PR350H Pelletizer

OPERATOR MANUAL

Original Instructions [English]

March 2025
Version 8

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INTRODUCTION

This manual should be kept with the machine and be readily accessible for operation. This manual contains information for the safety and operation.
The graphics used in this manual may show machine details that are different than the actual machine. Components of the machine may have been removed for illustrative purposes or the continuing improvement of the machine's design may cause changes that are not included in this publication.
The owner of this machine is responsible for verifying the operator of this machine is properly trained and understands the contents of this manual.

About the PR350H Pelletizer
The PR350H Pelletizer from Cold Jet presents a state-of-the-art dry ice Pelletizer with features for easy operation, swift production shifts, and high capacity performance.

The PR350H produces high-quality dry ice pellets. This is secured by the closed chamber technology which also ensures fast production shifts and an extremely short start-up time.

The automatic change of extruder plates eliminates downtime and reduces the loss of valuable CO_2. The pellet length and quality are optimized by the PR350 design, and it can produce two sizes of pellets without changing the extruder plates. The PR350H has many technical features compared to existing products on the market.

The hydraulic unit uses logic controlled high-performance components for optimal output.

The machine parts are protected by a moisture-free enclosure, which also reduces the noise level to a minimum (below 75 dB(a)). The PR350H provides a non-stop supply of high-density dry ice pellets. The source of raw material for the production of pellets is liquid carbon dioxide preserved at low temperatures in a storage tank.

The control system of the PR350H Pelletizer, based on Beckhoff Industrial PC and HMI system, offers maximum functionality and a user-friendly interface. By selecting the pellet size required, production starts by pressing one button. Just-In-Time production minimizes labor and waste during production.


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SYSTEM DESCRIPTION

This operator manual covers the PR350H operating instructions. The main parts are described in the machine structure section. Operating/User instruction for add-ons can be found in other materials not included in this manual.

Functional description
The main function of the PR350H is to produce dry ice pellets from liquid carbon dioxide. This is performed by a sequence of operations executed by the Beckhoff IPC. The main steps during normal production are as follows and refer to PI diagram 2A0512 and 2A0513 for PR350H:

1. **Start-up**
2. **Production**
3. **Standby**
4. **Shut down**

At every start-up, the hydraulic cylinder =G01-G1-MO1 for the extruder piston is extracted to its maximum position to extrude the CO_2 snow in the chamber in case of an emergency stop or machine error.

Liquid CO_2 is fed from an external CO_2 tank (not part of this description – see supplier information) through an insulated pipe to the PR350H. It is recommended to use a gas separator to expel gaseous CO_2 from the liquid CO_2.

When the hydraulic cylinder =G01-G1-MO1 for extruder piston is retracted and hydraulic cylinder =G01-Q3-MO1 for extruder plate changer is in the middle position - CO_2 In valve =W01-Q1 and Injection valve =G01-Q1 will open and purge gaseous CO_2 through the chamber, degassing filters via degassing pipes to the CO_2 out. When temperature =W01-TT1 in the liquid CO2 is -14°C injection will proceed until the timer is reached. The degassing valve =G01-Q5 on the extruder chamber will open to reduce chamber pressure before the hydraulic cylinder =G01-G1-MO1 so the extruder piston will extract until fast forward pressure set point is reached and the hydraulic cylinder will again retract. This will continue until the plug thickness set point is reached. When plug thickness is reached the hydraulic cylinder =G01-Q3-MO1 for the extruder plate changer will move to the selected extruder plate position and production will commence.

In production mode CO_2 In valve =W01-Q1 and the Injection valve =G01-Q1 will open until the timer is reached. The degassing valve =G01-Q5 on the extruder chamber will open to reduce chamber pressure before the hydraulic cylinder =G01-G1-MO1 for the extruder piston will extract until plug set point is reached and the hydraulic cylinder will again retract. This cycle will continue until a different step is selected. During production, it is possible to set the PR350H on standby. When the maximum standby time is reached, the PR350H will run a shutdown sequence.

