

AERO₂

PCS[®] 60

Operator Manual



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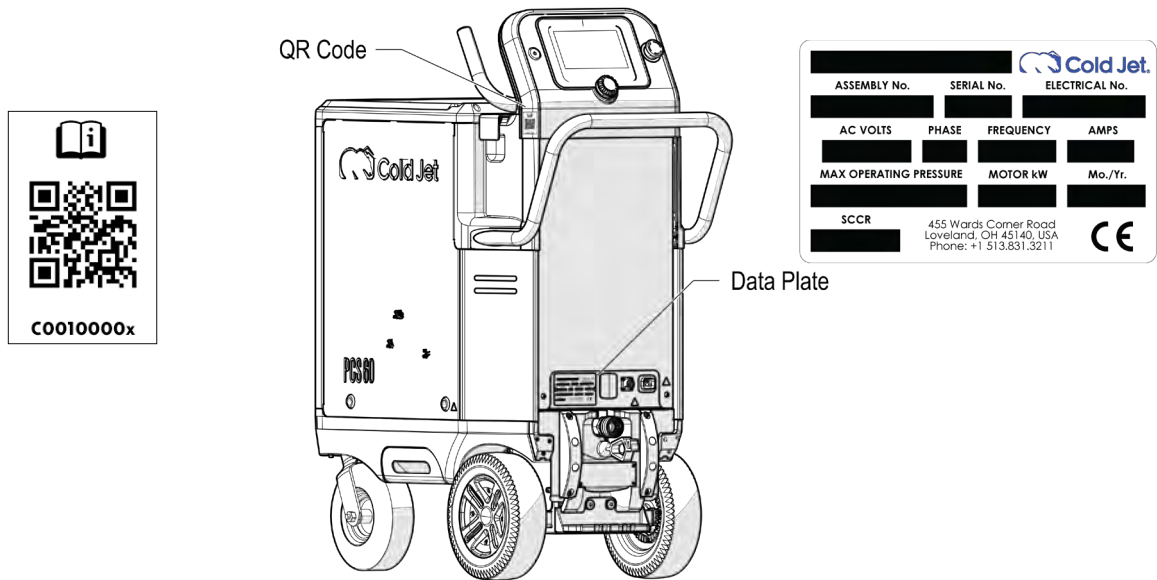
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System Identification

Locate the data plate for this machine and record the information provided in the spaces below. To view documentation for your machine, scan the QR code:



ASSEMBLY No. _____

SERIAL No. _____

ELECTRICAL No. _____

AC VOLTS _____

PHASE _____

FREQUENCY _____

AMPS _____

MAX OPERATION PRESSURE _____

MOTOR KW _____

Mo./Yr. _____

SCCR _____

Supplier Responsible for the Equipment:

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Introduction

About This Manual

This manual should be kept with the machine and be readily accessible to machine operators and maintenance personnel.

This manual contains information on the safety, transportation, operation, and maintenance of this machine.

The graphics used in this manual may show machine details that may be 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 PCS 60

This machine combines patented technology in a lightweight and compact design that gives the operator unparalleled control for dry ice cleaning and other applications.

- The Advanced Air-Flow System reduces pressure loss as the air flows straight through the system which also decreases sublimation and loss of the dry ice particles.
- The Blast Pressure Control System can be regulated digitally from the 7" HMI color screen on the control panel or certain applicators.
- The Sure Flow System with Dynamic Agitation is designed to keep warm air, moisture, and debris out of the hopper while keeping the dry ice flowing. The level of dry ice in the hopper can be monitored from the HMI screen of the control panel or certain applicators.
- The Advanced Direct Drive Feeding System is a two-stage feeding system that improves feed rate consistency and maximizes dry ice particle integrity.
- The Particle Control System (PCS) allows the operator to control the size of dry ice particles being blasted from 0.3 mm micro-particles to 3.0 mm pellets. The PCS is designed to precision-cut dry ice pellets into diamond-shaped particles.

Environmental Impact

Dry ice is a safe, clean, and non-toxic medium approved by the EPA, USDA, and FDA. The dry ice used in this machine is made from reclaimed CO₂ generated from other industrial processes.



Safety

General Safety Guidelines

This machine is designed to comply with international design standards and the European Machinery Directives. Therefore, using the machine does not pose a risk to the operator when the instructions in this manual are followed carefully. However, certain precautions must be followed during its use. To understand all the necessary precautions, the machine operator must read the entire manual before operating or performing maintenance on the machine.

Operation and maintenance should only be performed by authorized and trained personnel. Below are some basic safety guidelines:

- Follow local governing codes to ensure a minimum standard of safety.
- Wear protective gloves, eye protection, and hearing protection.
- Operate the machine in a well-ventilated work area.
- Follow the prescribed maintenance schedule (see "Maintenance" on page <?>).
- Start up and shut down the machine according to the instructions in this manual.
- Do not operate a machine that is damaged or in disrepair.
- Do not store objects on top of machine hopper.

CO₂ Safety

This machine uses dry ice (CO₂ in solid form). The temperature of dry ice is -109°F (-78.9°C). Avoid coming into direct contact with dry ice as it may cause severe tissue damage.

Study the material safety data sheet (MSDS) of dry ice (CO₂) supplied with the delivery of dry ice and follow all the recommendations and guidelines listed therein.

Operate the blaster in a well-ventilated work area with continuous CO₂ -level monitoring. The effects of CO₂ are entirely independent of the effects of oxygen deficiency. Therefore, CO₂ concentrations at 3-5% causes headaches, fast breathing and discomfort while higher concentrations may cause unconsciousness, suffocation or respiratory arrest. The legal exposure limit set by OSHA is a 0.5% average over an 8-hour workday and the acute (15 minute) exposure limit set is 3.0%.

