

(C) ICS ice cleaning systems s.r.o.  
Robotnícka 2192  
01701 Považská Bystrica  
Slovakia

+421 42 4261 135  
support@ics-dryice.com

[www.ics-dryice.com](http://www.ics-dryice.com)  
version:2601

# Operator's Manual

IC 110



CONTENT

Your dry ice blasting unit.....	2
Introduction & Copyright.....	3
Process Description.....	4
Technical data.....	5
Safety equipment.....	6
Operating the IC 110 .....	7
Connecting the IC 110 .....	8
Operating the Blast gun.....	10
Putting into operation.....	11
Decommissioning.....	11
Internal components of the equipment.....	12
Safety measures.....	15
Transportation.....	17
Repairs and warranty.....	17
Warranty conditions.....	17
Requirements for compressed air.....	18
Maintenance.....	18
Troubleshooting.....	19
Electrical components.....	19
Drawing .....	20
Wiring diagram IC 110 .....	21
Material safety data sheet for dry ice.....	22

## Your Dry ice Blasting Unit

Typ  
Modell  
Modèle

Nr.  
No.  
No.

Gewicht  
Weight  
Poids

Druck max.  
Pressure max.  
Pression max.

Baujahr  
Year of manufacture  
année de fabrication



Your contact to ICS:

ICS ice cleaning systems s.r.o.  
Robotnícka 2192  
Považska Bystrica 01701, SLOVAKIA

Tel.:+421 42 4261135  
Fax:+421 42 4330 248  
E-Mail: support@ics-dryice.com

[www.ics-dryice.com](http://www.ics-dryice.com)

## Introduction & Copyright

These operating instructions serve as explanation for a safe and undisturbed operation of the IC 110 dry ice blasting unit.

All individuals who are operating the blasting unit have to read and understand completely the operator's manual, before using it.

Please keep these operating instructions always close at hand.

Failure to observe the procedures specified herein may lead to serious consequences both on the equipment and on its operators. The operator has to strictly observe the working procedures described herein. Any changes made to these work procedures have to be approved in writing by ICS Ice Cleaning Systems s.r.o.

The manufacturer of the equipment is not held responsible for damages caused to the system or generated by the system in the following cases:

- Non-observance of these working instructions
- Improper use or handling of the IC 110
- Repair and maintenance works performed by unauthorized persons
- Installation and replacement with ICS non-original parts
- Noncompliance with the requirements regarding compressed air.

The copyright to this operating instructions manual belongs to ICS Ice Cleaning Systems s.r.o.

This operating manual is intended for the operating and supervisory personnel. It contains regulations, illustrations and instructions, whose usage, fully or partially, by third parties is completely prohibited without an express written permission in this respect.

Recommendations regarding the improvement of the machine or of the operating manual can be transmitted to ICS Ice Cleaning Systems s.r.o.

The graphic representation of the blasting equipment can differ from the current delivery program, in certain individual details. Special accessories are partially represented at additional costs.

## Process description

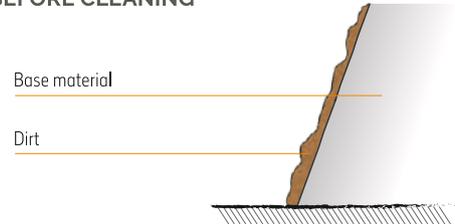
The dry ice blasting equipment IC 110 operates with granules of dry ice pellets (up to  $\varnothing 3\text{mm}$ ), produced through the pressing of the  $\text{CO}_2$  snow.

The pellets are blasted on the surface to be cleaned. The dirt from the surface is frozen through thermal shock and it breaks because of the different expansion coefficients.

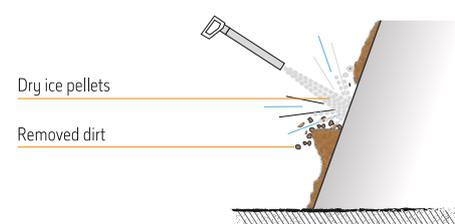
The  $\text{CO}_2$  granulate sublimates in the moment of impact from solid to gaseous state. Only the initial dirt remains behind.

The dry ice pellets in the hopper (up to  $\varnothing 3\text{mm}$ ) will be mixed using a compressed air operated dosing system, transported through the blasting hose and accelerated through blasting nozzle, the pellets can reach the speed of sound (depending on compressed air pressure and blasting nozzle).

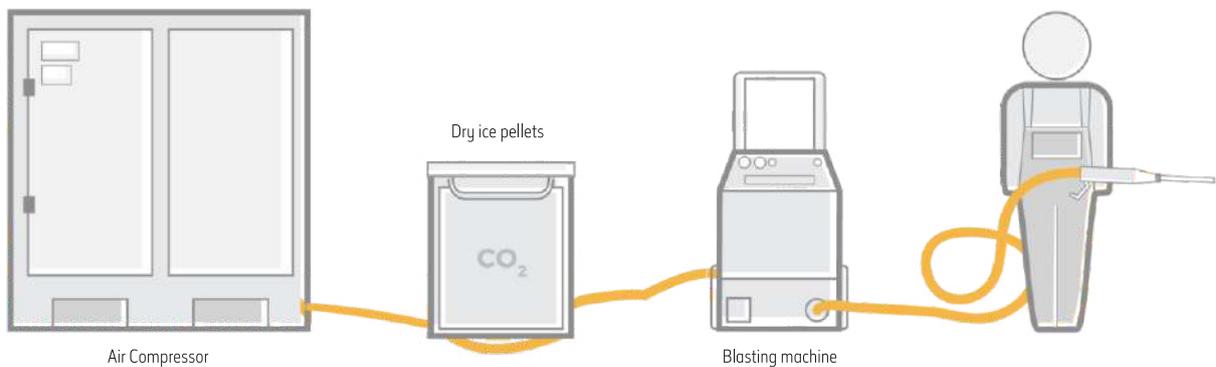
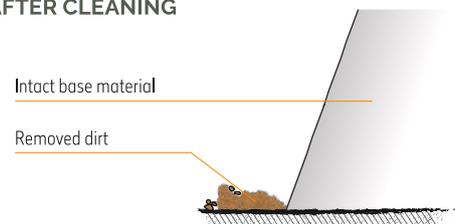
### BEFORE CLEANING



