electrical diagrams.



The control unit must be connected to the emergency stop power circuit, i.e. when an emergency stop takes place, the control unit is switched off!

- Assembly and fitting of electric devices may only be done by an electronics specialist
- For trouble-free operation with high data transmission rates, a proper grounding concept is mandatory. A uniform grounding potential is a prerequisite for this
- Screened cables are to be used exclusively for the wiring. The cable shield is connected at both ends largely to ground



Both ends of the cable shield must generally, or as often as possible, be connected to ground, otherwise malfunctions can occur! Due to this, the reliability of the unit and the normal processing sequence could be reduced!

Addressing / Address distribution

The communication between the users in the network takes place by CAN bus, therefore each existent component must be classified with a individual user address (node-ID).

Device	Channel	Setting values	Description
OptiTronic	1	1-64	see OptiTronic manual, system parameter PL
Encoder	0	32-35	see Gematic reciprocator control unit manual
Axes	0	1-16	see Gematic reciprocator control unit manual
CPU unit	0	81	Reciprocator control unit
CPU unit	0	82	Powder center control unit
CPU unit	0	84	Communication block for booth control unit
CPU unit	0	85	Communication block object recognition/multi light array control unit
CPU unit	0	86	Ethernet-CAN bus bridge
Gematic front panel	0	61	see powder center control unit, troubleshooting on the front panel
Gematic front panel	0	62	Reciprocator control unit

Channel 0 = CAN bus on the CPU

Channel 1 = CAN bus on extension module QCAN

Grounding of the powder center

The powder center must be grounded according to the general, local safety regulations. The grounding of the powder center must be checked regularly.

Adjusting the reflex sensor

On the vibration table, a reflex sensor monitors the presence of a powder recipient. The sensor must be adjusted in accordance to the following description:

Adjusting the switching threshold

1. Point the sensor at the object and clean the lenses
2. Adjust the sensitivity with the potentiometer in such a way, that the switching point is between the target and the background (or between a bright and dark target)



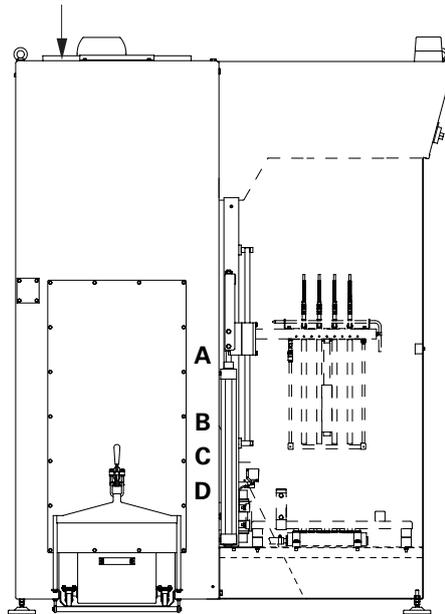
The scanning range depends on the target surface condition and the color of the object being monitored!

A blinking LED shows that the sensor is working without excess gain. Either the sensor is not adequately aligned to the object, the lens surfaces are dirty or the target does not emit enough light.

The lenses surface must be cleaned regularly and carefully!

Adjusting the lifting cylinder end switches

On the lifting cylinder, 4 proximity switches are installed for following functions, from top to bottom:



PZ1 Powder center - end switches on lifting cylinder

A	Working position with automatic fresh powder supply (level sensor in filling position, fresh powder - working position)
B	Lowest working position (level sensor in end position, lowest suction level)
C	Cleaning position for blowing off the suction tubes
D	Cleaning position for blowing off the suction tubes, injectors and powder hoses

Adjusting the proximity switches

The proximity switches are adjusted in following steps:

1. Install the proximity switch for working position **A** with automatic fresh powder supply at 330 mm, starting from the upper cylinder end piece
2. Install the proximity switch for the lowest working position **B** at 440 mm, starting from the upper cylinder end piece
3. Install the proximity switch for blow-off position **C** at 550 mm, starting from the upper cylinder end piece
4. Install the proximity switch for blow-off position **D** at 600 mm, starting from the upper cylinder end piece

5. Move the cylinder to the upper end position
6. Move the cylinder to the working position for automatic fresh powder supply
7. Check, if the distance between suction tube and fluid plate of the powder container, resp. floor of the powder box is approximately 100 - 300 mm
These settings can be made according to the customer's specifications. A greater distance from the floor means a large powder volume to run the plant, gives, however, greater safety with short breaks in the fresh powder supply.
8. Move the cylinder to the blow-off position of the suction tube. Check, if the distance between the suction tubes and nozzles is approximately 20-30 mm.
With this distance the blow-off effect of the suction tube is influenced and can be accommodated to the customer's specifications.
9. Move the cylinder to the blow-off position
10. Check if the end switch 4 is in operation (cylinder is under pressure)

Exhaust system / differential pressure

The powder center exhaust system (fan with filter cartridges) prevents the escape of powder from the powder center. The differential pressure means the air pressure difference between the filter cartridges/fan (suction side) and the working room (exhaust side).

Set exhaust volume

The exhaust air volume can be influenced with the vanes on the fan exhaust. In order to achieve the correct air volume, the unobstructed exhaust exit of the fan at start-up must be 80 mm (at mains frequency of 50 Hz) or 70 mm (at mains frequency of 60 Hz).



When too large exit openings are chosen, this can lead to premature clogging or to damage on the filter cartridges!

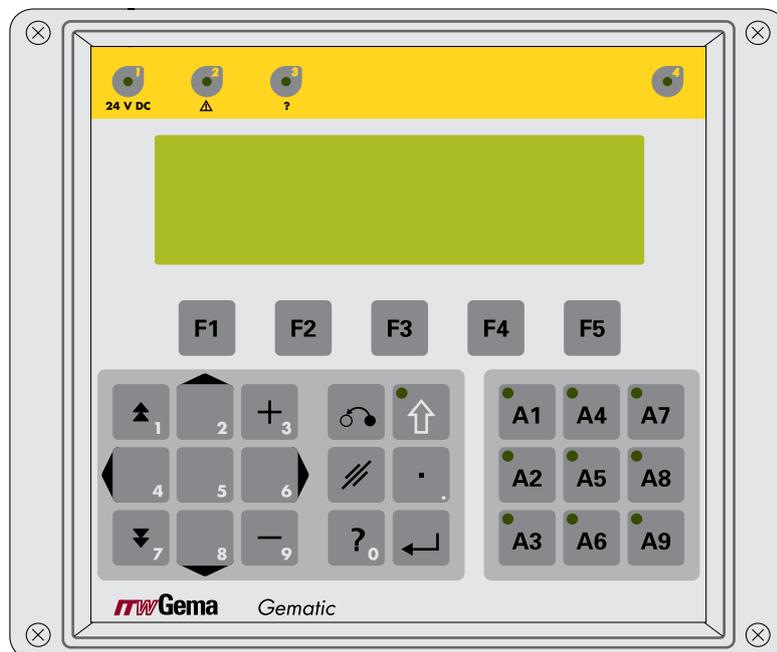
Gematic control unit

Operating panel

The operation, and monitoring of the powder center takes place with aid of the operation panel.

The operation panel serves to initiate the function commands, which are necessary for the satisfactory operation of the powder center. The function parameters are also input through the control panel. These are set at the factory and, therefore, may only be altered after consultation with an ITW Gema Service Center.

The display is a monochrome, graphic LCD-display with a resolution of 240x64 dots.



Gematic operating panel

Special key functions



The keys of the input field should only be pressed with fingertips and under no circumstances with fingernails or hard objects!

Function keys F1-F5

The function keys serve to carry out operating modes and menu dependent functions. The corresponding functions are displayed in the lower part of the LCD-display.

Keys A1-A9

Not active

Shift key

This key serves to switch the keyboard between the normal and the numeric keyboard. Each time the key is pressed it is switched backwards and forwards between these states. The LED in the SHIFT key illuminates when the second function is active.

Cursor key and

Switching between the input fields can be done with these keys. The values can be browsed through when Input is active.

Numeric keys (second function)

The numeric keys serve to input values in the corresponding input fields in connection with the preceding sign keys and the decimal point.

Delete key

The input field is deleted with this key.

Enter key

The input window is opened or the input value is saved in the memory with this key.

Escape key

This key closes the current display and switches to the previously opened window or closes the input without saving the values when the input was opened with ENTER.

Help key

This key serves to acknowledge the faults or display the acknowledged faults to the Gematic control unit (as long as the fault is not repaired).



**The function parameters are set at the factory and it's not allowed to change them by the customer!
Parameters may only be altered after consultation with an ITW Gema Service Center!**

LED Display functions

Shift key LED

This LED indicates the condition of the keyboard switching. The LED is activated when the second function is active, it is deactivated with a normal keyboard assignment. Numeric values can be input with an active SHIFT key.

LED No. 1

24 VDC

This LED is statically controlled and indicates that the panel is switched on and is connected with the PLC.

LED No. 2

Fault

This LED serves for the general display of a fault condition. If the fault is corrected or acknowledged, the LED is extinguished.

LED No. 3

Help ?

This LED is activated, if the operator calls up a help text by pressing the Help key. With the return to a normal display condition the LED is extinguished again.

LED No. 4 red (Upper right)

This LED indicates that the powder center is ready for operation.

Operating modes

General information

The following operating modes can be selected on the Gematic control:

- **Powder coating**
- **Cleaning**
- **Service / set-up / parametry**

The operating modes are explicitly described in the following chapters.

The operation level of the Gematic control is set out with pictograms, so that only the really essential parameters are displayed and the operator can therefore reach his solution quickly.

Basically, the control is in the none of these operating modes after switching on or after a restart. The operating modes are selected on the panel.

Coating operation

Before switching on the powder center

Before switching the powder center on the following points must be observed:

- Observe the safety regulations
- Check the grounding of the powder center, the booth and the other plant units and ensure it, if necessary
- Check the compressed air supply

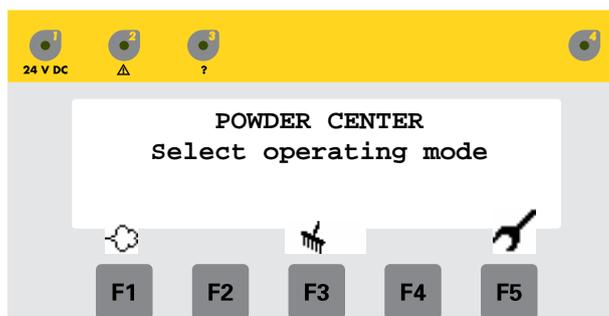
Starting up the powder center



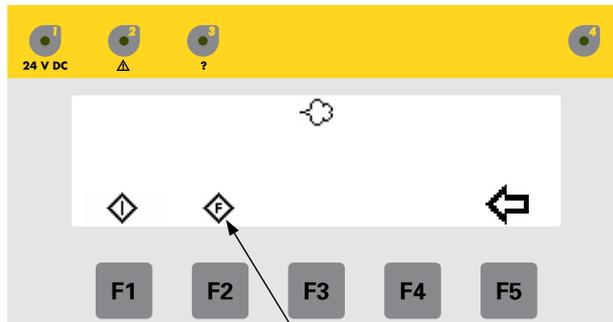
The keys of the input field should only be pressed with fingertips and under no circumstances with fingernails or hard objects!

At the start-up the following steps must be taken:

1. Switch on the booth (For further information, see the separate Booth Operating Instructions) - the signal "**Booth ready**" appears
2. Switch on the powder center main switch
3. Switch on the control voltage in the powder center with the key switch:
 - the key switch returns to its starting position
 - the interior lighting switches on
 - the exhaust air fan starts up
 - the display shows the basic menu

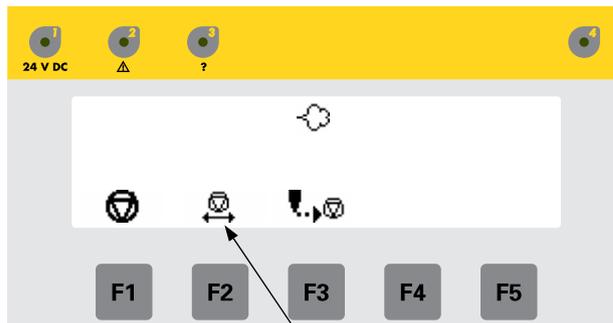


4. Place the powder box on the vibration table
5. Press the **F1** key „**Coating**“; this menu appears on the display:
 - Fluidizing is started



The symbol of fresh powder system appears only when it's adjusted in the menu „**Parameters**“.

6. The **F5** key  closes the „**Coating**“-menu and returns to the main menu
7. Press the **F1** key „**Start**“
The following menu appears on the display:

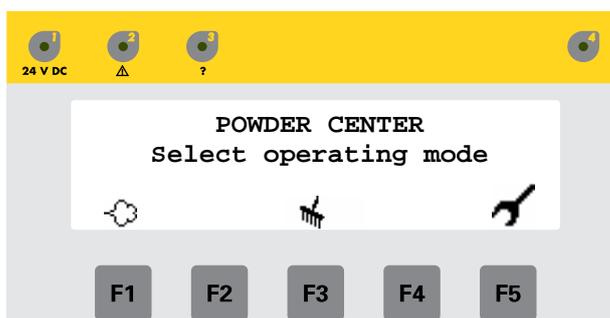


Both symbols appear only when it's adjusted in the menu „**Parameters**“

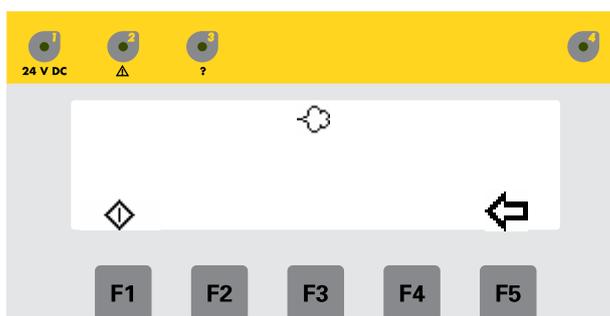
- the injectors move downwards
 - the level control is activated
 - the vibration table switches on
 - the powder sieve is started
8. Check the fluidization in the powder container
 - The powder must „boil“ lightly (setting it with the pressure regulating valve in the back wall of the powder center)

Starting up the powder center after an emergency stop

1. Switch on the booth (For further information, see the separate Booth Operating Instructions) - the signal "**Booth ready**" appears
2. Switch on the powder center main switch
3. Switch on the control voltage in the powder center with the key switch:
 - the key switch returns to its starting position
 - the interior lighting switches on
 - the exhaust air fan starts up
 - the display shows the basic menu

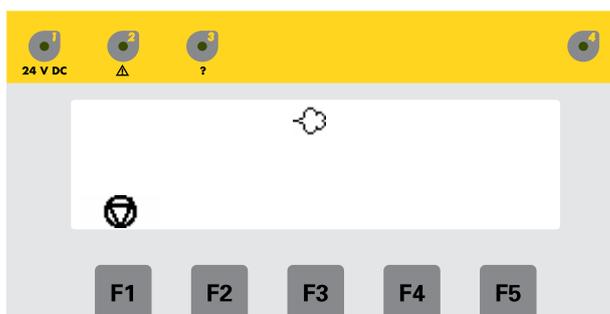


4. Press the **F1** key „Coating“
The following menu appears on the display:



- Fluidizing is started

5. Press the **F1** key „Start“
The following menu appears on the display:

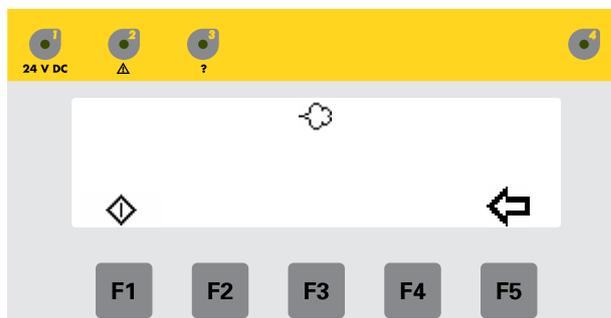


- The injectors move downwards, and the level control unit is activated
 - the vibration table switches on, the powder sieve is started
6. Check the fluidization in the powder container
- The powder must „boil“ lightly (setting it with the pressure regulating valve in the back wall of the powder center)

Switching off the powder center

The following steps must be taken to switch off the powder center:

1. Check if all the workpieces have been coated
2. Press the **F1** key
The following menu appears on the display:

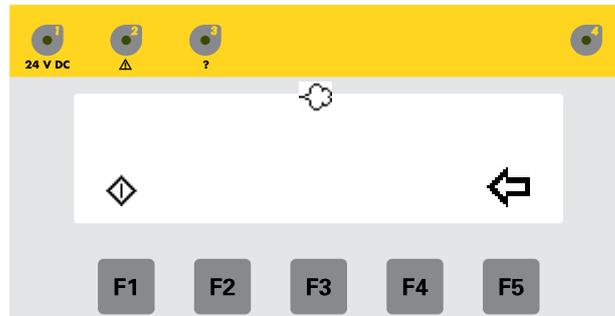


- the injectors move upwards
 - the level control switches off
 - the vibration table switches off
3. Switch off the powder center with the key switch
 - the interior lighting goes off
 - the exhaust air fan switches off
 4. Switch off the main switch

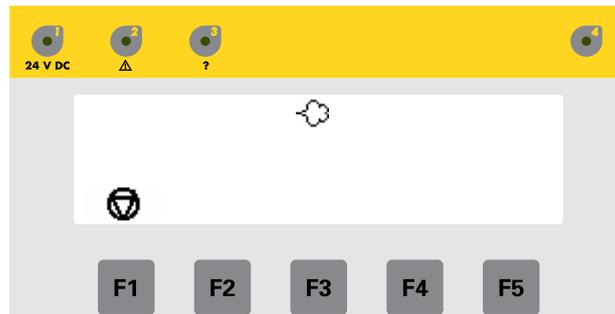
Changing the powder container during coating

