ICS ice cleaning systems s.r.o.
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Version: 24-01

Original Operations Manual

Blasting machine

IC-430

Content

1 Introduction and copyright

This operating manual explains the safe and defect-free usage of the IC-430 dry ice blasting equipment. Every person operating this equipment must have fully read and understood the instructions given in this manual before putting the equipment into operation. Please keep this manual safe and always 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:

- 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.

Any change in the operating procedure requires the written consent of the manufacturer of the IC-430:

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Copyright

The illustrations are different equipment variants.

1.1 System identification

Machine identification plate location

EU identification plate

ICS dry ice cleaning systems
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ICS ice cleaning systems, s.r.o., Robotnícka 2192, 017 01, Považská Bystrica, Slovakia

Name:	Dry ice blasting machine	Type:	IC-430
Ser. number:		Manuf. date:	
AC volts:	230V AC / 50 Hz	Weight:	124 kg
Amps:	2,5 A	Pressure max:	16 bar
SSCR:	10 kA	El. drawing number:	430-02

UL identification plate

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ICS ice cleaning systems, s.r.o., Robotnícka 2192, 017 01, Považská Bystrica, Slovakia

Name:	Dry ice blasting machine	Type:	IC-430
Ser. number:		Manuf. date:	
AC volts:	110V AC / 60 Hz	Weight:	275 lb
Amps:	2,5 A	Pressure max:	230 psi
SSCR:	10 kA	El. drawing number:	430-02

2 Safety instructions

The safety guidelines delineated below are critical for ensuring the safety of operators and other involved individuals, as well as the secure operation of the equipment.

Security and Risk

The IC-430 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 user is obligated to operate the IC-430 only in perfect condition.

Unauthorized modifications and alterations affecting the security of the IC-430 are not permitted.

2.1 Definitions of Responsible Persons

Operator

An operator is an individual or a legal entity operating the blasting machine, or on whose premises the blasting machine is being operated. The operator must ensure that the device is utilised solely for the intended purpose, and in adherence with all safety guidelines provided in this operations manual. The operator must ensure that all users of the machine have read and understood the safety guidelines. The operator is responsible for scheduling and proper execution of regular safety checks. Adherence to national performance standards is strongly advised.

Qualified Professional

A qualified professional is an individual who is employed by the manufacturer, or an individual who meets the following criteria:

- Possesses a completed professional qualification that demonstrably proves their professional competence, such as an apprenticeship certificate or an equivalent credential.

- Has demonstrable work experience proving that the qualified professional possesses the necessary expertise. The qualified professional should be familiar with various potential indicators necessitating further examination, based e.g. on risk assessments or routine inspections.

- A qualified professional must have experience in performing the aforementioned tests, or similar tests. In addition, a qualified professional shall stay updated on the current technological advances pertinent to the tested equipment and assessed risks.

Operating Personnel

The dry ice blasting machine can only be operated by personnel who have completed the necessary operations training and proved their competence to operate the equipment to the designated representative of the operator. The operating personnel shall at all times use suitable PPE (protective clothing, safety shoes, safety glasses, gloves). Safety shoes must be worn at all times for safety reasons. The operating personnel must be familiarised with the operating instructions, which should be readily accessible to them at all times.

The operating personnel must:

- Read and understand the operating instructions.
- Be familiar with the safe operation of the blasting machine.
- Be physically and mentally fit to use the blasting machine.

WARNING

The consumption of drugs or alcohol impairing reaction time renders an individual unsuitable for operating the blasting machine! Individuals under the influence of the aforementioned substances are strictly prohibited from interacting with the blasting machine!

2.2 General safety guidelines

Danger

- Intentional Misuse of Dry Ice May Be Harmful or Fatal.
- Dry ice is a skin and eye irritant. Avoid contact with skin, mouth, eyes, and clothing. May cause severe frostbite or burns.
- Dry ice is harmful if eaten or swallowed. If eaten, seek medical help immediately.
- Dry ice changes to CO2 gas as it sublimates (melts). Do not use or store in a confined space.
- Do not place dry ice in airtight containers. Airtight containers may explode as dry ice converts to CO2 gas.

CO2 concentration

Risk of suffocation on account of carbon dioxide. Dry ice pellets are CO2 in a solid form. At normal atmospheric pressure, CO2 can only exist in a solid form at a temperature of -79°C/-110°F or lower. When CO2 is used as a blasting medium, it becomes heated and changes into a gaseous form. As CO2 has a higher specific gravity than ordinary atmospheric air, inhaled air will contain CO2 – especially if the blasting process takes place in small or partly closed rooms. In such conditions there is a risk of the oxygen content of inhaled air being replaced by CO2. Therefore, it is essential to make sure the room is well ventilated when dry ice blasting!

- low CO2 concentrations (3-5%) result in headaches and rapid breathing,
- CO2 concentrations of (7-10%) produce headaches and nausea, and may lead to unconsciousness,
- higher CO2 concentrations lead to unconsciousness and in the worst case – suffocation.

As stated above, high CO2 concentrations can displace oxygen and result in unconsciousness. Therefore, avoid using the dry ice blasting machine in spaces/rooms where ventilation is limited.

CO2 detector

The presence of a CO2 detector is recommended in areas of limited ventilation such as rooms, closed tanks, etc. The CO2 detector must be installed to interrupt the blasting process before the CO2 concentration exceeds a prescribed limit.

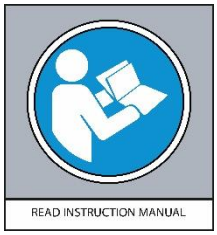
Improper Usage

he manufacturer disclaims any liability for risks arising from improper use of the blasting machine. Such risks are solely the responsibility of the operator or operating personnel.

CAUTION
The use of this device for purposes other than those outlined in the manual is strictly forbidden.

- The blasting machine must not be used in environments with an increased risk of fire or explosion, corrosive environments, or environments with a heightened presence of dust.
- The specified performance parameters of the device must be adhered to at all times.
- The device must not be used if the intake hoses or blasting hoses are damaged.
- The blasting machine must not be used if there is a possibility of unintended movement.

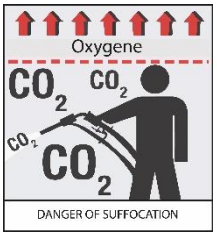
2.3 Symbols on the machine



READ INSTRUCTION MANUAL

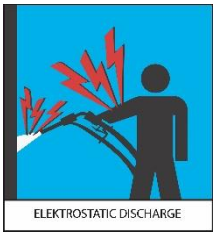
DANGER OF INJURY THROUGH CO2

USE EYE AND EAR PROTECTION



DANGER OF SUFFOCATION

WEAR GLOVES



ELECTROSTATIC DISCHARGE

WEAR LONG SLEEVED INDUSTRIAL CLOTHES

DANGER OF INJURY ICE TEMPERATURE -79 C

Note

In the event of an emergency requiring immediate cessation of blasting, activate the

EMERGENCY stop button.

2.4 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.

Serious discharge of static electricity can occur. Always make sure that objects to be cleaned are adequately earthed/grounded and that this earthing/ grounding remains stable throughout the whole cleaning process. The dry ice blasting machine is earthed/grounded, from machine cabinet to blasting gun, and through the main electricity connection on the rear side of the machine – provided that the machine has been set up and connected as described under STARTING MACHINE.

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

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.

Persons having a pacemaker are **not allowed** to work with the dry ice blasting machine.

2.5 Explosive Hazard

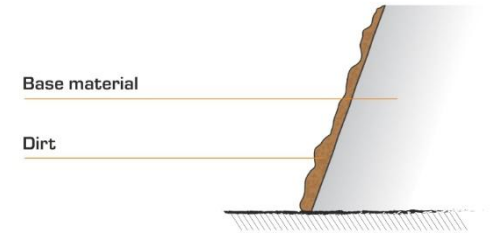
Attention!

The machine must never be used in surroundings where there is a **danger of explosion**. Despite optimum earthing/grounding of both machine and cleaning object, static electricity can be generated and create a spark.

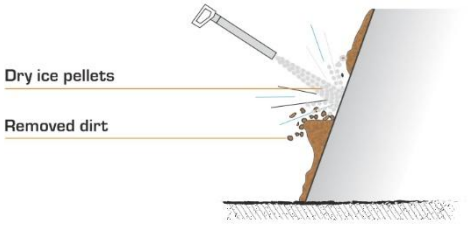
3 Process description

The dry ice blasting equipment IC-430 operates with granules of dry ice pellets (ø 3 mm), produced through the pressing of the 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 CO_2 granulate sublimes in the moment of impact from solid to gaseous state. Only the initial dirt remains behind.

BEFORE CLEANING

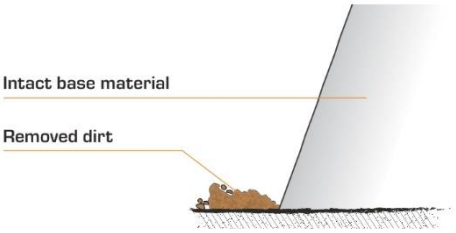


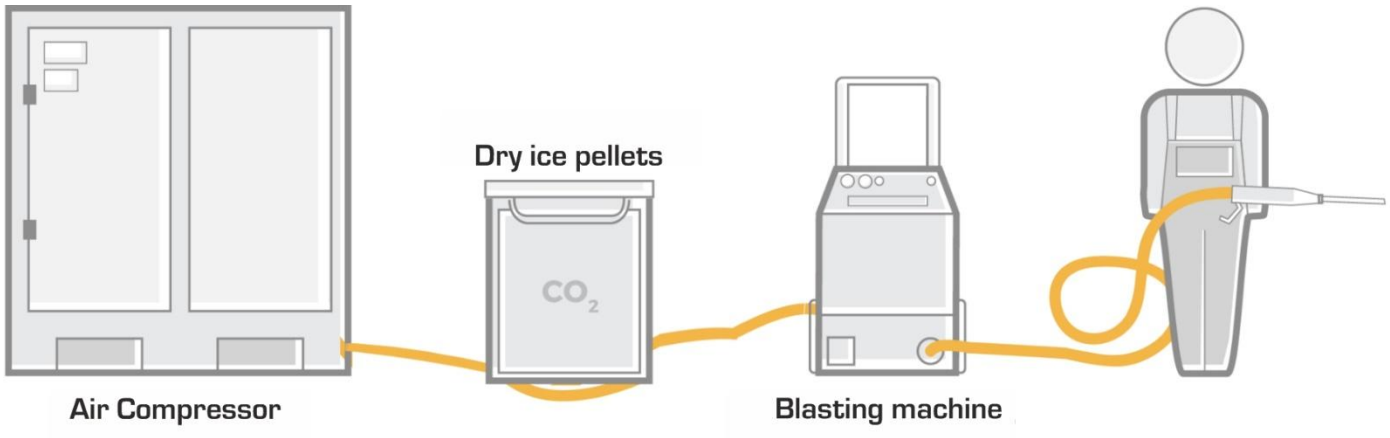
DURING THE CLEANING PROCESS



The dry ice pellets in the hopper (ø3 mm) will be mixed using a compressed air operated dosing system, transported through the hose and accelerated through the blasting nozzle, the pellets can reach the speed of sound (depending on pressure and blasting nozzle).

AFTER CLEANING





4 Machine technical data

Technical data

Electrical connection		
Supply voltage	V	110- 230 VAC/N/PE
Nominal apparent power	W	300
Frequency	Hz	50
Cos ϕ		0,96
Short-Circuit Current Rating (SSCR)	kA	10
Leakage current, typ.	mA	7,5
Residual current device (RCD)	mA	30
Dimensions IC-430		
Width	mm/inch	540/21
Depth	mm/inch	854/34
Height	mm/inch	980/38
Weight	kg/lb	124/265
Contents of dry ice container	kg/lb	25/55
Sound pressure level (EN 60704-1)	dB(A)	90 to 120
Compressed air		
Pressure supply min. - max.	bar/Psi	1-16/ 15- 230
Compressed air consumption	Nm3/min:	Up to 15 m3/h depend on nozzle

5 Setup and function

5.1 Unpacking the machine

The standard machine package will include:

- 7 m blast hose
- Personal protective equipment
- Blast gun IG-10-E
- Grounding kit 5m
- Round nozzle RN-10-10
- Flex case II. PLUS
- LED light for gun IG-10-02
- 10 m compressed air hose ¾"
- Ice shovel (2kg/4,4lb capacity)

This machine has been assembled and tested as one unit prior to shipment. Follow the steps below to inspect and unpack the machine from the shipping container.

1. Examine the shipping container for any damages that may have occurred during transport.
2. Remove the machine. Recycle boxes and packaging.
3. Examine the machine for any external damage that may have occurred during transport.

Refer to the packing slip for a list of the components shipped with the machine. Contact ICS ice cleaning systems s.r.o. if any damage has occurred to the shipping container or the machine.

Only trained and/or certified personnel should operate or rig the machine for shipment or move.

5.2 Transport and storage

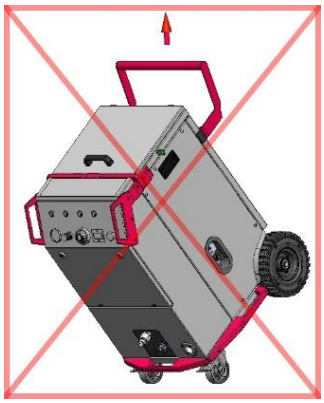
The following instructions are for proper transport of the machine. Follow all instructions as illustrated to avoid damaging the machine. It is recommended that only trained and qualified personnel use and move the machine.

- The handling handles on the machine for manual handling are marked in blue.

- Lifting the machine is allowed only according to the displayed image. A pair of transport bolts is used for lifting. Strapping the machine for long periods of time is not advised.