### DURING THE CLEANING PROCESS



### AFTER CLEANING



## Technical Data of the IC 110

Depth	500 mm
Width:	337 mm
Height:	614 mm
Weight:	35 kg (without hose package)
Hopper capacity:	10 kg standard
Dry ice consumption:	5-45 kg/h
Operation pressure:	min. 1 bar – max. 10 bar
Air consumption:	1.0 m <sup>3</sup> /min – 4,5 m <sup>3</sup> /min, according to the nozzle combination used and the working pressure
Requirements for the compressed air:	The compressed air should be clean, dry and oil-free, meaning without foreign matter.
Compressed air supply:	Min. requirements reg. compressed air quality according to ISO 8573-1:2010 [1:4:1]
Noise emission:	Claw coupling DIN 3489
	60-120 dB(A), according to the blast pressure, nozzle combination and the surface of the object to be cleaned



## Safety equipment

BEI BETRIEB / DURING OPERATION / EN COURS DE FONCTIONNEMENT / 使用上の注意						
<p>WARNUNG / BEWARE ATTENTION / 注意</p> <p>VERLETZUNGSGEFAHR DURCH CO<sub>2</sub> DANGER OF INJURY THROUGH CO<sub>2</sub> RISQUE DE BLESSURE PAR LE CO<sub>2</sub></p> <p>ベレットによる怪けに注意</p>	<p>WARNUNG / BEWARE ATTENTION / 注意</p> <p>Sauerstoff / Oxygene / Oxygène / 酸素 CO<sub>2</sub> CO<sub>2</sub> CO<sub>2</sub> CO<sub>2</sub></p> <p>ERSTICKUNGSGEFAHR DANGER OF SUFFOCATION RISQUE DE SUFFOCATION</p> <p>酸欠・CO<sub>2</sub>中毒の 恐れあり</p>	<p>WARNUNG / BEWARE ATTENTION / 注意</p> <p>ELEKTROSTATISCHE ENTLADUNG ELEKTROSTATIC DISCHARGE ÉLECTROSTATIQUE</p> <p>静電気に注意</p>	<p>WARNUNG / BEWARE ATTENTION / 注意</p> <p>VERBRENNUNGSGEFAHR EISTEMPÉRATUR -79°C DANGER OF INJURY ICE TEMPERATURE -79°C RISQUE DE BRÛLURE TEMPÉ- RATURE DE LA GLACE -79°C</p> <p>ドライアイス(-79°C)取扱注意</p>	<p>WARNUNG / BEWARE ATTENTION / 注意</p> <p>SICHT- UND GEHÖRSCHUTZ TRAGEN USE EYE AND EAR PROTECTION UTILISER IMPÉRATIVEMENS DES PROTECTIONS POUR LES OREILLES ET LES YEUX</p> <p>保護メガネ、耳栓着用厳守</p>	<p>WARNUNG / BEWARE ATTENTION / 注意</p> <p>HANDSCHUHE TRAGEN WEAR GLOVES PORT DE GANTS OBLIGATOIRE</p> <p>手袋着用厳守</p>	<p>WARNUNG / BEWARE ATTENTION / 注意</p> <p>ARBEITSKLEIDUNG MIT LANGEN ÄRMELN TRAGEN INDUSTRIAL CLOTHING PORT OBLIGATOIRE D'UNE COMBINATION À MANCHES LONGUES</p> <p>長袖の作業着を着用</p>
<p>BEACHTEN SIE ALLE HINWEISE IM BEDIENHANDBUCH / ADHERE TO ALL INSTRUCTIONS IN OPERATING MANUAL / TOUTES LES INSTRUCTIONS DANS LE MANUEL 取扱説明書を必ず一読して下さい。</p>						

Before starting work, care should be taken for the kind of dirt and object to be cleaned, so that you can optionally take further safety measures, e.g. full protection.

In order to use the dry ice blasting equipment in safe conditions, you should always wear the following protection equipment:

1. Safety glasses
2. Ear protection
3. Long-sleeved working suit
4. Protective gloves
5. Protective mask against Dust
6. Safety shoes

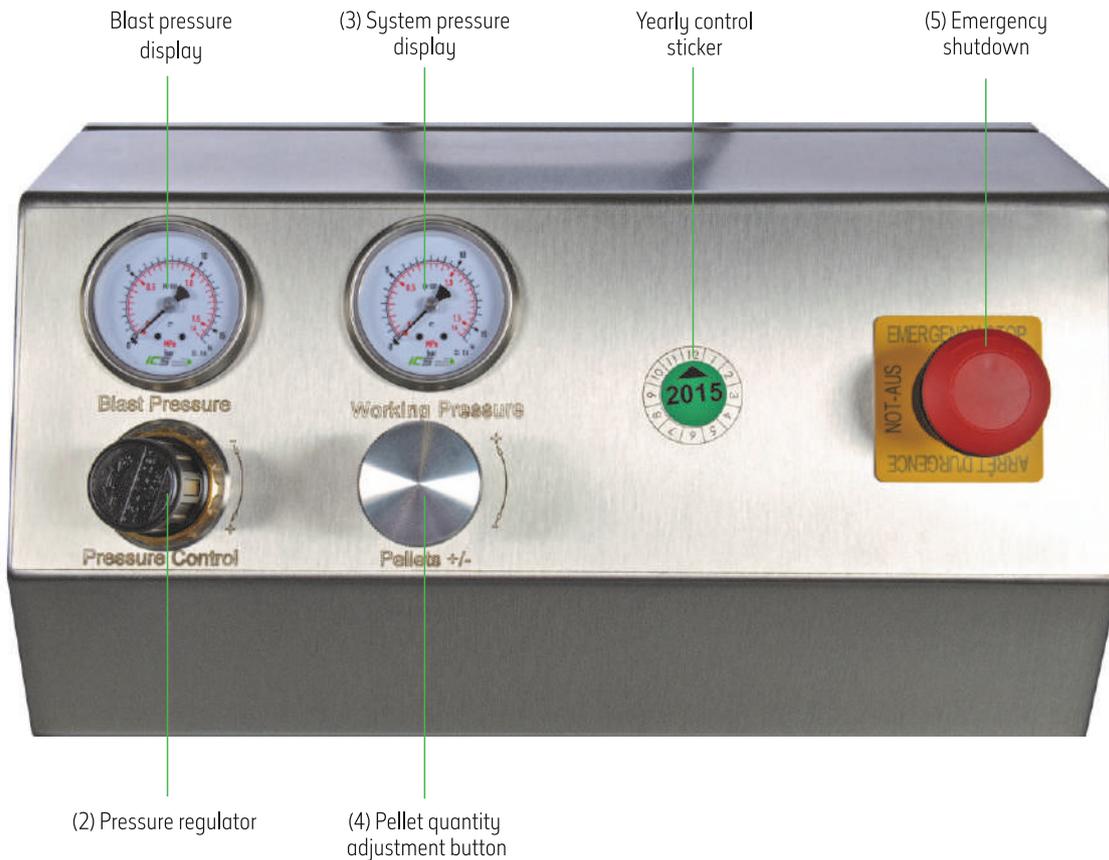
### Caution!