Changing a powder box during the coating process takes place with the following steps:

1. Check if coating can be interrupted
2. Press the **F1** key
The following menu appears on the display:



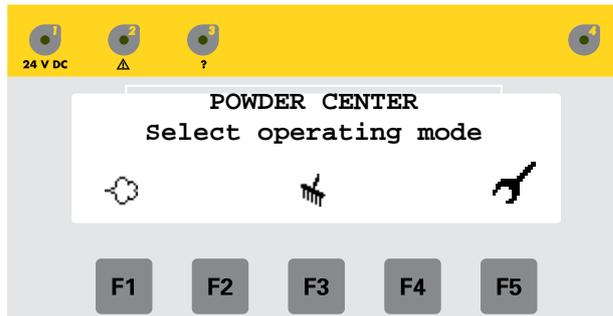
- the injectors move upwards
 - the level control switches off
 - the vibration table switches off
3. Replace the new powder box on the vibration table
 4. Press the **F1** key
The following menu appears on the display:



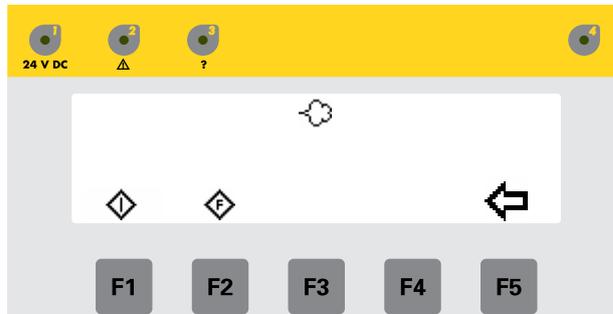
- The injectors move downwards, and the level control unit is activated
- the vibration table switches on

Working with the automatic fresh powder supply

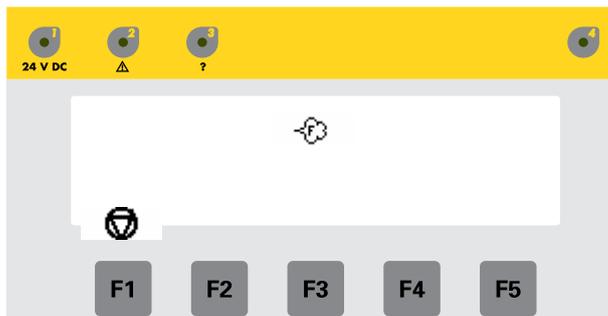
1. Switch on the booth (For further information, see the separate Booth Operating Instructions) - the signal "**Booth ready**" appears
2. Switch on the powder center main switch
The following menu appears on the display:
3. Switch on the control voltage in the powder center with the key switch:
 - the key switch returns to its starting position
 - the interior lighting switches on
 - the exhaust air fan starts up
 - the display shows the basic menu



4. Place the powder box on the vibration table
5. Press the **F1** key „Coating“
The following menu appears on the display:



- the injectors move upwards automatically (to the starting position)
6. Press the **F2** key
The following menu appears on the display:



- the injectors move downwards to the fresh powder working position
 - the level control is activated
 - the vibration table switches on
 - Fluidizing is started
7. Check the fluidization in the powder container
- The powder must „boil“ lightly (setting it with the pressure regulating valve in the back wall of the powder center)

Procedure at a fault in the automatic fresh powder supply

If no or only an unsatisfactory fresh powder supply takes place within the set time:

- the flashing light switches on, on the display appears the error message „**F5 no fresh powder**“
1. Press the ? key
 2. Press the **F2** key
The following menu appears on the display:
 - the injectors move to the actual powder level
 - the coating takes place without automatic powder supply

When the fresh powder supply is ready to operate, the following procedure will activate the system again:

1. Press the **F1** key
 - the injectors move upwards
 - the level control switches off
 - the vibration table switches off
2. Press the **F3** key
3. Press the **F1** key
 - the injectors move downwards to the fresh powder working position
 - the level control is activated
 - the vibration table switches on
 - Fluidizing is started

Coating with fresh powder is now in operation again.

Cleaning

General information

In the operating mode "**Cleaning**", various cleaning procedures can be automatically initiated:

- gun-, injector- and powder hose - cleaning 
- dense phase conveyor - cleaning 
- filter cartridge - cleaning 

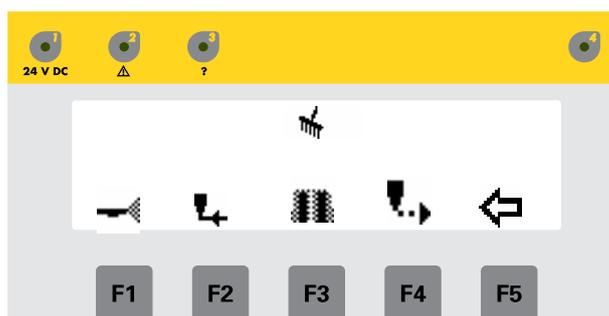
During the cleaning, the dense phase conveyor can also be stopped .

Gun cleaning



Before start cleaning, the guns must be in the cleaning position, see the instructions for the booth and axes.

1. Press the **F3** key in the main menu
The display shows the menu „Cleaning“

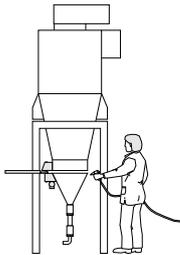
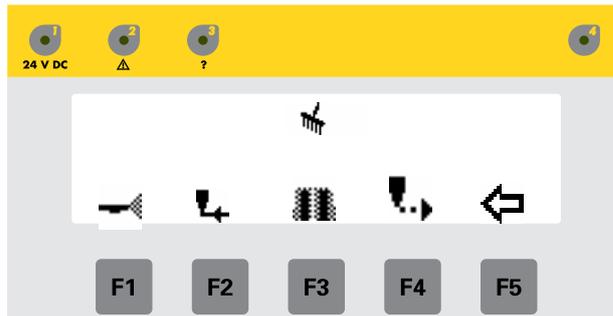


2. Press the **F1** key 
Following procedure will initiate automatically:
 - the injectors move downwards to the cleaning position
 - the blow off nozzles switch on, the suction tubes, injectors, powder hoses and guns are rinsed internally
 - the injectors remain in the cleaning position

3. This procedure can be repeated by pressing the key **F1** again!
 - during this procedure the outsides of the suction tubes, injectors, supports etc. can be cleaned manually with the compressed air gun
4. Press the **F5** key
The display shows the main menu

Dense phase conveyor - cleaning

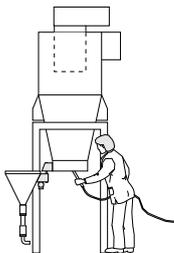
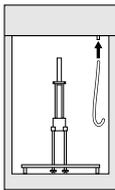
1. Press the **F3** key in the main menu
The display shows the menu „Cleaning“



2. Press the **F4** key to stop the dense phase conveyor
The animated symbol  stands still now
3. Open the cyclone funnel
4. Slowly swing out the sieve and clean with the compressed air gun



In order to avoid damage to the sieve when blowing through the transport hose, make sure that the sieve is swung out completely during the cleaning process!



5. Connect the transport hose to the cleaning connection on the cover of the powder center
6. Press the **F2** key
 - the transport hose is blown through, in pulses, for a set time
 - this procedure can be repeated by pressing the key **F2** again!
7. Swing the funnel on the cyclone slowly away and at the same time clean it off with the compressed air gun
8. Blow off the cyclone with the air hose / air lance from bottom to top, carefully clean the internal and external surfaces of the interior tube (broken lines)
9. Close the sieve and funnel on the cyclone again
10. Press the **F5** key
11. Place the powder container with the desired color on the vibration table

12. Disconnect the dense phase conveyor hose
13. Put the powder center into operation according to section "Start - up")

Filter cartridge - cleaning

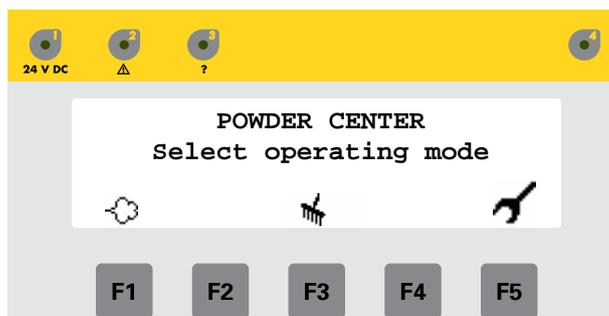
The filter cartridges can be cleaned cyclically during booth operation. The cleaning procedure must be initiated manually at the switch. The cycle determining times are set at the factory.



It is recommended to clean the filter cartridges at least once per week or more frequently with stronger powder accumulation. However, not more than once or twice per shift!

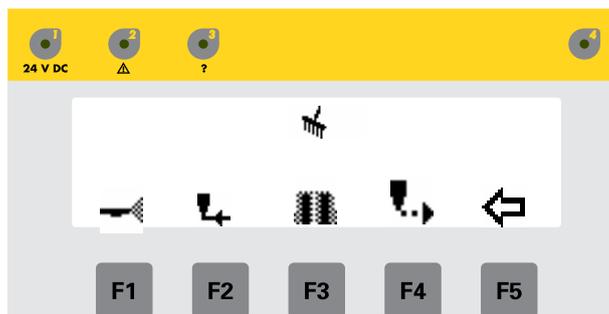
Filter cleaning can only be carried out when the powder center is in operation, with the following steps:

1. Check if coating can be interrupted
2. If yes, press the **F5** key
The display shows the main menu



- the injectors move upwards
- the level control switches off
- the vibration table switches off

3. Press the **F3** key
The display shows the menu „Cleaning“



4. Press the **F3** key
 - both filter cartridges are cleaned, one after the other
(Caution: loud air blast)

This cleaning process can be repeated, as required.



**The cleaning times are set at the factory!
If the filter cartridges must be cleaned after a few hours of operation because the max. differential pressure has been overstepped (at which the fault message „M9 Please clean filter“ is displayed), contact must be made with an ITW Gema Service center!**

The upper limit value, at which the fault message is displayed, is customer specific. The corresponding parameters are set on assembly by the ITW Gema Service personnel.

5. Press the **F5** key
The display shows the main menu
6. Press the **F1** key
 - the injectors move downwards
 - the level control is activated
 - the vibration table switches on
 - Fluidizing is started

Now the control unit is ready for coating.

Color change

General information

The procedure at a color change in an automatic plant is described below. If the powder center is used for other applications, it can happen that some of the following points are not applicable and can, therefore, be skipped over.

A prerequisite for a quick and efficient color change is that it is done by 2 people, so that some of these steps can be carried out simultaneously. The color change can begin, when the last workpieces have left the booth. In automatic operation mode, the coating is stopped automatically.

Color change procedure

	Working step	Action
1	Close the booth, and manual coating doors - this prevents the powder from escaping when blowing off/trough the guns	
2	Switch the booth to cleaning operation	
3	Move the reciprocator, and XT-axes to the cleaning position	
4	Return to the main menu	
5	Select Cleaning operating mode	
6	Knock off the powder accumulations from the suction unit	
7	Take away the powder box from the vibration table	
8	Blow off the suction unit from outside with the air gun	
9	Connect the recovery hose to the container	
10	Clean filter cartridge if necessary	
11	Move the suction unit to the cleaning position, internally gun cleaning	
12	Open the cyclone	
13	Stop the dense phase conveyor	
14	Disconnect the recovery hose from the container, put in for cleaning and clean	
15	Connect the recovery hose to the rinsing connection	
16	Blow off and check the cyclone funnel	

BOOTH
CLEANING

17	Blow off the cyclone immersion tube by changing of extremely colors!	Use the immersion tube cleaning lance!
18	Close the cyclone	Watch out the gasket!
19	Clean and check the sieve	
20	Insert the sieve	Watch out the gasket!
21	Move suction unit upwards, fine cleaning, visual inspection	
22	Blow off the interior of the powder center	
23	Check suction unit for powder accumulation	
24	Insert powder container	
25	Activate coating operation, move suction unit downwards	
26	Connect recovery hose to the sieve machine after 2-3 minutes	
	Empty the waste drawer once per shift	Watch out the gasket!
	Check the guns for wear once per week	Replace the worn guns!

Service / set-up / parametry ↗

General information

All presettings, which are necessary for operating, can be entered in the "Service" operating mode. The following submenus are available:

Parameter 	Edit and query the system parameters of the plant
Infos 	Check the PLC version and the cycle time
Language 	Select the language
I/O 	Check the inputs and define the output settings



The programming of the parameters or programs takes place by the operating panel. During setting of parameters the fan is switched off and the control of the powder center does not take place. After terminating the service operating mode, a restart of the software must take place, if necessary.

Parameters



Attention:

The parameters are set at the factory and may not be changed by the customer!
Parameters may only be altered after consultation with an ITW Gema Service Center!

Parameter values

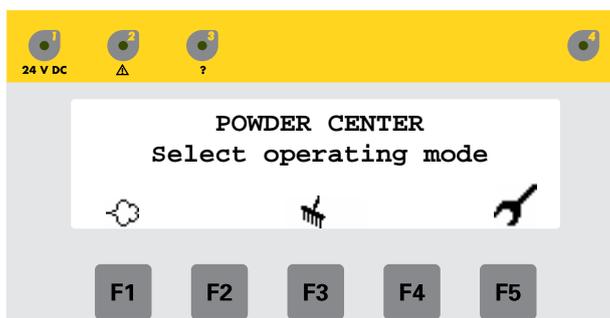
The following values are default values, and are set at the factory. They have to be entered and adjusted by the service engineer at start-up.

Parameter	Description	Value
Level sensor off	If the powder level is sinking, the cylinder-time will be adjusted	3.0 s
Cartridge cleaning on	During this time, the valve for the filter cleaning is open	0.5 s
Cartridge cleaning off	During this time, the valve is closed until the second filter cleaning impulse	8.0 s
Clean powder hose total	Total time for powder hose-cleaning	30.0 s
Clean powder hose on	Impulse-time: during this time, air blows trough the hoses	0.5 s
Injectors/powder hose/gun cleaning	Waiting period up to the next impulse	1.0 s
Dense phase conveying, delay conveying air	Time until conveying air starts, after opening the lower pinch valve	0.7 s
Dense phase conveying time	During this time, the lower pinch valve is opened	5.0 s
Dense phase conveying, waiting period	During this time, both pinch valves are closed	2.0 s
Dense phase conveying, fill time	During this time, the upper pinch valve is opened	7.0 s
Clean recovery hose total	Total time for recovery hose-cleaning	20.0 s
Clean recovery hose on	Impulse-time: during this time, air blows trough the hoses	1.0 s
Clean recovery hose off	Waiting period up to the next impulse	1.0 s
Timeout fresh powder requirement	Period until a message appears, after level sensor detected no powder	100.0 s
After run-time fresh powder requirement	During this time the fresh powder supply is still running, when level sensor detects powder again	5.0 s
Number of injector blocks		2
Number of cylinders		1
Number of powder boxes		1
Second dense phase conveying		FALSE
Fresh powder system		FALSE
Softkey Vibrator		FALSE
Softkey dense phase conveying off		TRUE
Powder center standalone		FALSE
Timeout blow-off position (suction)	The suction tubes move upwards again, when the proximity switch for the blow-off position is not reached after the elapse of this time	10.0 s
Timeout powder level (suction)	After this time has elapsed, the level sensor moves upwards again, when the powder level is too deep (Normal operation)	10.0 s
Timeout cylinder upwards		5.0 s
Waste pump powder center on	During this time the waste powder pump in Powder center is put in operation	15 min
Waste pump filter on	During this time the Filter waste powder pump is put in operation	15 min
Waste pump pause	Pause between two pump cycles	600 min

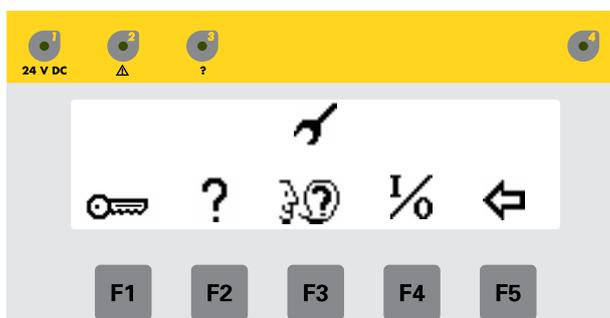
Language change

In order to input the settings on the operating panel, the plant must be in operation. To do this proceed as follows:

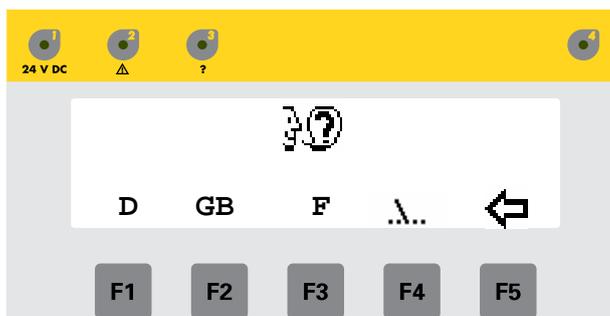
1. Switch on the booth (For further information, see the separate Booth Operating Instructions) - the signal “**Booth ready**” appears
2. Switch on the powder center main switch
3. Switch on the control voltage in the powder center with the key switch:
 - the key switch returns to its starting position
 - the interior lighting switches on
 - the exhaust air fan starts up
 - the display shows the basic menu



4. Press the **F5** key
The following menu appears on the display:



5. Press the **F3** key
The following menu appears on the display:



6. Press the **F1...F3** key for the desired language
7. Press the **F4** key for further languages:
further available languages will appear on the display: **E, I, P, NL, CZ, S** etc.
8. Press the **F5** key, the previous menu appears (Press the key several times, until the desired menu appears)

Messages

Error messages

An error message always appears on the display when there are faults on the powder center. The causes of these errors must be eliminated before further procedures are carried out. (See also „Troubleshooting guide“).