- It is forbidden to lift the device other than as shown in the picture.

Do not lift the machine using the front handlebar, upper handlebar, or the lower bumper as there will be no stability which could cause damage to equipment or harm to personnel.



5.3 Machine illustrations and labels

Front view

No	Name
1	Manipulation holders for accessories
2	Control panel
3	Electrical cabinet
4	Front lockable wheels

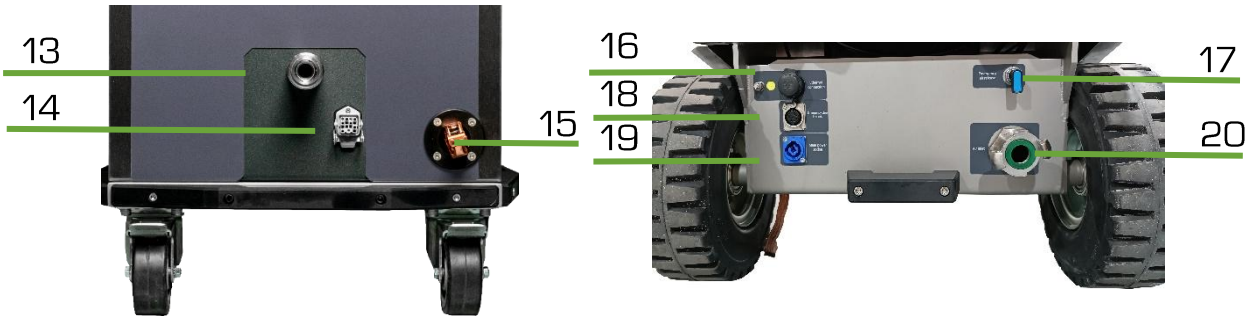
Back view

No	Name
5	Back manipulation handle
6	Front manipulation handle
7	Ground conductor, loose
8	Back foot manipulation handle

Side view

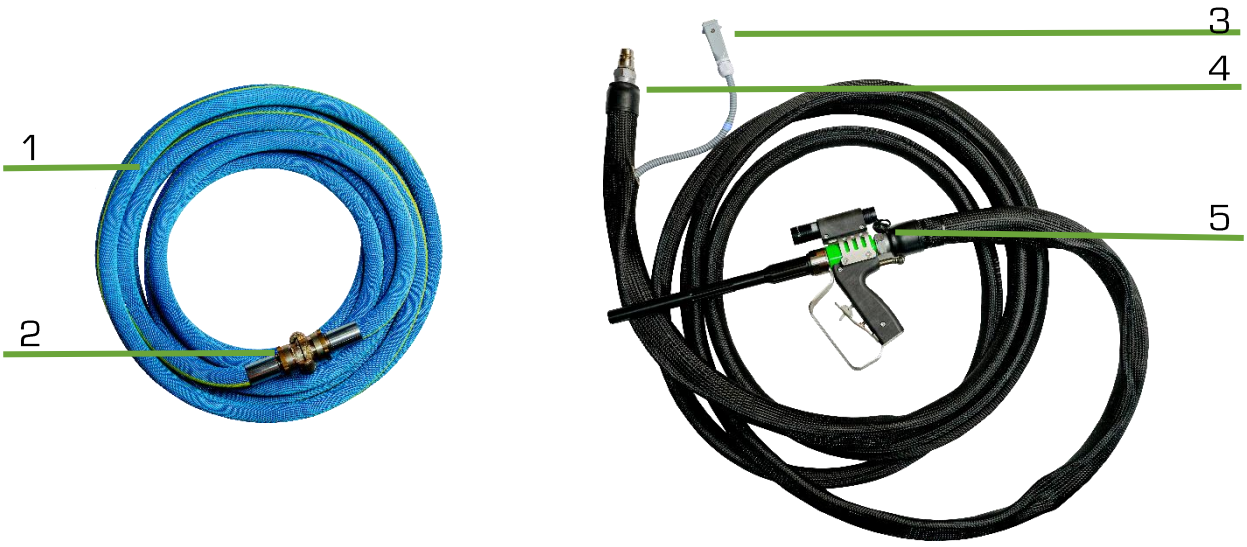
No	Name
9	Tiltable hooks for accessories
10	Back manipulation holder
11	Removable side cover
12	Side holder

Front and back connection plate



No	Name
13	Blast hose connection point
14	Applicator Cord connection
15	Static Ground Reel
16	Ethernet connection
17	Emergency pressure air release valve
18	Emergency interlock connector
19	Power supply connector
20	Inlet air connection

Connection hoses



No	Name
1	Inlet air hose
2	Claw coupling
3	Signal cable to dry ice blasting machine
4	Hose coupling to dry ice blasting machine
5	Dry ice blasting gun

Dry ice blasting gun

No	Name
6	LED light
7	Signal cables coupling
8	Ergonomic handle
9	Two step trigger
10	Hand safety cover

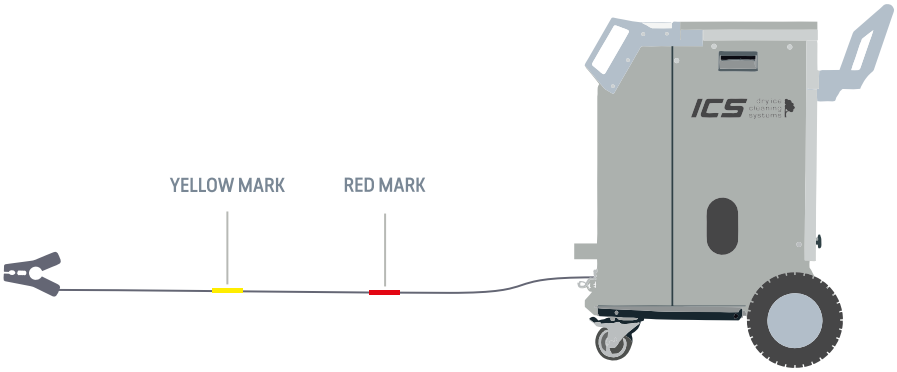
5.4 Control panel

No	Name
1	Main switch
2	7inch HMI touch panel
3	Encoder button
4	Emergency stop

5.5 Device Grounding Procedure

1. Connect the device to the building's grounding terminal.
2. Use the supplied grounding kit to connect the object being blasted to the primary grounding terminal.

The grounding kit on the device is marked as follows:
Yellow mark: 2m from the end of the rope. / Red mark: 1m from the end of the rope.
Extending the rope beyond the red mark may result in damage to the grounding kit!!!



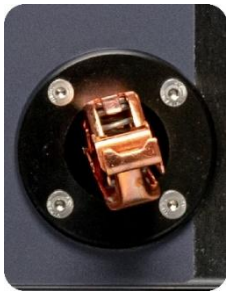
5.6 Starting machine

1. Make sure the machine is on a level, horizontal surface, and that the wheel brakes are applied.
2. Connect the compressed air hose using **the claw coupling by rotating** the hose coupling in a clockwise direction until it snaps into place two times.
3. Insert the plug of the power cord and turn it to the right until it locks by itself. Insert the grounded plug in a suitable socket.
4. Connect the signal cable at both ends of the blasting hose with the sockets on the front of the machine and the blasting gun.

CORRECT ORDER IS IMPORTANT!
FIRST connect the blasting hose couplings, then the signal cable.

5. Open the external compressed air supply (slowly).

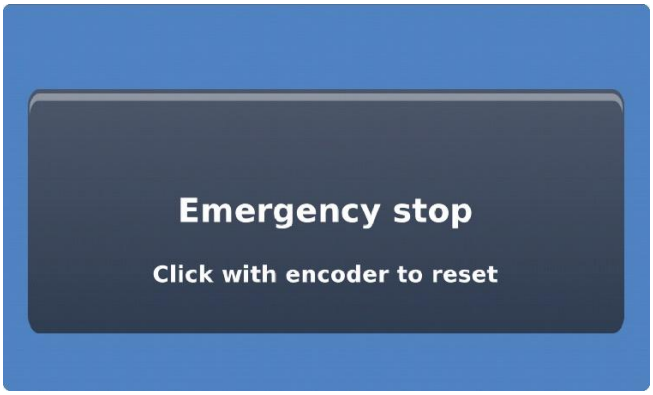
6. Machine is equipped with a Static ground Cable which is mounted on the front of the machine. Connect the Static Ground Cable to the item being blast cleaned or to an electrically conductive supporting structure of the material.



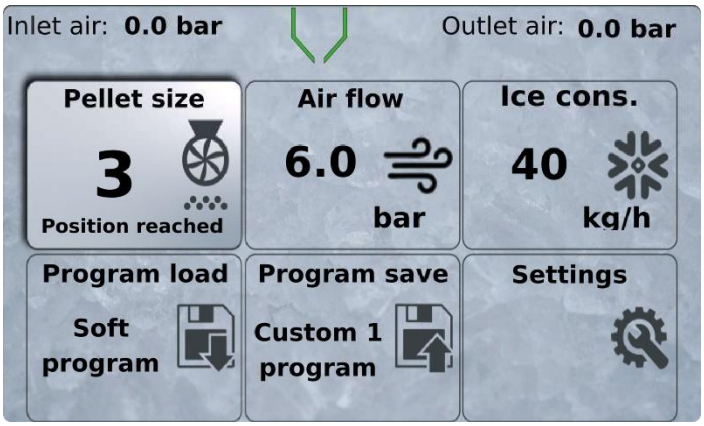
7. Control panel procedure:

Push" Main Switch" button.

Release the E-stop button and then press the button on the control wheel to reset the e-stop.



Set the necessary parameters on the machine. More information chapter 5.9



8. Lift the lock pin and activate the trigger on the blasting gun for a few seconds to allow air to flow through the system. This checks for moisture in the airstream and proper operation of the dosing disc, vibrator, and regulator.

Please note:

Before activating the blasting gun switch, the operator must be in a safe and stable working position. Depending on the jet pressure, the recoil on the jet gun also changes. At the highest jet pressure with the largest nozzle diameter, the recoil force can amount to 10 kg / 22 lbs, which is why it is ensured that the operator does not lose balance.

9. Open the hopper using the handle
10. Put dry ice into the hopper using the scoop, only pour in the amount you will need for cleaning.

Warning:

If the blasting is interrupted for more than 20 minutes, do not keep dry ice in the hopper, there is a risk of freezing the system!!!

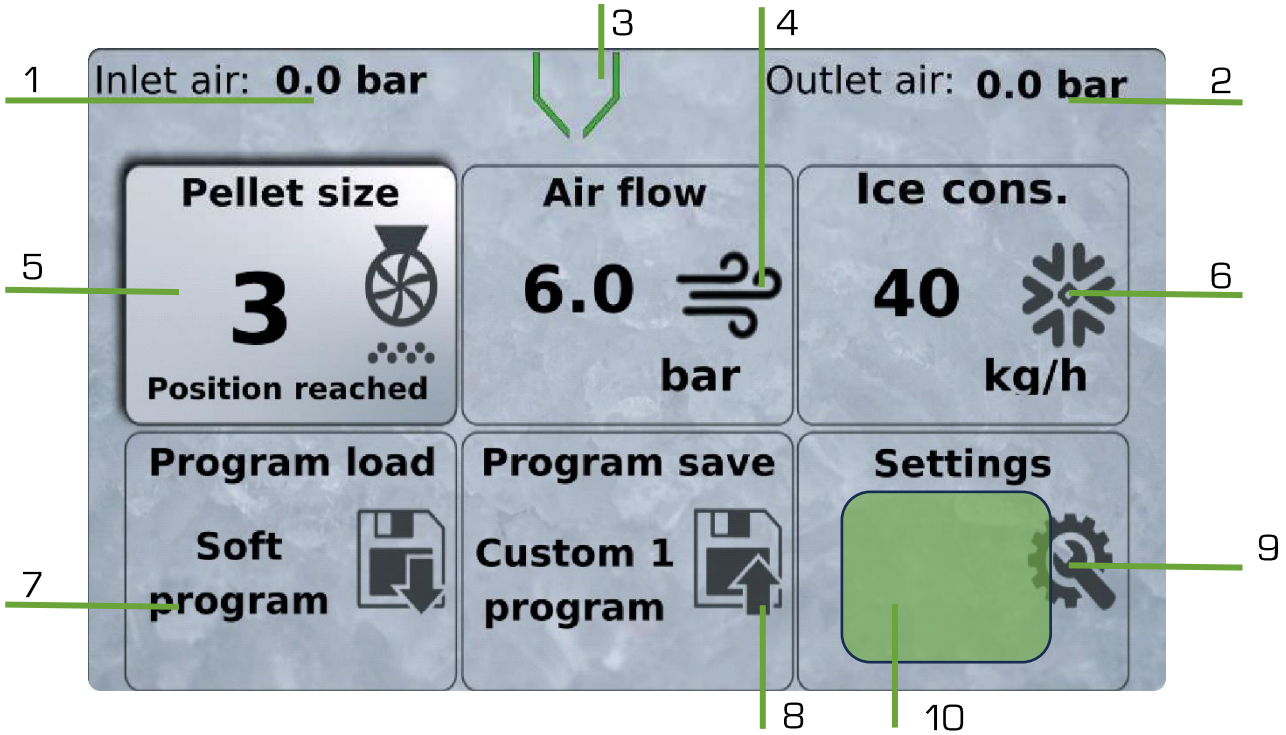
11. Close the hopper, the machine is ready for blasting.

5.7 Shutting down the machine

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. Actuate the Off button.
5. Turn off the main switch.
6. Disconnect the power supply cable.
7. Detach the power plug and the air hose from the equipment.
8. Disconnect the hose package and roll it up.