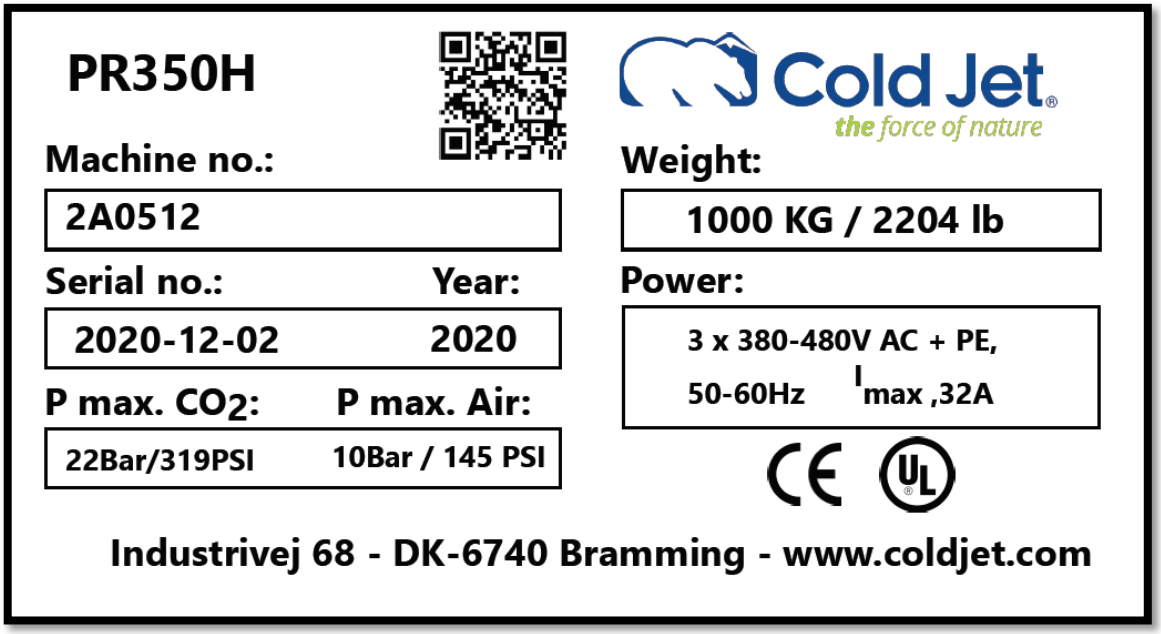
The shutdown sequence ensures that PR350H is stopped in a proper position to empty the extruder chamber of dry ice snow and avoid moisture in the extruder chamber. The hydraulic cylinder =G01-Q3-MO1 for the extruder plate changer will move to the selected position and the hydraulic cylinder =G01-G1-MO1 for the extruder piston will extract to the maximum position and return to shut down setpoint position. The hydraulic cylinder =G01-Q3-MO1 for the extruder plate changer is in the middle position and all valves are closed.

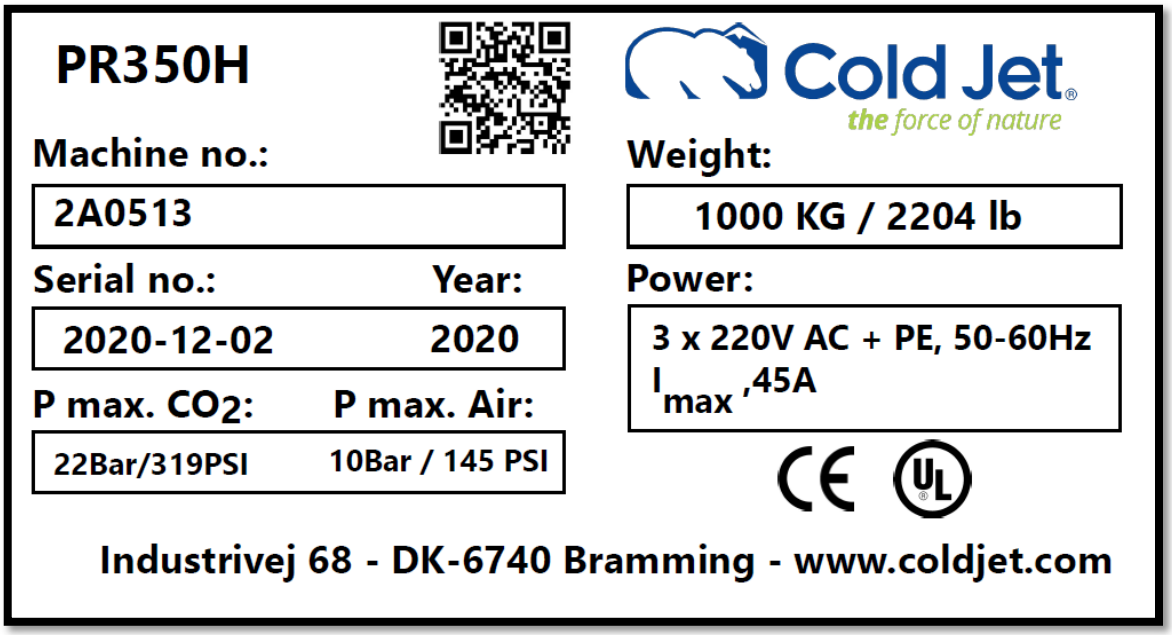
Color detection of the lighthouse

Green:	Machine is ready and there are no alarms (error messages).
Yellow:	Machine has been paused.
Red:	Machine out of operation due to an alarm (error message).