When the error is eliminated, the display returns to the main menu again.

no.	Text	Cause
F1	Deep powder level	<p>Operation mode „Coating“ is activated </p> <p>Powder coating is started with soft key </p> <p>Powder level sinks and the cylinder will be lowered</p> <p>If the lower final position is reached without detecting powder, this message will be shown</p> <p>Remark: This error is indicated with the message number 1</p>
F2	No powder	<p>Operation mode „Coating“ is activated </p> <p>Powder coating is started with soft key </p> <p>Cylinder will be lowered until powder is detected</p> <p>This error will be indicated if no powder is detected after the timeout of 5 seconds</p>
F3	Error level sensor	<p>Operation mode „Coating“ is activated </p> <p>Powder coating is started with soft key </p> <p>Before the cylinder is lowered, the Error-signal will be controlled by the level sensor</p> <p>If the Error-signal is constantly there, the level sensor will be adjusted</p> <p>If the Error-signal flashes with 2Hz, this error-message will be shown. The red LED at the level sensor flashes also</p> <p>The reason is because the sensor is adjusted in the air, or a short-circuit is present</p>
F4	Fill position not detected	<p>Operation mode „Coating“ is activated </p> <p>Fresh powder system is activated </p> <p>Cylinder will be lowered until the fill position is reached.</p> <p>This error will be indicated if no powder is detected after the timeout of 5 seconds</p>

Nr.	Text	Cause
F5	No fresh powder	<p>Operation mode „Coating“ is activated </p> <p>Fresh powder system is activated </p> <p>If the powder level dropped, fresh powder will be requested. This error will be indicated if the powder level is not detected after 100 seconds</p>
F6	Blow-off position not detected	<p>Operation mode „Cleaning“ is activated </p> <p>Injector, powder hose and gun cleaning is activated </p> <p>The cylinder will be lowered. This error will be indicated if the blow-off position is not reached after 5 seconds</p>
F7	Cleaning position not detected	<p>Operation mode „Cleaning“ is activated </p> <p>Injector, powder hose and gun cleaning is activated </p> <p>This fault will be indicated if the blow-off position is reached, but the cleaning position is not reached after 5 seconds</p>
F8	Cylinder defective	<p>Operation mode „Coating“ is activated </p> <p>Powder coating is started with soft key </p> <p>If the level sensor detects powder, the cylinder moves upwards. But if the level sensor doesn't communicate „No powder“ after 5 seconds, this error will be indicated</p> <p>Remark: This error is indicated with the message number 8</p> <p>Further reasons: The sensor at the end position is defective or dampened, the level sensor is defective or too much powder clings to it</p>
F9	Differential pressure reached	<p>This error is indicated if the control voltage is switched on and the differential pressure is reached</p> <p>Remark: This error is indicated with the message number 9</p>
F10	Fan motor protection	<p>If the fan is switched on, it is supervised whether the motor protection switch is released</p> <p>Check motor (overheat, running properties, voltage etc.)</p> <p>Check contamination of the propeller</p> <p>Check the settings of the motor protection switch</p>
F11	Vibrator motor protection	<p>If the vibrator is switched on, it is supervised whether the motor protection switch is released</p> <p>Check motor (overheat, running properties, voltage etc.)</p> <p>Check the settings of the motor protection switch</p>
F12	Sieve motor protection	<p>If the sieve is switched on, it is supervised whether the motor protection switch is released</p>
F13	Communication error	
F14	Fatal CAN Error Panel	

Warnings

Warnings are notes for the operator. If a warning is present, this appears on the display. The warning is to be acknowledged. Afterwards the last illustration shown appears on the display.

no.	Text	Cause
M1	Refill powder, acknowledge	<p>Operation mode „Coating“ is activated </p> <p>Powder coating is started with soft key </p> <p>Powder level sinks and the cylinder will be lowered</p> <p>If the lower final position is reached without detecting powder, this message will be shown</p> <p>Remark: This message is indicated with the error number 1!</p>
M2	Please remove powder box	<p>Operation mode „Cleaning“ is activated </p> <p>Injector, powder hose and gun cleaning is activated </p> <p>This message will be indicated if the powder box is still inserted</p>
M3	Please insert powder box	<p>Operation mode „Coating“ is activated </p> <p>Powder coating is started with soft key </p> <p>This message will be indicated if the powder box is not inserted</p>
M4	Final position is reached	<p>Operation mode „Coating“ is activated </p> <p>Powder coating is started with soft key </p> <p>This message will be indicated if the cylinder is still on the final position</p>
M5	Please start fresh powder	<p>Operation mode „Coating“ is activated </p> <p>Fresh powder system is activated </p> <p>If the powder level dropped, fresh powder will be requested. This error will be indicated if the powder level is not detected after 100 seconds</p>
M6	No cleaning release (Booth)	
M7	Booth not ready	<p>This message will be indicated, if the parameter is „Stand alone“ = FALSE and the signal is „Booth ready“ = FALSE</p>
M8	Level sensor defective	<p>Operation mode „Coating“ is activated </p> <p>Powder coating is started with soft key </p> <p>If the level sensor detects powder, the cylinder moves upwards. But if the level sensor doesn't communicate „No powder“ after 5 seconds, this error will be indicated</p> <p>Remark: This message is indicated with the error number 8</p>
M9	Please clean filter	<p>This error is indicated if the control voltage is switched on and the differential pressure is reached</p> <p>Remark: This message is indicated with the error number 9</p>
M10	Switch off dense phase conveying	<p>Operation mode „Cleaning“ is activated </p> <p>This message is indicated if the soft key Cleaning  is pressed and the dense phase conveying is still not stopped</p>

Troubleshooting on the front panel

Fault	Possible causes	Remedy
The display on the front panel is either completely dark or completely bright after switching on	Front panel defect CAN bus cable not connected or broken No terminal resistor no 24 V power supply Contrast adjusted incorrectly	Replace connect or replace Fit terminal resistor Check the power supply set contrast (see below)
Only the upper line appears on the display when switching on	CAN bus cable not connected or broken No terminal resistor ID number of the panel is not 61 Baud rate is not 125 kBd CPU not started	connect or replace Fit terminal resistor Set correct ID number (see below) Set the Baud rate correctly (see below) See also "Optical status display"

Settings on the Gematic front panel

User address (ID Number), Baud rate and contrast

As the Gematic front panel is included in the CAN bus network, the user address 61 (hexadecimal) is assigned. The address input is done manually directly on the panel.

1. Hold the key **A9** pressed and switch on the Gematic control unit
2. Press the **Enter** key 
The Cursor moves from one parameter to another
3. Change the corresponding parameter values with the **Cursor** keys  and 
 - **CAN-Bus Node ID (ID number) = 61**
 - **Baud rate = 125 kBd**
 - **Contrast = approx. 10-30**
4. Switch off the control unit
The set values remain saved

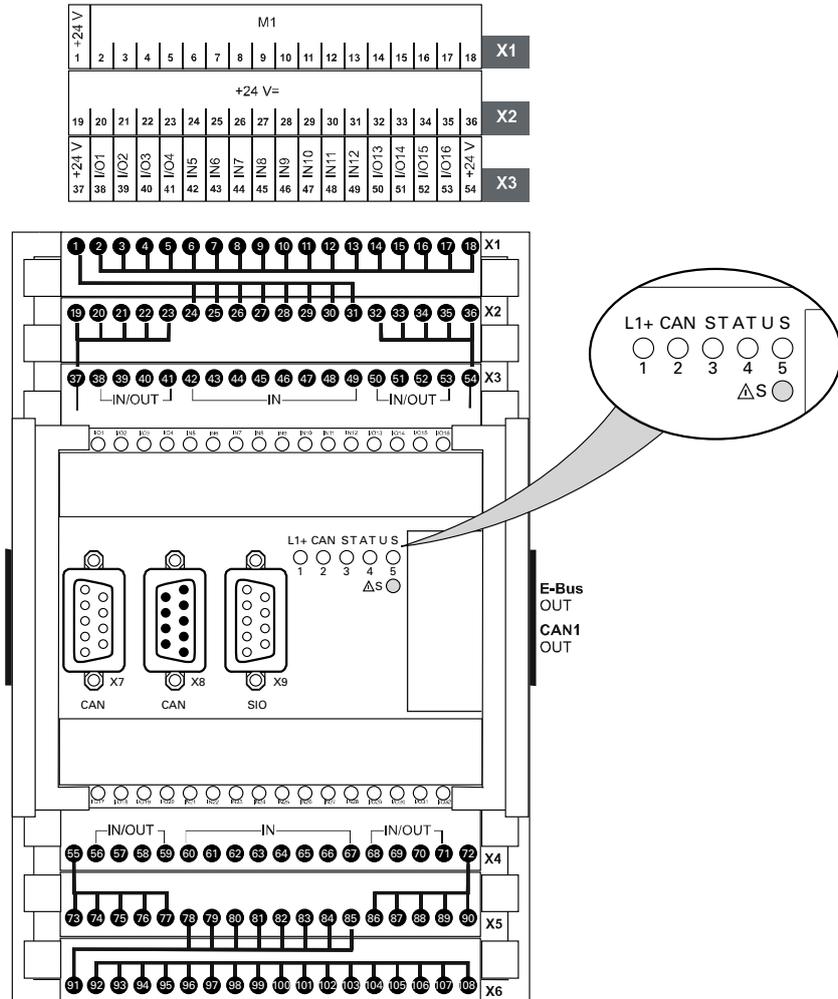


By pressing the **HELP** key  all three parameter values are returned to the factory settings!

Optical status display

Display on the CPU module

Elementary operating conditions and fatal errors are visually indicated by means of LEDs on the front panel of the CPU modules.



Optical status display on the CPU module

Description

LED 1 green	LED on	24 V voltage is present
LED 2 green	LED blinking	CAN bus communication active
LED 3 green	LED on	PLC / software OK
LED 4 red	LED on	Error or PLC stopped without saving the program in the memory
LED 4 red	LED blinking	PLC stopped with program in the memory Start the PLC again - see below

Start the PLC when LED 4 (red) blinks



By pressing the S key all plant-specific parameters are lost, the software of the plant is restored to the condition of delivery and has to be parametered again!

1. Press the **S** key
LED 3 illuminates (green)
2. When the LED 3 illuminates (green), press the **S** key again
The PLC starts

Maintenance

Daily after pauses between working and at the end of the shift

- Coarse cleaning of the booth
- Carry out cleaning according to the sections "Cleaning"
- Clean (dry) the sensor of the container recognition on the vibration table
- Check the nozzles for wear (see also operating instructions for the guns)
- Check the injector hose connections for wear or clogging with the help of ITW Gema plug gauge (order no. 362 280)

Check weekly

- Check in the clean air chamber the after-filter housing for powder deposits through the exhaust air opening (powder deposits are an indication of defect or badly fitted filter elements)
- Clean the powder center completely (no wet cleaning)
- Check the oil separator (if oil is present, the compressed air preparation must be checked)

Check every 6 months

- Disconnect the measuring lines of the manostat on the manometer and blow it off from the manometer to the measuring point (beginning of the line).



Attention:
The indicated blowing direction is absolutely to be observed!

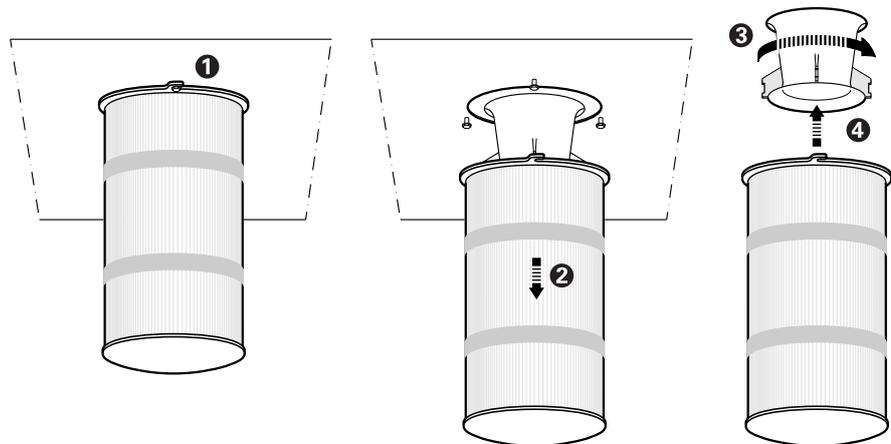
Replacing the filter cartridges

The filter cartridges must be replaced, when:

- Powder is present in the fan chamber in spite of satisfactory assembly
- The fault message „**CLEAN filter cartridge**“ appears at short intervals

A filter cleaning operation must be carried out before every filter cartridge replacement:

1. Start up the powder center
2. Clean all filter cartridges manually several times
3. Switch off the powder center
4. Remove the service panel on the side of the exhaust air housing
5. Loosen the 3 filter cartridge fixing screws a couple of turns (1), do not unscrew completely
6. Turn the filter cartridge slightly and lift down from the fixing screws (2)
7. Turn the Venturi tube (3) and dismantle from the filter cartridge (4)



Replacing the filter cartridges

8. Remove the displacement tube by pressing the locking spring and pull out of the filter cartridge
9. Clean all parts, especially the seating surfaces and the threads on the filter cartridge connection
10. Fit the displacement tube and the Venturi tube into the new filter cartridge
11. Hang the filter cartridge onto the fixing screws and turn to the stop
12. Tighten the fixing screws evenly to the spacing stop, so that the seal sits all the way round and the filter cartridge hangs vertically
13. Replace the service panel again

Replacing the filter pad on the fan housing

The filter pad must be replaced, when:

- contamination is very thick and can no longer be blown off
- the filter pad is clogged with powder residue
- the air permeability is strongly reduced

After unscrewing the retaining grid, the filter grid can be opened, the filter pad replaced and the grid can be screwed back.



**If the interior of the fan housing is covered with powder, it must be looked for from where the powder can occur this area!
Above all it is important to check the filter cartridges!**

Replacing the membrane valve on the pressure tank



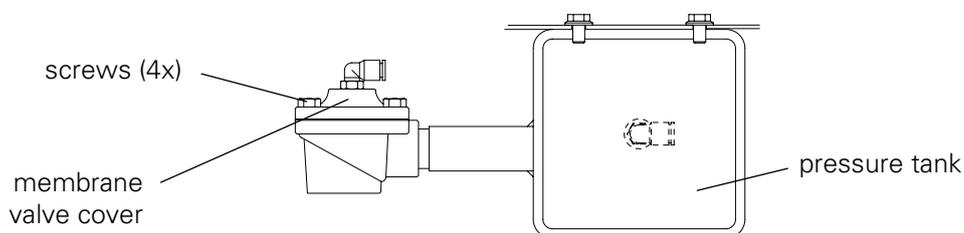
Before work on the membrane valve can be carried out, it must be made sure that the pressure tank is empty!

The membrane valves, with a split nut, are screwed on the rinsing tubes of the pressure tank. The following steps must be taken:

1. Vent the compressed air tank completely
Disconnect the compressed air supply to the powder center
2. Dismantle the filter cartridges according to section "Replacing the filter cartridges"
3. Check that the pressure gauge on the pressure reducing valve „Filter rinsing“ displays 0 bar
4. Remove the membrane valve by unscrewing the split nut
5. Loosen the membrane valve hose connection
6. Fit the new membrane valve in the reverse order



The exhaust opening of the membrane valve must be fitted vertically, pointing downwards, in the center of the filter cartridge.



Troubleshooting

General information



Attention:
Faults are to be fixed by trained personnel only!

If an emergency stop occurs or there is a fault in the powder center fan motor, the whole plant is switched off.

A signal lamp illuminates simultaneous with the appearance of every fault message. The fault message is acknowledged by pressing the **ACK** key.

Problem fixing

Problem / error / malfunction	Procedure / remedy
The fan does not run or switches off	Check the switching on procedure, see section "Starting up the powder center" Check the motor protection relay Check the temperature of the fan motor Check the contamination of the fan
Too little suction	Check the direction of rotation of the fan Cleaning pressure too low, set to at least 2.5 bar Filter cartridges clogged, clean according to section "Replacing the filter cartridges" Filter pad on the fan housing clogged, see section "Replacing the filter pad on the fan housing" Check the fan exhaust opening, see section "Set exhaust volume"
Powder in the clean air chamber and/or powder exits from the exhaust opening	Filter cartridges defect or badly fitted (leaking), see also section "Replacing the filter cartridges"

<p>Filter cleaning does not work or only works unsatisfactorily</p>	<p>Check the cleaning pressure Poor compressed air quality (contains oil or water) Check the control pressure of the membrane valve Check the membrane valve according to Section "Replacing the membrane valve on the pressure tank" Check exhaust opening of the membrane valve (vertically, pointing downwards)</p>
<p>Filter cleaning does not switch off</p>	<p>Check the control pressure to the membrane valve Replace the membrane valve according to Section "Auswechseln des Membranventils am Drucktank"</p>
<p>Air escapes from the safety valve on the compressed air tank (hissing noise)</p>	<p>Check the pressure set on the pressure regulator "Filter rinsing"</p>



**Do not make repairs or settings to the safety valve!
 The pressure tank must be empty before service works on the membrane valves are carried out!**

Spare parts list

Ordering spare parts

When ordering spare parts for powder coating equipment, please indicate the following specifications:

- Type and serial number of your powder coating equipment
- Order number, quantity and description of each spare part

Example:

- **Type** PZ Powder center with Gematic control unit,
Serial number 1234 5678
- **Order no.** 203 386, 1 piece, Clamp - Ø 18/15 mm

When ordering cable or hose material, the required length must also be given. The spare part numbers of this yard/meter ware is always marked with an *.