In poorly ventilated areas, the elevated concentration of CO<sub>2</sub> can lead to breathing difficulties and suffocation. Therefore, you should always ensure that enclosed spaces are properly ventilated (exhaust air and fresh air supply).

When cleaning in silos, tanks or other similar spaces, ensure adequate air circulation or use additionally a breathing mask, which contains in the air supply line an activated carbon filter.



## Operating the IC 110



The Emergency shutdown (5) push-button immediately stops all functions of the equipment.

**Caution!**

Despite the emergency shutdown push-button has been actuated, the equipment is pressurised!

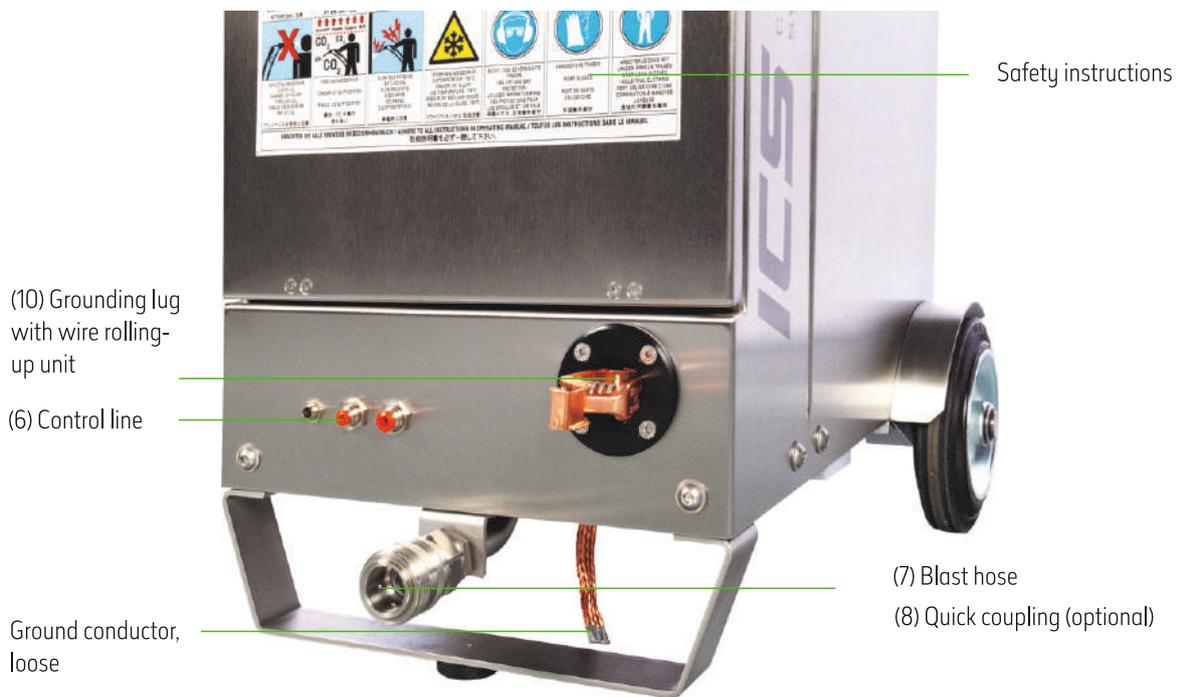


By using the pressure regulator (2), the blast pressure can be adjusted progressively between 1-10 bar.

The ice consumption is progressively adjustable between 5-45 kg/h by using the pellet quantity adjustment button (4).

## Connecting the IC 110

### Connections and components on the front side



The blast hose connection (7) seals conically and can be connected or disconnected with a SW32 wrench.

If your equipment is provided with a quick coupling (8) (optional), push the outer ring towards the housing and insert the fitting of the blast hose until the ring snaps by itself in position. The closing is done in reverse order.

### **Please do not use this quick coupling as carrying aid during transportation!**

The control lines (6) are simply inserted according to the diameter, up to the stop. For unlocking, press the coloured plastic locking ring while pulling the control line.

If you have problems with static charges, additionally ground the machine with the grounding lug (9), e.g. to a water conduit.

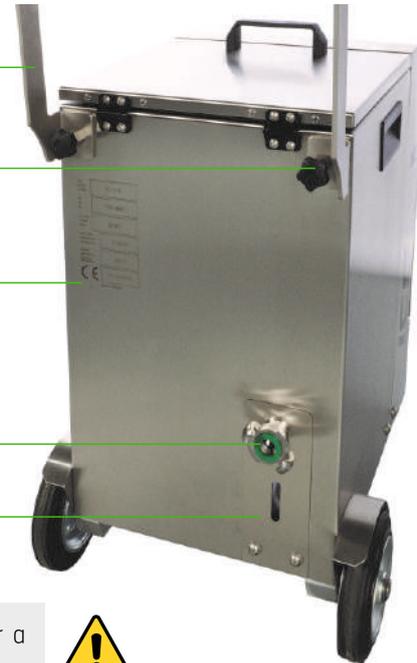
### Connections and components on the back side

Connect the compressed air hose using the claw coupling (12) by rotating the hose coupling in a clockwise direction until it snaps into place two times. In order to remove it, press the coupling of the unpressurised compressed air hose towards the machine and then turn to left.

IC 110

- (10) Transport handle
- (11) Fastening screws, transport handle
- Type plate with the series & manufacturing year

- (12) Claw coupling, compressed air
- (13) Viewing window, filtered water separator



**Attention!** Pressure max. 10 bar. The blasting equipment is designed for a pressure of up to 10 bar. Exceeding this value actuates the internal safety valve!