5.8 HMI panel

5.8.1 Main screen

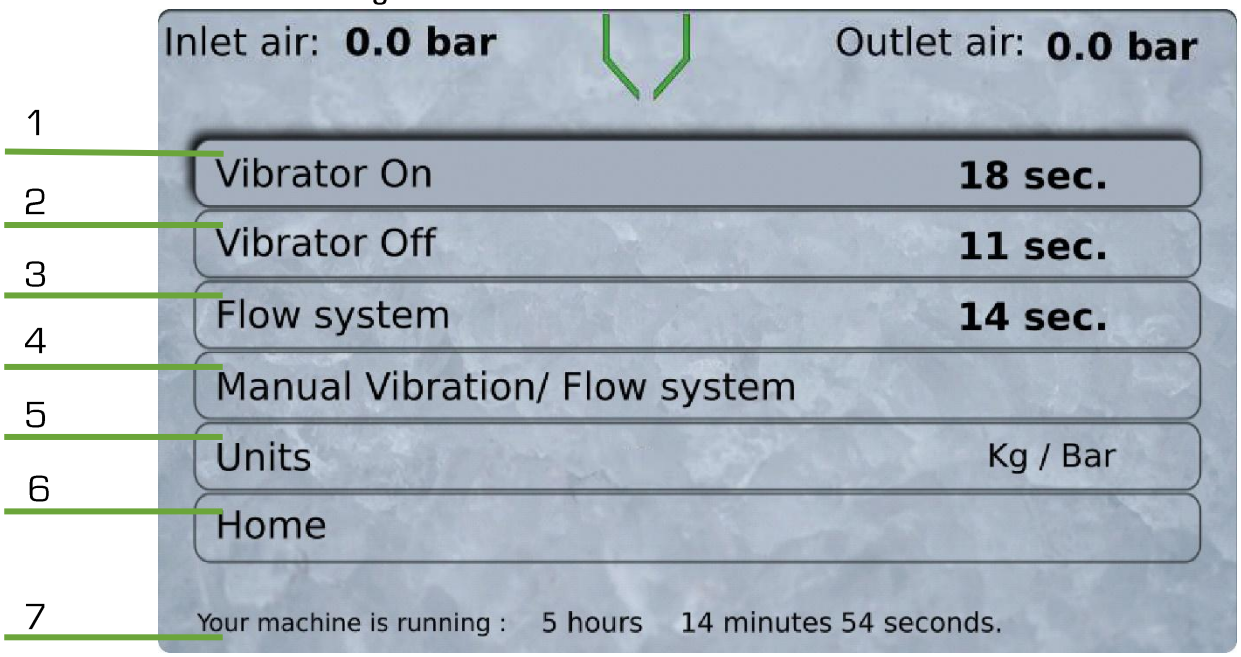


1. **Input Pressure:** If it flashes red, it means that the set pressure for blasting exceeds the input pressure of the device. If the inlet pressure drops below 1 bar, the unit will automatically switch to air blast mode to protect the systems.
2. **Output pressure indicator:** The pressure is 1 bar lower. When the gun is switched on, it will adjust to the desired blast pressure selected by the operator.
3. **Tray ice level indicator.**
4. **Dry ice consumption setting:**

   The maximum dry-ice consumption depends on the pellet grinding size setting.

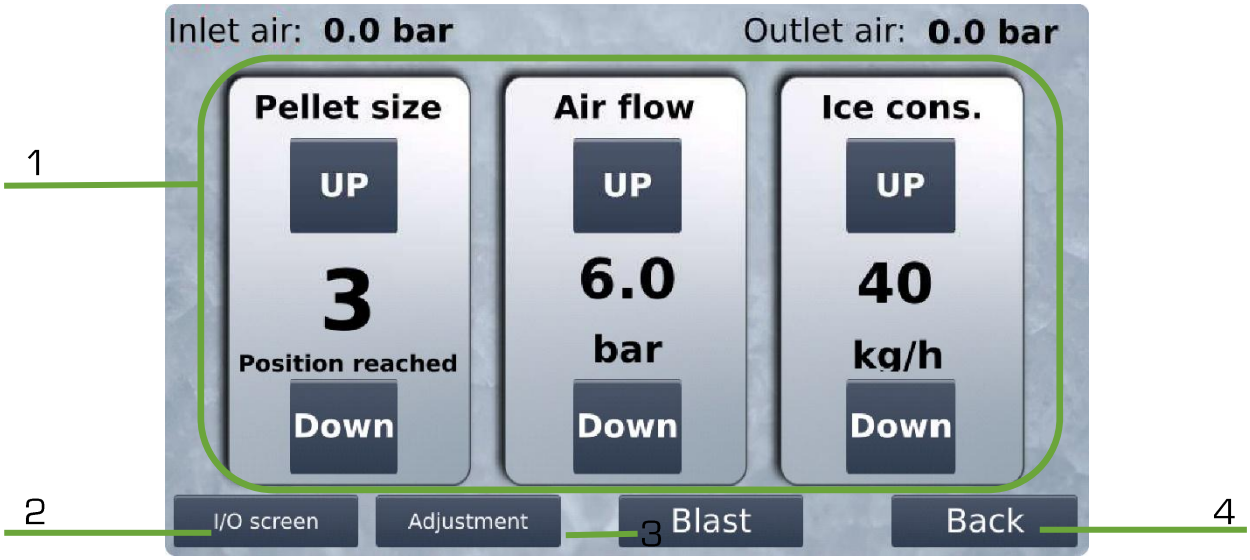
   - Air blowing
   - 10-100 kg/h = depending on the position of the grinder.
   - 100- 120 kg/h = when the grinder is fully open.
5. **Blast pressure adjustment:**
6. **Pellet grinding size.**
7. **Program load:** Possibility to load cleaning parameters: fine, medium, hard cleaning. The operator can save the current cleaning parameters under the program name custom1 and custom2.
8. **Program save:** After setting the parameters and selecting the desired saving of the custom1 or custom2 program, they are saved under the selected.
9. **Settings:** For the machine settings screen see chapter 5.9.2.
10. **Hidden touch button:** When touched for 3 seconds the HMI touch screen is loaded.

5.8.2 Settings screen



1. **Vibrator On**: Adjustment vibrator ON time
2. **Vibrator Off**: Adjustment the vibrator OFF time
3. **Flow System**: Set the frequency of the flow system.
4. **Manual Vibration / Flow system**: manually turn on the vibration + flow system.
5. **Units**: Switch between KG / BAR or LB / PSI
6. **Home**: Back to main screen
7. Hour counter

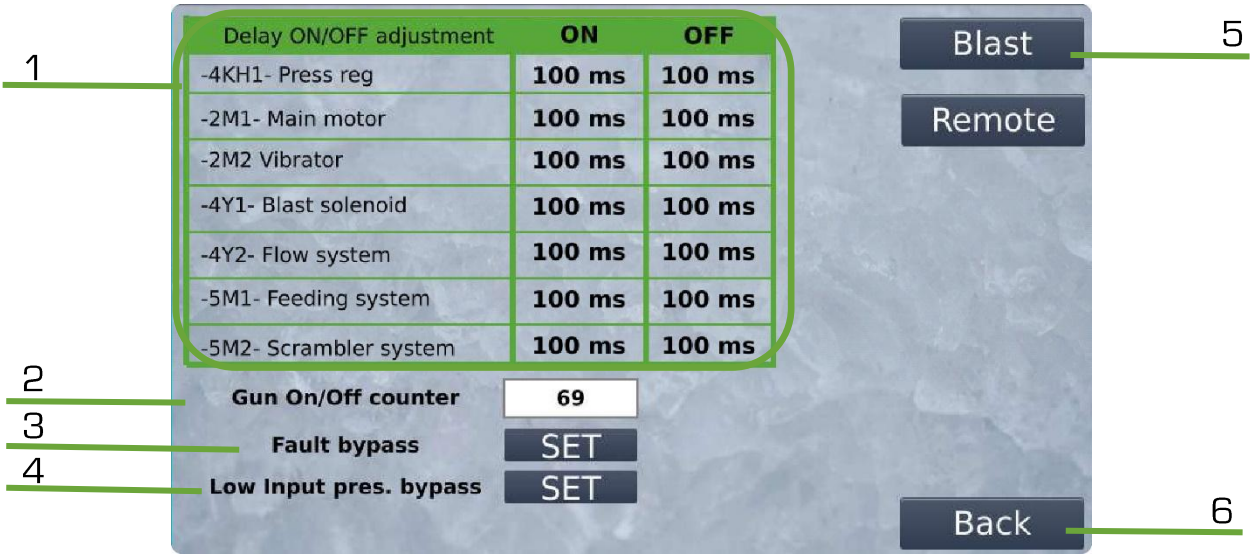
5.8.3 HMI touch screen



1. Touch blasting adjustment parameters.
2. Input/Output screen.
3. Adjustment.
4. Back to main screen.

Only an ICS service technician can adjust the parameters in the adjustment screens.

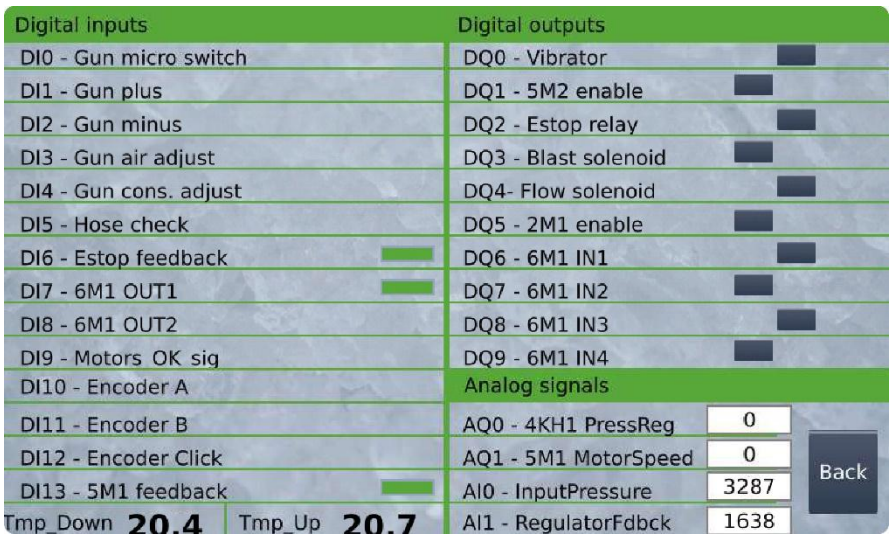
5.8.4 Adjustment screens



1. Adjustment table: Time delay for blast ON / OFF.
2. Gun switch counter.
3. Fault bypass: disable all faults.
4. Low input pressure bypass: Disable low input pressure function.
5. Blasting button: Manual blasting button for testing.
6. Back: Back to main screen.

Input/Output screen.

Reading machine inputs/outputs used for machine diagnostics.



6 Troubleshooting and maintenance

6.1 Preventive maintenance

Thanks to its practical structure, the IC-430 equipment only requires a very low maintenance.

For the IC-430, 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 or with an ICS authorised partner.

6.1.1 Daily maintenance

1. Check the power supply cable and signal cable.
2. Pay special attention to places on the blasting hoses where kinks may have occurred during operation.

If any kind of damage to the blasting hose or the machine itself is noted, such damage must be repaired either by an ICS technician or by the owner's qualified personnel who has been trained by ICS in the repair and maintenance of dry ice blasting machines and accessories. Beyond the necessary knowledge, the person concerned must have appropriate tools and equipment, as well as the auxiliary materials required, at his disposal.

6.1.2 Safety Mechanisms Check

Perform a check of the safety mechanisms every three months to ensure their correct function and effectiveness.

EMERGENCY STOP Button Check

1. Press the red EMERGENCY STOP pushbutton to check its function; the button should remain in the pressed position and all movements of the device should immediately cease.
2. Rotate the EMERGENCY STOP pushbutton to the right to release it. The device should remain deactivated.

SAFETY SENSOR FOR SIEVE PRESENCE Check

1. Verify that the safety proximity sensor, which checks the presence of the hopper sieve, is functioning correctly. Upon removal of the sieve, all movements of the device should immediately cease.
2. After reinserting and securing the sieve with screws, the device should remain deactivated. The device should only reactivate upon resetting using the RESET button on the control panel.

If any deficiency, damage, or malfunction is detected during the aforementioned procedures, the operating personnel should immediately cease the checking procedure and deactivate the MASTER SWITCH.

Due to the components used to ensure safe access to potentially dangerous internal areas with high values of PFHD and MTTFD, the frequency of access does not affect the service life of the device's safety mechanisms. The minimum service life of the safety components is 20 years.

6.1.3 1000 hours maintenance

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. Cleaning control air filter, replacing filter.
5. Checking the pneumatic control elements, checking for leaks and replacing the shock absorber.
6. Complete electrical inspection, including contacts, voltage converter, frequency inverter, electric motor, firm seating of elements and terminals.
7. Checking the entire ice dosing system for signs of wear, if it is functional and leak-proof.
8. Checking the functioning and firm seating of the vibrator
9. Checking the ice loosening system, including the electro-pneumatic control, for signs of wear, if it is functional and safe for use.
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.