System identification

System is marked with:





Examples of system identification.

Supplier responsible for the equipment

Cold Jet ApS
Industrivej 68
DK-6740 Bramming
Denmark
Phone: +45 75 56 15 00
Fax: +45 75 56 15 09
Homepage: www.coldjet.com

TECHNICAL DATA

Rated Output:
kg/h: up to 350
lbs/h: up to 772
lbs of high-quality dry ice pellets, depending on the extruder plate applied

Pellet Size:
Diameter:
mm: 1,7 – 3 – 6 – 10 – 16
inch: 0.07 – 0.12 – 0.24 - 0.39 - 0.62

Inlet Liquid CO_2 Pressure:

Liquid CO2 Supply System	PR350H
Supply Pressure (Min-Max)	13-18 bar (189 - 261 psi)
Supply Pressure Range	+/- 1.0 bar (14.5 psi)
Supply Pressure (Recommended PBU Setting)	15-16 bar (218 - 232 psi)

Liquid CO_2 Dryness Fraction:
The water content should not exceed 35 ppm and should not be less than 5 ppm – or equivalent to a dewpoint temperature of -66°C to -51°C (-86.8°F to -59.8°F).
NOTE:
The liquid CO_2 supply must be completely free of oil and must have a minimal purity of 99.9%.

Liquid CO_2 Supply Pipe:
Internal diameter 20 mm (0.8 inch), very well insulated with a minimum number of bends and fittings.
NOTE: If over 20 m (65.6 feet) in length, use an internal diameter of 25 mm (1 inch).

Power Supply:

Electrical Service & Supply	**Standard**	**Including Warm Weather Kit**	**Including Cold Weather Kit**	**Including Warm and Cold Weather Kits**
Voltage AC/ Frequency (EU 50Hz)	3 x 400 VAC/50Hz			
Voltage AC/ Frequency (US 60 Hz)	3 x 480 VAC/60Hz			
Avg. Power Consumption (EU 50Hz)	21,7 A	23,4 A	22,8 A	24,5 A
Avg. Power Consumption (US 60Hz)	19,0 A	20,7 A	20,3 A	22,0 A
Upstream Fuse/CB (max)	32 A			
Upstream Fuse/Class CC or J	30 A			
IEC Short Circuit Ratings	Ik min 0,5 kA, Ik max 10 kA			
UL SCCR	25kA symmetrical 480V max. When requirements for upstream fuses are observed			

Machine Dimensions:
Length: 1500 mm / 59 inch
Width: 1000 mm / 39 inch
Height: 1800 mm / 71 inch
Height: 1845 mm / 73.6 inch (incl. ext. legs)
Weight: 1000 kg / 2204 lbs

Noise level: below 75 dB(a)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SAFETY REGULATIONS

General Measures
The PR350H manual contains instructions for starting up, operating, and servicing the machine. The operator must follow all instructions in this manual. The owner must make sure that the operator understands the contents of this manual and follows its guidelines and safety regulations.

Personnel Qualifications
Employees, who are in charge of installation, operation, service, and maintenance must be adequately trained to install and operate this machine.

If the employees do not possess sufficient knowledge, they must be instructed and trained properly. If necessary, this can be arranged in cooperation with the manufacturer of the machine.

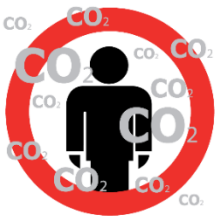
The owner of the machine shall make sure that the operator, who is to work with the PR350H, fully understands the importance of studying the contents of this manual and comply with the SAFETY REGULATIONS described on the following pages as well as those placed on the machine.

Contraindications
Cold Jet Machines are designed to operate for long periods of time. The machine is designed with an HMI that enables the operator to act upon errors that might occur during operation. The machine should only be operated with the doors closed.
Entering the machine, for service purposes etc. should be done in a way that allows the Contained CO2 to reach a safe level and the temperature to fall for certain areas.
Machines with moving parts inside can cause injury, therefore they are designed with door switches that disable the machines from running when opened/activated.

Security and Risk
The PR350H 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.
Installation must be carried out according to the instruction" Preinstallation PR120H-350H-750H".

The machine may only be installed by authorized personnel with knowledge of the Council Directives BT 2014/35/EU and EMC 2014/30/EU (or similar directives in other parts of the world).