The wear parts are always marked with a #.

All dimensions of plastic hoses are specified with the external and internal diameter:

Example:

Ø 8/6 mm, 8 mm outside diameter (o/d) / 6 mm inside diameter (i/d)



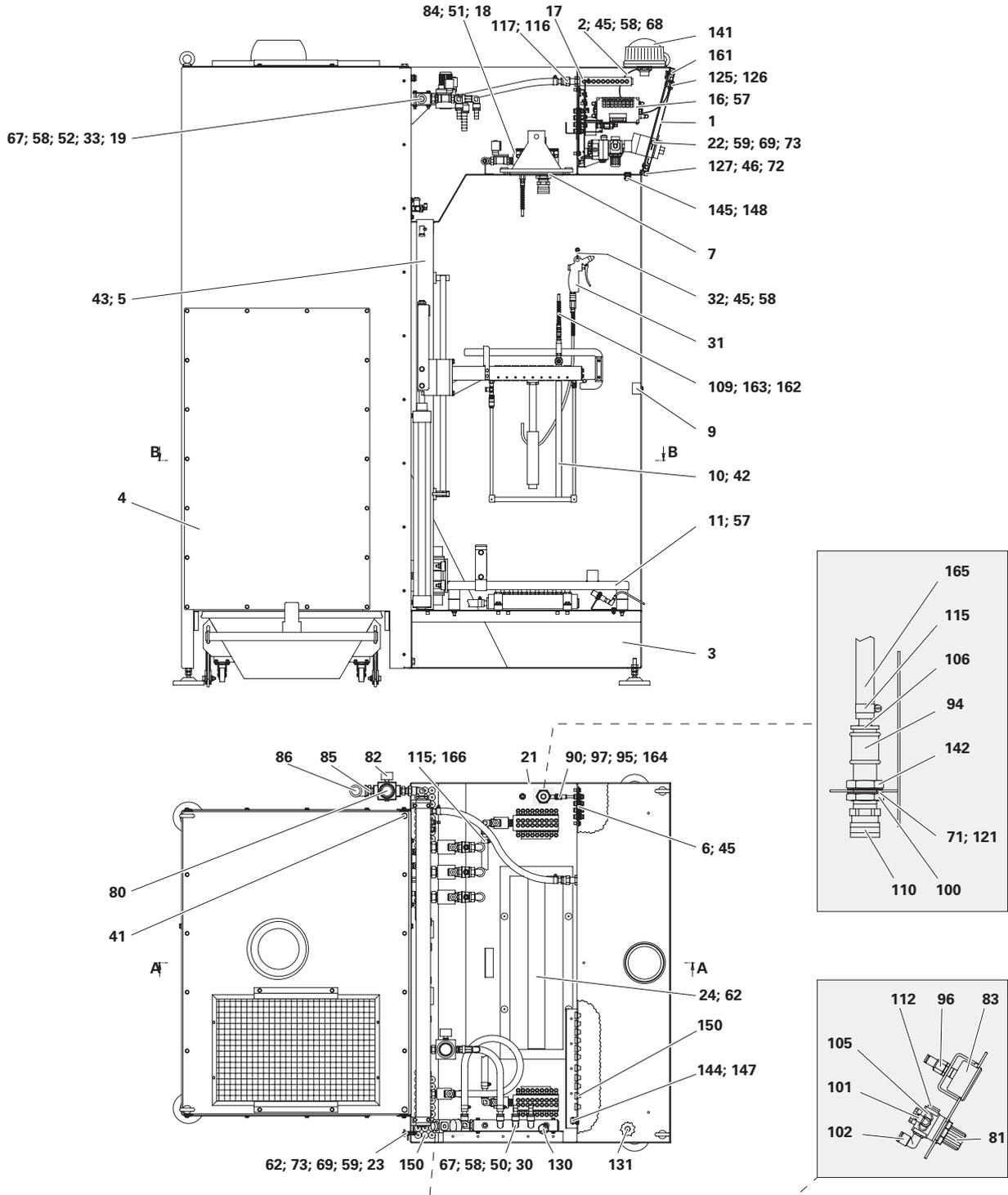
WARNING!

Only original ITW-Gema spare parts should be used, because the explosion protection will also be preserved that way. The use of spare parts from other manufacturers will invalidate the ITW Gema guarantee conditions!

PZ1 Powder center - complete

1	Cover with OP7	373 044
	Cover with OP17	375 167
	Cover with GF1	375 179
2	Safety cable - L=550 mm	373 940
3	Operating area housing	379 999
4	Exhaust air unit 1 - complete	391 336
	Exhaust air unit 2 - complete	386 278
	Exhaust air unit 3 - complete	391 964
5	Cylinder unit - complete	380 652
6	Connection plate - 16-x, complete, PZ01	382 264
	Connection plate - 32-x, complete, PZ01	382 272
7	Plexiglas plate - type 100	374 202
8	Cable sleeve	375 551
9	Double hose holder - complete	372 790
10	Injector holder - complete (see Injector unit Spare parts list)	
11	Vibration table - complete (see Vibration table Spare parts list)	
12	Blow-off block	373 079
13	Block holder bracket	379 913
14	Rubber nozzle	379 921
15	Blow-off nozzle	379 930
16	Pneumatic unit - 1.0, 1 x dense phase conveyor, VZ01/AL1	373 206
	Pneumatic unit - 1.0, 2 x dense phase conveyor, VZ01/AL1	374 580
	Pneumatic unit - 1.0, 1 x dense phase conveyor, VZ01/AL2	387 754
	Pneumatic unit - 1.0, 2 x dense phase conveyor, VZ01/AL2	387 762
17	Distributor tube 1.0 - complete	379 158
18	OR-Valve battery 18-F - complete	393 908
19	Distributor tube 2.0 - complete (see Distributor tube Spare part list)	
20	Connection plate	386 340
22	Grounding cable - APS 1	366 650
23	Studding - M6x50 mm, brass	301 159
24	Lighting unit - Type 100-2-5 - complete	351 725
25	Perforated plate - 2sp	382 434
	Perforated plate - 4sp	384 216
	Perforated plate - 6sp	384 232

PZ1 Powder center - complete

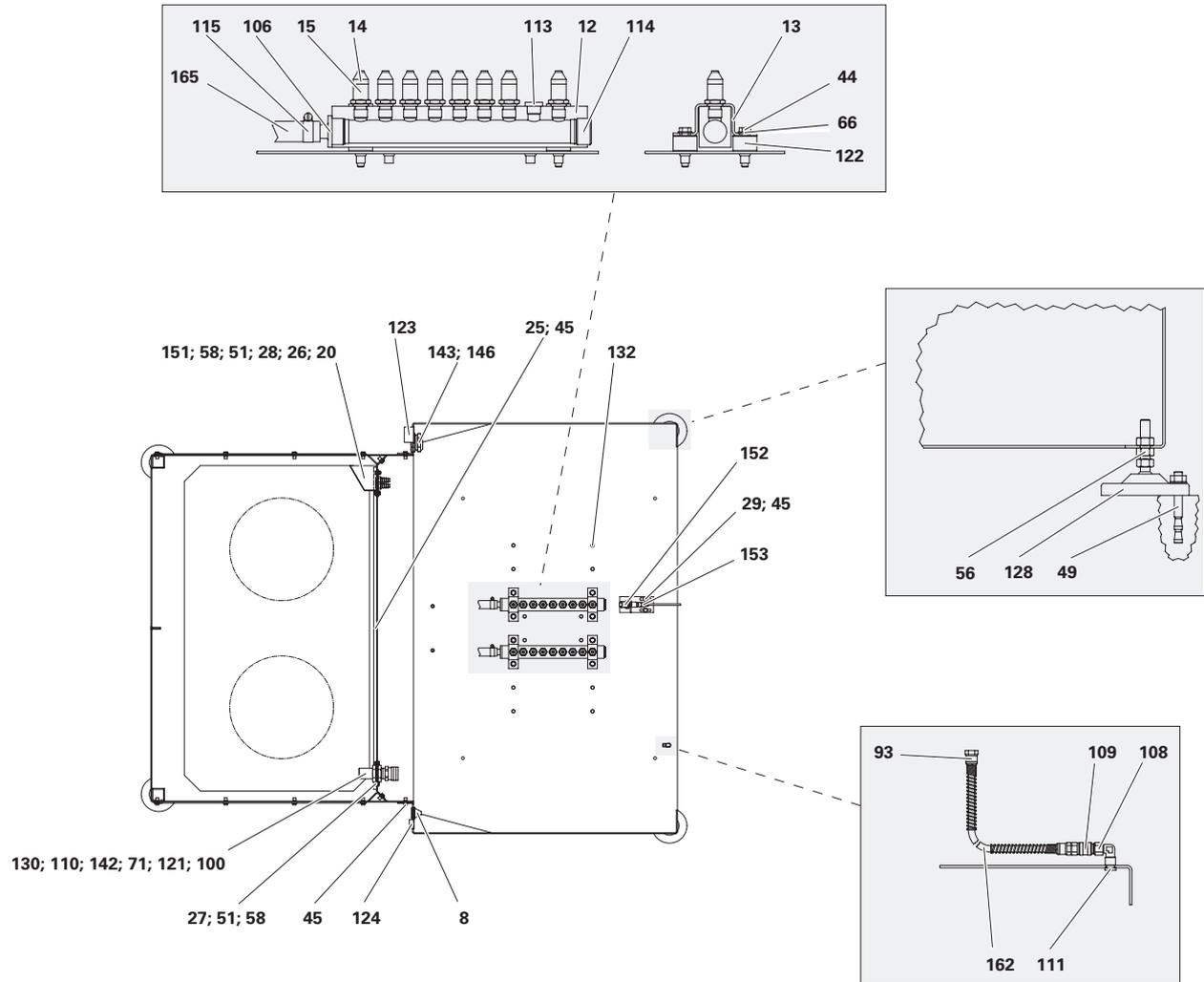


PZ1 Powder center - complete, Part 1

PZ1 Powder center - complete (cont.)

26	Deflector	382 442
27	Cover panel	384 224
28	Connecting nipple	386 359
29	Sensor holder	389 234
30	Distributor tube 2.1 - complete (see Distributor tube Spare part list)	
31	Compressed air gun - complete	389 510
32	Compressed air gun hook	393 320
33	Terminal strip	393 894
41	Hexagon screw - M12x20 mm	248 576
42	Shakeproof screw - M8x25 mm	244 465
43	Shakeproof screw - M8x20 mm	244 422
44	Hexagon screw - M8x10 mm	213 900
45	Shakeproof screw - M6x16 mm	244 503
46	Hexagon screw - M12x20 mm	213 802
49	Steel bolt dowel - M10x90 mm	245 216
50	Hexagon screw - M6x50 mm	213 870
51	Shakeproof screw - M6x12 mm	244 406
52	Hexagon screw - M6x60 mm	213 888
56	Hexagon nut - M12	215 597
57	Hexagon shakeproof nut - M8	244 449
58	Hexagon shakeproof nut - M6	244 430
59	Hexagon nut - M6, brass	200 417
62	Milled nut - M6, brass	200 433
66	Washer - Ø 8.4/17x1.6 mm	215 813
67	Washer - Ø 6.4/12.5x1.6 mm	216 020
68	Washer - Ø 6.4/16x1.6 mm	215 805
69	Washer - Ø 6.4/12.5x1.6 mm, brass	200 476
71	Spacing ring - Ø 36/48x0.3 mm	200 760
72	Lock washer - M6 R	205 117
73	Shake proof washer - Type A, M6 R	200 450
80	Pressure reducing valve - 350a103-1/2", 0-10b	240 133
81	Pressure regulator - Rb.01, 0.5-6 bar	264 342
82	Pressure gauge - 1/8"a, 0-10 bar	259 179
83	Pressure gauge - Ø 50 mm, 1/4"a, 0-6 bar	260 517
84	Plug - Ø 8 mm	238 023

PZ1 Powder center - complete (cont.)



PZ1 Powder center - complete, Part 2

PZ1 Powder center - complete (cont.)

85	Double nipple - 1"a-1/2"a	259 225
86	Elbow joint - 1"i-1"i	259 454
90	Fluidizing pad	237 264
93	Nut with kink protection - M12x1 mm, Ø 8 mm	201 316
94	Adapter - 1"i-1"i	260 274
95	Connection sleeve - 1/4"i, Ø 8 mm	233 390
96	Connection sleeve - 1/4"i, Ø 6 mm	233 404
97	Adapter nipple - 1/8"i-1/4"a	231 932
100	Double nipple - 1"a-1"a	258 733
101	Elbow joint - 1/8"a, Ø 6 mm	203 033
102	Elbow joint - 1/4"a, Ø 8 mm	224 359
105	Y-connection fitting - 1/4"a, Ø 8 mm	260 215
106	Hose connection - Ø 19 mm, 1"a	259 250
108	Connector - NW5, 1/8"i	200 859
109	Quick release connection - NW5, Ø 8 mm	203 181
110	Coupling - female thread G1"	258 539
111	Plug cap - 1/8"a	203 297
112	Plug cap - 1/4"a	203 300
113	Plug cap - 3/8"a	203 319
114	Plug cap - 1"a	258 679
115	Hose clamp - 25-35 mm	226 335
116	Adapter - 1/2"i-1/2"i	202 622
117	Hose connection - Ø 16-1/2"a	259 268
121	Seal - Ø 36/50x2 mm	200 751
122	Rubber damper - Ø 30x20 mm, M8/Ai, 45sh	260 460
123	Blind grommet - TI-2-234	260 541
124	Blind grommet - TI-2-222	260 576
125	Panel lock - Dg 32/Bdb 3	262 110
126	Tongue - Zh 26	262 153
127	Hinge - 180°, black	258 652
128	Leveling pad - Ø 110 mm/M12, L=96 mm	255 610
130	Blind grommet - TI-4-355	207 705
131	Blind grommet - TI-2-214	263 648
132	Blind grommet - TI-4-073	260 754

PZ1 Powder center - complete (cont.)

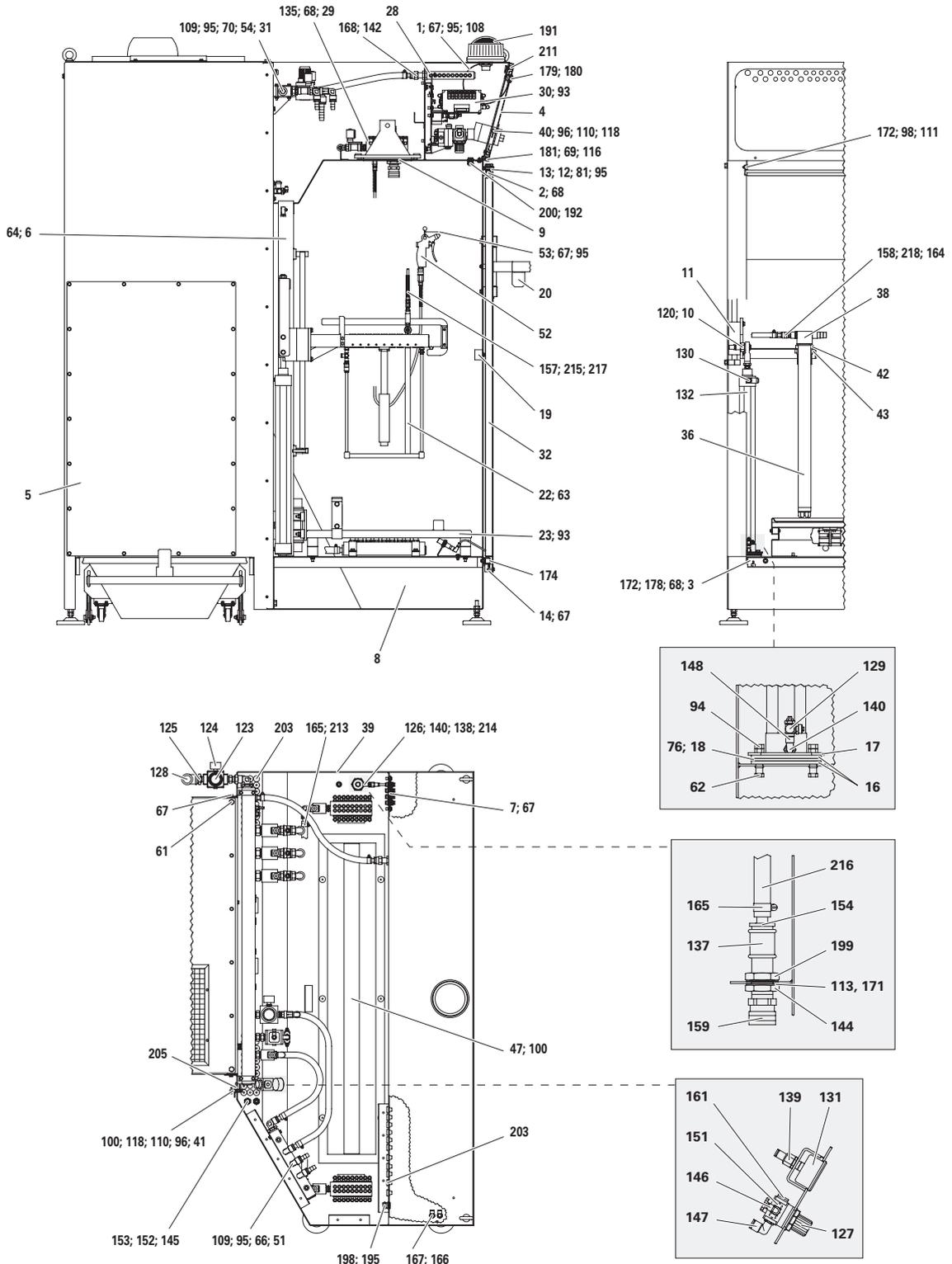
141	Flashlight signal station - type 898	266 680
142	Locknut - G1"	258 717
143	Lead-through - PG36, D30-35, brass	260 550
144	Lead-through - PG13, brass	204 919
145	Lead-through - PG11, brass, long	260 240
146	Locknut - PG36, brass	217 166
147	Locknut - PG13, brass	229 474
148	Locknut - PG11	200 387
150	Cable lead-through - Tet-C, 7-10 mm	258 873
151	Locknut - PG09, brass	204 420
152	Light sensor - Bos 18m-Pa-1pd	265 802
153	Connecting cable - 5 m, 4 pin, M12, elbow connector	260169
161	Edge protection profile - 22x15 mm	104 655
162	Plastic tube - Ø 8/6 mm, black, antistatic	103 756*
163	Plastic tube - Ø 8/6 mm, red, PUR	103 500*
164	Plastic tube - Ø 8/6 mm, black, PA	103 152*
165	Solaflex hose - Ø 19/26 mm	104 213*
166	Solaflex hose - Ø 16/23 mm	102 296*

