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

Operators manual

Pelletizer IP-100H


ICS
dry ice
cleaning
systems

Content

1. Introduction

This operating manual is intended to explain the safe and trouble-free operation of the pelletizer with the serial number:

All persons who work with the system must have read and understood the manual completely before the system is put into operation. Please keep this manual ready for reference.

The Failure to observe the procedures described in the manual can lead to serious consequences for plants and persons.

The operator has to adhere strictly to the described operating procedures.

Any change in the operating procedure requires the written consent of the manufacturer of the IP-100-H:

ICS ice cleaning systems s.r.o.
Robotnícka 2192,
01701 Považská Bystrica
Slovakia
Phone: +421 42 42611-35 E-mail: info@ics-dryice.sk

The manufacturer of this system is not liable for damages that occur or are caused by:

- Improper handling
- Failure to follow the operating instructions
- Repairs by unauthorized personnel
- Installation and replacement of non-original ICS parts
- Inappropriate use
- Operation by non-instructed personnel

1.1 Copyright

Suggestions for improving the system or the manual can be sent to ICS ice cleaning systems s.r.o. Robotnícka 2192, 017 01 Považská Bystrica.

The illustrations are different equipment variants.

2. Safety regulations

The safety measures mentioned here are important for the health of users and persons involved, as well as for the risk-free use of the system.

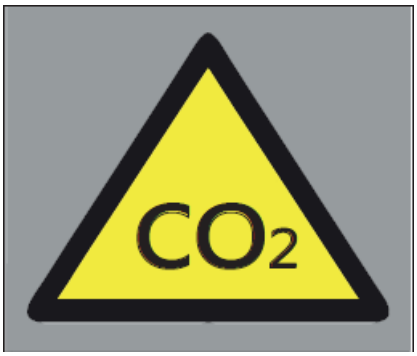
Security and Risk
The IP-100H is designed to comply with the EC Declaration of Conformity for Machinery. Therefore, using the machine does not pose a risk to the operator when the instructions in this manual are followed.
It is important that the operator follows the safety signs posted on the machine and the safety regulations described in this manual and that the operator reads and understands the contents of this manual before starting up the machine. The machine may only be installed by authorized personnel with knowledge of the Council Directives 73/23/EEC and the 89/336/EEC and the 89/336/EEC (or similar directives in other parts of the world).

The user is obligated to operate the IP-100-H only in perfect condition.

Unauthorized modifications and alterations affecting the security of the IP-100-H are not permitted.

2.1 Points to be observed

Danger of Suffocation
Dry ice pellets are CO2 in solid form. At ordinary atmospheric pressure, CO2 can only exist in this solid form at temperatures of -79°C (-110°F) or lower. Therefore, during dry ice production, the CO2 will immediately be heated and thus transform from solid form into gas form.
Please note:
Since the specific gravity of CO2 is higher than that of ordinary atmospheric air, the air with its contents of oxygen will be replaced by CO2 if the dry ice production is taking place in small or insufficiently ventilated rooms.



Gaseous CO_2 displaces oxygen, which is essential for breathing, and results in poisoning phenomena in higher concentrations. Adequate fresh air supply must be given the utmost importance. The MAK value (= the maximum concentration to be accepted during which 8 h may be irradiated) of CO_2 gas is 5,000 ppm, i.e. a max. concentration in the air of 0.5 vol. %.

The ICS ice cleaning system s.r.o. company recomended always use CO2 monitoring system in room where is Pelletizer IP100H installed.

Danger of Congelation

CO2 in solid form has a temperature of -79°C /-110°F or lower at atmospheric pressure and can therefore cause serious congelation injuries.

IMPORTANT!

The dry ice is extremely cold, therefore, do not touch parts of the machine,which are in direct contact with the dry ice without wearing appropriate protective clothing and gloves.

The system and piping are pressurized after the connection has beencompleted.

Wear Protective Gloves and googles

Risk of injury on account of flying dry ice pellets or dirt particles. Wear close fitting safety goggles. Risk of hearing impairment. Wear ear-pro-tection aids

Static Electricity

Dry ice can cause electrostatic discharges. However, the equipment is bonded to the ground to minimize electrostatic discharge, and the warning sign is meant to instruct the operator to avoid placing the equipment in rooms containing explosive gasses. It is recommended to use a plastic shovel in the dry ice container.