Danger of Suffocation
Dry ice pellets are CO_2 in solid form. At ordinary atmospheric pressure, CO_2 can only exist in this solid form at temperatures of -79°C (-110°F) or lower. Therefore, during dry ice production, the CO_2 will immediately be heated and thus transform from solid form into gas form.
Please note:
Since the specific gravity of CO_2 is higher than that of ordinary atmospheric air, the air with its contents of oxygen will be replaced by CO_2 if the dry ice production is taking place in small or insufficiently ventilated rooms.



Therefore, please note the following:

1. Low CO_2 concentrations (3-5%) may cause headaches and rapid breathing.
2. CO_2 concentrations of (7-10%) may cause headaches and nausea and may result in unconsciousness.
3. Higher CO_2 concentrations will result in unconsciousness and suffocation.

High CO_2 concentrations may result in unconsciousness due to the displacement of oxygen. Therefore, always provide sufficient ventilation of the working area, and avoid producing dry ice in small rooms.

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.

Danger of Congelation

CO_2 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.

Pinch Point Hazard

If the plexiglass covers in front of the extruder plates are removed, the operator will be exposed to pinch point hazards.

Wear Protective Gloves

While working with the conveyor system, the operator must wear protective gloves to avoid contact with the dry ice or with parts of the machine which are in direct contact with the dry ice.

SAFETY OPERATION

Emergency stop

All equipment is connected to the general emergency system for PR350H.
When an emergency-stop device is activated, all components located in the emergency zone will be disconnected from their power source.

Machine safety

There are machine safety measures in the following areas:

- Extruder unit
- Extruder plate changer

In these areas, protective covers are in place.
The covers are provided with locking screws to deter removal.

Required performance level PLr = c Implemented in category = Cat3.

There is a danger of congelation/frost bite by touching machine parts cooled down by dry ice.
To prevent congelation the entire machine enclosure is provided with locks that require special tools to open.

Liquid CO2 Leakage

If liquid CO_2 is leaking from any point of the CO_2 pipe system, the CO_2 supply must be stopped immediately. Localize the leakage and repair.

Stop Production

1. The machine is stopped by pressing the "Start / Stop" button.

NOTE: This will activate the shutdown procedure.

2. The CO_2 valve on the machine inlet will automatically close. It is recommended to close the manual valve on the mounting kit before leaving the machine unused for a longer period of time.
3. Cut off the main electric supply.

NOTE:

Do not shut off the main switch on the cabinet inside the machine before the inlet CO_2 pressure is ZERO. The CO_2 pressure can be checked on the "Process values" page.

Daily checkup before start-up

1. Check the oil level in the sight glass.
2. Check the pipe system for leaks.
3. Check the operation time since last service.
4. Open the drain and drain all water from the frame, then guide any remaining towards the open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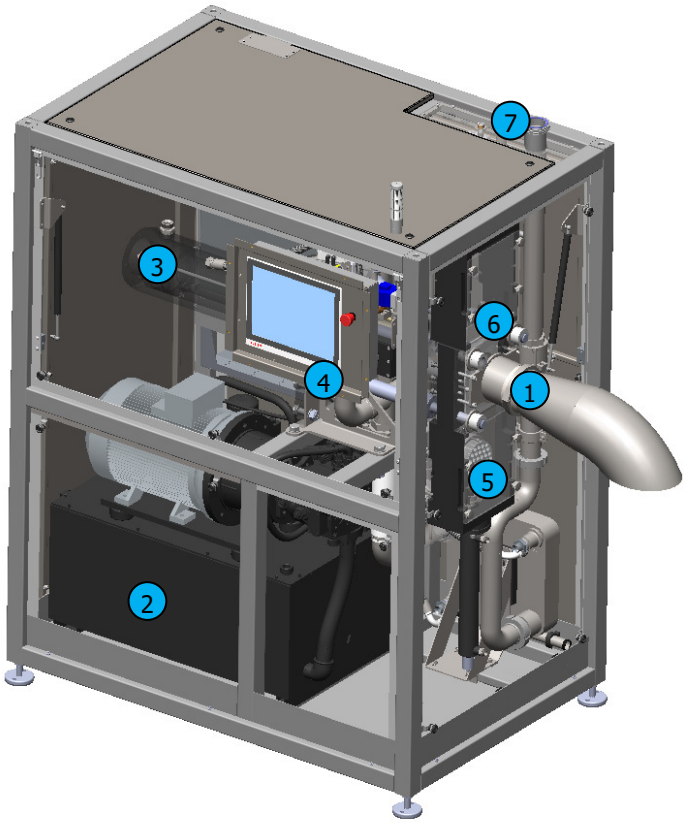
MACHINE STRUCTURE

PR350H



1 Pellet outlet sprout
2 Hydraulic station
3 Main hydraulic cylinder
4 Touch panel
5 Extruder plate cylinder
6 Extruder plate changer
7 Connection to an external supply, CO^2 in and Out

MACHINE CONTROLS

The PR350H is controlled from an HMI screen. The next section will describe the function of the HMI.