* Please indicate length

PZ2 Powder center - complete

1	Safety cable - L=550 mm	373 940
2	Rail	375 349
3	Guide profile	375 381
4	Cover, standard - PZ2	375 306
	Cover with OP17 - PZ2	384 739
5	Exhaust air unit 1 - complete	391 336
	Exhaust air unit 2 - complete	386 278
	Exhaust air unit 3 - complete	391 964
6	Cylinder unit - complete	380 652
7	Connection plate - 16-x, complete, PZ01	382 264
	Connection plate - 32-x, complete, PZ01	382 272
8	Operating area housing	382 906
9	Plexiglas plate - type 150	376 175
10	Bearing bolt	374 210
11	Linear slide bar	374 229
12	Roller	375 357
13	Bearing bush	375 373
14	Guide	375 403
15	Cable sleeve	375 551
16	Rubber washer	376 388
17	Clamp plate	376 302
18	Retaining disk	376 310
19	Double hose holder - complete	372 790
20	Swivel frame - complete	373 877
21	Guide support - 2 fold	376 299
22	Injector holder - complete (see Injector unit Spare parts list)	
23	Vibration table - complete (see Vibration table Spare parts list)	
24	Blow-off block	373 079
25	Block holder bracket	379 913
26	Rubber nozzle	379 921
27	Blow-off nozzle	379 930
28	Distributor tube 1.0 - complete (see Distributor tube Spare part list)	
29	OR-Valve battery 18-F - complete	393 908

PZ2 Powder center - complete

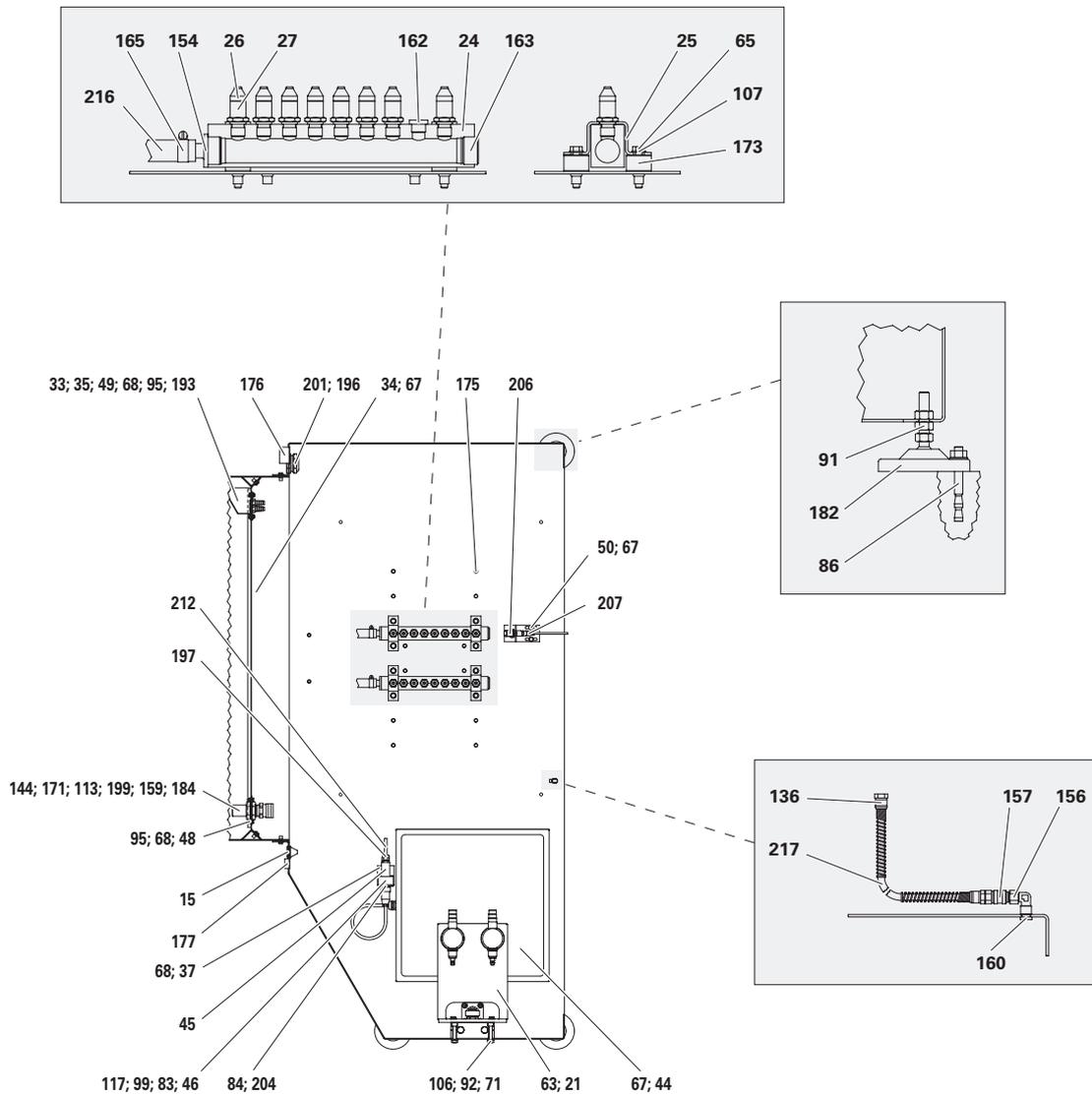


PZ2 Powder center - complete, Part 1

PZ2 Powder center - complete (cont.)

30	Pneumatic unit - 1.0, 1 x dense phase conveyor, VZ02/AL1	378 305
	Pneumatic unit - 1.0, 1 x dense phase conveyor, VZ02/AL2	387 770
31	Distributor tube 2.0 - complete (see Distributor tube Spare part list)	
32	Door	375 390
33	Connection plate	386 340
34	Perforated plate - 2sp	382 434
	Perforated plate - 4sp	384 216
	Perforated plate - 6sp	384 232
35	Deflector	382 442
36	Fluidizing/suction unit - PP2/FPS10	357 960
37	Mounting bracket	355 437
38	Powder pump PP02 - complete	357 910
40	Grounding cable - APS 1	366 650
41	Studding - M6x50 mm, brass	301 159
42	Pump guide	357 855
43	Locknut	357 863
44	Vibration table - complete	372 099
45	Grip cap	205 133
46	Intermediate piece	303 267
47	Lighting unit - Type 150-2-5 - complete	354 945
48	Cover panel	384 224
49	Connecting nipple	386 359
50	Sensor holder	389 234
51	Distributor tube 2.1 - complete (see Distributor tube Spare part list)	
52	Compressed air gun - complete	389 510
53	Compressed air gun hook	393 320
54	Terminal strip	393 894
61	Hexagon screw - M12x20 mm	248 576
62	Hexagon screw - M8x45 mm	213 985
63	Hexagon shakeproof screw - M8x25 mm	244 465
64	Hexagon shakeproof screw - M8x20 mm	244 422
65	Hexagon screw - M8x10 mm	213 900
66	Hexagon screw - M6x50 mm	213 870
67	Hexagon shakeproof screw - M6x16 mm	244 503
68	Hexagon shakeproof screw - M6x12 mm	244 406

PZ2 Powder center - complete (cont.)



PZ2 Powder center - complete, Part 2

PZ2 Powder center - complete (cont.)

69	Hexagon screw - M6x10 mm	213 802
70	Hexagon screw - M6x60 mm	213 888
71	Allen cylinder screw - M10x50 mm	260 975
76	Countersunk-head screw K-SI - M8x20 mm	241 504
81	Cap screw K-SI - M6x35 mm	216 933
83	Cap screw K-SI - M3x35 mm	219 932
84	Cap screw K-SI - M3x12 mm	216 747
86	Steel bolt dowel A - M10x90 mm	245 216
91	Hexagon nut - M12	215 597
92	Hexagon nut - M10	215 589
93	Hexagon shakeproof nut - M8	244 449
94	Hexagon nut - M8	215 570
95	Hexagon shakeproof nut - M6	244 430
96	Hexagon nut - M6, brass	200 417
98	Hexagon nut - M4	205 192
99	Hexagon nut - M3	202 142
100	Milled nut - M6, brass	200 433
106	Washer - Ø 10.5/21x2 mm	215 821
107	Washer - Ø 8.4/17x1.6 mm	215 813
108	Washer - Ø 6.4/16x1.6 mm	215 805
109	Washer - Ø 6.4/12.5x1.6 mm	216 020
110	Washer - Ø 6.4/12.5x1.6 mm, brass	200 476
111	Washer - Ø 4.3/9x0.8 mm	215 791
113	Spacing ring - Ø 36/48x0.3 mm	200 760
116	Lock washer - M6 R	205 117
117	Lockwasher - M3 R	201 880
118	Shake proof washer - Type A, M6	200 450
120	Snap ring - A-16	260 258
123	Pressure reducing valve - 350a103-1/2", 0-10b	240 133
124	Pressure gauge - 1/8"a, 0-10 bar	259 179
125	Double nipple - 1"a-1/2"a	259 225
126	Fluidizing pad	237 264
127	Pressure regulator - Rb.01, 0.5-6 bar	264 342
128	Elbow joint - 1"i-1"i	259 454
129	Throttle check valve - DRV-SS	235 059

PZ2 Powder center - complete (cont.)

130	Throttle check valve - PWR-A1489	258 750
131	Pressure gauge - Ø 50 mm, 1/4"a, 0-6 bar	260 517
132	Cylinder - Ø 50 mm, stroke=600 mm, ISO 6431	258 784
135	Plug - Ø 8 mm	238 023
136	Nut with kink protection - M12x1 mm, Ø 8 mm	201 316
137	Adapter - 1"-1"i	260 274
138	Connection sleeve - 1/4"i, Ø 8 mm	233 390
139	Connection sleeve - 1/4"i, Ø 6 mm	233 404
140	Adapter nipple - 1/8"i-1/4"a	231 932
142	Adapter - 1/2"i-1/2"i	202 622
144	Double nipple - 1"a-1"a	258 733
145	Connection fitting - 3/8"a-3/8"a	202 975
146	Elbow joint - 1/8"a, Ø 6 mm	203 033
147	Elbow joint - 1/4"a, Ø 8 mm	224 359
148	Elbow joint - 1/8"a-1/8"i	237 604
151	Y-connection fitting - 1/4"a, Ø 8 mm	260 215
152	Cap nut - 3/8"i	203 157
153	Hose nipple - i/d Ø 8 mm	203 165
154	Hose connection - Ø 19 mm, 1"a	259 250
156	Connector - NW5, 1/8"i	200 859
157	Quick release connection - NW5, Ø 8 mm	203 181
158	Quick release connection - NW7,4 - Ø 10 mm	239 267
159	Coupling - female thread G1"	258 539
160	Plug cap - 1/8"a	203 297
161	Plug cap - 1/4"a	203 300
162	Plug cap - 3/8"a	203 319
163	Plug cap - 1"a	258 679
164	Hose clamp - 15/18 mm	203 386
165	Hose clamp - 25/35 mm	226 335
166	Lead-through connection - Ø 8/8 mm	253 880
167	Adjusting elbow - Ø 8/8 mm	238 287
168	Hose connection - Ø 16 mm, 1/2"a	259 268
171	Seal - Ø 36/50x2 mm	200 751
172	Rubber buffer - Ø 15x8 mm, M4, A 55sh	234 915
173	Rubber damper - Ø 30x20 mm, M8/Ai, 45sh	260 460

PZ2 Powder center - complete (cont.)

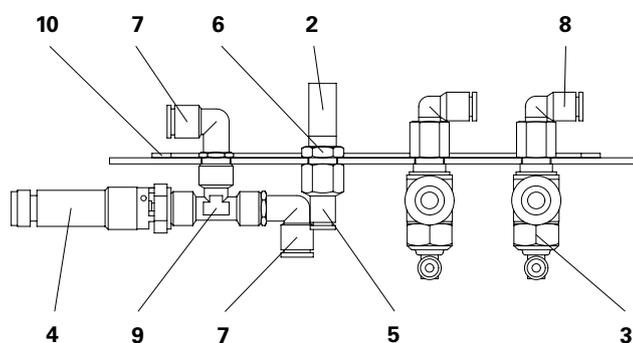
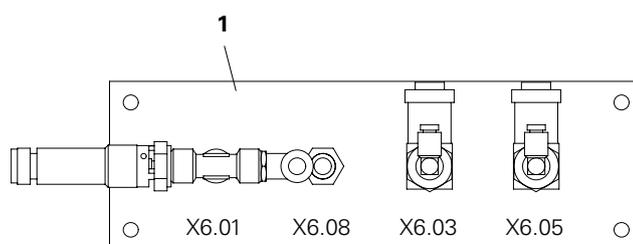
174	Blind grommet - TI-2-213	206 784
175	Blind grommet - TI-4-073	260 754
176	Blind grommet - TI-2-234	260 541
177	Blind grommet - TI-2-222	260 576
178	Terminal slider - 25x25x1-2 mm	260 851
179	Panel lock - Dg 32/Bdb 3	262 110
180	Tongue - Zh 26	262 153
181	Hinge - 180°, black	258 652
182	Leveling pad - Ø 110 mm/M12, L=96 mm	255 610
184	Blind grommet - TI-4-355	207 705
191	Flashlight signal station - type 898	266 680
192	Locknut - PG11	200 387
193	Locknut - PG9, brass	204 420
195	Lead-through - PG13, brass	204 919
196	Locknut - PG36, brass	217 166
197	Lead-through - PG9, plastic	222 330
198	Locknut - PG13, brass	229 474
199	Locknut - G1"	258 717
200	Lead-through - PG11, brass, long	260 240
201	Lead-through - PG36, D30-35, brass	260 550
203	Cable lead-through - Tet-C, 7-10 mm	258 873
204	Flanged plug - 4 pin	206 490
205	Cable bush - i/d Ø 30 mm	260 614
206	Light sensor - Bos 18m-Pa-1pd	265 802
207	Connecting cable - 5 m, 4 pin, M12, elbow connector	260 169
211	Edge protection profile - 22x15 mm	104 655
212	Cable - 4x1mm ²	100 579*
213	Solaflex hose - Ø 16/23 mm	102 296*
214	Plastic tube - Ø 8/6 mm, black, PA	103 152*
215	Plastic tube - Ø 8/6 mm, red, PUR	103 500*
216	Solaflex hose - Ø 19/26 mm	104 213*
217	Plastic tube - Ø 8/6 mm, black, antistatic	103 756*
218	Solaflex hose - Ø 10/16 mm	100 498*

* Please indicate length

Connection plate - complete

Connection plate - large - complete	380 407
1 Connection plate - large	380 385
2 Silencer - 1/8"	235 083
3 Stop valve	259 004
4 Safety valve - 1/4", 6 bar	258 776
5 Connection sleeve - 1/4", Ø 6 mm	233 404
6 Adapter nipple - 1/8"-1/4"	231 932
7 Elbow joint - 1/4", Ø 8 mm	224 359
8 Elbow joint - 1/4", Ø 8 mm	254 002
9 T-piece - 1/4"-1/4"-1/4"	261 173
10 Adhesive sealing strip	100 250*