Always use a CO₂ monitoring/alarm system when working with machinery that emits CO₂ in a confined room/space.

Electrostatic Discharge



Dry ice blasting may create electrostatic discharges. This machine is fitted with effective electrostatic dischargers to prevent injury or damage. Also, the machine must be plugged into a properly grounded electrical outlet.

It is recommended to avoid operating the machine near explosive or flammable material. Also, use a plastic shovel when handling dry ice to eliminate any electrostatic discharge.

Safety Labels

The symbols used on the machine were developed by the International Organization for Standardization (ISO) and are defined below. These symbols may include yellow warnings triangles, blue mandatory action circles, or red prohibited action circles.

Symbol	Definition
	General Warning
	Cold Temperature Warning
	Pressurized Material Ejection Hazards
	Electrostatic Discharge Warning
	Asphyxiation Warning
	Hand Crushing Warning
	Wear protective gloves.
	Wear hearing protection.
	Wear eye protection.
	Read operator and maintenance manual.
	Do not operate without Safeguard Grate/guard in place.
	No foreign objects allowed inside machine.
	CO ₂ is in use.

Symbol	Definition
	Protective Earth/Ground
	Frame/Chassis Terminal

There may be other safety labels or warning signs on the machine that contain additional information regarding potential safety hazards not explained in this manual. Operators and maintenance personnel should familiarize themselves with these safety labels and warning signs.

Replace any safety labels or warning signs if they become damaged, missing, or illegible.

Cautions and Warnings

Please review the following cautions and warnings before operating or performing maintenance on the machine.

- | | |
|----------------|--|
| CAUTION | Read the instructions before using the machine. Only qualified personnel should operate the PCS 60. |
| WARNING | Ensure adequate ventilation when operating this equipment to prevent the build-up of carbon dioxide gas. If used indoors or other confined space, a CO ₂ detector should be used to monitor for excessive unsafe levels of CO ₂ gas, and provide a suitable warning. |
| WARNING | Ensure that expended dry ice pellet emissions are not in the vicinity of air ventilation. |
| WARNING | This machine has been designed for use with 3mm dry ice pellets recommended by Cold Jet. The use of other cleaning agents or chemicals may adversely affect the safety of the machine. |
| WARNING | High pressure blast streams can be dangerous if subject to misuse. The blast stream must never be directed at persons, live electrical equipment or the machine itself. |
| WARNING | Do not use the machine within range of persons unless they wear the personal protective equipment. (PPE) |
| WARNING | Do not direct the blast stream against yourself or others in order to clean clothes or foot-wear. |

- WARNING** High pressure cleaners shall not be used by children or untrained personnel.
- WARNING** High pressure hoses, fittings and couplings are important for the safety of the machine. Use only hoses, fittings and couplings recommended by Cold Jet.
- WARNING** To ensure machine safety, use only original spare parts from Cold Jet or approved by Cold Jet.
- WARNING** The applicator and applicator hose contain electrical connections. Do not immerse in water.
- WARNING** Do not use the machine if a supply cord or important parts of the machine are damaged, e.g. safety devices, high pressure hoses, applicator.
- WARNING** Inadequate extension cords can be dangerous. If an extension cord is used, it shall be suitable for the environment in which it is used, if used outdoors the connection has to be kept dry and off the ground. It is recommended that this is accomplished by means of a cord reel which keeps the socket at least 2.4 inches (60 mm) above the ground.
- WARNING** Always unplug the power cord when leaving the machine unattended.

PCS 60 System Description

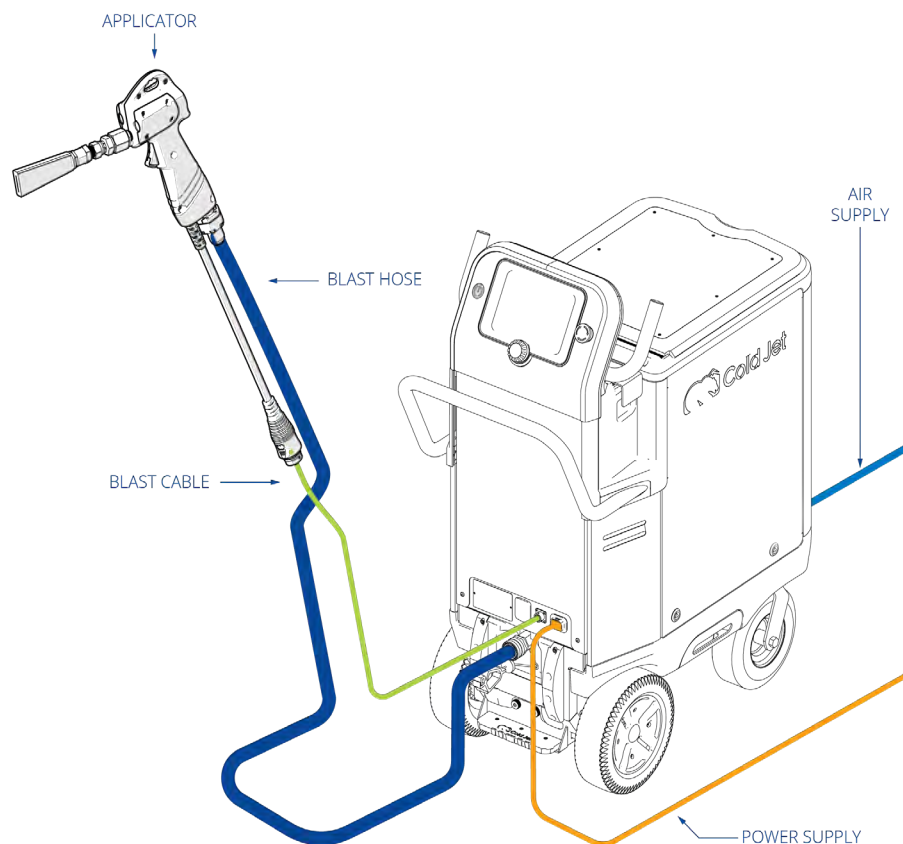
The PCS 60 may be supplied with the Performance Kit or the Precision Kit or both depending on what was ordered. An optional Advanced Applicator is available upon request. The standard applicator kits are as follows:

Performance Kit

- 3/4 in or 1 in Performance Applicator
- Performance nozzle
- Nozzle handle
- 1 in Air supply hose 25 ft (7.62 meters)
- 3/4 in or 1 in Hybrid-Flex blast hose 20 ft (6.09 meters)
- Hose carrier
- Hose wrap

Precision Kit

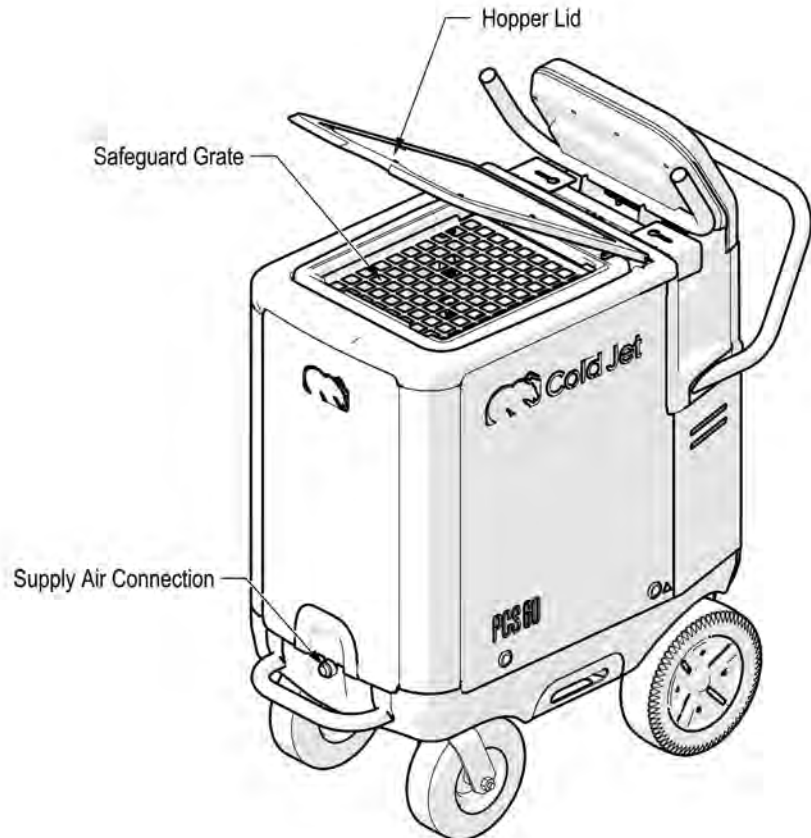
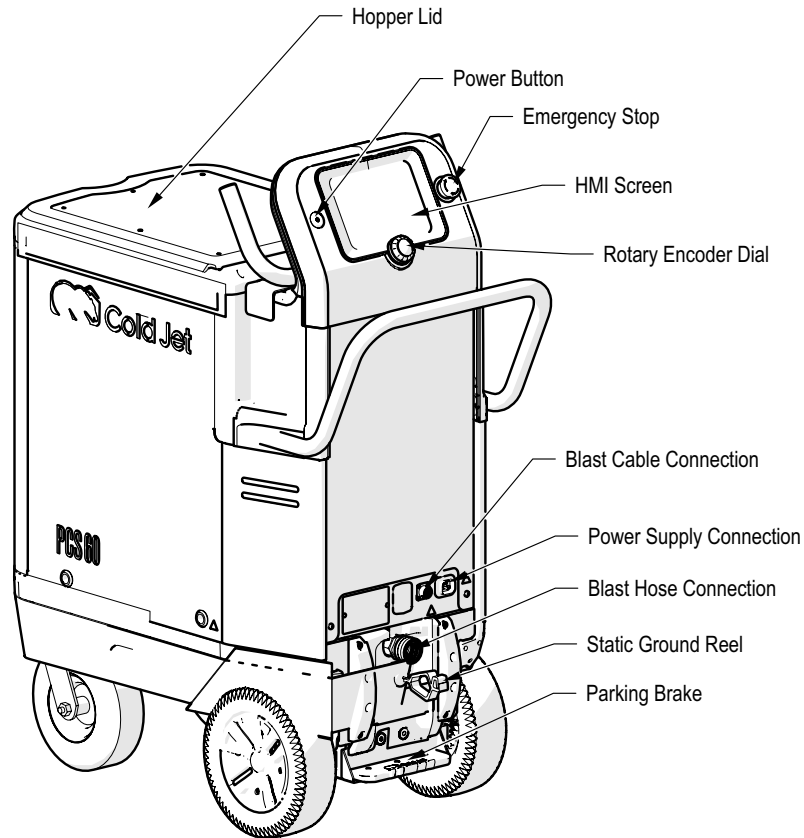
- 1/2 in Precision Applicator
- 2 Precision nozzles
- 1 in Air supply hose 25 ft (7.62 meters)
- 1/2 in Hybrid-Flex blast hose 12 ft (3.66 meters)
- Hose carrier
- Hose Wrap