Dangers can arise from the machine if it is used improperly by untrained personnel. All users must be aware of these safety points. Improper handling of the machine and / or dry ice can threaten health and life, or at least cause serious damage.

Operate the system only in the technically perfect condition as well as in accordance with its intended purpose, safety and danger awareness, and observe the operating instructions!

In particular malfunctions that may affect safety must be promptly remedied.

Note

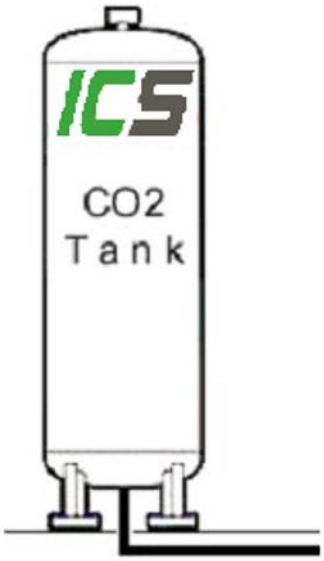
If an immediate interruption of the production is necessary in case of emergency, press the

EMERGENCY switch!

3. Process description

The ICS ice cleaning systems s.r.o. pelletizer IP-100-H produces highly compressed dry ice pellets from liquid CO_2 (carbon dioxide).

Liquid CO_2 is conducted from a low-pressure storage tank into the pelletizer and there is released, producing dry ice snow. The piston, which interacts in the pelletizer, presses the snow through a die into highly compressed dry ice pellets.



CO2- tank

IP-100-H

dry-ice box

4. Technical data of IP-100-H

4.1 table

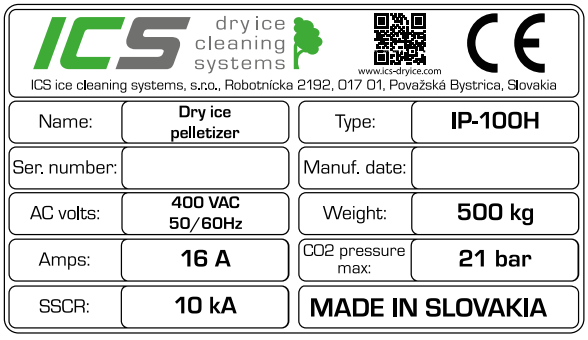
Electrical connection		
Voltage	V	400
Current type		3x400 V AC/N/PE
Frequency	Hz	50
Connected load	kW	7,5
Earthing system		TN-S
Short-Circuit Current Rating (SSCR)	kA	10
Backup fuse	Imax.	32 A
Residual current device (RCD)	mA	30
Dry ice		
Supply pressure, liquid carbon dioxid	MPa (bar)	1,6...2,1 (16...21
Max. moisture content, liquid carbon dioxid	ppm	66
Oil content, liquid carbon dioxide		absolutely free of oil
Diameter of dry ice pellets	mm	3 (optional 1,5/16)
Max. pellet production	Kg/h	
Dimensions IP100H		
Width	mm	890
Depth	mm	1330
Height	mm	1590
Weight	Kg/lb	500/1102
Sound pressure level (EN 60704-1)	dB(A)	90
Dimensions heat exchanger		
Width	mm	440
Depth	mm	400
Height	mm	600
Weight	Kg/lb	40/88
Hydraulic unit		
Quality		16/13 as per ISO 4406
Viskosity		ISO VG 46
Amount of oil	l	50

Warning:

We would like to point out that too moist CO_2 can adversely affect the production performance and even lead to mechanical damage. Use only dry CO_2 liquid for successful operation of the IP-100-H. Do not attempt to operate the machine with CO_2 that contains a higher humidity than specified in the technical data.

4.2 System identification

System is marked with:



5. Transport

Danger: Weight 500 kg. Use loops that are suitable for this purpose!

Lifting points forklift, maximum 670mm wide.

The transport by means of a forklift is possible at the lower attachment points.

6. Assembly and installation

Your new IP-100-H has successfully passed its test run before shipment in ICS ice cleaning systems s.r.o. factory and is fully assembled. The hydraulic unit is already filled with oil.