* Please indicate length



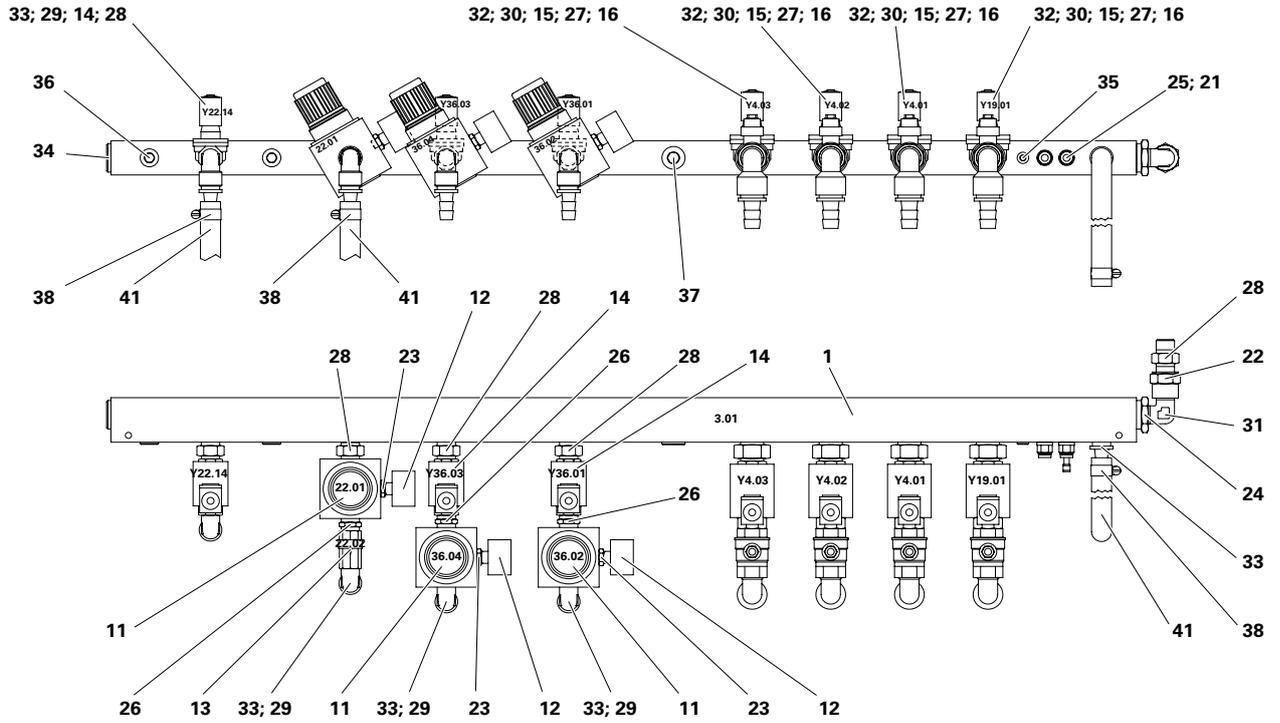
Connection plate - complete

PZ1 Distributor tube 2

1	Distributor tube - 2.0	393 878
11	Pressure regulator - R33, 0-10 bar	259 187
12	Pressure gauge - 1/8"a, 0-10 bar	259 179
13	Check valve - 1/2"i-1/2"i	259 160
14	Solenoid valve - 1/2", NW11,5 / 24VDC	259 195
15	Solenoid valve - 3/4", NW18 / 24VDC	259 209
16	Ball valve "Safe" - 3/4"a-3/4"i	259 764
21	Plug - Ø 8 mm	238 023
22	Adapter - 1/2"i-1/2"i	202 622
23	Adapter nipple - 1/8"i-1/4"a	231 932
24	Adapter nipple - 1/2"i-1"a	252 875
25	Screw-in nipple - 1/4"a, Ø 8 mm	245 933
26	Double nipple - 1/2"a-1/2"a	243 540
27	Double nipple - 3/4"a-3/4"a, divisible	243 574
28	Double nipple - 1/2"a-1/2"a, divisible	243 582
29	Elbow joint - 1/2"a-1/2"i	223 166
30	Elbow joint - 3/4"a-3/4"i	259 233
31	Elbow joint - 1/2"a-1/2"a	266 906
32	Hose connection - Ø 19 mm, 3/4"a	226 343
33	Hose connection - Ø 16 mm, 1/2"a	259 268
34	Plug cap - 1"a	258 679
35	Plug cap - 1/4"a	258 695
36	Plug cap - 1/2"a	259 306
37	Plug cap - 3/4"a	259 314
38	Hose clamp - 25-35 mm	226 335
41	Solaflex hose - Ø 16/23 mm	102 296*

* Please indicate length

PZ1 Distributor tube 2



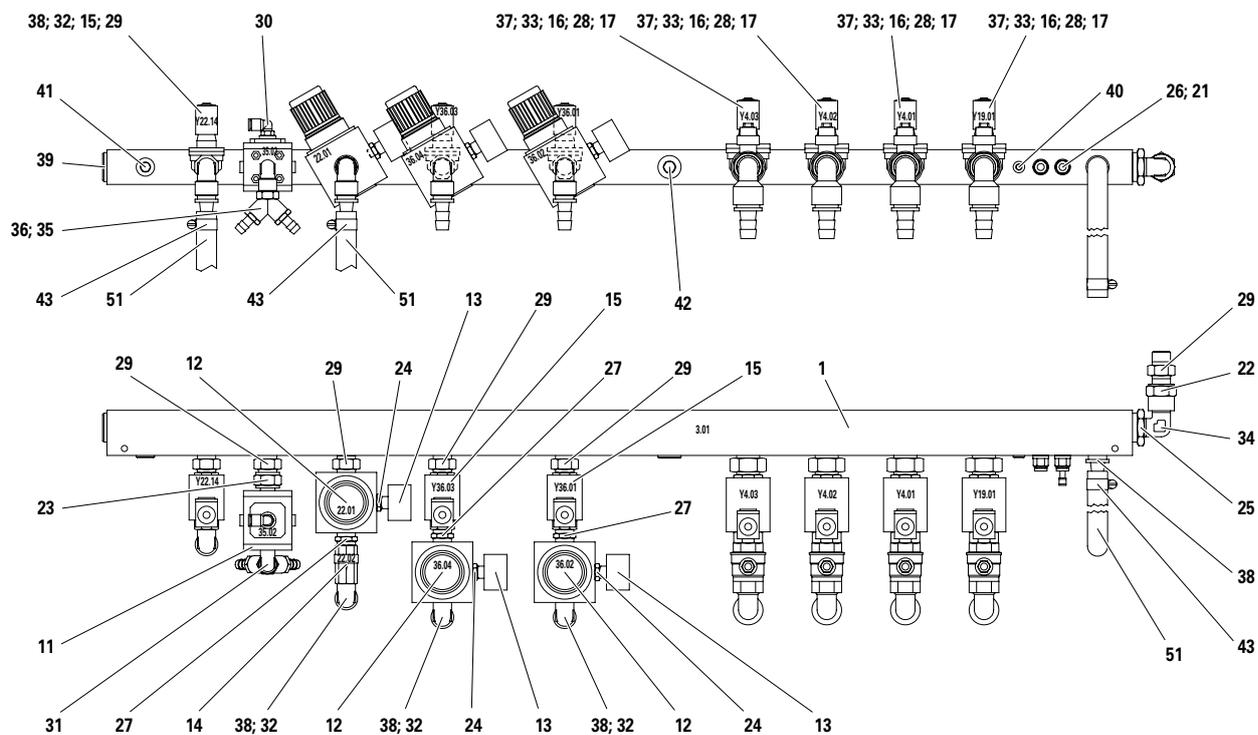
PZ1 Distributor tube 2

PZ2 Distributor tube 2

1	Distributor tube - 2.0	393 878
11	Pressure regulator - 334a021, 3/8", remote control	244 384
12	Pressure regulator - R33, 0-10 bar	259 187
13	Pressure gauge - 1/8"a, 0-10 bar	259 179
14	Check valve - 1/2"i-1/2"i	259 160
15	Solenoid valve - 1/2", NW11,5 / 24VDC	259 195
16	Solenoid valve - 3/4", NW18 / 24VDC	259 209
17	Ball valve "Safe" - 3/4"a-3/4"i	259 764
21	Plug - Ø 8 mm	238 023
22	Adapter - 1/2"i-1/2"i	202 622
23	Connection sleeve - 1/2"i-3/8"a	202 380
24	Adapter nipple - 1/8"i-1/4"a	231 932
25	Adapter nipple - 1/2"i-1"a	252 875
26	Screw-in nipple - 1/4"a, Ø 8 mm	245 933
27	Double nipple - 1/2"a-1/2"a	243 540
28	Double nipple - 3/4"a-3/4"a, divisible	243 574
29	Double nipple - 1/2"a-1/2"a, divisible	243 582
30	Elbow joint - 1/8"a, Ø 8 mm	203 050
31	Elbow joint - 3/8"a-3/8"i	223 158
32	Elbow joint - 1/2"a-1/2"i	223 166
33	Elbow joint - 3/4"a-3/4"i	259 233
34	Elbow joint - 1/2"a-1/2"a	266 906
35	Y-piece - 3/8"a-3/8"i-3/8"i	254 304
36	Hose connector - Ø 12 mm, 3/8"a	220 000
37	Hose connection - Ø 19 mm, 3/4"a	226 343
38	Hose connection - Ø 16 mm, 1/2"a	259 268
39	Plug - 1"a	258 679
40	Plug - 1/4"a	258 695
41	Plug - 1/2"a	259 306
42	Plug - 3/4"a	259 314
43	Hose clamp - 25-35 mm	226 335
51	Solaflex hose - Ø 16/23 mm	102 296*

* Please indicate length

PZ2 Distributor tube 2



PZ2 Distributor tube 2

"Solaflex" hoses

Hose no.	Length* (mm)	Ø (mm)	Order no.
1	1520	23/16	102296*
2	460	23/16	102296*

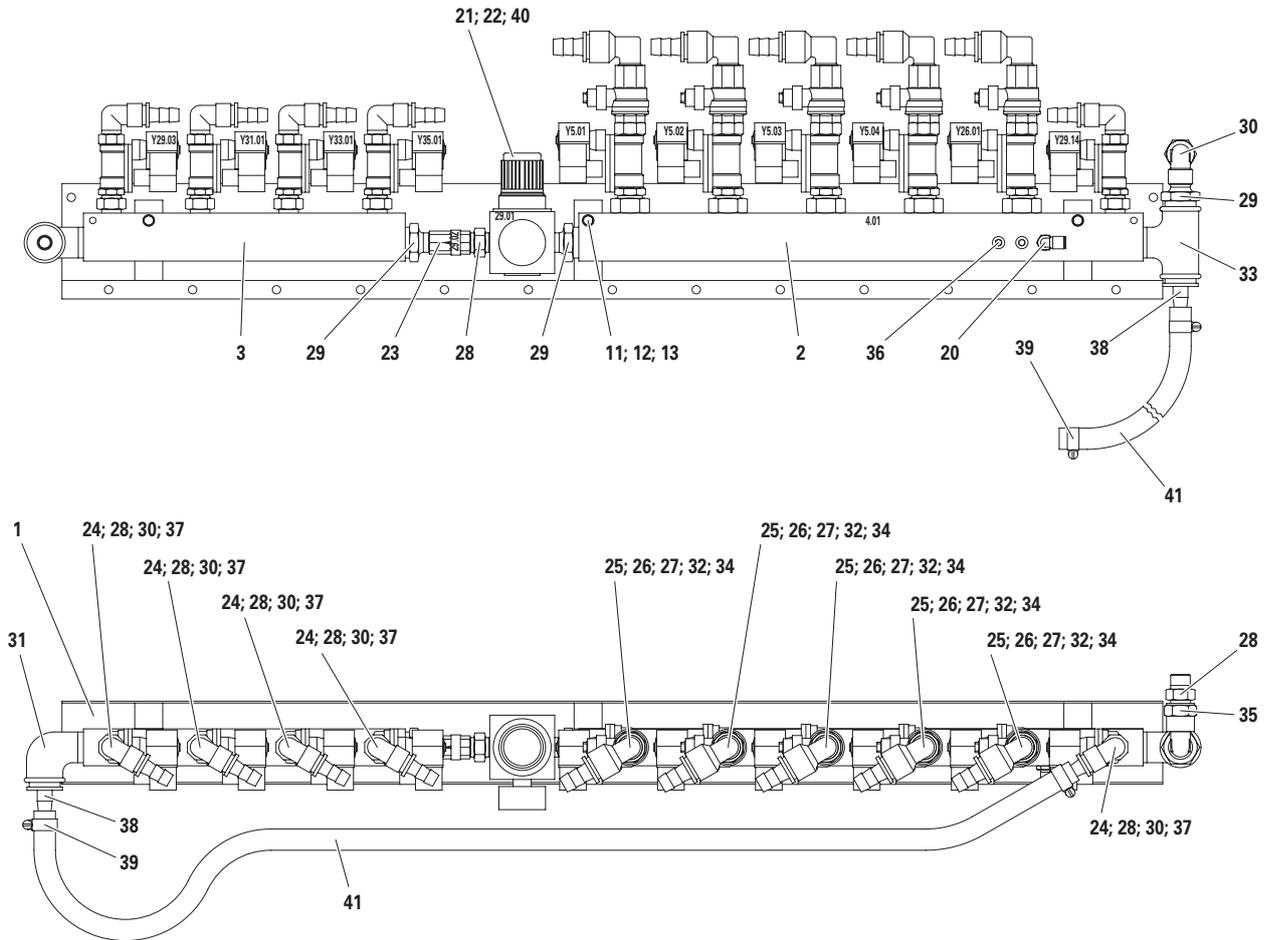
* Please indicate length

PZ3 Distributor tube 2

1	Carrier plate	383 171
2	Distributor tube - 2.0	377 279
3	Distributor tube - 2.1	377 287
11	Hexagon screw - M6x50 mm	213 870
12	Hexagon shakeproof nut - M6	244 430
13	Washer - Ø 6.4/12.5x1.6 mm	216 020
20	Elbow joint - 1/4"a, Ø 8 mm	254 029
21	Pressure regulator - R33, 0-10 bar	259 187
22	Pressure gauge - 1/8"a, 0-10 bar	259 179
23	Check valve - 1/2"i-1/2"i	259 160
24	Solenoid valve - 1/2", NW11,5 mm / 24VDC	259 195
25	Solenoid valve - 3/4", NW18 mm / 24VDC	259 209
26	Double nipple - 3/4"a-3/4"a, divisible	243 574
27	Ball valve "Safe" - 3/4"a-3/4"i	259 764
28	Double nipple - 1/2"a-1/2"a, divisible	243 582
29	Double nipple - 1"a-1/2"a	259 225
30	Elbow joint - 1/2"a-1/2"i	223 166
31	Elbow joint - 1"a-1"i	258 725
32	Elbow joint - 3/4"a-3/4"i	259 233
33	T-piece - 1"a-1"i-1"i	261 114
34	Hose connection - Ø 19 mm, 3/4"a	226 343
35	Adapter - 1/2"i-1/2"i	202 622
36	Plug cap - 1/4"a	258 695
37	Hose connection - Ø 16 mm, 1/2"a	259 268
38	Hose connection - Ø 16 mm, 1"a	259 276
39	Hose clamp - 25-35 mm	226 335
40	Adapter nipple - 1/8"i-1/4"a	231 932
41	Solaflex hose - Ø 16/3.5 mm	102 296*

* Please indicate length

PZ3 Distributor tube 2

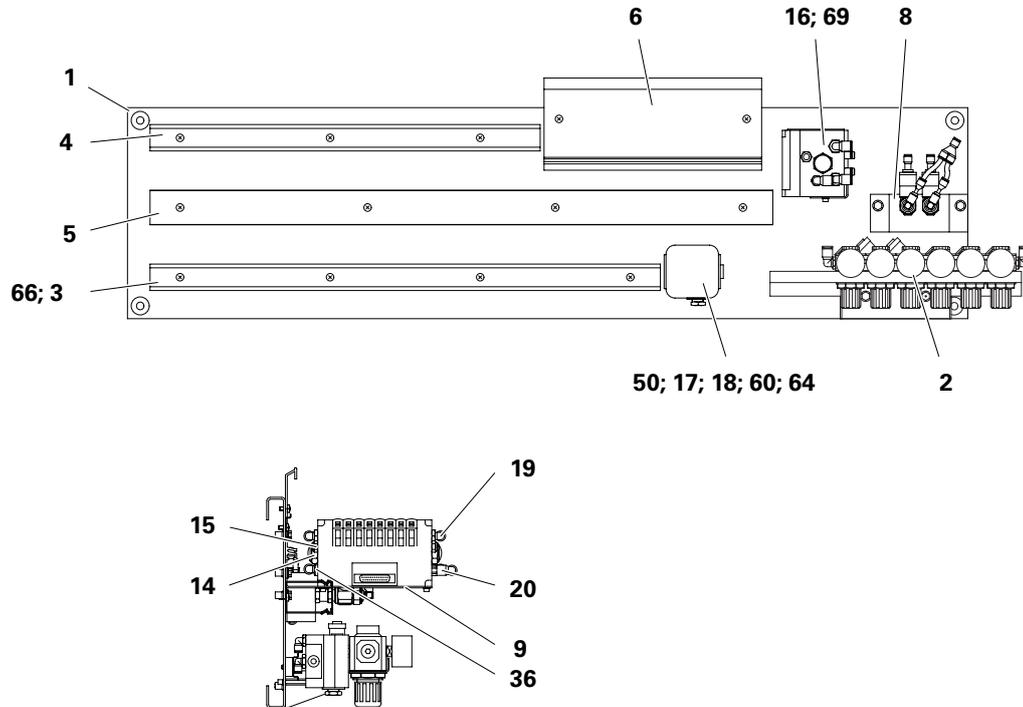


PZ3 Distributor tube 2

PZ1 Pneumatic unit

1	Assembly plate	373 214
2	Assembly frame, for VZ01/AL1 with 1 dense phase conveyor	387 665
	Assembly frame, for VZ01/AL1 with 2 dense phase conveyors	387 673
3	Carrier profile - 35-680 mm	378 666
4	Carrier profile - 35-520 mm	373 281
5	Cable channel - 40/60-830 mm	373 257
6	Fitting rail - PZ 01	374 539
8	Valve holder 2-F/VZ01 (for 2 dense phase conveyors) - complete	378 810
9	Valve block holder bracket	377 384
14	Silencer - 1/2"a	261 599
15	Silencer - 1/8"a	251 305
16	Valve block - 6CTC	261 602
17	Elbow joint - 1/4"a, Ø 6 mm	203 041
18	Elbow joint - 1/8"a, Ø 6 mm	254 061
19	Elbow joint - 1/4"a, Ø 8 mm	254 029
20	Elbow joint - 1/8"a, Ø 8 mm, high	259 101
36	Plug cap - 1/8"a	203 297
50	Differential pressure monitor - type 930.86	259 110
60	Spacer - M4	256 501
61	Hexagon shakeproof screw - M6x16 mm	244 503
62	Cap screw - M5x10 mm	241 849
64	Cap screw - M4x16 mm	216 801
65	Washer - Ø 4.3/9x0.8 mm	215 791
66	Screws (4x)	238 325
67	Cap screw - M5x16 mm	216 852
68	Allen cylinder screw - M4x10 mm	216 267
69	Spacer screw - M3	261 688