6.2 Faults

Faults from the PLC control panel:

Num.	Description	Corrective Action
Alarm 1	4BP- Input pressure sensor fault	Check the input pressure sensor
Alarm 2	4KH1- Pressure regulator fault	Check the pressure regulator
Alarm 3	6M1- Position motor feedback missing	Check power supply to motor 6M1
Alarm 4	6M1- Position motor not homed	Check motor 6M1
Alarm 5	5M1- Scrambler motor feedback missing	Check power supply to converter 5U1 and motor 5M1
Alarm 6	2M1-5M2- Feedback from motors	Check power supply to converters 2U1, 5U2 and motors 2M1, 5M2
Warning 1	Low battery	Low battery in PLC
Warning 2	Baterry is not inserted	Battery not detected

Process faults on the machine:

Problem	Description	Corrective action
Loss of the blasting function due to the formation of a dry ice pellet cluster in the hopper throat	Due to atmospheric conditions and the long presence of dry ice pellets in the hopper, pellet clusters form and the blasting function is lost	Comply with the operating conditions. 1. Disconnect the machine from the power supply 2. Unscrew the hopper grid (simultaneous rotation- loosening of both screws). 3. Physically remove the ice cluster. 4. Reassemble the protective cover. (The presence of the protective cover is detected by a sensor) 5. Start the machine.
The equipment cannot be started	The Reset button is lit despite actuation.	Unlock the Emergency Stop button by pulling it. Check the hopper grid for firm seating.
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 and the blasting tube are not optimally combined with one another and adjusted to each other.

7 Repair 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.

The spare parts which fail 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.

Warranty conditions

The warranty becomes void in the following cases:

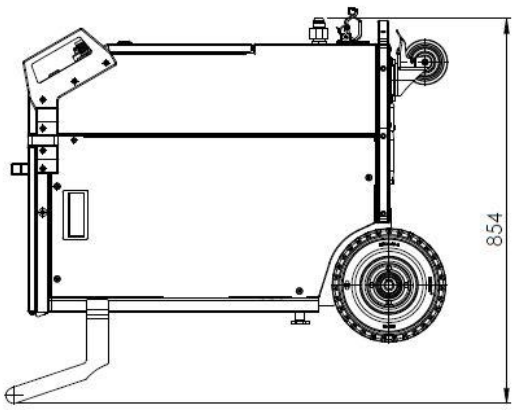
- incorrect handling of the IC-430 equipment.
- using non-original spare parts.
- works at the IC-430 equipment carried out by unauthorised persons.
- using materials different than dry ice.
- noncompliance with the requirements regarding compressed air quality.

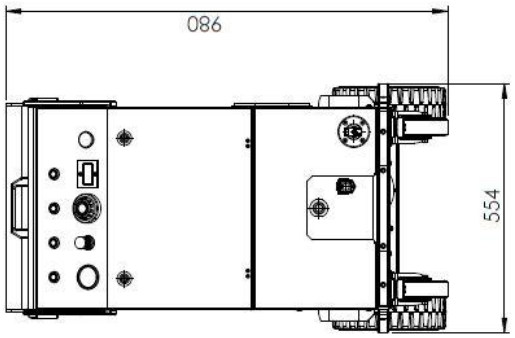
Carrying out unauthorised changed to the IC-430 equipment is prohibited!

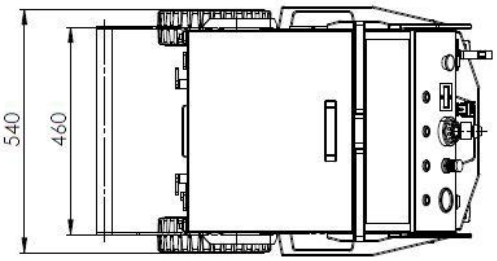
The warranty is subject to the GTC of ICS ice cleaning systems s.r.o.

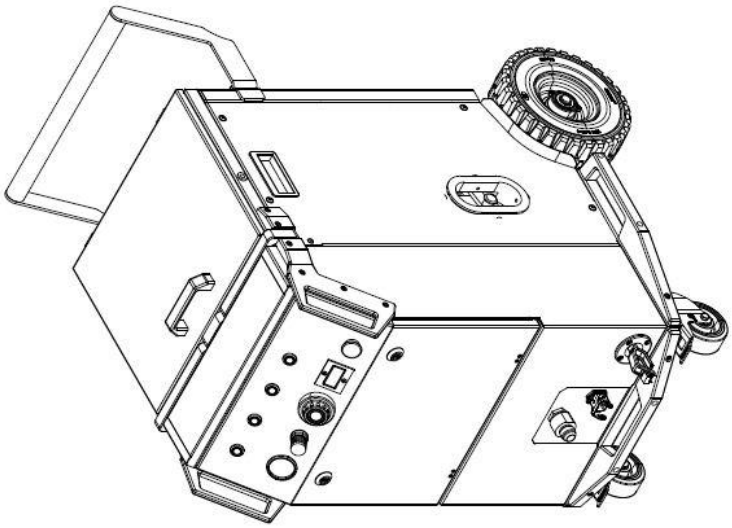
8 Technical schematics

8.1 Dimensional drawing









ICSform_IC-430

ICS Ice Cleaning Systems s.r.o.

Robotnicka 2192, Povazska Bystrica
017 01
Tel. +421 (0)42 42 61 135

Popis projektu	Dry ice blasting machines
Číslo výkresu	IC-430-02

- Main voltage : 110-230 VAC
  - L1 = black
  - N = light blue
  - PE = yellow-green
- Control voltage : 24VDC
  - 24VDC = dark blue
  - 0VDC = dark blue/white
- Electrical schematic number : IC-430-02

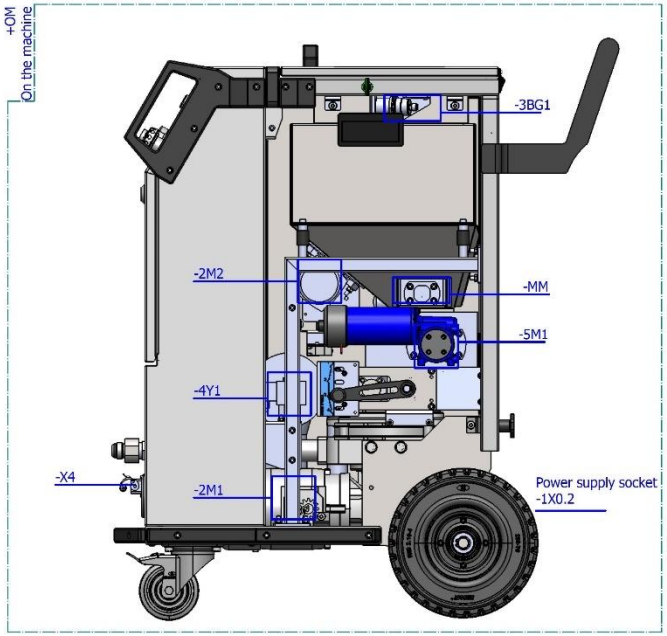
Vytvořeno dne	31. 3. 2022
Zpracováno dne	16. 8. 2024

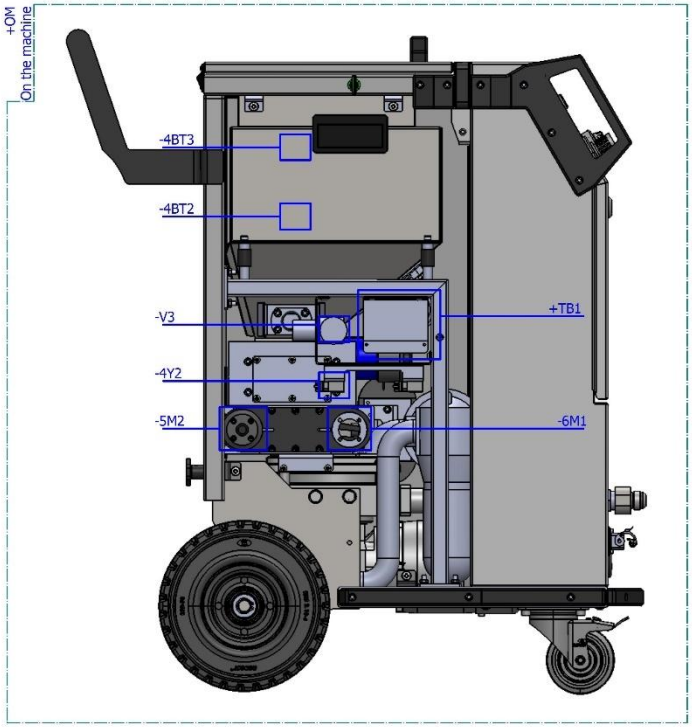
Počet stran 14

2

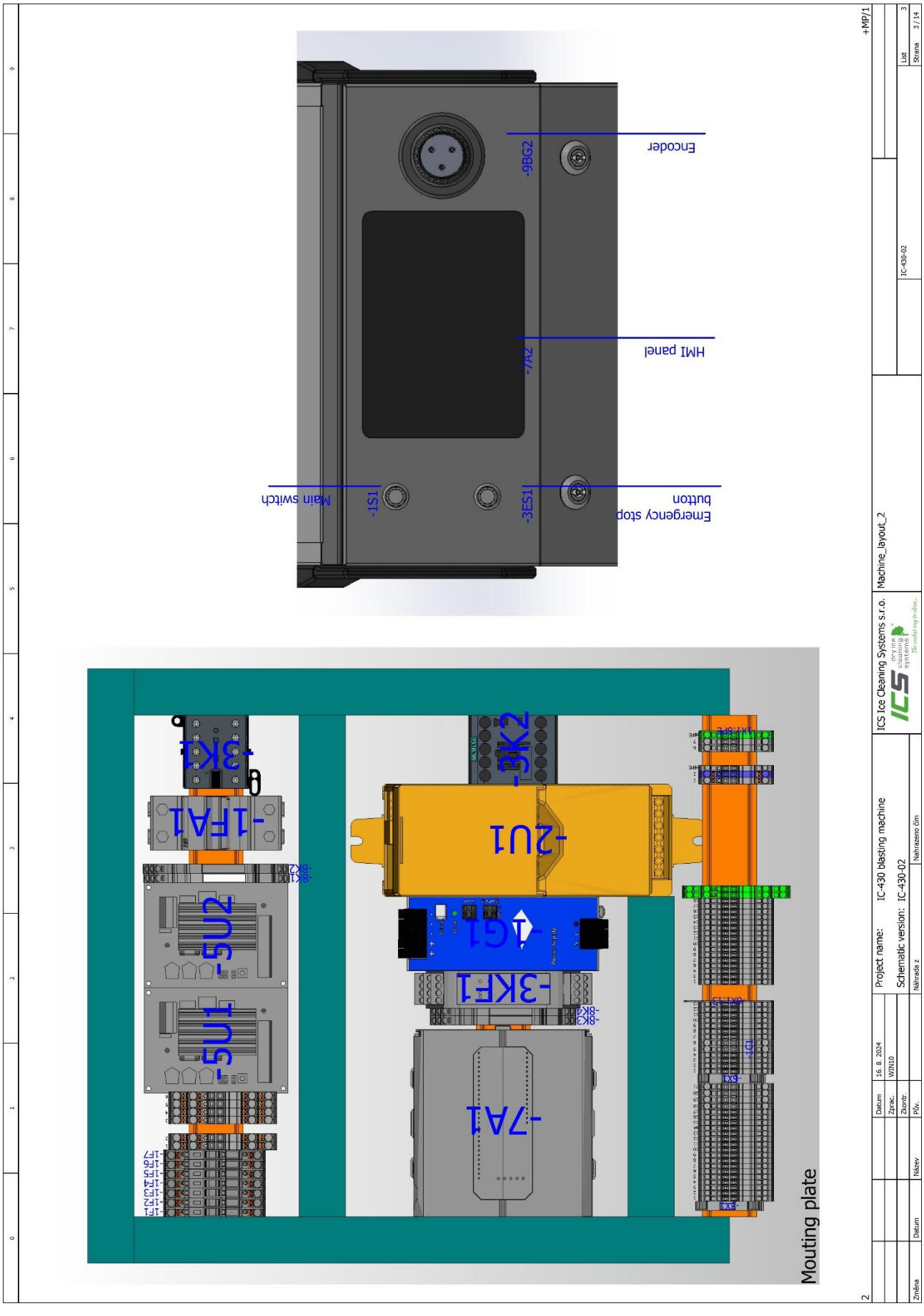
			Datum	26. 6. 2024	Project name: IC-430 blasting machine	ICS Ice Cleaning Systems s.r.o.	Title page	
			Zprac.	ics178npc	Schematic version: IC-430-02			IC-430-02 List 1
			Zkontr.					Strana 1 / 14
Změna	Datum	Název	Pův.		Náhrada z	Nahrazeno čím		