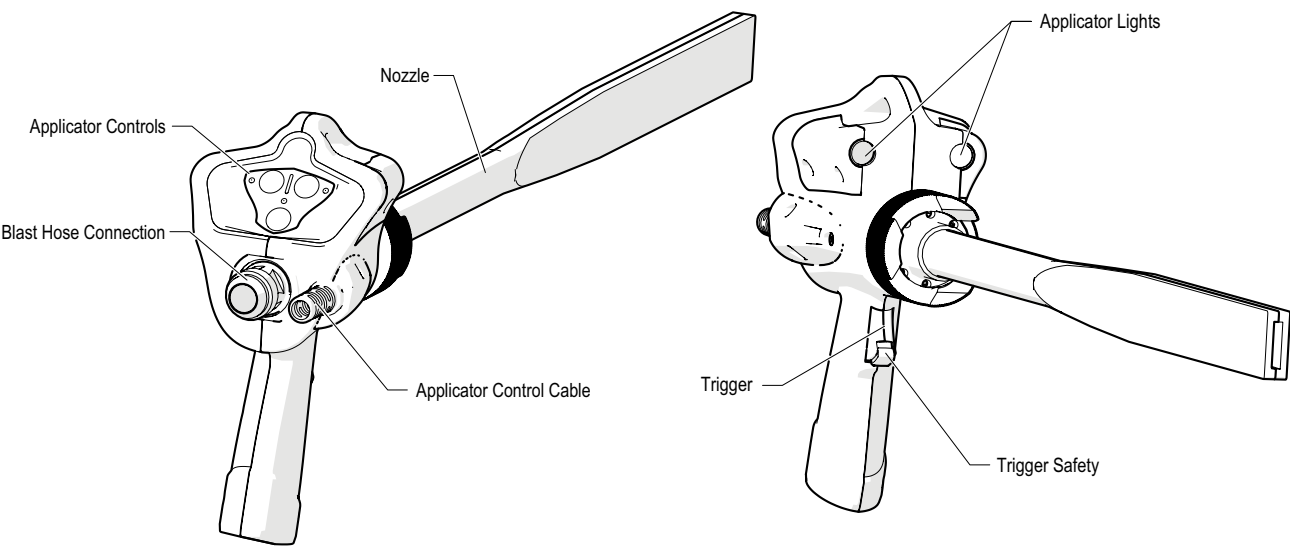
PCS 60 Data

Dimensions	38.75 x 18.98 x 45.03 in (984.33 x 482.21 x 1143.82 mm)
Weight	269 lb (122 kg)
Blast Medium	3 mm dry ice pellets
Hopper Capacity	60 lb (27 kg)
Power Requirement	110/220 VAC (50/60 Hz) 4.5A
Air Supply Pressure	40-145 psi (2.8-10 bar)
Air Flow	12-100 cfm at 80 psi (0.33-2.83 m³/min at 5.5 bar)
Air Flow Line	¾ in (19 mm) straight-through
Blast Pressure	20-145 psi (1.4-10 bar)
Variable Feed Rate	0-4 lb/min (0-1.8 kg/min)
Blast Particle Size	3.0 mm to 0.3 mm (Variable Particle Size Controls)
Air Hose	1in (25.4 mm) Air Supply Hose
Blast Hose	½ in (12.7 mm) Advanced combination material flex hose (low flow) ¾ in (19 mm) Advanced combination material flex hose (medium flow) 1in (25.4 mm) Advanced combination material flex hose (standard)
Applicator	½ in (12.7 mm) Precision Applicator with on/off; air only; light control ¾ in (19 mm) Performance Applicator with on/off; air only; light control 1in (25.4 mm) Performance Applicator with on/off; air only; light control 1in (25.4 mm) Advanced Applicator with on/off; air only; light control; particle adjust and flow control ¾ in (19 mm) Advanced Applicator with on/off; air only; light control; particle adjust and flow control, blasting pressure, and dry ice feed rate
Control/Display	7 in (17.7 cm) LCD screen with rotary encoder dial
Communication	IoT connectivity via a cellular 3G/LTE Global and Cold Jet Connect™
Integration	Automation/Integration capable with PLC controlled system (Modbus protocol by utilizing the optional Integration Kit - Integration upgrade is optional)
Noise Level	Noise level 60 dB(A) up to 130 dB(A) The PCS 60 has many features such as Nozzle selection, air pressure settings, hose sizes and pellet size. The material or materials and surrounding environment will also be key to actual sound pressure levels at the machine or the blast area.

PCS 60 Components



Performance Applicator Components

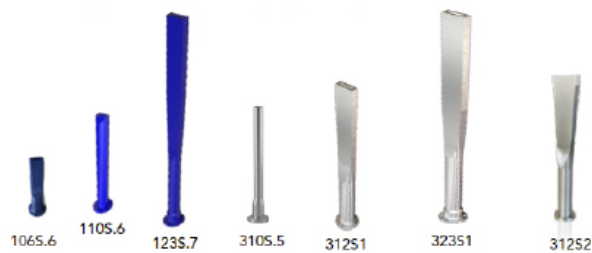


Performance Applicator Nozzles

There are several different styles of nozzles, depending on the application the PCS was ordered for. The table below can be used to help with initial settings as you set up the PCS 60 for operation. Specialty nozzles available on request.

Low and Standard Flow Nozzles

These straight nozzles have standard air consumption rate of 100 cfm or less at 80 psi.