PZ1 Pneumatic unit

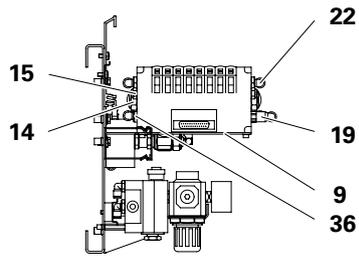
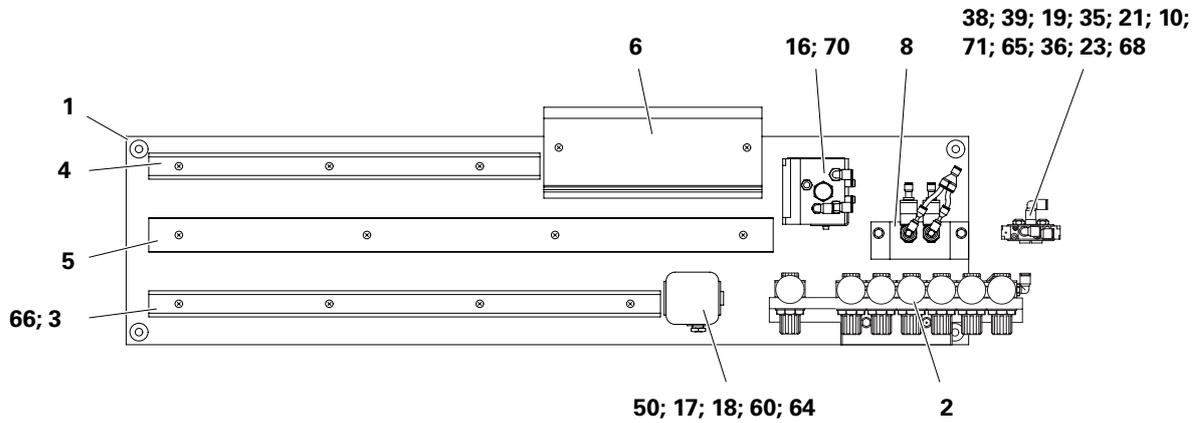


PZ1 Pneumatic unit

PZ2 Pneumatic unit

1	Assembly plate	373 214
2	Assembly frame, for VZ02/AL1 with 1 dense phase conveyor	387 681
3	Carrier profile - 35-680 mm	378 666
4	Carrier profile - 35-520 mm	373 281
5	Cable channel - 40/60-830 mm	373 257
6	Fitting rail - PZ 01	374 539
8	Valve holder 2-F/VZ01 (for 2 dense phase conveyors) - complete	378 810
9	Valve block holder bracket	377 384
10	Fluidizing pad	404 780
14	Silencer - 1/2"a	261 599
15	Silencer - 1/8"a	251 305
16	Valve block - 7CTPC	263 010
17	Elbow joint - 1/4"a, Ø 6 mm	203 041
18	Elbow joint - 1/8"a, Ø 6 mm	254 061
19	Elbow joint - 1/8"a, Ø 8 mm, high	259 101
21	Silencer - 1/8"a	251 305
22	Elbow joint - 1/4"a, Ø 8 mm	254 029
23	Screw-in nipple - M5a, Ø 4 mm	257 095
35	Elbow joint - 1/8"a, Ø 8 mm	203 050
36	Plug cap - 1/8"a	203 297
38	Pneumatical valve - VI-5/2-1/8"-P, NW4	257 125
39	Connection plate - 1/8"	257 141
50	Differential pressure monitor - type 930.86	259 110
60	Spacer - M4	256 501
61	Hexagon shakeproof screw - M6x16 mm	244 503
62	Cap screw - M5x10 mm	241 849
64	Cap screw - M4x16 mm	216 801
65	Washer - Ø 4.3/9x0.8 mm	215 791
66	Spacer (4x)	238 325
67	Cap screw - M5x16 mm	216 852
68	Allen grub screw - M5x5 mm	258 908
70	Spacer screw - M3	261 688
71	Cap screw - M4x16 mm	216 801
72	Allen cylinder screw - M4x10 mm	216 267

PZ2 Pneumatic unit



PZ2 Pneumatic unit

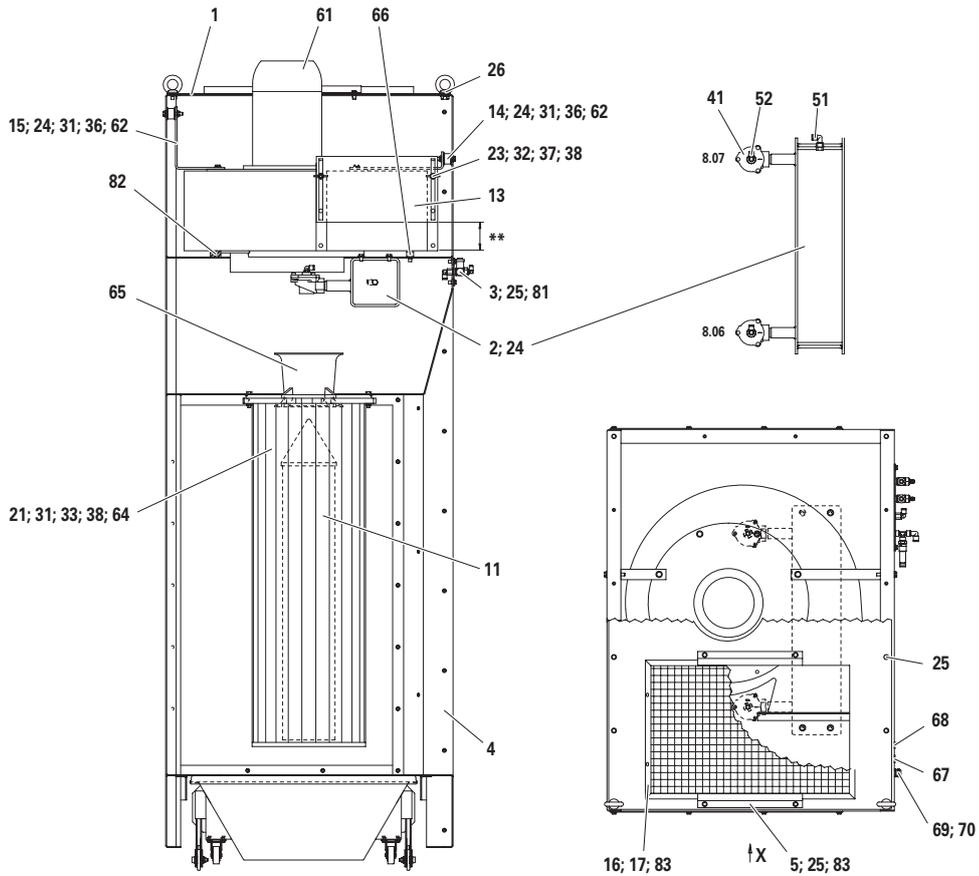
Exhaust air unit

1	Cover plate	373 133
2	Pressure tank	380 377
3	Connection plate - large - complete	380 407
4	Exhaust air housing	391 298
5	Stop bracket	375 209
7	Service cover - AL01	391 832
11	Displacement tube - L=920 mm	390 259
12	Waste powder container - complete	395 773
13	Regulating valve	373 419
14	Support bracket rear	374 377
15	Support bracket front	374 385
16	Quick-change frame - 400x600 mm	320 633
17	Filter pad - 405x605x23 mm	320 650
21	Hexagon screw - M8x40 mm	213 977
23	Hexagon screw - M8x16 mm	213 926
24	Hexagon shakeproof screw - M8x12 mm	248 550
25	Hexagon shakeproof screw - M6x16 mm	244 503
26	Eyebolt - M12	260 568
31	Hexagon shakeproof nut - M8	244 449
32	Wing nut - M8	215 678
33	Square nut - M8/20x20x4 mm	242 659
36	Washer - Ø 9/35x2,5 mm	241 490
37	Washer - Ø 8.4/17x1.6 mm	215 813
38	Lockwasher - M8 R	215 953
41	Membrane valve - DN20, 3/4"i-1/8"i	259 985
51	Elbow joint - 1/4"a, Ø 8 mm	224 359
52	Elbow joint - 1/8"a, Ø 8 mm	203 050
61	Fan - 2.4-3 kW	259 756
62	Rubber damper - Ø 30x20 mm, M8/Ai, 45sh	260 460
64	Filter cartridge - JP32, Ø 325x1000 mm	258 830
65	Venturi - for JP32, Ø 325 mm	258 857
66	Rubber buffer - Ø 20x15 mm, M6, A 55sh	211 770
67	Blind grommet - TI-2-214	263 648
68	Blind grommet - TI-2-212	252 204
69	Lead-through - PG11, brass, long	260 240

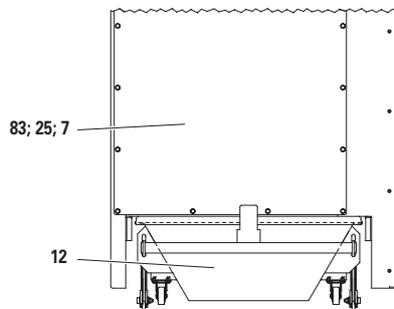
Exhaust air unit

70 Locknut - PG11	200 387
81 Plastic tube - Ø 8/6 mm, black, PA	103 152*
82 Adhesive profile PUR - 30x20x2000 mm	257 770
83 Adhesive seal strip - 9x2 mm	100 250*

* Please indicate length



View X



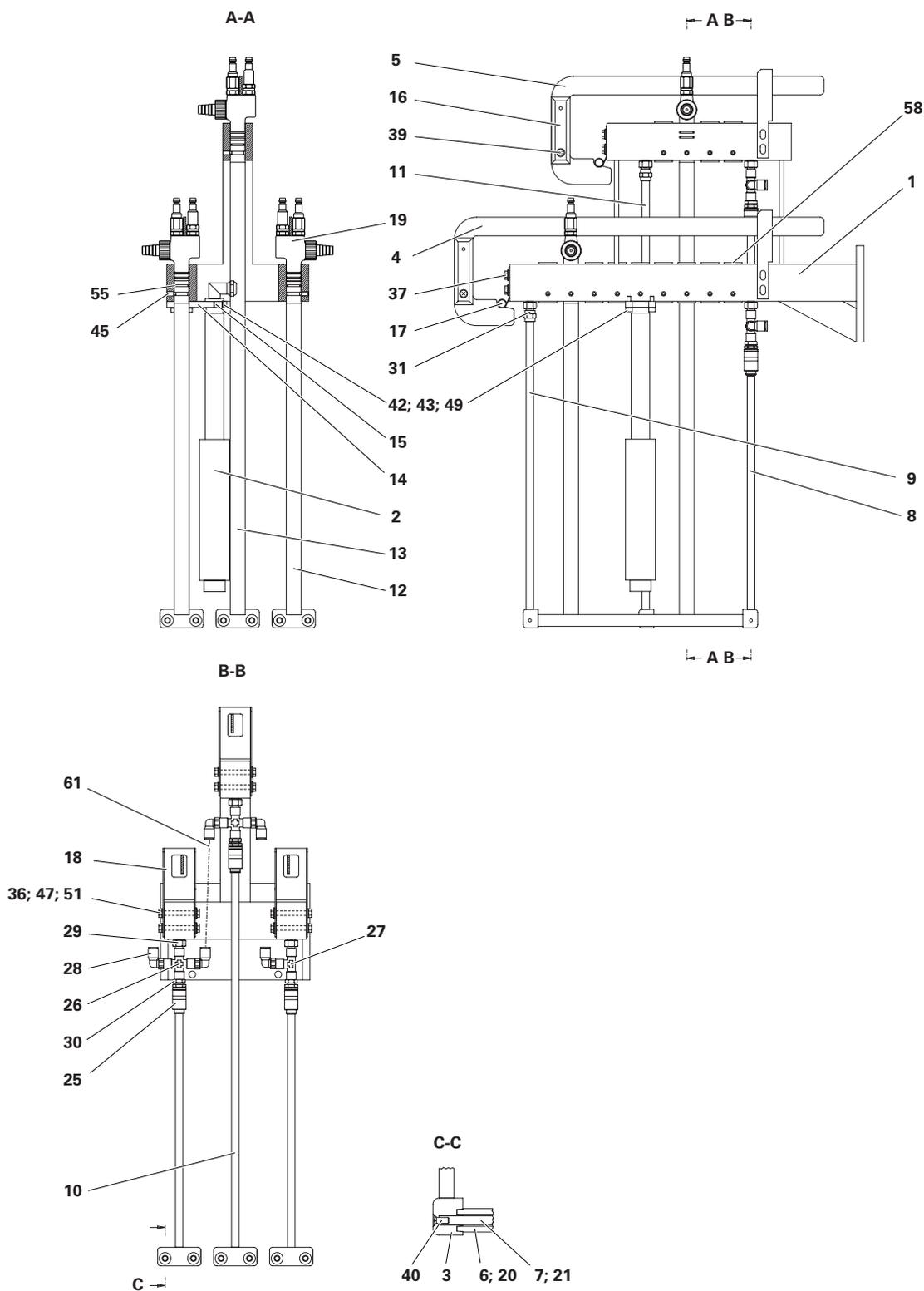
Exhaust air unit

** 80 mm (when connected to 3x...V/50 Hz)
 70 mm ((when connected to 3x...V/60 Hz)

Injector unit

1	Injector holder - 9P, right	392 502
	Injector holder - 9P, left	392 510
	Injector holder - 18P	392 529
	Injector holder - 22P	392 537
	Injector holder - 27P, right	392 545
	Injector holder - 27P, left	392 553
2	Level sensor - complete (see also Level sensor Spare parts list)	373 192
3	Fluidizer-T-piece	373 150
4	Bracket (stop rod) - 9P	392 588
5	Bracket (stop rod) - 4P	392 570
6	Fluidizing tube - L=282 mm	373 109
7	Tie rod - L=306 mm	373 052
8	Support tube - G1/8" x 329 mm	387 320
9	Support tube - G1/8" x 402 mm	387 290
10	Support tube - G1/8" x 519 mm	387 347
11	Support tube - G1/8" x 592 mm	387 339
12	Suction tube - L=450 mm	379 956
13	Suction tube - L=640 mm	386 057
14	Sensor holder	383 287
15	Clamp	373 095
16	Handle	392 618
17	Clamp band	392 600
18	Fixing profile	392 596
19	Injector IG02-V (complete)	391 530
20	Fluidizing tube - L=127 mm	385 719
21	Tie rod - L=151 mm	385 697
25	Throttle check valve - DRV-55, 1/8"	259 330
26	Cross element - 1/8"i	259 560
27	T-connection - 1/8"i-1/8"i-1/8"i	253 928
28	Elbow joint - 1/8"a, Ø 8 mm	203 050
29	Double nipple - 1/8"a-1/8"a divisible	253 847
30	Double nipple - 1/8"az-1/8"az	259 578
31	Adapter - 1/8"i-1/8"i	259 551
36	Hexagon screw - M6x50 mm	213 870
37	Hexagon shakeproof screw - M6x12 mm	244 406
39	Countersunk head screw - M5x20 mm	237 779

Injector unit



Injector unit

Injector unit (cont.)