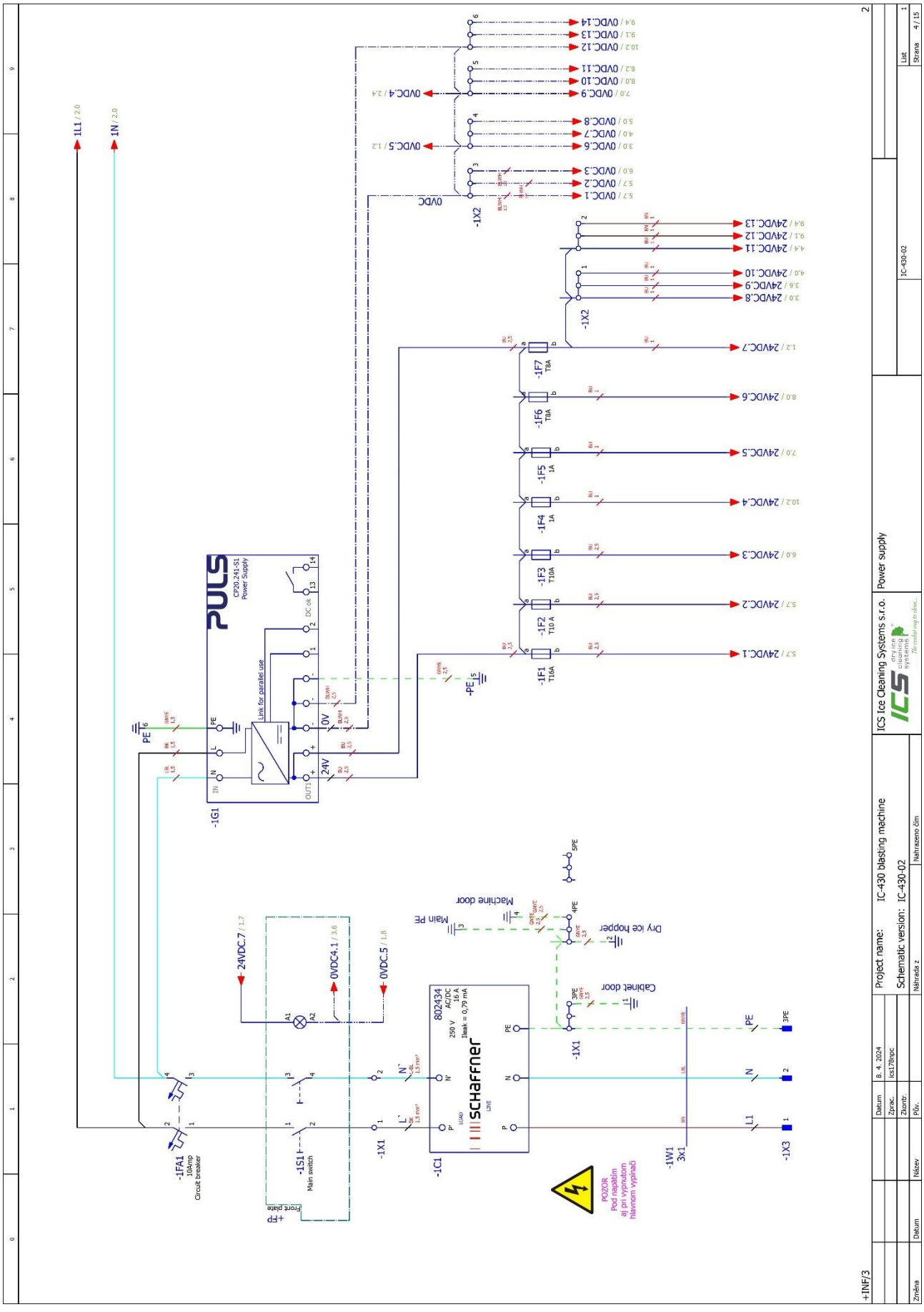
+ OM = On the machine
+ FP = Front plate
+ MP = Mouting plate
+ BH = Blasting hose

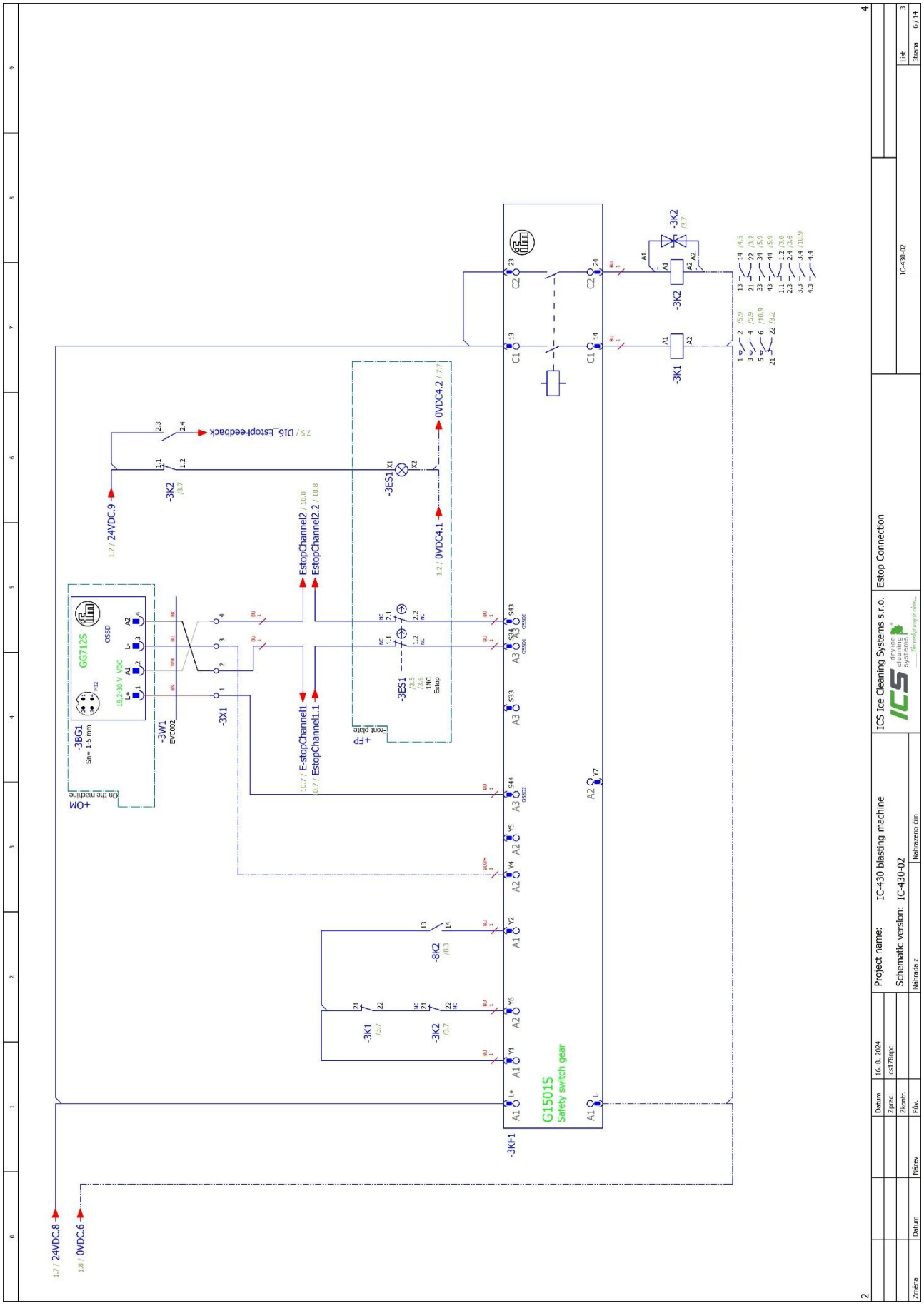


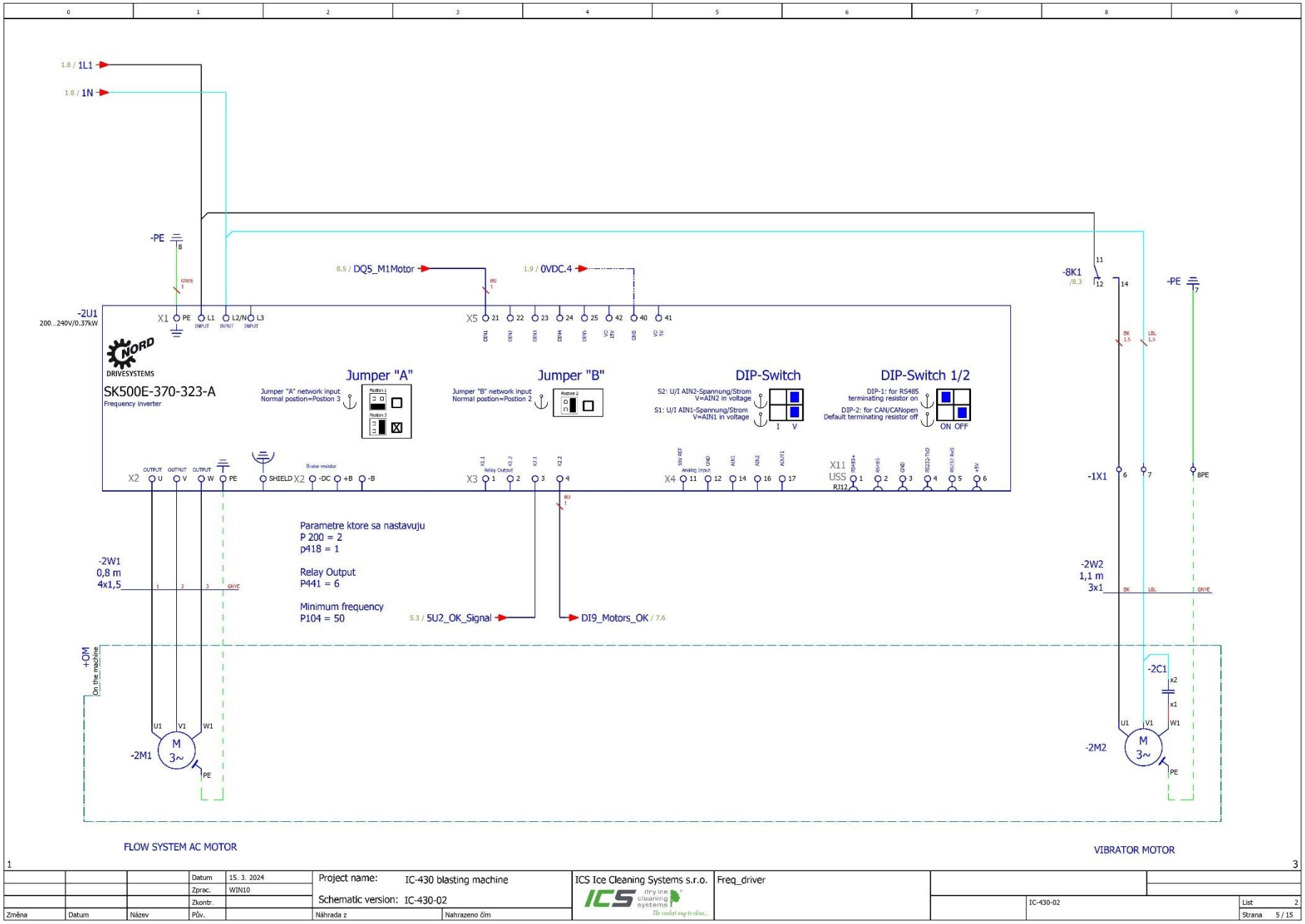


			Datum	8. 4. 2024	Project name: IC-430 blasting machine	ICS Ice Cleaning Systems s.r.o.	Machine_layout_1	
			Zprac.	ics178npc	Schematic version: IC-430-02			
			Zkontr.				IC-430-02	List 2
Změna	Datum	Název	Pův.		Náhrada z	Nahrazeno čím		Strana 2 / 15

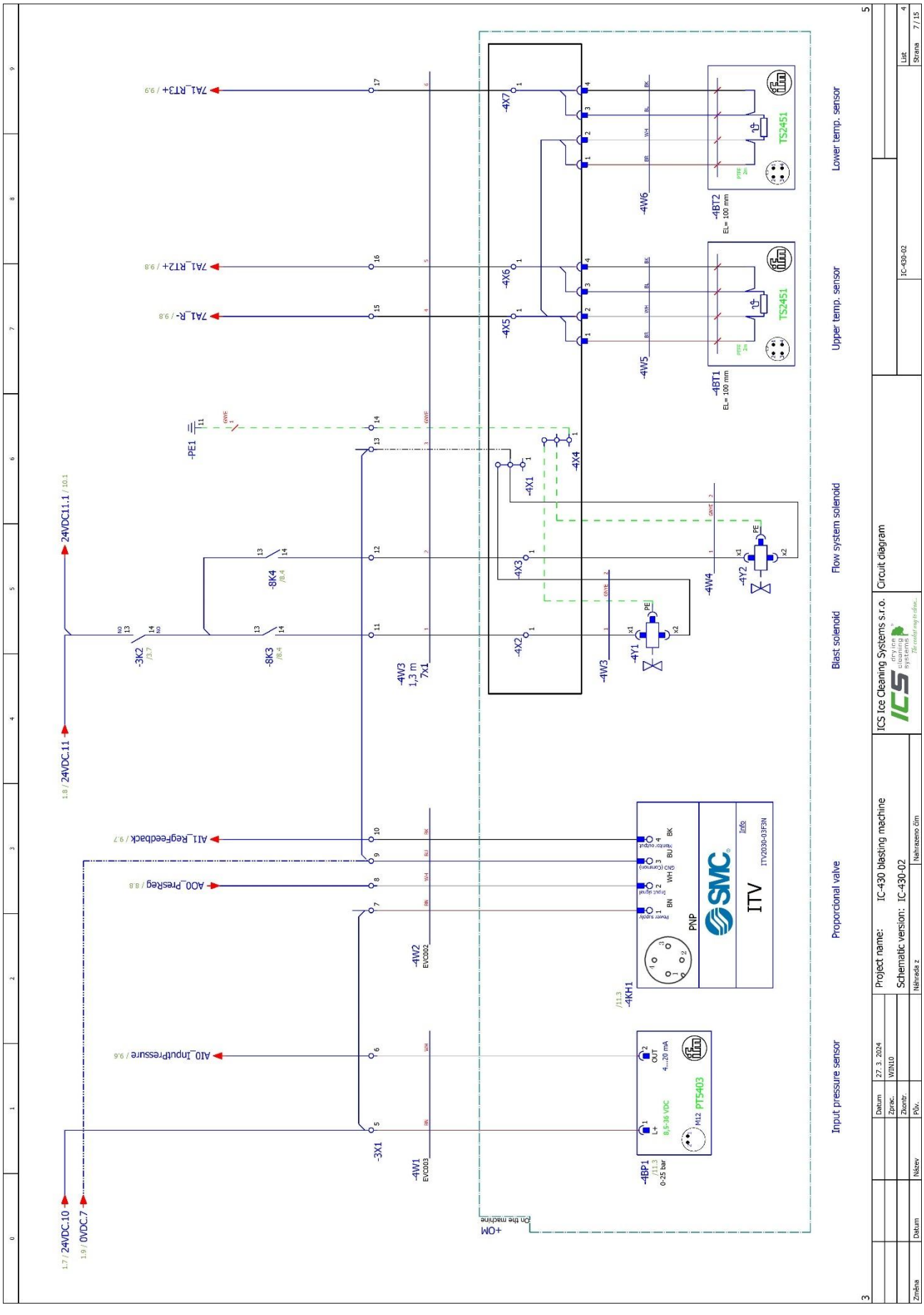

Encoder
-9BG2
HMI panel
-7A2
Emergency stop button
-3ES1
Main switch
-1S1
Mouting plate
-7A1
-3KF1
-2U1
-3K2
-1FA1
-3K1
-5U2
-5U1
ICS Ice Cleaning Systems s.r.o.
Project name: IC-430 blasting machine
Schematic version: IC-430-02
Machine_layout_2
IC-430-02
+MP/1
Strana 3 / 14