Proper grounding:

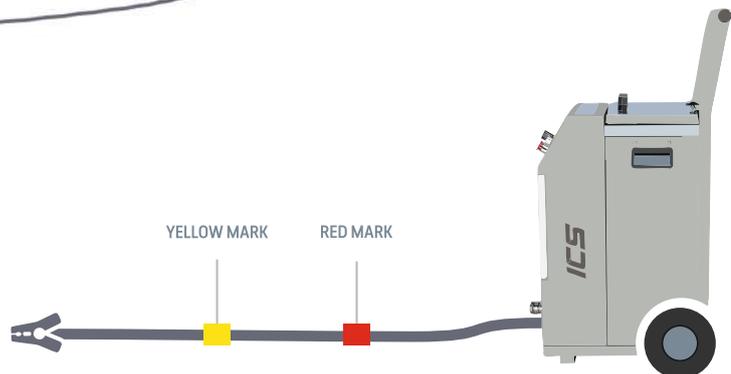
Main protective earth terminal



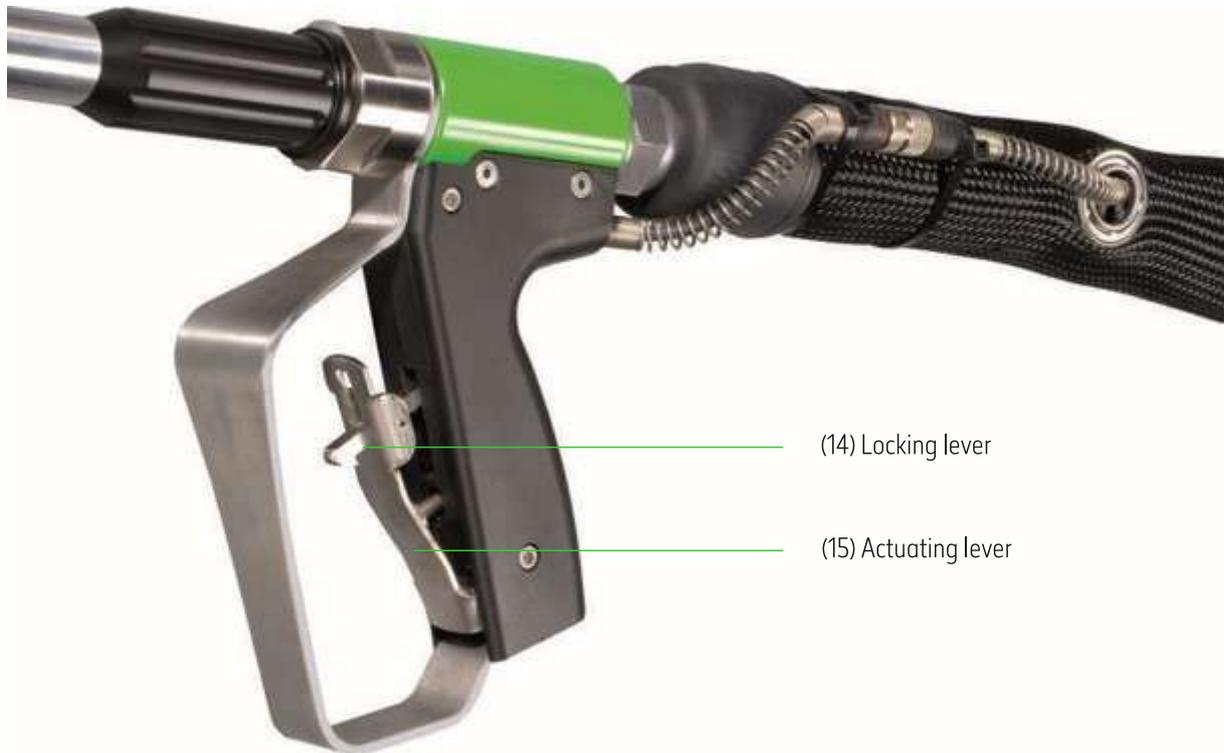
1. Connect the machine to the main grounding terminal.
2. Connect the blasted object with the included grounding kit to the main grounding terminal.



**Warning!** The yellow mark on the grounding kit indicates the last 2 meters. The red mark indicates the end of the cable. Never pull on the red mark, there is a risk of damaging the grounding kit.



## Operating the Blast gun



In order to trigger the blast gun, push the locking lever (14) upwards and pull the actuating lever (15) towards the handle. In order to stop the blast, release the actuating lever (15), it goes by itself back into the starting position.

### Caution!

Always make sure you hold the gun safely and securely in your hand, so as not to endanger yourself or other persons.



## Putting into operation

In order to put the IC 110 into operation proceed as follows:

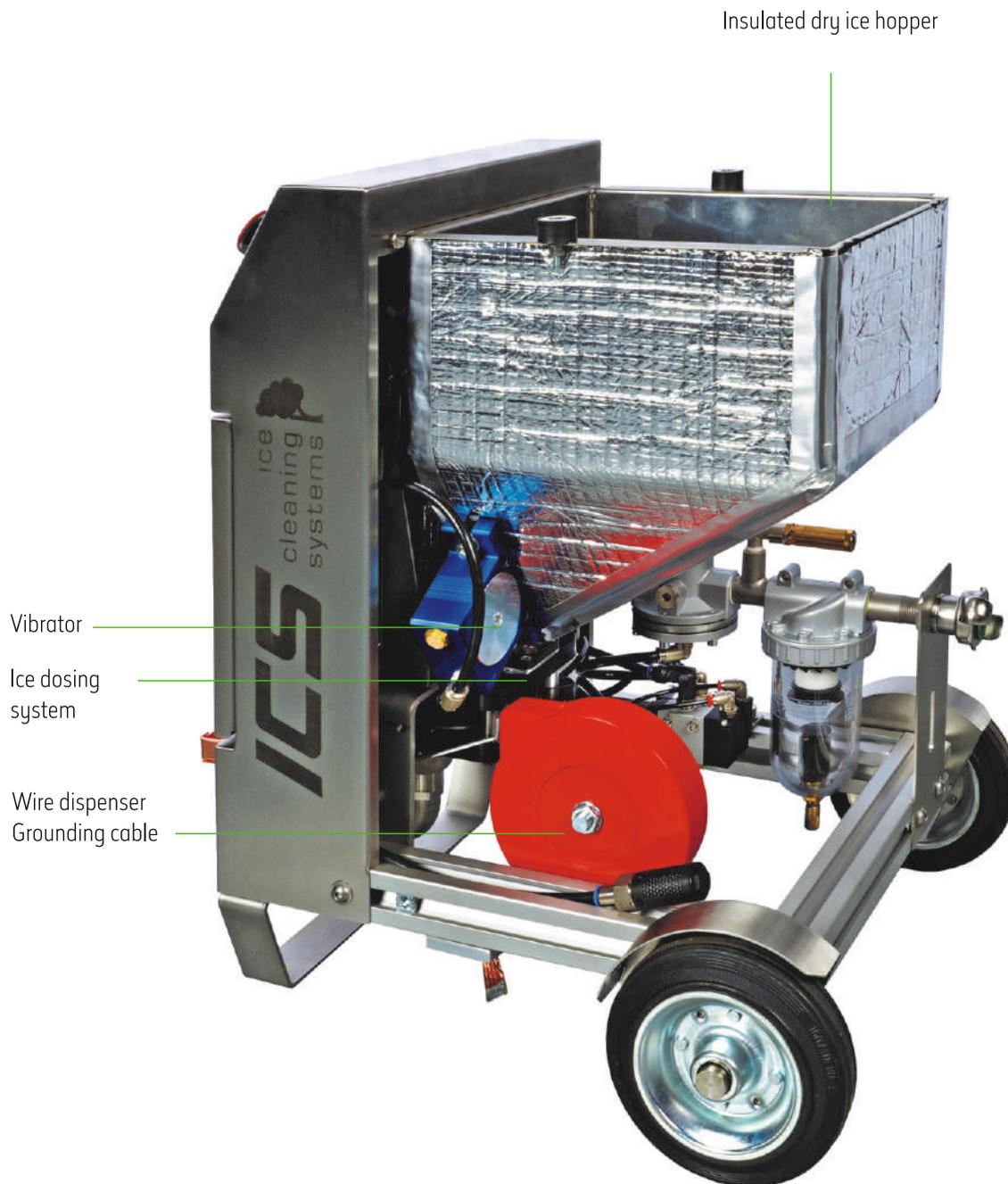
1. Check before each putting into operation if there is enough oil in the system oiler. (see page 14)
2. Connect the compressed air hose first with the claw coupling (12) at the back of the blasting equipment and then to the compressed air source.
3. Connect the blast hose of the hose package to position (7/8). Check the position of the quick coupling (8). Connect the control lines of the hose package to position
4. Open slowly the compressed air source.
5. Adjust the blast pressure from the pressure regulator (2).
6. Adjust the ice consumption from the pellet quantity adjustment (4).
7. Now actuate the gun for about 10 seconds towards the floor in order to blast the residual humidity out of the system.
9. Now fill the hopper with dry ice and close the lid to prevent any foreign objects getting inside the hopper.
10. Now the IC 110 is ready for use.