Nozzle	Air Consumption	Blast Swath	Dry Ice Feed rate	Length	Material
106S.6	50cfm @ 80psi 1.4m ³ /min @ 5.5 bar	0.6 in 15 mm	1-3 lbs/min 0.5-1.4 kg/min	6 in 152 mm	Anodized Aluminum
110S.6	50cfm @ 80psi 1.4m ³ /min @ 5.5 bar	0.6 in 15 mm	1-3 lbs/min 0.5-1.4 kg/min	10 in 254 mm	Anodized Aluminum
123S.7	50cfm @ 80psi 1.4m ³ /min @ 5.5 bar	0.7 in 18 mm	1-3 lbs/min 0.5-1.4 kg/min	23 in 584mm	Anodized Aluminum
310S.5	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	0.45 in 11mm	2-4 lbs/min 0.9-1.8 kg/min	10 in 254mm	Aluminum
312S1	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	1 in 25mm	2-4 lbs/min 0.9-1.8 kg/min	12 in 305mm	Aluminum
323S1	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	1" 25 mm	2-4 lbs/min 0.9-1.8 kg/min	23 in 584 mm	Aluminum
312S2	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	1.8 in 46 mm	2-4 lbs/min 0.9-1.8 kg/min	12 in 305 mm	Aluminum

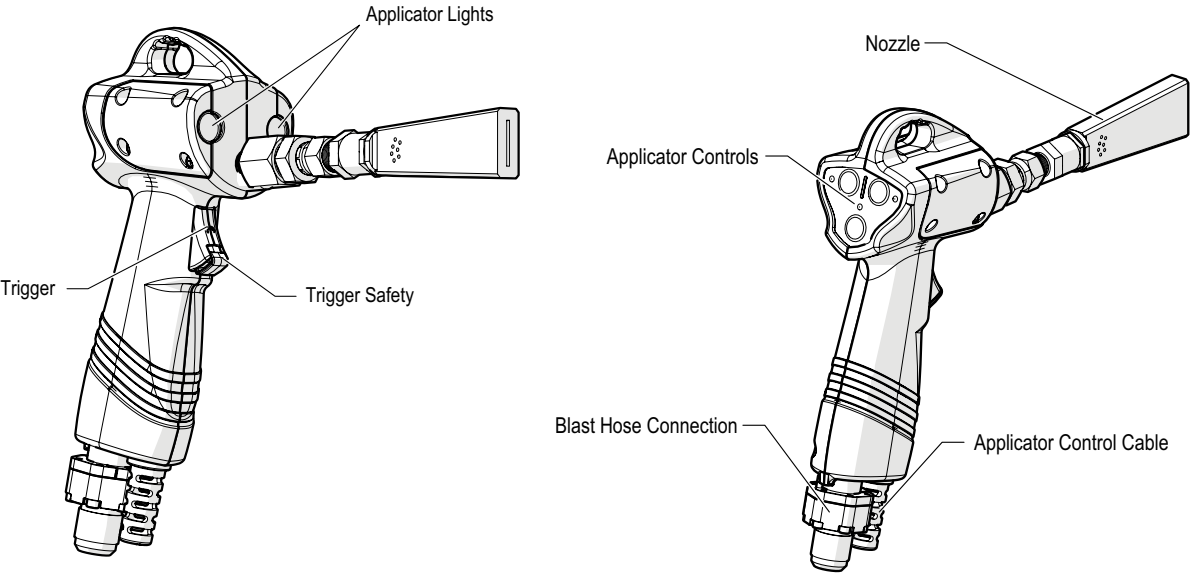
Specialty Nozzles

These nozzles have various configurations for special applications and operation.



Nozzle	Air Consumption	Blast Swath	Dry Ice Feed rate	Length	Material
112HK	70cfm @ 80psi 2.0m ³ /min @ 5.5 bar	0.25 in (0.6 cm)	1-3 lbs/min 0.5-1.4 kg/min	12 x 2 in (30.5 x 5.1 cm)	Polymer Coated SST
114P.5	70cfm @ 80psi 2.0m ³ /min @ 5.5 bar	0.25 in (0.6 cm)	1-3 lbs/min 0.5-1.4 kg/min	10.3 in (26.2 cm)	Polymer
307A135V.8	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	0.75 in (1.9 cm)	2-4 lbs/min 0.9-1.8 kg/min	7.3 X 6.3 in (18.6 x 16 cm)	Polymer Coated SST
307A45H1	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	1 in (2.5 cm)	2-4 lbs/min 0.9-1.8 kg/min	7.3 x 5 in (18.6 x 12.7 cm)	Polymer Coated SST
307A90H.8	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	0.75 in (1.9 cm)	2-4 lbs/min 0.9-1.8 kg/min	7 x 5.3 in (17.8 x 13.5 cm)	Polymer Coated SST
307A90V1	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	1 in (2.5 cm)	2-4 lbs/min 0.9-1.8 kg/min	7.3 x 7 in 186 x 178 mm	Polymer Coated SST
308A45H.8	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	0.75 in (1.9 cm)	2-4 lbs/min 0.9-1.8 kg/min	7.7 x 3.5 in (19.6 x 8.9 cm)	Polymer Coated SST
308A45V.8	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	0.75 in (1.9 cm)	2-4 lbs/min 0.9-1.8 kg/min	7.7 x 3.5 in (19.6 x 8.9 cm)	Polymer Coated SST
309A45H.8	120cfm @ 80psi 3.4m ³ /min @ 5.5 bar	0.75 in (1.9 cm)	3-5 lbs/min 1.4-2.3 kg/min	8.9 x 4 in (22.6 x 10.2 cm)	Aluminum
317A90H1	100cfm @ 80psi 2.8m ³ /min @ 5.5 bar	1 in (2.5 cm)	2-4 lbs/min 0.9-1.8 kg/min	16.6 x 3.4 in (42.2 x 8.6 cm)	Polymer Coated SST