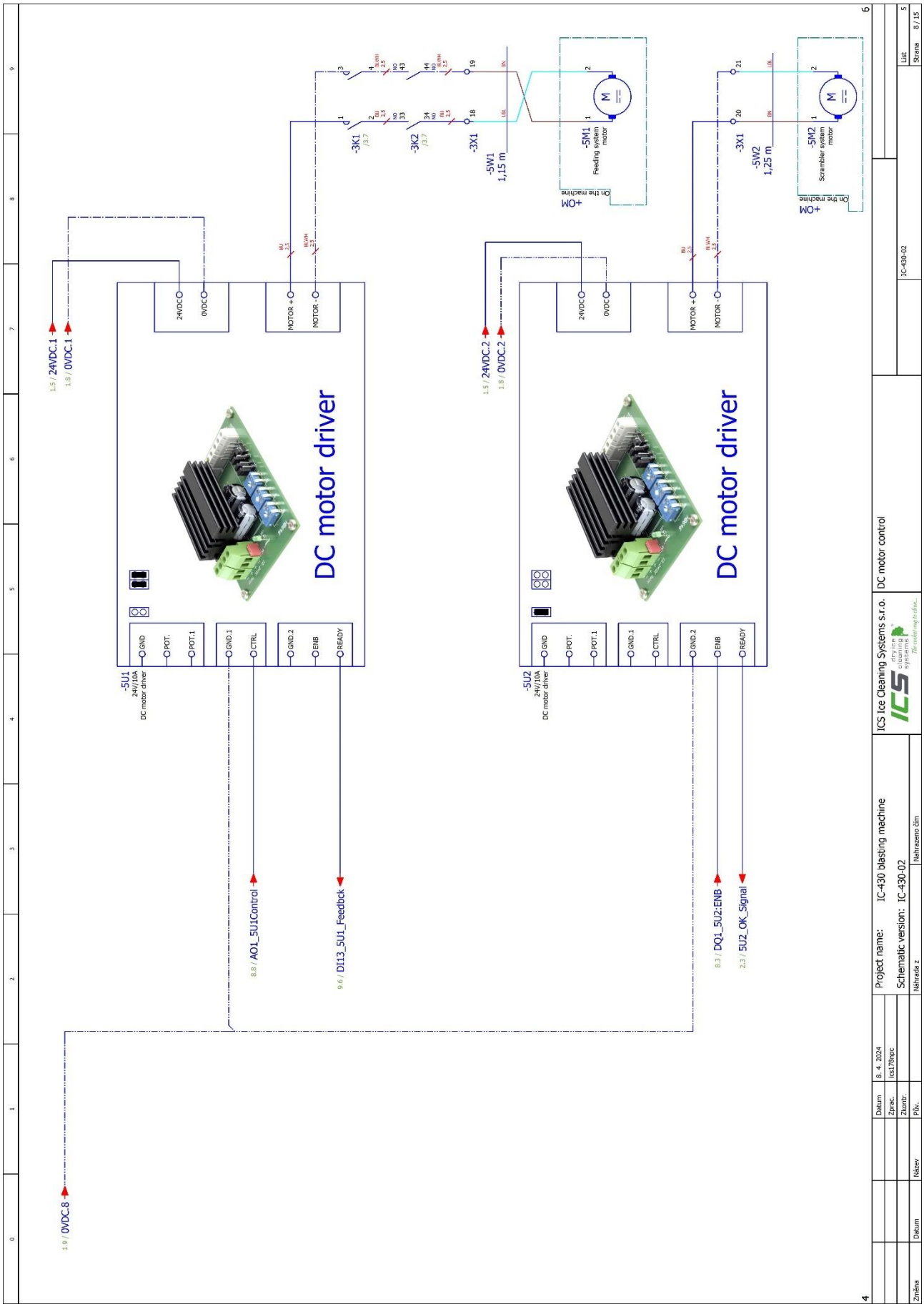

Project name: IC-430 blasting machine
Schematic version: IC-430-02
ICS Ice Cleaning Systems s.r.o.
Power supply
IC-430-02
Strana 4 / 15
+1NF/3
-1G1
-1FA1
10Amp
Circuit breaker
-1S1
Main switch
-1C1
802434
-1X1
-1X2
-1X3
-1W1
3x1
-1F1 T10A
-1F2 T10 A
-1F3 T10A
-1F4 1A
-1F5 1A
-1F6 T8A
-1F7 T8A
Dry ice hopper
Cabinet door
Machine door
Main PE
Front plate
POZOR
Pod napätím
aj pri vypnutom
hlavnom vypínači

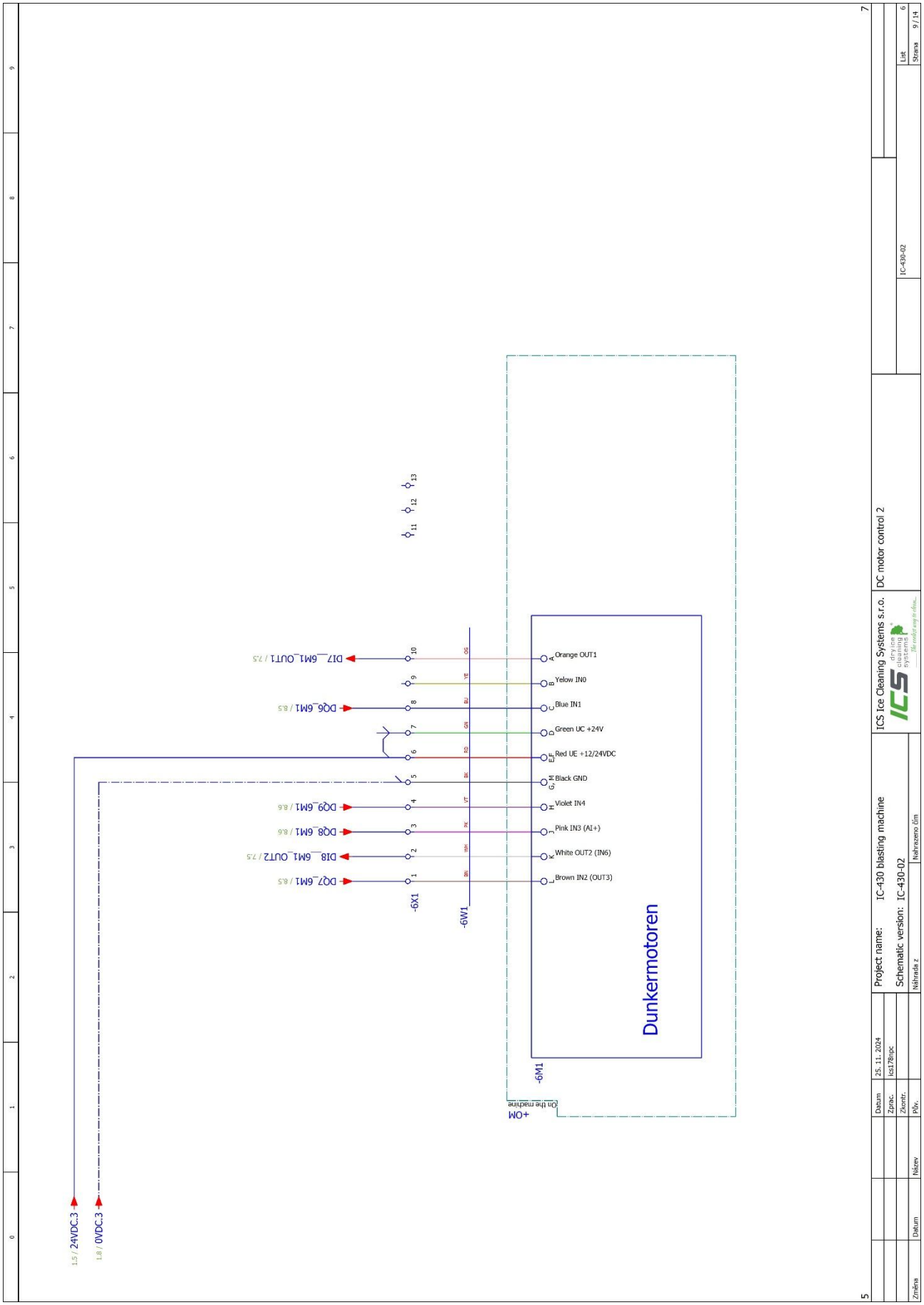

G1501S
Safety switch gear
-3KF1
-3BG1
GG712S
-3W1
-3X1
-3ES1
-3K1
-3K2
-8K2
+OM
On the machine
Front plate
EstopChannel1
EstopChannel2
E-stopChannel1
EstopChannel1.1
EstopChannel2.2
1.7 / 24VDC.9
1.2 / 0VDC4.1
0VDC4.2 / 7.7
7.5 / DI6_EstopFeedback
1.7 / 24VDC.8
1.8 / 0VDC.6
ICS Ice Cleaning Systems s.r.o.
Project name: IC-430 blasting machine
Schematic version: IC-430-02
Estop Connection
IC-430-02
Náhrada z
Nahrazeno čím