## Decommissioning

After completion of the blasting operations, proceed as follows:

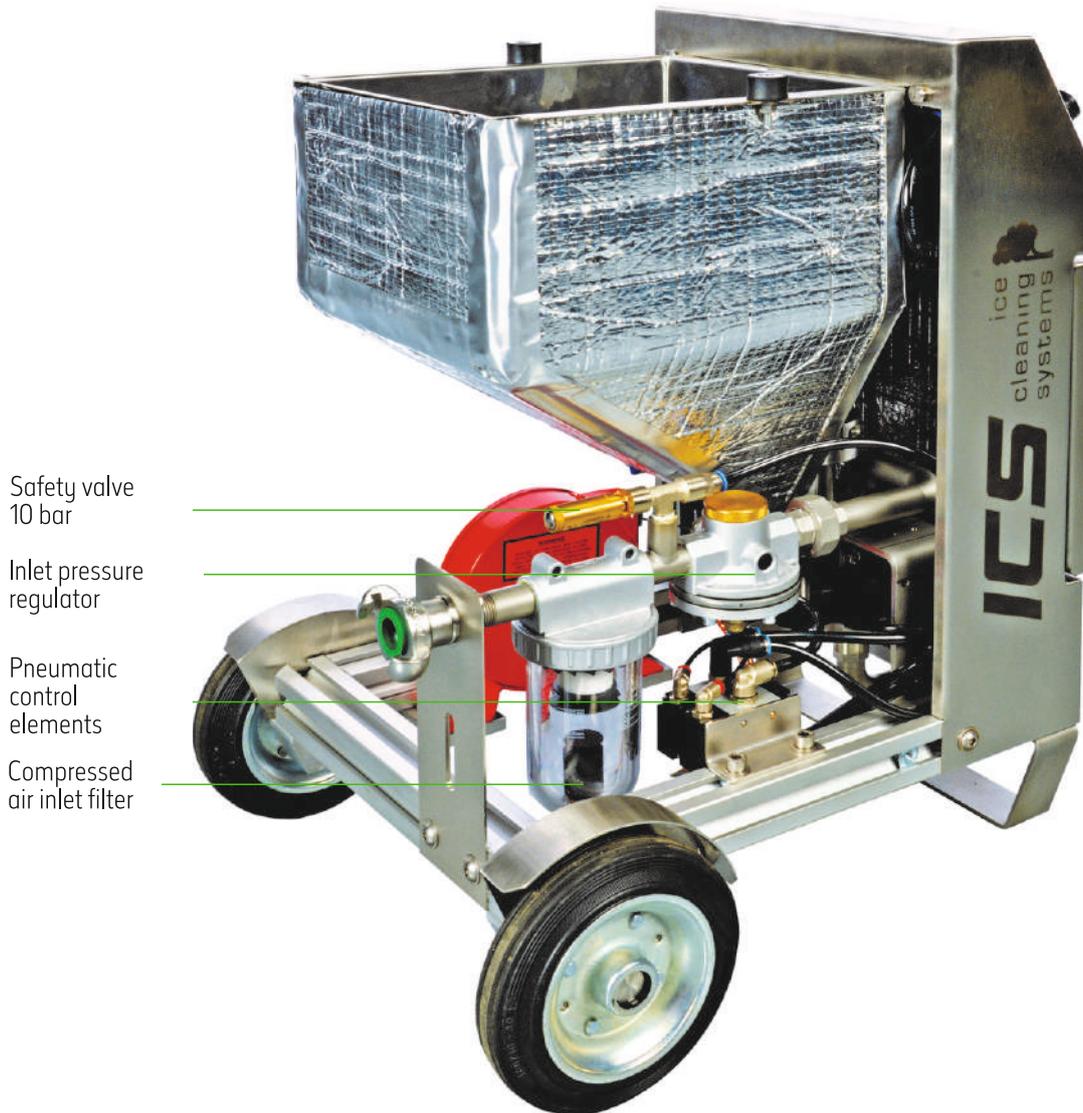
1. Empty the dry ice from the hopper.
2. Close the compressed air source.
3. Actuate the gun to release the residual compressed air.
4. Remove the air hose (12) from the equipment.
5. Disconnect the hose package (7/8) and roll it up.