Precision Applicator Components

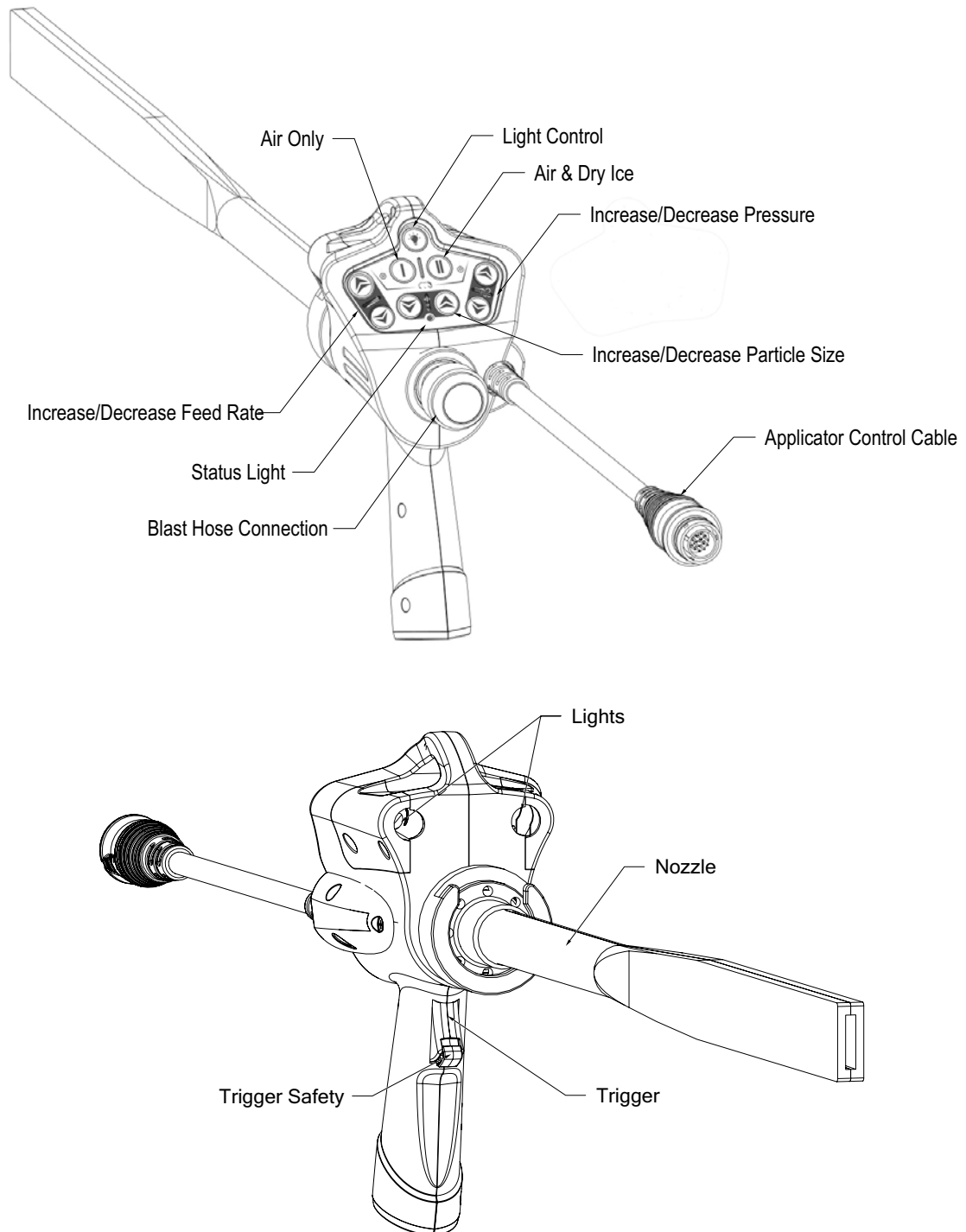


Precision Applicator Nozzles



Nozzle	Air Consumption	Blast Swath	Dry Ice Feed Rate	Length	Material
(MC13) Yellow	12 CFM@80 psi (0.3 m ³ /min 5.5 bar)	0.13 in (.3 cm)	0.1-0.4 lbs/min .05-0.2 kg/min	6 in (15.2 cm)	Plastic
(MC19) White	30 CFM@80 psi (0.8 m ³ /min 5.5 bar)	0.19 in (.5 cm)	0.2-1.0 lbs/min 0.1-0.5 kg/min	6 in (15.2 cm)	Plastic
(MC31) Blue	50 CFM@80 psi (1.5 m ³ /min 5.5 bar)	0.31 in (.8 cm)	0.5-1.2 lbs/min 0.2-0.6 kg/min	6 in (15.2 cm)	Plastic
Fan Nozzles					
(MC47)	25 CFM@80 psi (0.7 m ³ /min 5.5 bar) Fan	0.47 in (1.2 cm)	0.2-1 lbs/min 0.1-0.5 kg/min	6 in (15.2 cm)	Plastic & Aluminum
(MC28)	25 CFM@80 psi (0.7 m ³ /min 5.5 bar) Fan	.28 in (.7 cm)	.2-1 lbs/min 0.1-0.5 kg/min	6 in (15.2 cm)	Plastic & Aluminum
(MC35)	25 CFM@80 psi (0.7 m ³ /min 5.5 bar) Fan	0.35 in (.9 cm)	0.2-1 lbs/min 0.1-0.5 kg/min	6 in (15.2 cm)	Plastic & Aluminum
(MC88F)	25 CFM@80 psi (0.7 m ³ /min 5.5 bar) Fragmenting Fan	0.88 in (2.2 cm)	0.2-1 lbs/min 0.1-0.5 kg/min	5 in (12.7 cm)	Plastic & Aluminum
(MC88)	30 CFM@80 psi (0.9 m ³ /min 5.5 bar) Fan	0.88 in (2.2 cm)	0.5-1.2 lbs/min 0.2-0.6 kg/min	5 in (12.7 cm)	Plastic & Aluminum
Angled Nozzles					
(MC25A45)	25 CFM 0.7 m ³ /min	0.25 in (.6 cm)	0.2-1 lbs/min 0.1-0.5 kg/min	6 in (15.2 cm)	Aluminum
(MC25A90)	25 CFM 0.7 m ³ /min	0.25 in (.6 cm)	0.2-1 lbs/min 0.1-0.5 kg/min	6 in (15.2 cm)	Aluminum
Advanced Nozzles					
(MC26M)	35 CFM 1.0 m ³ /min	0.26 in (.7 cm)	0.2-1.2 lbs/min 0.1-0.6 kg/min	5 in (12.7 cm)	Plastic & Aluminim
(MC29MH)	50 CFM 1.5 m ³ /min	0.29 in (.7 cm)	0.5-1.2 lbs/min 0.2-0.6 kg/min	6 in (15.2 cm)	Plastic & Aluminim