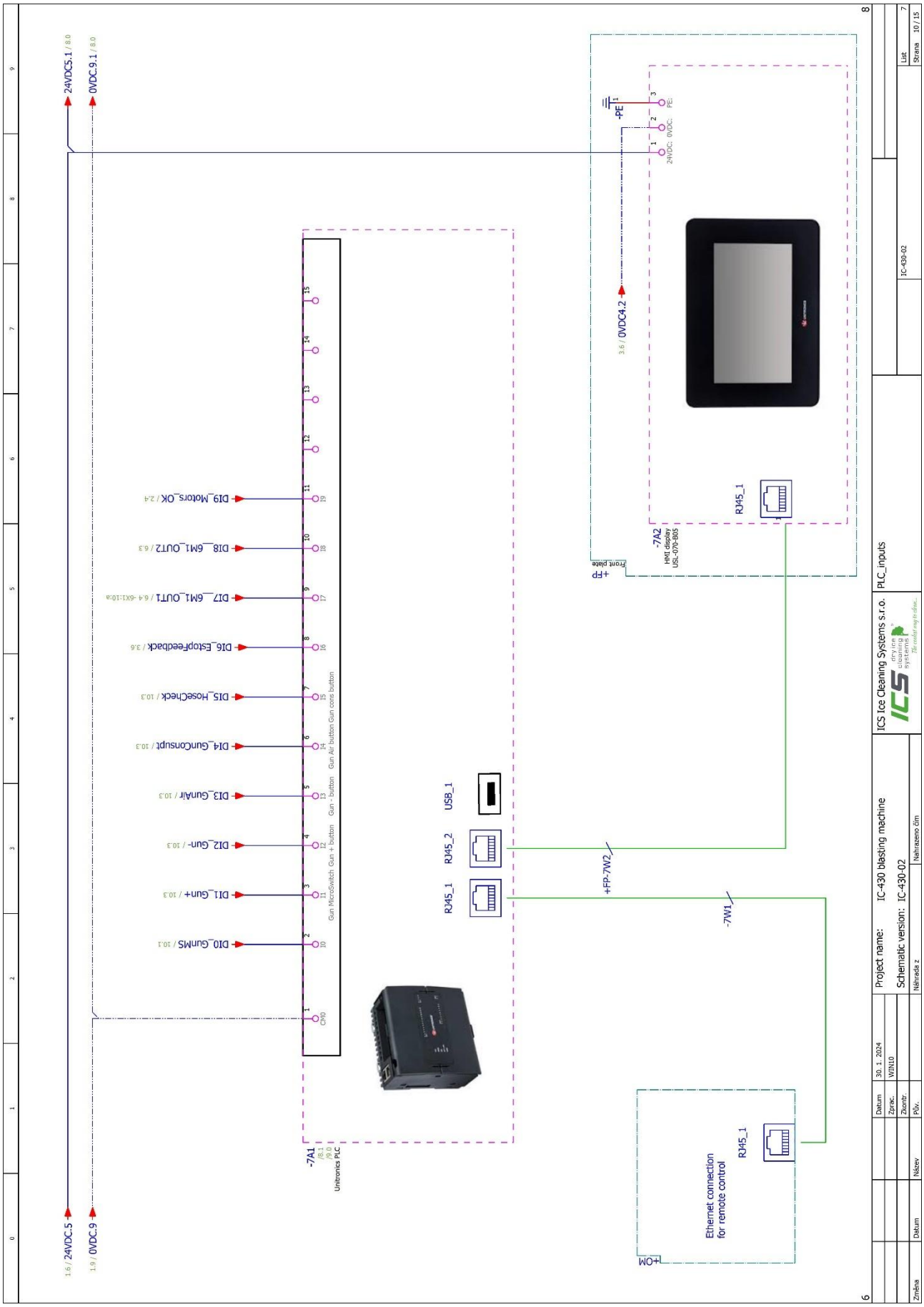


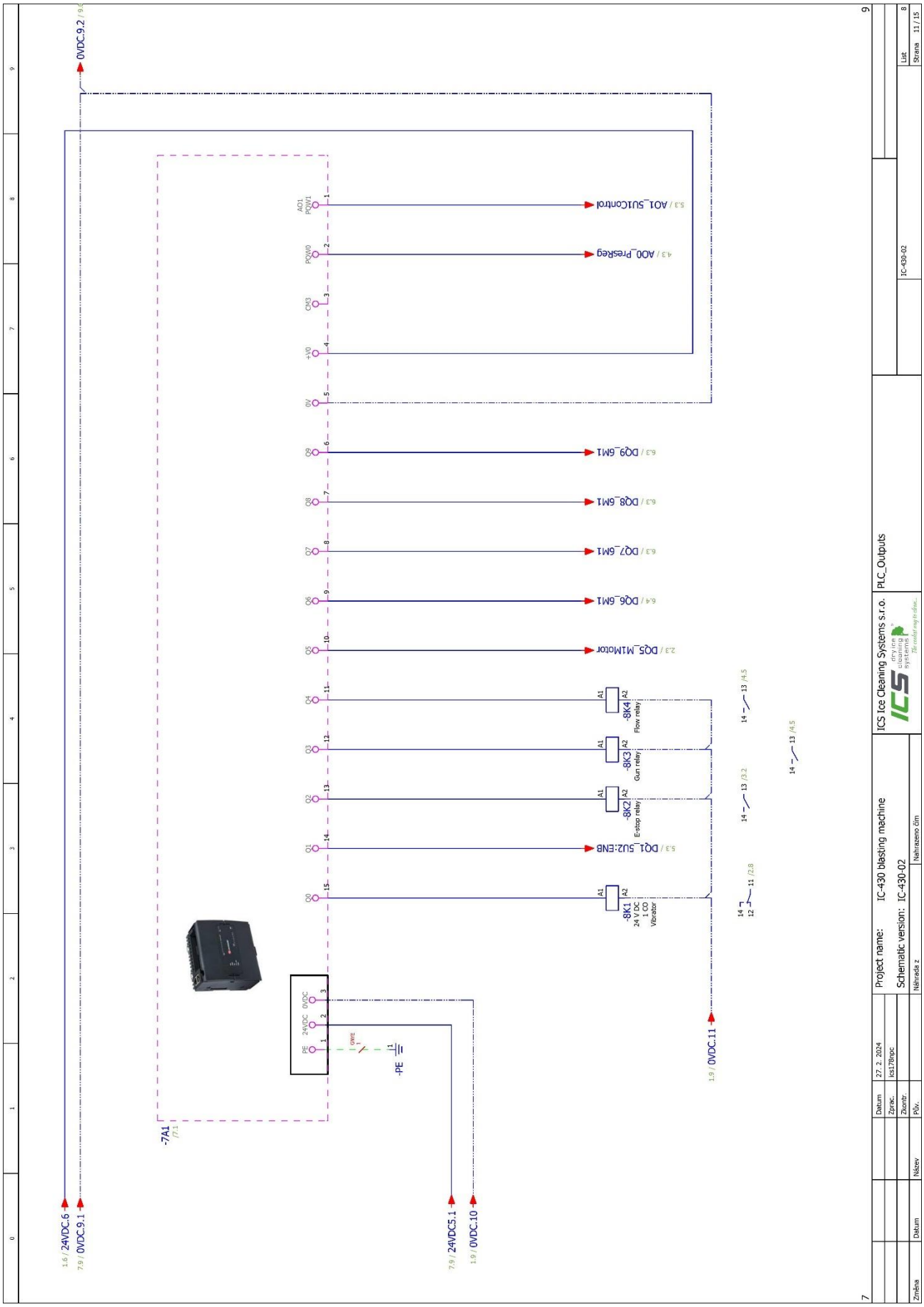
			Datum	15. 3. 2024	Project name:	IC-430 blasting machine	ICS Ice Cleaning Systems s.r.o.	Freq_driver	
			Zprac.	WIN10	Schematic version:	IC-430-02			IC-430-02 List 2
			Zkontr.						Strana 5 / 15
Změna	Datum	Název	Pův.		Náhrada z	Nahrazeno čím			

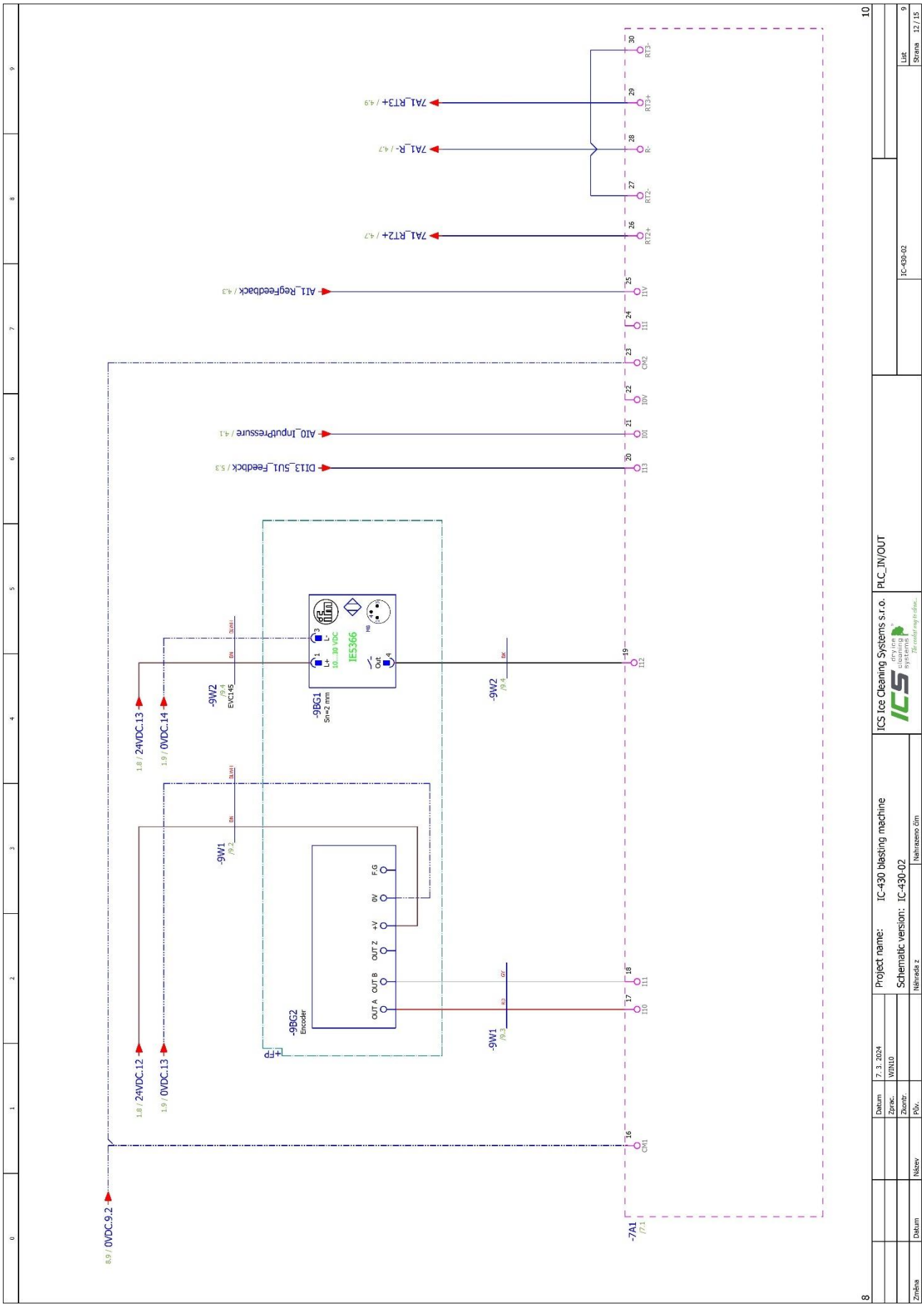

Project name: IC-430 blasting machine
Schematic version: IC-430-02
ICS Ice Cleaning Systems s.r.o.
Circuit diagram
IC-430-02
Lower temp. sensor
Upper temp. sensor
Flow system solenoid
Blast solenoid
Proporcional valve
Input pressure sensor
-4BT2
-4BT1
-4Y2
-4Y1
-4KH1
-4BP1
-3X1
-3K2
-8K4
-8K3
-PE1
-4W3
-4W2
-4W1
-4W6
-4W5
-4W4
-4X7
-4X6
-4X5
-4X4
-4X3
-4X2
-4X1
7A1_RT3+
7A1_RT2+
7A1_R-
A11_RegFeedback
A00_PresReg
A10_InputPressure
24VDC11.1
24VDC.11
24VDC.10
0VDC.7
+OM
On the machine
TS2451
PT5403
ITV
SMC
PNP
4...20 mA
0-25 bar
8,5-36 VDC

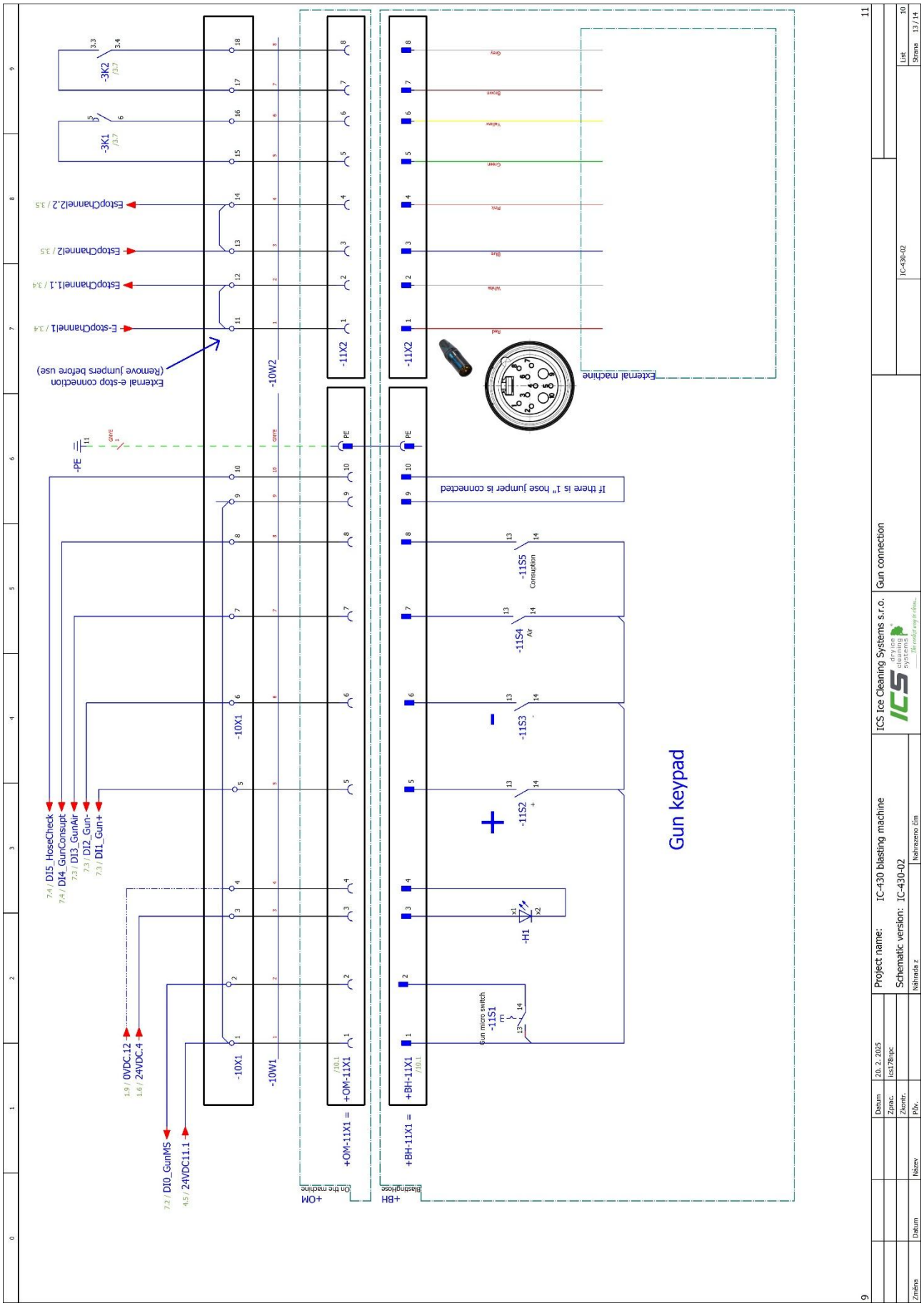

DC motor driver
DC motor driver
-5U1
24V/10A
DC motor driver
-5U2
24V/10A
DC motor driver
24VDC
0VDC
MOTOR +
MOTOR -
GND
POT.
POT.1
GND.1
CTRL
GND.2
ENB
READY
1.5 / 24VDC.1
1.8 / 0VDC.1
1.5 / 24VDC.2
1.8 / 0VDC.2
1.9 / 0VDC.8
8.8 / AO1_5U1Control
9.6 / DI13_5U1_Feedback
8.3 / DQ1_5U2:ENB
2.3 / 5U2_OK_Signal
-3K1
-3K2
-3X1
-5W1
1,15 m
-5M1
Feeding system motor
-3X1
-5W2
1,25 m
-5M2
Scrambler system motor
+OM
On the machine
Project name: IC-430 blasting machine
Schematic version: IC-430-02
ICS Ice Cleaning Systems s.r.o.
DC motor control
IC-430-02
Strana 8 / 15