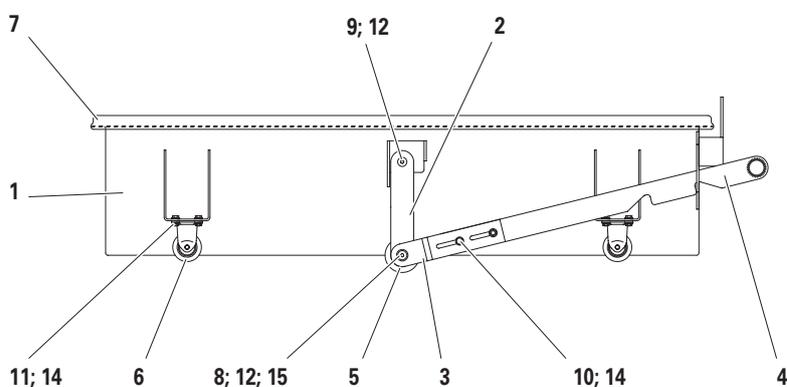
40	Countersunk head screw - M4x10 mm	214 655
42	Allen cylinder screw - M5x20 mm	222 950
43	Allen cylinder screw - M5x16 mm	216 356
45	Allen grub screw - M6x12 mm	259 748
47	Washer - Ø 6.4/12.5x1.6 mm	216 020
49	Lock washer - M5 R	205 168
51	Hexagon shakeproof nut - M6	244 430
55	O-Ring - Ø 16x2 mm, nitrile	231 517
58	Blind grommet - TI-2-215	259 586
61	Plastic tube - Ø 8/6 mm, black, antistatic	103 756*

* Please indicate length

Waste powder container

1	Waste powder container AL01	395 730
2	Roller holder	395 757
3	Connecting plate	395 765
4	Handle	395 749
5	Roller	395 722
6	Roller - 50 mm	258 571
7	Edge protection profile - 19x19 mm	102 261*
8	Precision shoulder screw - Ø 10x25 mm, M8	268 232
9	Precision shoulder screw - Ø 10x16 mm, M8	242 896
10	Hexagon shakeproof screw - M6x20 mm	244 414
11	Hexagon shakeproof screw - M6x12 mm	244 406
12	Hexagon shakeproof nut - M8	244 449
14	Hexagon shakeproof nut - M6	244 430
15	Washer - Ø 10.5/21x2 mm	215 821

* Please indicate length

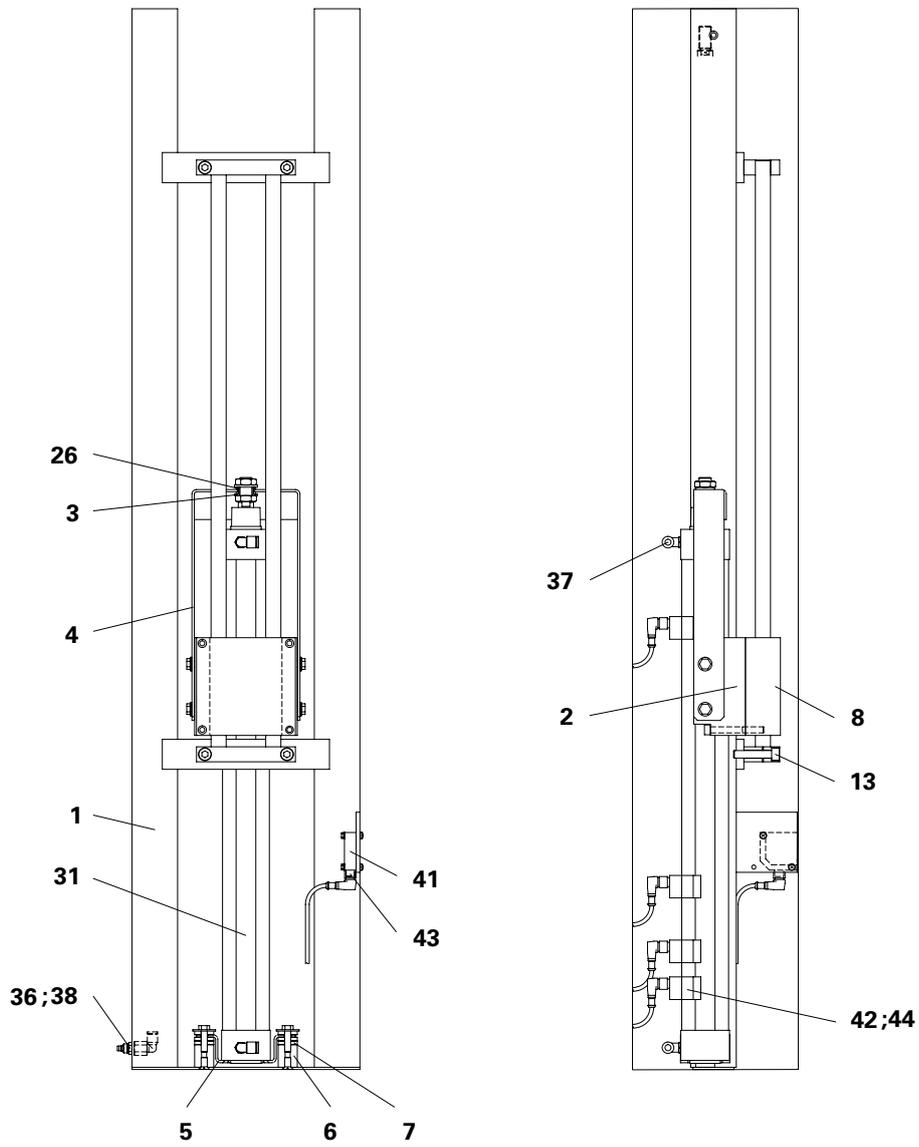


Waste powder container

Cylinder unit - complete

Cylinder unit - complete	380 652
1 Cylinder holder	380 644
2 Carrier plate	380 750
3 Clamping bush	380 768
4 Intermediate plate	380 660
5 Cylinder holder	380 679
6 Spacer	380 687
7 Rubber washer	380 695
8 Linear slide bar	380 776
26 O-Ring - Ø 20x3 mm	224 359
31 Cylinder	258 784
36 Screw-in nipple - 1/4", Ø 8 mm	225 479
37 Elbow joint - 1/4", Ø 8 mm	224 359
38 Elbow joint - 1/4", Ø 8 mm	254 002
41 Reflected light switch	260 150
42 Cylinder switch	259 438
43 Connection cable with angled plug	260 169
44 Connection cable with angled plug	259 420

Cylinder unit - complete



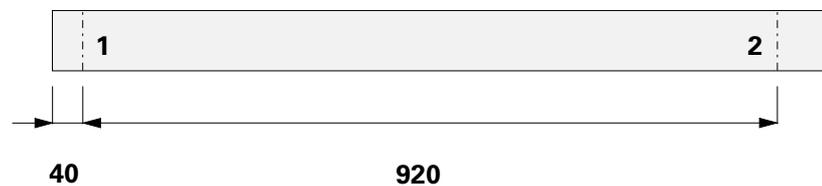
Cylinder unit - complete

Vibration table - complete

1	Vibrating table	375 411
2	Clamping plate	375 420
3	Rubber band	375 438*
21	Vibrator	258 628
22	Terminal slider	209 082
23	Rubber bearing - Ø 40x40 mm, M8	223 000
24	Lead-through - PG13	204 919
31	Vibrator cable	103 764*

* Please indicate length

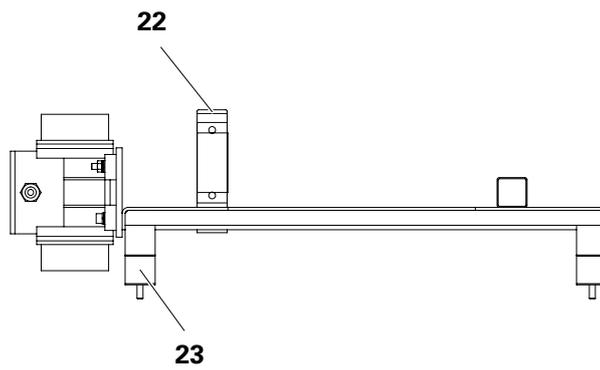
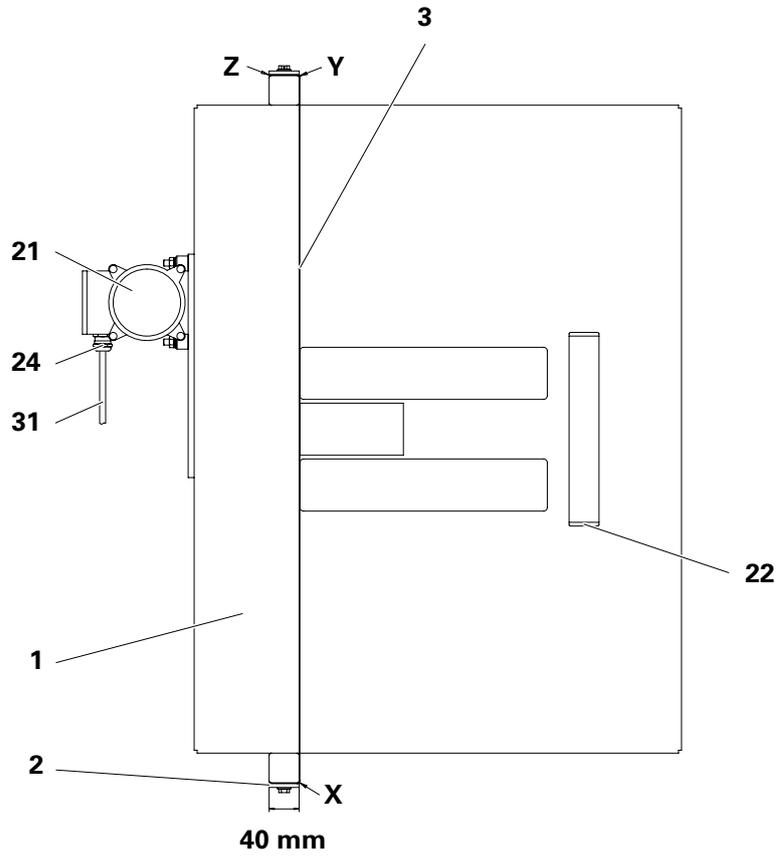
Tensioning the rubber band



Procedure:

1. Measure and mark 40 mm and 920 mm on the untensioned band
2. Fix the rubber band tight with the clamp plate (Pos. 2), so that the first marking (40 mm) is at the position **X**
3. Stretch the rubber band to the second marking (920 mm), so that it is level with position **Y**, then clamp it tight with the second clamp plate
4. Cut off any surplus rubber at the position **Z**

Vibration table - complete



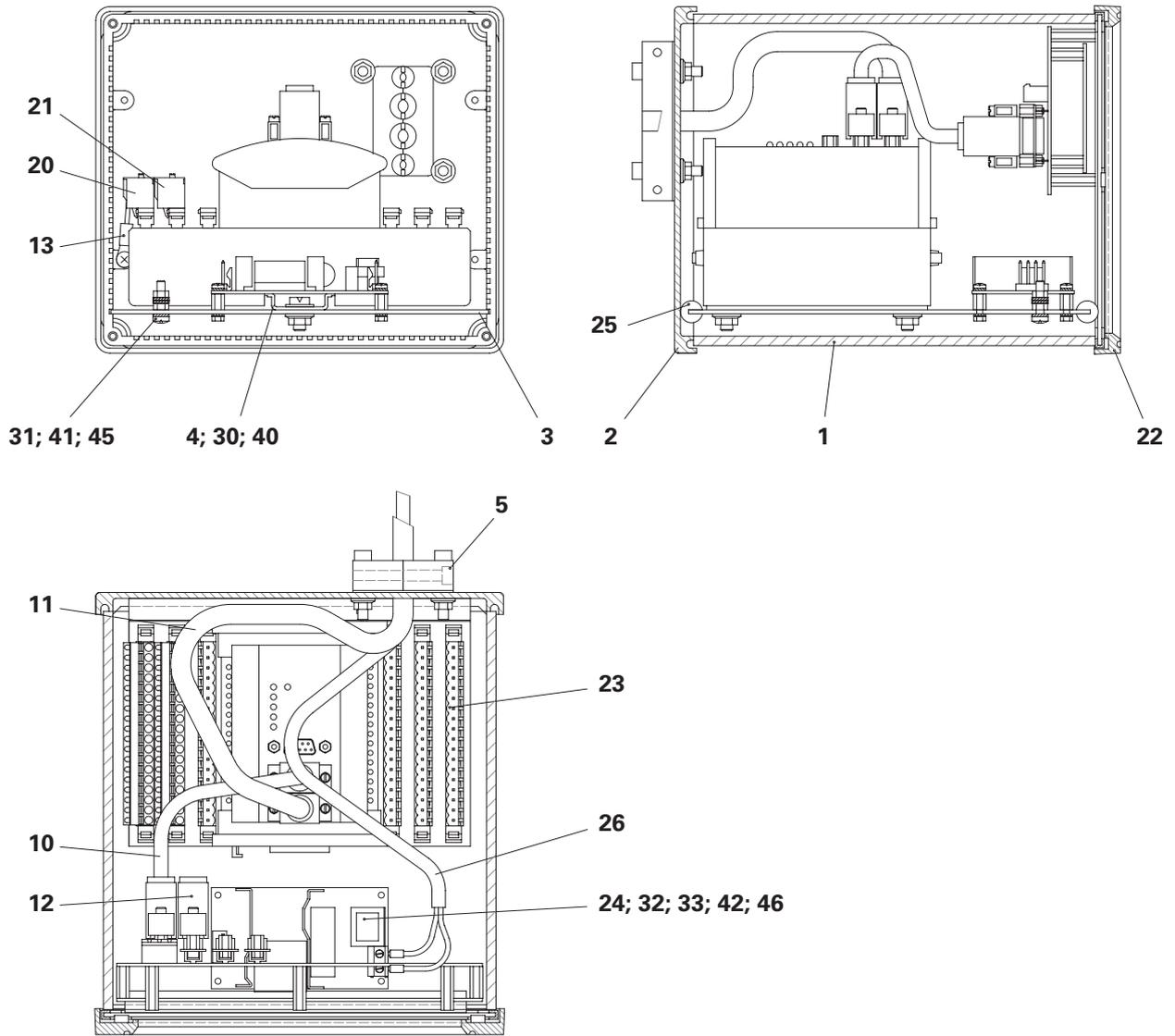
Vibration table - complete

CR03 Gematic control unit

2	Rear wall	387 282
3	Assembly plate	387 274
4	Support profile	386 817
5	Cable connection - complete	388 408
10	CAN bus cable CR03 internal	387 118
11	CAN bus cable - L=20 m	387 100
12	CAN bus terminal plug	384 917
13	Cable set CR03	387 126
20	18 pin socket rail no. 1-18	264 580
21	18 pin socket rail no. 19-36	264 598
22	Display unit	263 621
23	CPU unit	263 605
24	Power pack - phased - 24 VDC, 0.92 A	264 091
25	Foam rubber profile (0.34 m)	104 418
26	Cable - 3x1 mm ²	100 170*
30	Cap screw - M6x12 mm	238 163
31	Cap screw - M4x18 mm	201 910
32	Cap screw - M3x6 mm	202 355
33	Spacer - M3, SW5,5x12 mm	256 250
40	Hexagon shakeproof nut - M6	244 430
41	Hexagon nut - M4	205 192
42	Hexagon nut - M3	202 142
45	Shake proof washer - Type A, M4	216 038
46	Shake proof washer - Type A, M3	205 885

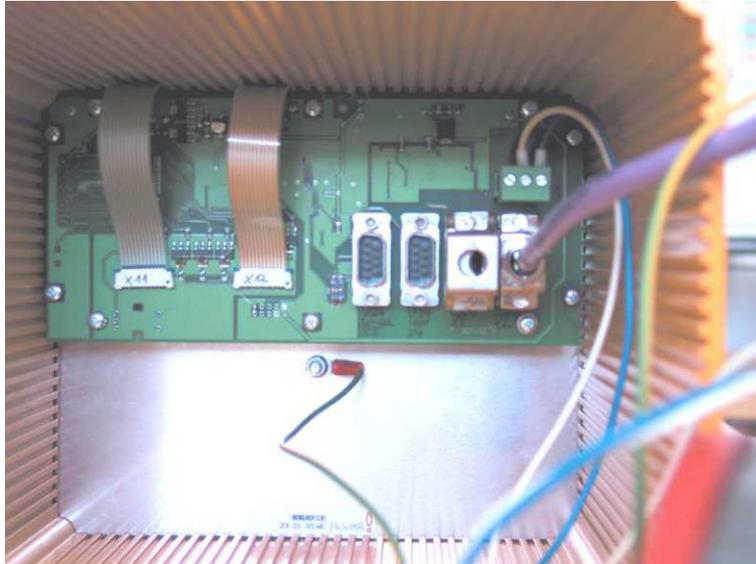
* Please indicate length

CR03 Gematic control unit

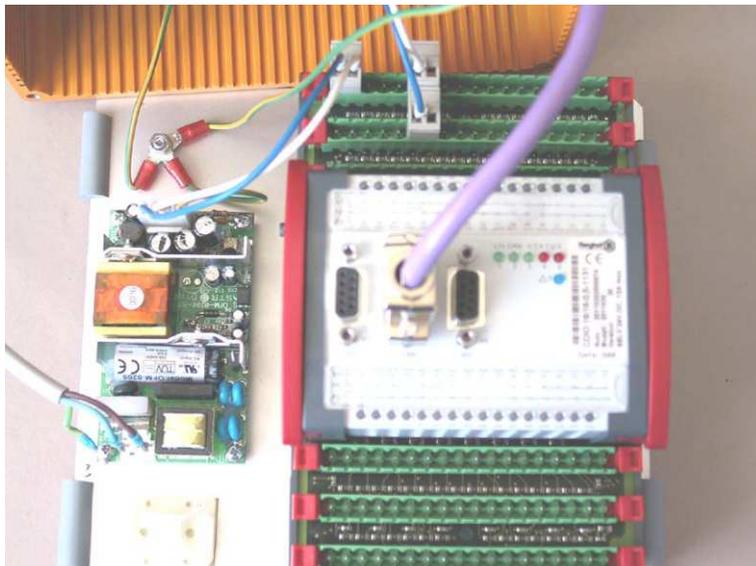


CR03 Gematic control unit

CR03 Gematic control unit - inside view



CR03 Gematic control unit - inside view

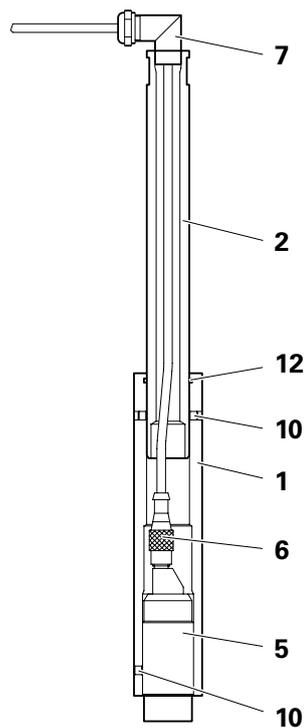


CR03 Gematic control unit - inside view

Level sensor

Level sensor - complete	373 192
1 Sensor holder	373 176
2 Holder extension	373 184
5 Proximity switch	258 911
6 Connection cable	258 920*
7 Elbow lead-through - PG9	258 938
10 Grub screw - M5x5 mm	258 908
12 O-Ring - Ø 25x2 mm, nitrile	241 733#

* Please indicate length



Level sensor