Advanced Applicator Components*



*The following bullets are the functions of the New Advanced applicator feed rate, blast pressure, and particle size:

- **Increase/decrease feed rate** – adjust in increments of 0.2 lbs. with each button click; metric increments will be 0.5 kg
- **Increase/decrease blast pressure** – adjust in increments of 10 psi ; metric increments will be 1 bar
- **Particle size** – adjust in increments of 0.1 mm

Control Panel and HMI Screens

This PCS 60 uses a rotary encoder dial that allows the operator to navigate, select and adjust settings on the control panel screen. You must first press the rotary encoder to activate navigation. Navigate between options by turning the rotary encoder dial left or right; this will highlight the option in blue. Once the desired option is highlighted, simply press the dial to select it; this will highlight the option in green. With the option selected (green), turn the rotary encoder dial left or right to adjust the setting then press again to accept.

Some options can be adjusted directly from the home screen while other options can be found on other screens. To access these other screens using the rotary encoder dial, navigate to the settings screen and press to select. Continue to navigate through the screens (i.e. recipe, status, applicator, advanced, reset, settings) and adjust the settings as needed by turning and pressing the rotary encoder dial.

When not being used, the screen on the control panel will display a screen saver with feed rate, particle size, air pressure, blast pressure and hopper level. Press the rotary encoder dial to bring up the home screen.

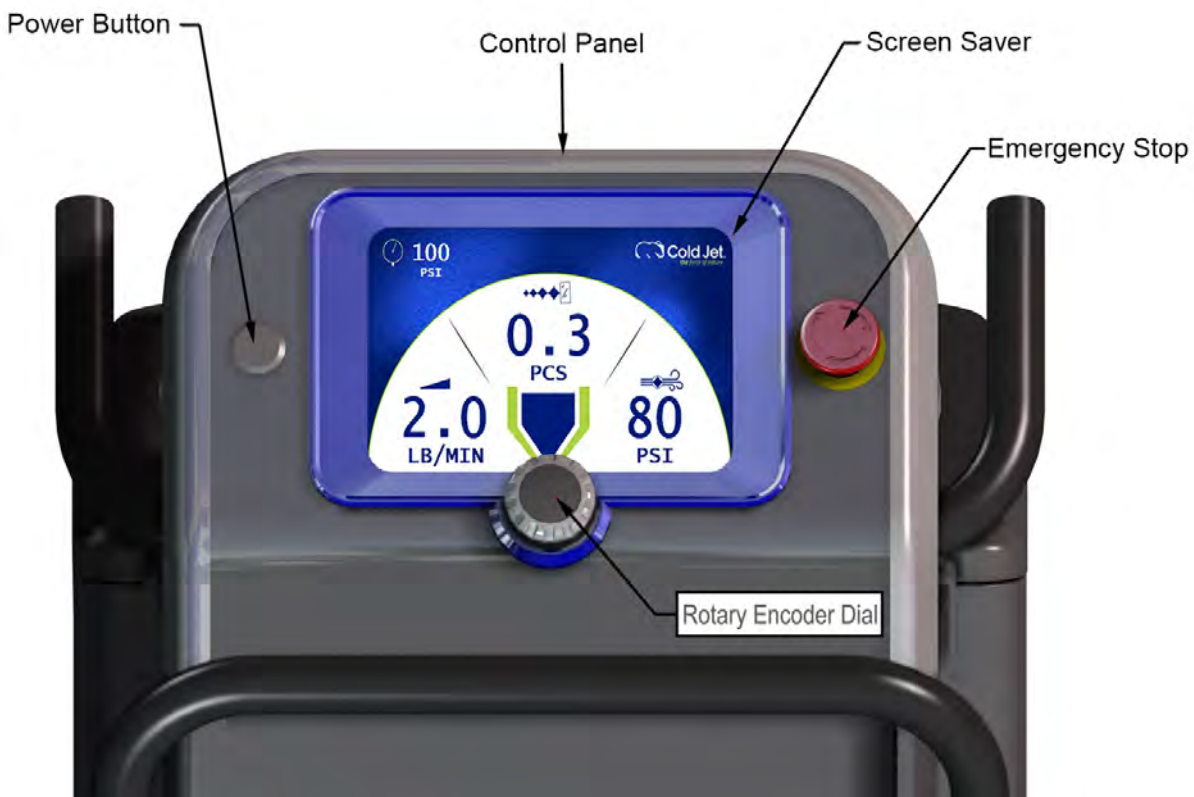


Figure 1: Control Panel and Rotary Encoder Dial

There are two screen states for the PCS 60. A blue screen (home screen) which is the system operating and settings screen. A black screen indicates that the PCS 60 is in the advanced settings or the recipe screen. Changes can be made in each screen.