## Internal components of the equipment



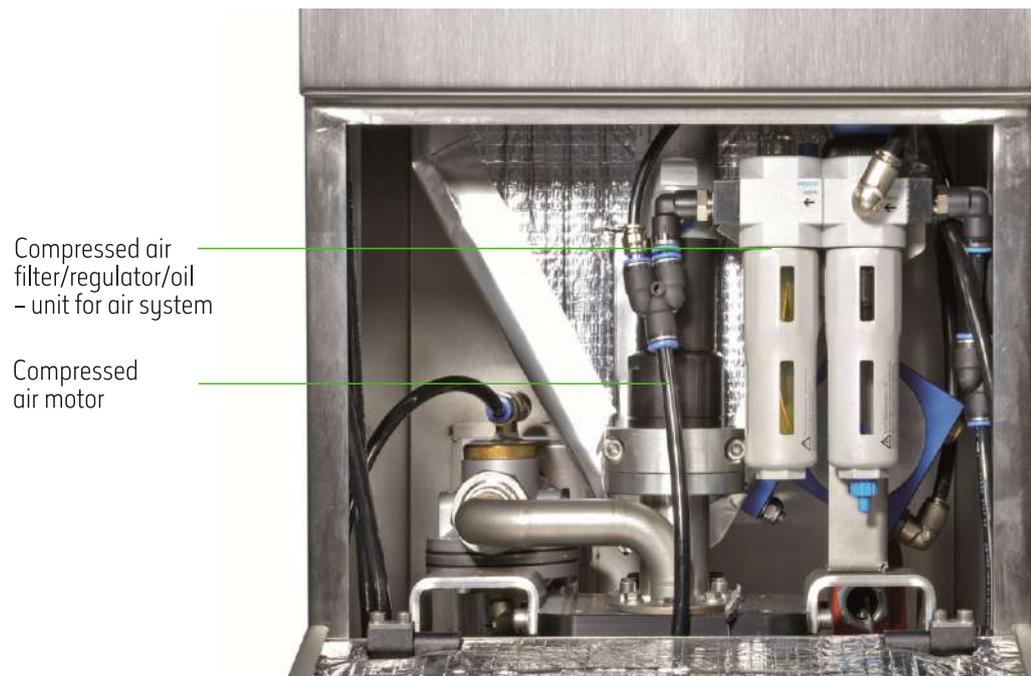
IC 110

# Internal components of the equipment



IC 110

### Internal components of the equipment



**Attention!**

Before each putting into operation check if there is enough oil in the system oiler. **Use only RSL 32 oil.**

## Safety measures

The safety measures are important both to you and to the operating personnel involved, and also for the use in optimal conditions of the IC 110 blasting equipment.

Before making any works at the IC 110, the equipment has to be depressurised. The compressed air hose has to be mounted so as not to present any danger.

Only free of damage compressed air hoses have to be used. The compressed air source is slowly opened after the successful connection to the equipment. From this point on, the IC 110 is pressurised and it cannot be left under any circumstances unsupervised.

### Caution!

When working with dry ice, the safety data sheet of the supplier has to be observed. Make sure that only dry ice can be found in the recipient. Always use gloves when handling dry ice, otherwise it may cause cryogenic burns.

**The dry-ice temperature is -79°C.** See the safety data sheet at the end of this manual.



You always have to make sure that there is enough fresh air in the room, because CO<sub>2</sub> in gaseous state replaces the oxygen from the room.

### Failure to observe this indication may represent a danger to life!

The maximum allowable concentration (maximum allowable concentration in 8 hours of work) is of 5.000 ppm.

**A CO<sub>2</sub> concentration of 8-10% (v/v) in the air is fatal!**

Note: 1 kg dry ice pellets sublimates into about 0.5m<sup>3</sup> CO<sub>2</sub> when blasting.

## IC 110

The dry ice shall not be kept in the hopper for more than 15 minutes, in order to avoid the freezing of the IC 110 equipment.

Still, if the hopper freezes, it has to be emptied manually. It is not allowed to press it with an object in order to loosen the ice pellets, because the dosing plate can become damaged.

The very high speed of the pellets can cause injuries. Therefore, blasting towards people or animals is prohibited. Never stretch your hand towards the blast, high risk of injury! Make sure that in the working area no unauthorised personnel is allowed.

The IC 110 has to be operated only by qualified personnel and after a detailed training, in order to avoid as much as possible the hazard potential and to ensure a smooth work flow.

The operator undertakes to use the IC 110 equipment only when it is in perfect condition and to immediately remedy any kind of damages.

When using the IC 110 the local standards relating to security and accident prevention shall always apply.

**Caution!**

The blasting procedure shall not be carried out in areas with explosive air mixtures.



High electrostatic charges can develop. Always pay attention that the object which has to be cleaned should have earthing and this earthing should not be removed during the cleaning process. The IC 110 is provided with earthing from the gun, to the hose package up to the power plug.



The user should always wear safety footwear class S2 or higher in order to protect himself from the static charge.

**Persons having a pacemaker are not allowed to work with the IC 110.**



## Transportation

For the simple transportation from one working place to another within your company, you are advised to use the transport handle (10 / see page 9).

For the transportation with a shipping company, the IC 110 equipment shall be fastened on a pallet using a strap and with the hoses rolled up. After removing the fastening screws (11 / see page 9) and the transport handle (16), the blasting equipment becomes easier to handle during transport.

**Attention! You are advised to transport the IC 110 equipment only in upright position!** In case the equipment is transported in horizontal position, the oil leaks from the system oiler in the pneumatic system and from the equipment.

## Repairs and warranty

Please bear in mind that the works, including the inspection and maintenance works, especially at the safety devices can be carried out only by an ICS technician or by a person who received special training for equipment and accessories of ICS Ice Cleaning Systems s.r.o. and who can present evidence in this respect.

The potential repairs necessary during the warranty period have to be agreed upon beforehand with ICS Ice Cleaning Systems s.r.o.

The spare parts which fall in the warranty period are replaced either at our location or are sent to you. The transportation costs, travel costs and costs related to the stay, as well as those for the disassembly and reassembly fall on the client. For the evaluation of the warranty, the component or the equipment shall be sent to ICS Ice Cleaning Systems s.r.o.

## Warranty conditions

The warranty becomes void in the following cases:

- incorrect handling of the IC 110 equipment.
- using non-original spare parts.
- works at the IC 110 equipment carried out by unauthorised persons.
- using materials different than dry ice.
- noncompliance with the requirements regarding compressed air quality.

Carrying out unauthorised changes to the IC 110 equipment is prohibited! The warranty period is 12 months after the delivery date. Excluded are rubber parts, wear parts and maintenance parts.