1. Remove the packaging material and inspect the equipment for transport damage.
2. Check the pipe connections and screw connections for tight fit.
3. The installation of the system should be done as close as possible to the CO_2 tank.
4. Ensure that at least 1m of access space is provided on all four sides.
5. The pelletizer should be placed in a dry place where adequate ventilation is available. A CO_2 gas warning device must be installed.
6. The tank must have a gas sampling, as well as a liquid intake (see technical data). The supply valves should be installed in the pelletizer room. The liquid feed line to the pelletizer must be isolated.

    a) Aligning the system on the ground:
    b) Position the pelletizer in the desired position.
    c) Turn the four adjustable feet with your hand to the floor.
    d) Now set the adjustable feet so that the system is level (water level) and lock it with the upper nut.

7. Connect the pelletizer to a CEE socket.

DANGER:

The electrical wiring must never be laid under cold pipes as condensation forms there.

8. Check the oil level of the hydraulic unit. Filling height: Sight glass 3/4 full.

DANGER:

Never fill the hydraulic unit above 3/4 of the sight glass, as otherwise serious damage can occur!

9. Connect the **CO_2 gas and** liquid pipe from the low pressure tank to the DN20 (3/4 ") inlet. Isolate the supply line (e.g. Armaflex hose AF / B1 H-22 or better)

DANGER:

If the CO2 liquid line is longer than 3 m from the tank, use a minimum DN 50/2 ". Do not use fittings or elbows that will reduce or increase the diameter of the pipe. There must never be chips or other residues in the pipeline!

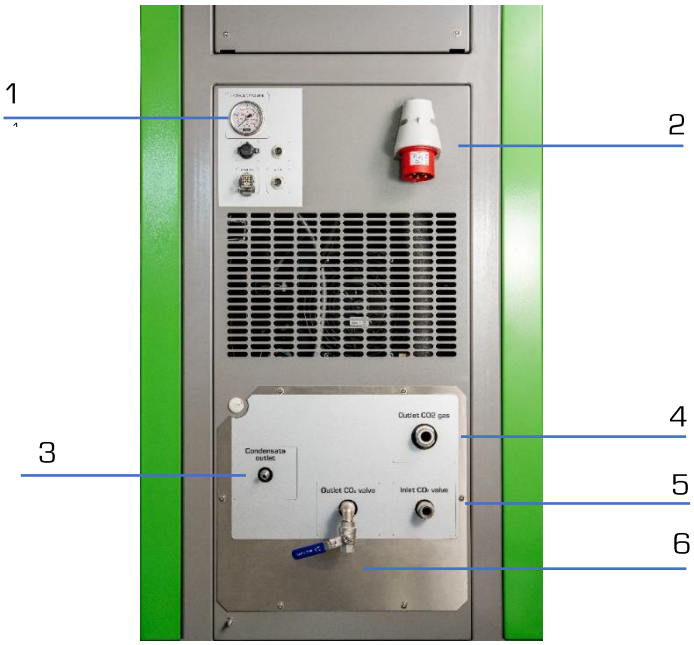
10. Connect the CO_2 exhaust gas pipe to the DN25 (1 ") exhaust gas connection and route it to the outside. For this, use a cold-resistant pipe DN65 (2 ½"). Avoid bends or angles in the exhaust pipe.

7. Overview of the device

7.1 Side view

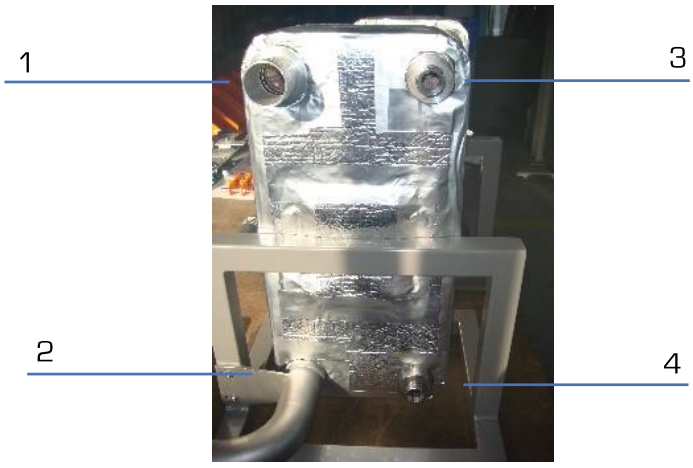
No.	Name	Function
1	Output arc	Align dry ice pellets to the box.
2	Adjustable legs	Adjusting pelletizer height.
3	Electrical cabinet	Electrical connections.
4	Oil level	Hole for oil check.