1.5 / 24VDC.3
1.8 / 0VDC.3
-6X1
-6W1
-6M1
+DM
On the machine
Dunkermotoren
Orange OUT1
Yelow IN0
Blue IN1
Green UC +24V
Red UE +12/24VDC
Black GND
Violet IN4
Pink IN3 (AI+)
White OUT2 (IN6)
Brown IN2 (OUT3)
DI7_6M1_OUT1 / 7.5
DQ6_6M1 / 8.5
DQ9_6M1 / 8.6
DQ8_6M1 / 8.6
DI8_6M1_OUT2 / 7.5
DQ7_6M1 / 8.5
ICS Ice Cleaning Systems s.r.o.
DC motor control 2
Project name: IC-430 blasting machine
Schematic version: IC-430-02
IC-430-02
Datum 25. 11. 2024
Zprac. ics178rpc
Změna
Datum
Název
Zkontr.
Přiv.
Náhrada z
Nahrazeno čím
List 6
Strana 9 / 14


24VDC5.1 / 8.0
0VDC.9.1 / 8.0
1.6 / 24VDC.5
1.9 / 0VDC.9
-7A1
Unitronics PLC
-7A2
HMI display
USL-070-B05
-PE
PE:
24VDC:
0VDC:
0VDC4.2
3.6 /
+FP
Front plate
RJ45_1
USB_1
RJ45_2
+FP-7W2
-7W1
+OM
Ethernet connection
for remote control
DI19_MotorsOK / 2.4
DI18_6M1_OUT2 / 6.3
DI17_6M1_OUT1 / 6.4 -6X1:10:a
DI16_EstopFeedback / 3.6
DI15_HoseCheck / 10.3
DI14_GunConsupt / 10.3
DI13_GunAir / 10.3
DI12_Gun- / 10.3
DI11_Gun+ / 10.3
DI10_GunMS / 10.3
Gun MicroSwitch
Gun + button
Gun - button
Gun Air button
Gun cons button
ICS Ice Cleaning Systems s.r.o.
PLC_inputs
Project name: IC-430 blasting machine
Schematic version: IC-430-02
IC-430-02
30. 1. 2024
WIN10
Nahrazeno čím
Nahrazeno z
Datum
Název
Změna
List 7
Strana 10 / 15


0VDC.9.2
24VDC.6
0VDC.9.1
24VDC5.1
0VDC.10
0VDC.11
-7A1
AO1_SU1Control
AO0_PreReg
DO9_6M1
DO8_6M1
DO7_6M1
DO6_6M1
DO5_M1Motor
DO1_SU2:ENB
-8K4 Flow relay
-8K3 Gun relay
-8K2 E-stop relay
-8K1 24 V DC 1.5 A Vibrator
-PE
Project name: IC-430 blasting machine
Schematic version: IC-430-02
ICS Ice Cleaning Systems s.r.o.
PLC_Outputs
IC-430-02

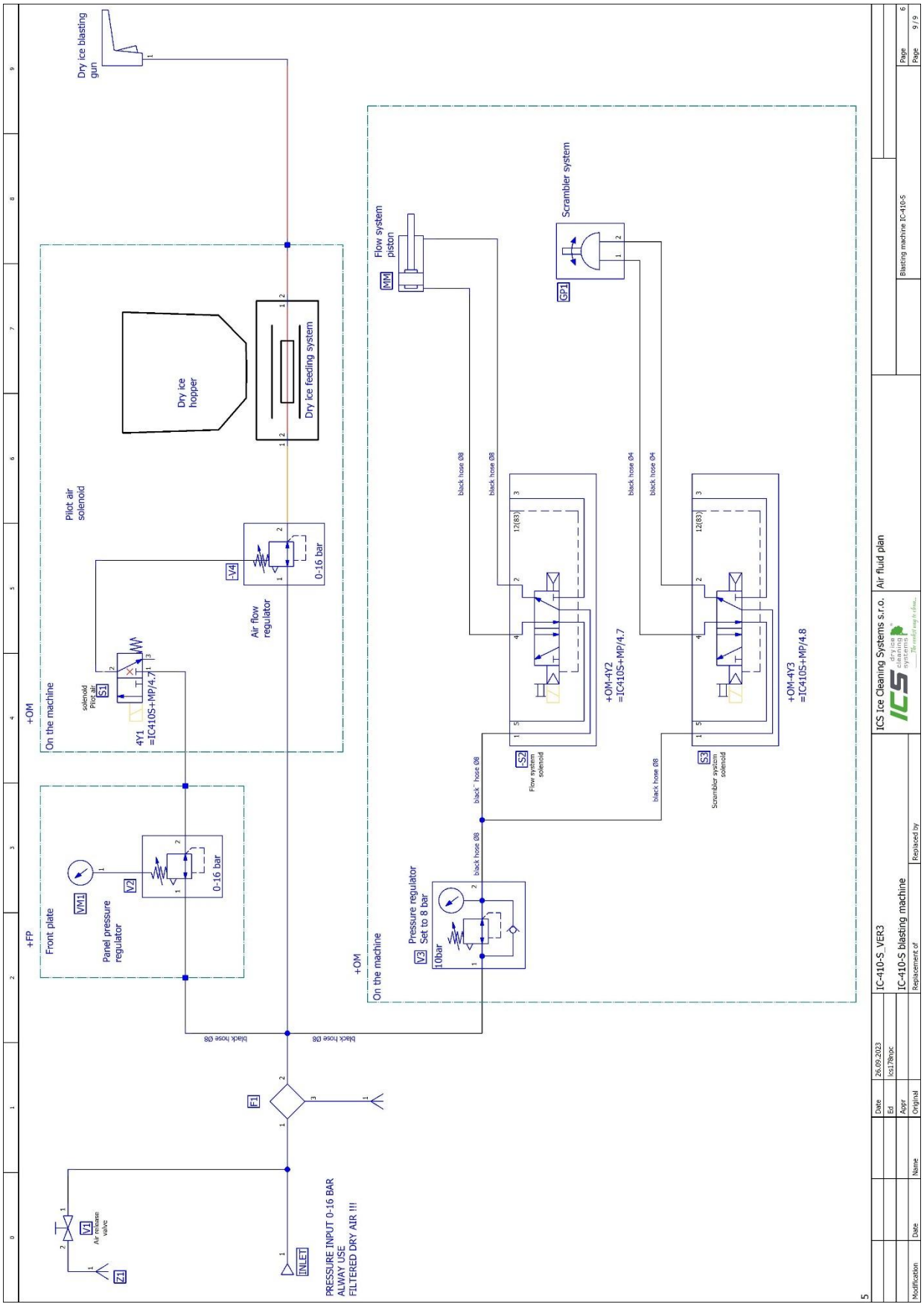

ICS Ice Cleaning Systems s.r.o.
PLC_IN/OUT
Project name: IC-430 blasting machine
Schematic version: IC-430-02
IC-430-02
-7A1
-9BG1
-9BG2
-9W1
-9W2
24VDC.12
24VDC.13
0VDC.9.2
0VDC.13
0VDC.14
AI1_RegFeedback
AI0_InputPressure
DI13_SU1_Feedback
7AI_RT2+
7AI_R-
7AI_RT3+


Gun keypad
Project name: IC-430 blasting machine
Schematic version: IC-430-02
ICS Ice Cleaning Systems s.r.o.
Gun connection
IC-430-02
-10X1
-10W1
-10W2
-11X2
+OM-11X1
+BH-11X1
-PE
-3K2
-3K1
-11S5 Consuption
-11S4 Air
-11S3
-11S2
-11S1 Gun micro switch
-H1
External machine
(Remove Jumpers before use)
External e-stop connection
If there is 1" hose jumper is connected
DI5_HoseCheck
DI4_GunConsupt
DI3_GunAir
DI2_Gun-
DI1_Gun+
DI0_GunMS
0VDC.12
24VDC.4
24VDC11.1
EstopChannel2.2
EstopChannel2
EstopChannel1.1
E-stopChannel1
On the machine
Blastinghose

Spare parts list electrical

ID:	Name	Article. No.	Schematic pos.
-X0	Power socket	52033	1.1
-1C1	Power line filter	52030	1.1
-1S1	Main switch button	52061	1.1
-1FA	Circuit breaker	52020	1.1
-1G1	Power supply	52179	1.4
-1F1	5x20mm Cartridge Fuses T10A	N/A	1.5
-1F2	5x20mm Cartridge Fuses T10A	N/A	1.5
-1F3	5x20mm Cartridge Fuses T5A	N/A	1.6
-1F4	5x20mm Cartridge Fuses T8A	N/A	1.6
-1F5	5x20mm Cartridge Fuses T1A	N/A	1.6
-1F6	5x20mm Cartridge Fuses T8A	N/A	1.6
-1F7	5x20mm Cartridge Fuses T8A	N/A	1.6
-2U1	Frequency driver	52016	2.0
-2M1	Feeding system motor	52155	2.1
-2M2	Vibrator motor	52106	2.8
-3KF1	Safety relay	52180	3.1
-3BG1	Safety induction sensor	52186	3.4
-3W1	M12 connector cable	52143	3.4
-3ES1	NC contact	52146	3.5
-3ES1.	LED module	52147	3.5
-3S1	Emergency stop button	52064	3.5
-3K1	Power contactor	52182	3.7
-3K2	Power contactor	52182	3.7
-4BP1	Input pressure sensor	52208	4.1
-4KH1	Proportional valve	51133	4.2
-4BT1,2	Temperature sensor	52209	4.7
-5U1	DC motor driver flow system	52112	5.5
-5U2	DC motor driver scrambler system	52112	5.5
-5M1	Flow system motor	52158	5.9
-5M2	Scrambler system motor	52078	5.9
-6M1	Motor position	52157	6.1
-6BG1	Induction sensor	52210	6.5
-7A1	PLC unit	52211	7.1
-7A2	HMI panel	52189	7.6
-8K1	Interlock relay	52187	8.3
-8K2,3,4	Interlock relay SSR	52212	8.4
-9BG2	Encoder	52213	9.2
-9BG1	Induction sensor	52214	9.4
-MS1	Gun micro switch	52081	4.2

8.3 Pneumatic schematic



Spare parts list pneumatic

ID:	Name	Article. No.	Schematic pos.
-F1	Air filter	51011	11.1
-V1	Emergency aiir release valve	51103	11.0
-V2	Pressure regulator with manometer	51122	11.2
-S1	Flow system solenoid	52019	11.4
-S3	Solenoid pilot air	52188	11.4
-V4	Pilot air regulator	51016	11.4
-MM1	Flow system piston	51072	11.7

9 Liquidation

Disposal of the machine

Have the machine disposed of at an authorized disposal center or at collection center. Before disposing of the machine, it is necessary to remove and separate the following materials and send them to separate collection in accordance with applicable regulations on environmental protection:

- stainless steel parts
- plastic parts
- electrical and electronic components*

(*) Mainly for the disposal of electrical and electronic components, please contact local dealer.

10 Certificates

10.1 Certificate STN EN ISO 9001:2016

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

SNAS
Reg. No. 153/Q-011

TÜV SÜD
Slovakia

CERTIFICATE

TÜV SÜD Slovakia s.r.o.
Certification Body for Management Systems
Accredited by SNAS
Certificate on accreditation No. Q-011

certifies that

ICS ice cleaning systems

ICS ice cleaning systems s. r. o.
Robotnícka 2192
SK – 017 01 Považská Bystrica
IČO: 45 570 370

has established and applies
a Quality Management System for

Development, manufacture, sale and service of machines for dry ice blasting. Development, manufacture, sale and service of machines for the production of dry ice. Production of dry ice. Industrial cleaning with dry ice.

An audit was performed, Report No. **1587/30/22/Q/AS/R2**
Proof has been furnished that the requirements
according to

STN EN ISO 9001:2016

are fulfilled. The certificate is valid from **2022-07-28** until **2025-05-18**

Certificate Registration No. **Q 1587-3**

Date of recertification audit: **13.06.2022**

Bratislava, 2022-07-28

TÜV SÜD

TÜV SÜD Slovakia s.r.o.
Certification Body for Management Systems
Member of Group TÜV SÜD
Jašikova 6, 821 03 Bratislava

F-Q-019/2/5

10.2 ES DECLARATION OF CONFORMITY

in compliance with the Machine Directive 2006/42/EC dated 17 May 2006, Annex II A
We hereby declare that the machine specified below complies in its design and construction and in the version marketed by us with the basic safety and health requirements of the EC Directive 2006/42/EC. Any changes to the machine unauthorized by us shall invalidate this declaration.

Product: **Dry Ice Blasting Machine**
Manuf. Date:
Type: IC-410 / IC-410-S / IC-430
Serial number:

Manufacture:

ICS ice cleaning systems, s.r.o.
Robotnícka 2192
Považská Bystrica, Slovakia
Tel.: +421 42 4261 135
Email: info@ics-dryice.sk
Web: www.ics-dryice.sk

It is declared the compliance with other directives/regulations applicable to the product:

- ✓ **DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** on machinery, and amending Directive 95/16/EC.
- ✓ **DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.
- ✓ **DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** on the harmonization of the laws of the Member States relating to electromagnetic compatibility.

Applied harmonized standards in particular:

- ✓ **ISO 12 100-1:2011 Safety of machinery** — Basic concepts, general principles for design — Part 1: Basic terminology, methodology
- ✓ **EN ISO 13849-1:2016** Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2015)
- ✓ **EN 60204-1:2019** Safety of machinery. Electrical equipment of machines. Part 1: General requirements
- ✓ **EN 61439-1:2012** Low-voltage switchgear and control-gear assemblies. Part 1: General rules
- ✓ **EN ISO 4414:2011**. Pneumatic fluid power — General rules and safety requirements for systems and their components

Representative for the technical documentation: Ing. Ľudovít Bakala PhD., Robotnícka 2192, Považská Bystrica, Slovakia
Place: Považská Bystrica, Slovakia,
Date: 31. 01. 2024

Peter Gabriš
Executive manager


ICS
dry ice
cleaning
systems