## Requirements for compressed air

For an efficient blasting result, the compressed air to be used is of outermost importance. The compressed air should be dry, clean, oil-free and free of foreign bodies. We recommend that the minimum requirements for the quality of the compressed air comply with ISO 8573-1:2010 [1:4:1].

Particle= class 1= 0,1mg/m<sup>3</sup>

Water= class 4= DTP 3°C

Oil = class 1= 0,01mg/m<sup>3</sup>

The pressure range of the IC 110 equipment is between 1- 10 bar and the air volume between 1.0-4.5 m<sup>3</sup>/min.

## Maintenance

Thanks to its practical structure, the IC 110 equipment only requires a very low maintenance. For the IC 110, maintenance works should be performed on a regular basis at every 1,000 operating hours, and at least once a year (see the yearly control sticker). We recommend concluding a maintenance contract with ICS Ice Cleaning Systems s.r.o. or with an ICS authorised partner.

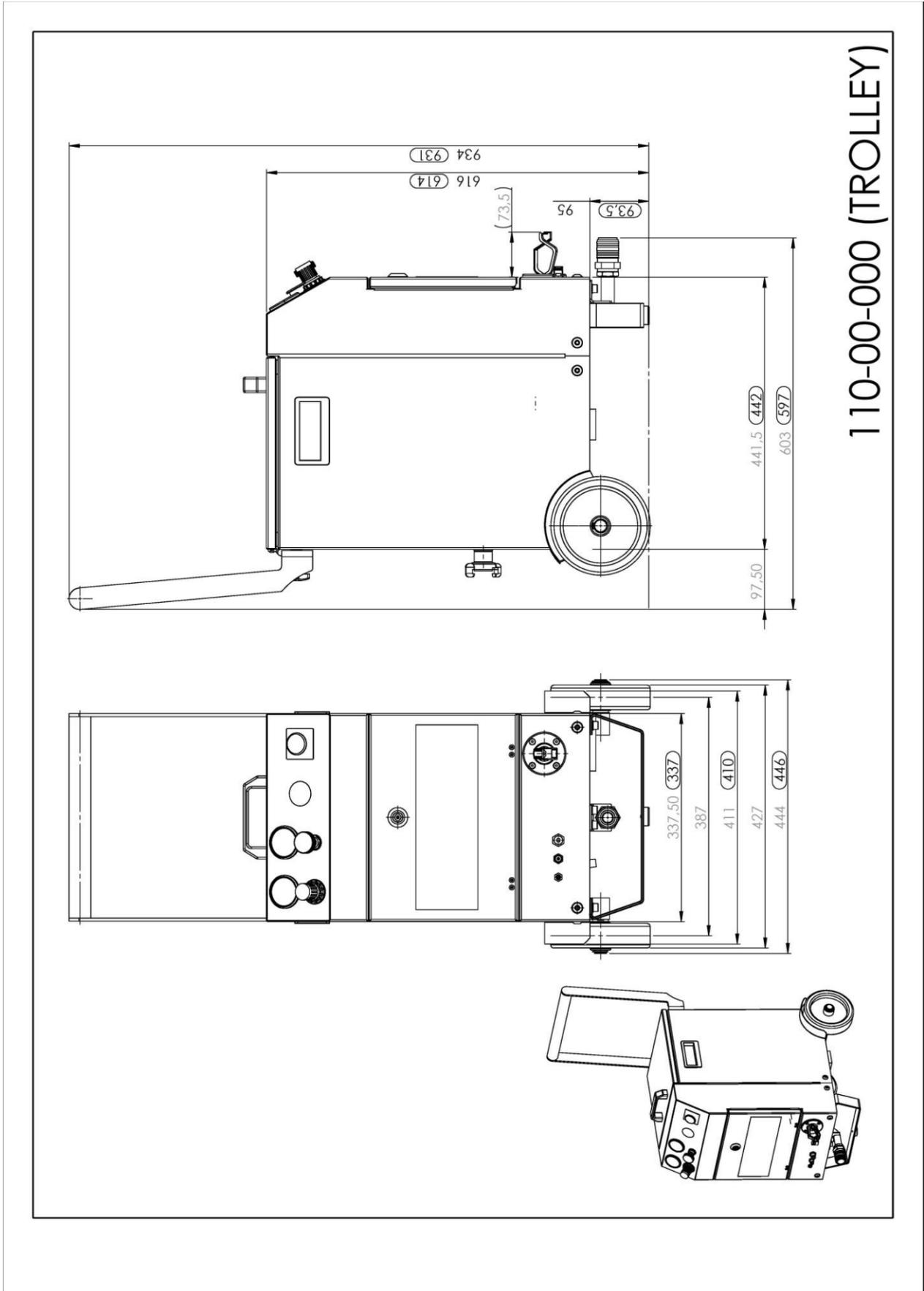
### Maintenance plan for IC 110 after 1,000 operating hours:

1. General visual inspection of body, weld joints, chassis, tires, screw seat
2. If necessary, complete exterior and interior cleaning
3. Checking the functioning of the inlet pressure regulator and pilot pressure regulator
4. Filter / regulator / oiling system combination, replacing the filter, cleaning, refilling and re-adjusting
5. Checking the pneumatic control elements, checking for leaks and replacing the shock absorber
6. Checking and replacing compressed air inlet filter, filter cartridge and automatic drain wire
7. Checking the functioning, leakage and firm seating of the compressed air motor
8. Checking the entire ice dosing system and the metering disk for signs of wear, if they are functional and leak-proof
9. Checking the functioning and firm seating of the vibrator
10. Checking the hose package for signs of wear, if it is functional and leak-proof (pressing)
11. Checking the connecting elements, connectors and pneumatic couplings for signs of damage, if they are functional and safe for use
12. Checking the blast gun if it is functional and safe for use
13. Checking the existing blasting nozzles for signs of wear and cracks
14. Pressure and safety test
15. Functional test
16. Blasting test
17. Replacing the inspection and maintenance plates