PR350H HMI Screen

1. **Homepage**
2. **Start, stop, and pause**
3. **Manuel/automatic**
4. **Process values**
5. **Alarm and history page**
6. **Login page**
7. **Operation time and service time**
8. **Nickname**
9. **Hardware status**
10. **Info page**

1 Start-up page

This page can be activated from any page by pressing the "Home button" in the lower right-hand corner.

The main page shows if the extruder is selected by the color of the die plate above/under the outlet sprout is green. If the die plate is grey then it has not been selected. It also displays which extruder plate is selected, indicated on the die plate. It is possible to run with 1 or 2 sides.

Active  Inactive 

2 Start, stop, and pause

The main functions can be activated by pressing one of the three buttons on the main screen.
By activating the "Start / Stop" button the machine starts or stops when in operation mode. When activating the PR350H, the standby buttons will be visible. Activating standby mode the PR350H will go into a pause mode.

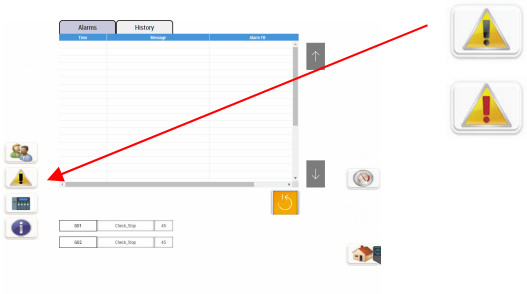
When the PR350H is in a standby mode, the HMI screen changes the start buttons color to yellow. If the pause time exceeds the set pre-entered set point, the machine will automatically run a stop cycle and re-enter operation mode after the cycle is done.

3 Manual/Automatic

By activating the "mode select" button, it is possible to choose between automatic mode and manual mode.
The default selection is automatic mode, which must be selected for production. In manual mode, the PR350H can be turned off.

4 Process values

By pressing the "gauge" button the "process values" page is activated. The page contains a 2-column display of real-time process values (PV). The corresponding "Set Values" (SV) are displayed next to the PV for comparison. During production, the PV will vary inside the given SV window.
The operating hours, time to service, and the cumulated strokes for the extruder are also displayed on this page.



5 Alarm

The Alarm page displays alarms for both Pelletizer and Dosing Unit. By pushing the "Alarm" button the active alarms are shown on the screen. When an alarm occurs the alarm buttons exclamation mark will change from black to red. To reset the alarms press the reset button.

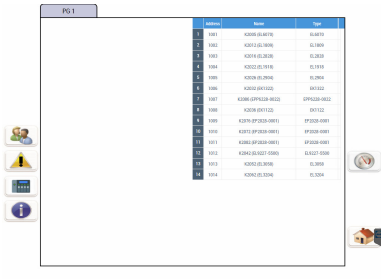
Alarms must be reset before production can continue. When an alarm is reset the text will
Disappear. If the text does not
Disappear by pushing the reset button this means that the error has not been corrected. For more information please see the appendix Alarm list

The History page shows the last 1000 alarms of the PR350H.

6 Password protection

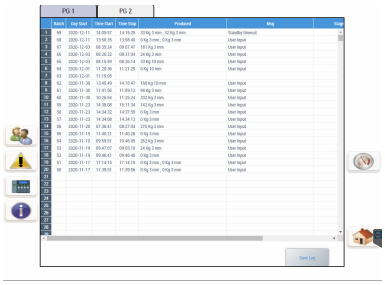
Some functions are password protected. To change these values the User must log in.
By activating the "User" button a login window and a keyboard appears on the screen.
Select the user level and enter the corresponding password.
Press OK to proceed and cancel to exit.
To remove the keyboard, press X in the upper right corner.

This sector can also be used to change the language.



9 Hardware status

These pages give information about the Hardware status for some of the electrical components. If there are no faults in the system, all the Address lines will be white. If there is a fault in a component, its address line will become red.



10 Info page

Info page divided into 2 pages, PG1 and PG2.

PG1 is the Production log, and it has the last 1000 productions.

PG 2 shows information such as Device, PLC, Software, and TeamViewer ID.