7.2 Back view



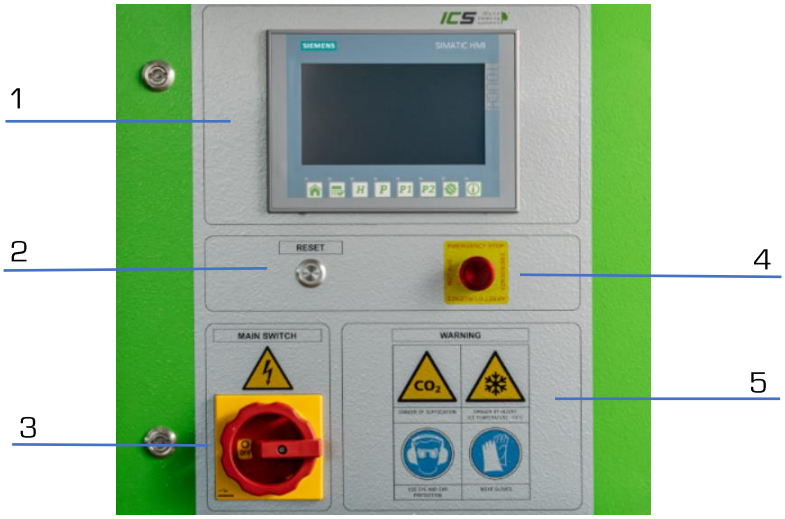
No.	Name	Function
1	Hydraulic pressure manometer	Hydraulic pressure max. 210 bar.
2	Elecrtical socket	CEE 32A 6h IEC60309/DIN EN 60309.
3	Condensate outlet	To relase the condensate water.
4	Outlet CO2 gas	To direct the exhaust gases to the outside.
5	Inlet CO2 valve	The supply of CO2.
6	Outlet Co2 valve	Output from machine

7.3 Heat exchanger



No.	Name	Function
1	Inlet exhausted CO2	From machine to Heat exchanger
2	Outlet exhausted CO2	From heat exchanger out of room
3	Inlet liqiud, gas CO2	From CO2 liquid pipes to heat exchanger
4	Outlet liquid, gas CO2	From heat exchanger to machine

7.4 Panel overview



No.	Name	Function
1	HMI panel	Human machine interface panel
2	Reset button	Reset emergency stop
3	Main switch	Main switch for on/off machine
4	E-stop	Emergency stop

8. Commissioning of IP-100-H

8.1 start up production

1. Remove the cap from outlet arc

2. Check the die for residual ice If ice is formed, deice the die with an industrial air dryer (max.50°C) and then dry and clean with a cloth.

Danger:
Moisture in the cylinder chamber can lead to considerable damage to the system!

3. Close the outlet CO2 valve.

4. Open gas CO2 valve on the tank, wait until pipes are pressurezide and close gas valve. Then slowly open the liquid CO2 line to the pelletizer until the pressure has built up.

Danger:
If this item is not strictly followed, there is a risk that CO2 snow will form in the pipeline! *Explanation: liquid CO2 may only be introduced into a line pre-pressurized in order to maintain the liquid aggregate state, otherwise solid CO2 (snow)*

5. Switch On Pelletizer. Wait until system boot up.
    - Reset emergency stop
    - Switch On hydraulic over HMI panel (more details in capitole 8.3)
    - Switch On production button, program 1 automatic start

Wait until dry ice plate is created. When the pellets production starts press the program 2 button.