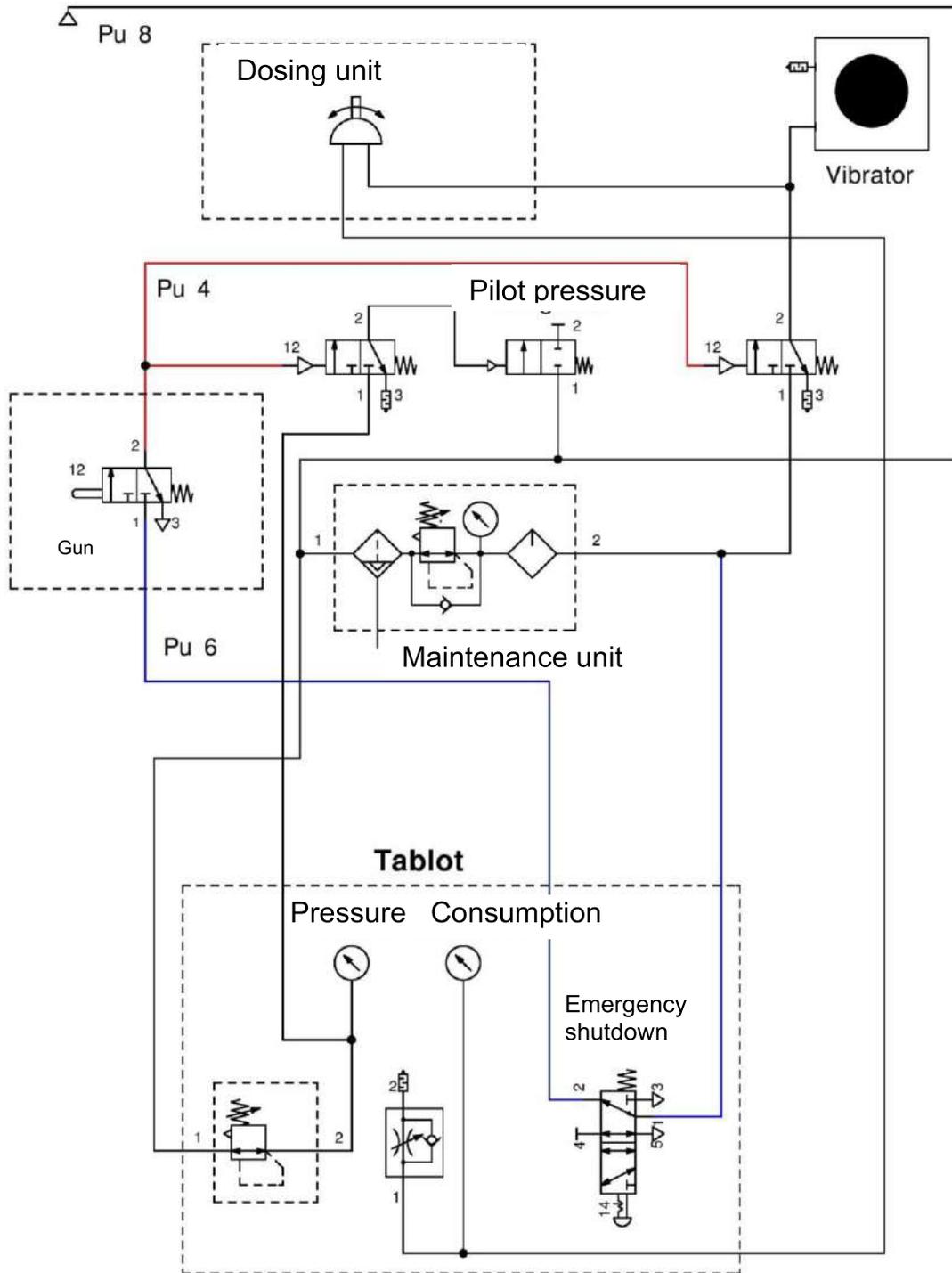
## Troubleshooting

Problem	Description	Corrective action
The equipment cannot be started	The Reset button is lit despite actuation.	Unlock the Emergency Stop button by turning it to right.
The equipment does not start	Nothing happens after the gun has been actuated.	Check whether the control line is blocked.
No air comes out from the gun	The equipment is running, but it does not blow out air.	Check the compressed air supply and the connection of the equipment and adjust the desired blast pressure at the equipment.
No ice comes out	After actuating the gun, only air and no ice comes out.	Place ice in the hopper. Set a minimum quantity of 10 kg/h.
The equipment is running, but no ice comes out	Ice is falling down on the lower part of the equipment	Blast pressure, amount of ice & the blasting tube are not optimally combined with one another and adjusted to each other.

IC 110



IC 110



IC 110

08.04.2014 K.K.

IC 110

<p>ICS Ice Cleaning Systems GmbH</p>	<p>Operating manual according to art. 14 of the Ordinance on Hazardous Substances Operating area: Working place:</p>	<p>Status: May 2012 (based on SDB 4/ 2005)</p>
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**Identification of hazardous substance Dry Ice**

Other designation: Carbon dioxide – in frozen state

CAS no.: 124-38-9 EU index no.: 204-696-9

Aggregate state: solid

Colour: white

Odour: inodorous

Flash point:

Boiling point: -78.5°C

Melting point: -56.6 °C

**Dangers for people and environment**



Risk of frostbite development (-78°C) at skin contact  
Risk of suffocation because of the sublimated vapours (from 1 litre of dry ice result 460 litres of gas)



Loss of mobility and consciousness  
The gas released through evaporation is heavier than air and can accumulate in lower spaces

**First aid measure and rules of conduct**



**Protective measures:**

- Avoid contact of the product with skin and eyes;
- During usage, ensure proper ventilation in the room;
- During the shredding operation, avoid dispersion of the chips;
- Do not transport with elevator if the elevator is being used by people;
- Avoid protrusion of the gas released by evaporation in the sewerage or in lower areas.

**Eye protection:**

Wear goggles with tight-closing system.



**Hand protection:**

Wear protective gloves made of leather or low temperature resistant gloves

**Suitable extinguishing agents:**

According to the conditions; carbon dioxide does not burn

**Storage:**

- not to be stored in basements and unventilated spaces;
- not to be stored in gas-tight containers (risk of bursting because of high pressure).

**First aid measure**

Injured persons have to be transported out of the danger area, using protection means, proper ventilation has to be ensured, in case of high concentration levels, a self-contained breathing apparatus has to be used.

**Administering first aid**



General information

**After inhalation** Ensure proper ventilation, in case a person becomes unconscious, the victim should be positioned in a stable side position, in case of respiratory arrest administer artificial respiration, seek medical assistance.

**In case of skin contact** In case of frostbites, rinse for 15 minutes with lukewarm water. **In case of eye contact** Rinse eyes for at least 15 minutes, afterwards see an ophthalmologist.

**After swallowing:** Drink plenty of water, seek medical assistance.

**Appropriate disposal**

The dry ice residues can be stored outdoors and left to evaporate, but only under strict supervision. For additional information, contact the Labour Protection Department.



[www.ics-dryice.com](http://www.ics-dryice.com)