- Switch On program 2

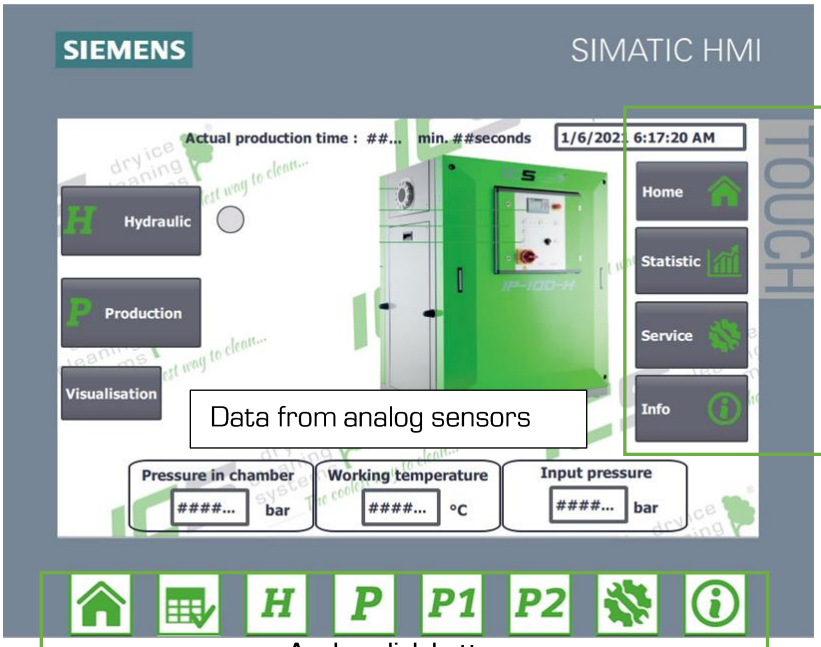
> Danger:
>
> Ensure that the outlet arc is mounted on the extruder head as the production process starts to produce severe dry ice snow ejection on the die before the actual pellet production takes place. There should therefore be no persons in front of the die!
>
> Do not leave pelletizers unattended!

6. Under optimum manufacturing conditions, the temperature display on the display should indicate a CO_2 temperature between - 21 ° C and - 40 ° C (via heat exchanger). If you need a short break press the .Production button, maximum 30 minutes! Then again push production button.

8.2 Stop production

1. Switch off production, hydraulic over HMI button.
2. Close CO2 liquid valve.
3. Open outlet CO2 valve on the machine. Wait until pressure drop to 0 bar.
4. Switch off pelletizer

8.3 HMI panel explane



Home button – Mainscreen
Statistic button – Statistic from Temp. sensor, Input Pressure, Pressure in chamber
Service – screen for maintenance
Info – Screeen where you can see info about your machine (working hour, set time when pelletizer should stop)

Analog click buttons

(All important functions you can manage with this buttons)

To start production CO2 input pressure must be betwen 12-20 bar !!

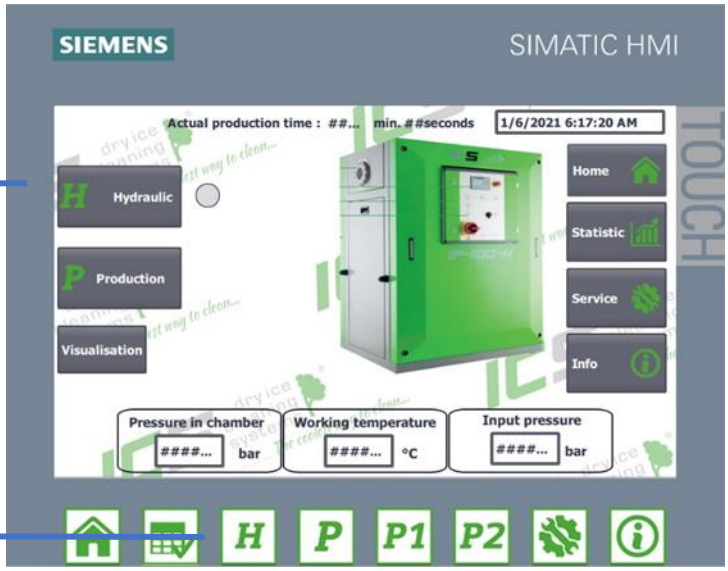
If there is some fault, icon is occur. To reset fault press reset button on the HMI or over button.

Start-up HMI panel

1. After switch on, reset e-stop
2. Push the the hydraulic touch button or push manual button and motor will start.

Hydraulic touch button

Hydraulic click button



3. Production touch button.
    - Program 1 – Program for creation dry ice plate

    When dry ice plate is created (few minutes) you can manualy set program 2.

    - (Program 1->Program2 automatic change after 20min.)

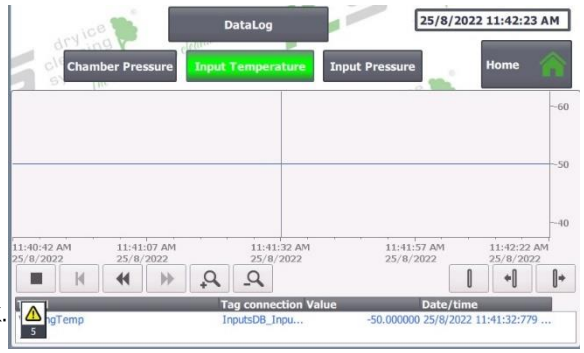
Statistic screen

Graphical diagram from

- Chamber pressure
- Input temperature
- Input pressure

Data log

Datas from sensors are stored to USB stick.

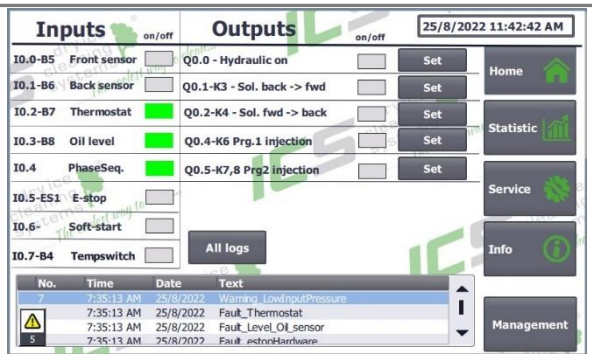


Service screen

Inputs – See inputs from sensors.
Outputs – You can manage your actuators (only)

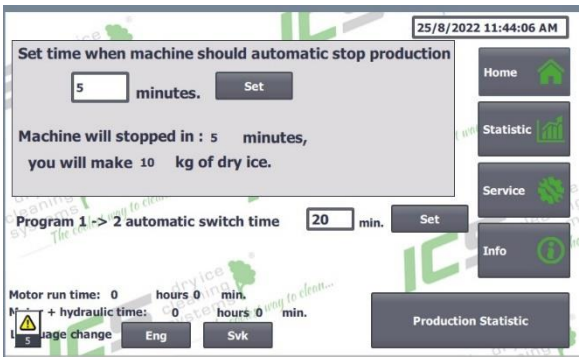
All logs- On this screen you see all faults and warining pelletizers messages.

.

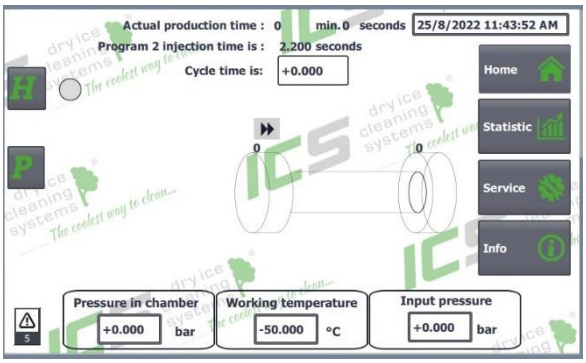


Info screen

There you can adjust when your Pelletizer should Stop program. Adjust time and push set button On main screen you can see how much time you will produce.
To cancel timer click set button once again.
Prograqm 1-2 automatic switch time.
After 20min program 1-2 will automatic change
Production statistic : on this screen you can see your production.



Statistic screen



9.Troubleshoots and maintenance

9.1 Faults

All faults must be repaired and then reseted with reset button.

Fault_EstopHardware

Unlock Estop button then reset fault with touch button on panel.

Fault_Level_Oil_sensor

Check oil level on hydraulic or check -4B8 sensor.

Fault_Thermostat

Oil temperature is over 70 °C, wait for cool down or check -3M2 cooling motor function.

Fault_Softstarter

Check motor protection -1CB1 or check soft starter -1Q2.

Fault_RuntimeBCK->FWD

Piston is moving from backward position to forward position more then 25 seconds. Check front sensor -4B5. There can be fault also on hydraulic agregat- low pressure.

Fault_RuntimeFWD->BCK

Piston is moving from forward position to backward position more then 25 seconds. Check back sensor -4B6. There can be fault also on hydraulic agregat- low pressure.

Fault_HighChamberPressure

In chamber is more than 8bar! Check exhaust line.

Fault_PhaseSequenceCheck

Check -1K1 relay. Phases (L1,L2,L3) are out of sequence or Neutral line is missing (N).

Fault_BrokenWireTempSensor

CO2 temperature sensor -4B3 is disconnected or broken.

9.2 Warnings

Warning_LowInputPressure

Your input CO2 pressure is lower than 12bar.

Warning_HighInputPressure

Your input CO2 pressure is bigger than 20bar.

Warning_CallService

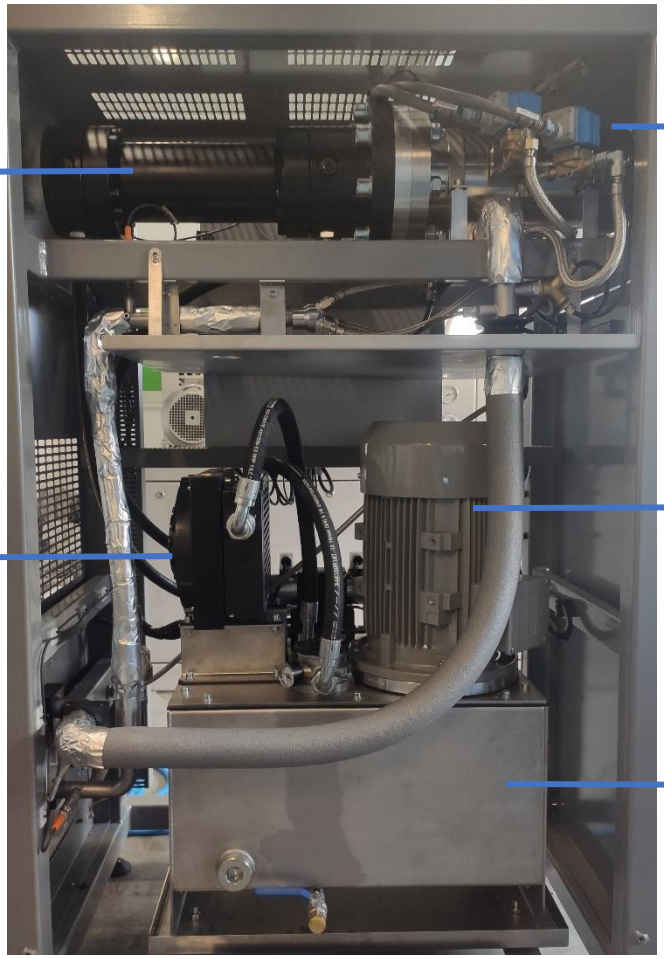
Every 1000 production hours Inform ICS service team for preventive maintenance.

Warning_ThermoswitchCooling

Hydraulic cooling motor is running.

9.3 Maintenance

Inside machine



Your IP-100-H has been designed with a long service life, but requires a minimum of maintenance to maintain it. The display also shows a message when a service is pending and what needs to be done.

Daily

1. Check the pipe for leaks.
2. Place cap after end of production.
3. Check the exhaust pipe for free passage.
4. Pay attention to leaks.

Every 1000 hours or once a year

1. Drain the oil from the hydraulic unit through the drain plug and
2. refill up to 3/4 of the suction gas.
3. Replace the filter element of the return line.
4. Check hoses, hydraulic lines and bearings.t
5. Check piston CO2 solenoids, exchange gaskets, tighten the screws.

The work according to point 4 may only be carried out by qualified technicians of the company ICS ice cleaning systems s.r.o.

Danger:
More frequent cleaning may be required if the IP-100-H is operating under dusty conditions.
Failure to observe maintenance will void the warranty!

10. Waranty

The warranty for this product IP-100-H basic is 12 months , excluded seals , hydraulic hoses and wearing parts.

The warranty of the hydraulic unit is limited on 12 month according to the warranty terms of the supplier of these parts.The warranty is only valid if the products are used according to the operating instructions, as well as maintenance intervals described in the accompanying manual. Are done in time.The guarantee for products manufactured by ICS ice cleaning systems s.r.o. is valid according to our general business terms. Warranty claims on supplier products used in ICS ice cleaning systems s.r.o products are assigned to the customer.

The warranty period begins with the delivery date. The guarantee claim includes the exchange or the repair of defective products or assemblies, if they have been approved by ICS ice cleaning systems s.r.o as such.

The repair or replacement is carried out within the guarantee period by a technician of the company ICS ice cleaning systems s.r.o, either in the company's own workshop, or free of charge at the customer's premises. Travel and transport costs are not included in the warranty.

If the product can not be repaired despite several efforts, ICS ice cleaning systems s.r.o is entitled to replace the product completely.

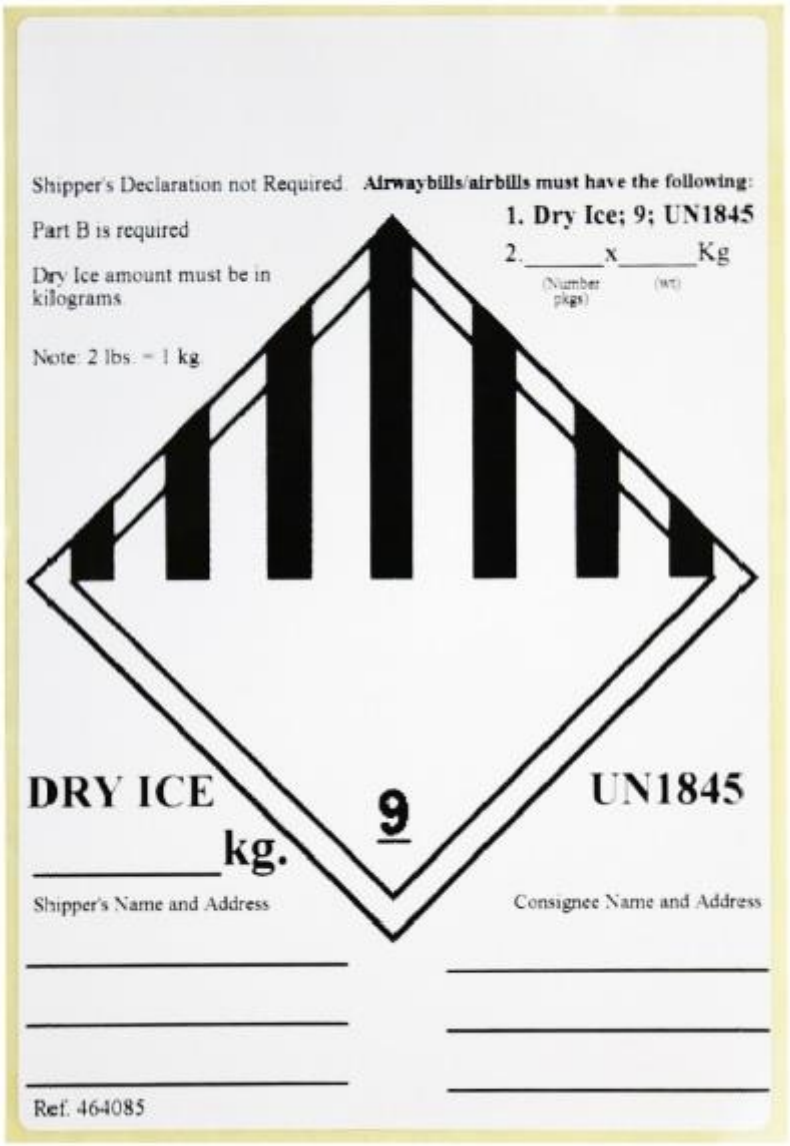
All parts and materials exchanged for repairs are the property of ICS ice cleaning systems s.r.o. A continuous use of those parts is not included in the warranty. Any warranty claims must be submitted in writing to ICS within 30 days after the defect has occurred. Upon expiry of this period, the company ICS ice cleaning systems s.r.o reserves the right to refuse any claim to warranty. The following damages are not included in the warranty: ICS is not res;ponsible for the following damages:

- Damage due to improper handling, accidents, improper storage, transport damage, unnatural working environments
- Mutual, incidental, special damage
- Replacement of wearing parts
- Failure to comply with the recommended maintenance intervals, replacement intervals, operating instructions, specifications, or other contractual components
- Labor costs, losses or damage due to insufficient performance, maintenance or repair work by other than ICS technicians
- Improper use of the products. ICS can not be held liable for consequential damages, even if contracts or production quotas can not be fulfilled.

These are the basic warranty regulations of the company ICS ice cleaning systems s.r.o. Other warranties are expressly excluded.

11. Identification of dry ice

Dry ice boxes are subject to the dangerous goods regulations and must be marked accordingly. The weight must be expressed in kg! Special marking class 9 - UN 1845.



12. Pelletizer mouting plane

(see in attachment)

13. Hydraulic plan

(see in attachment)

14. Electric plan

(see in attachment)

15. CE declaration of conformity

(see in attachment)