Figure 2: Home Screen

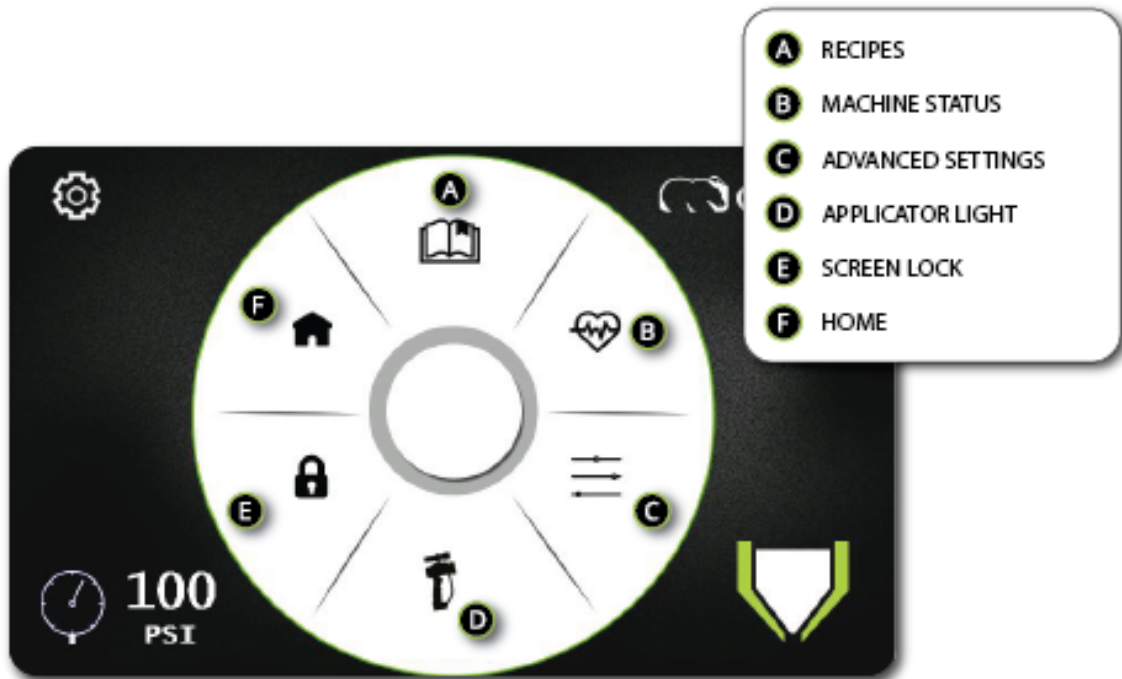


Figure 3: Settings Screen

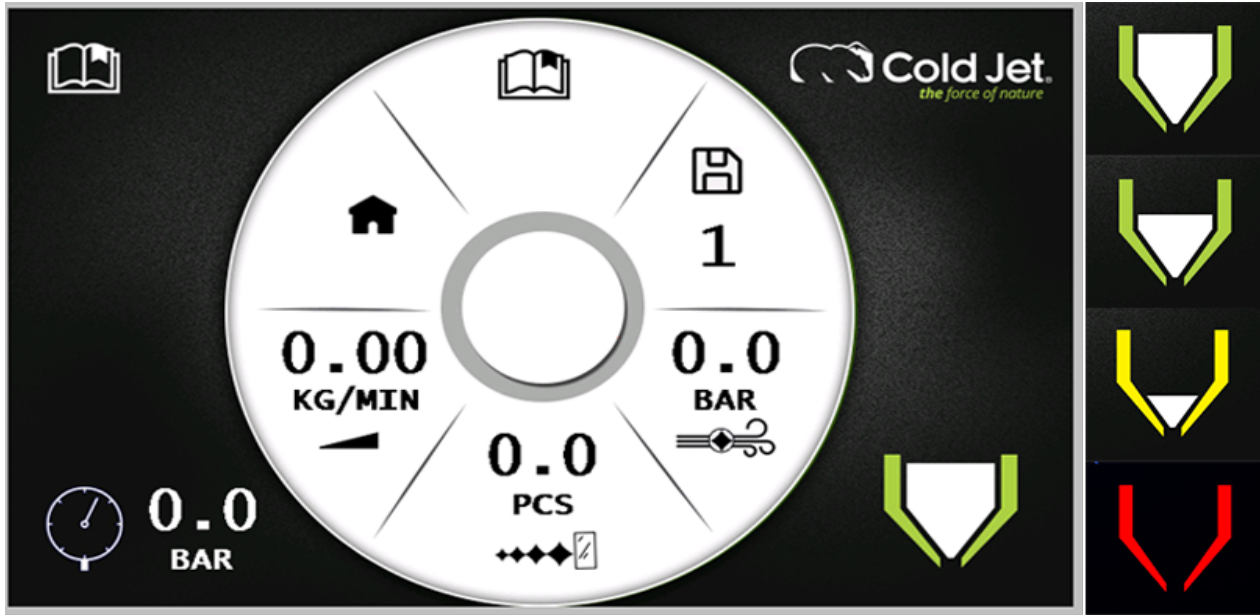


Figure 4: Hopper Level Indicator

During operation, some items on the screen will indicate level or failure mode by changing colors. Green is normal, yellow or orange is a warning and red is critical and needs attention. The above illustration indicates the level of the dry ice in the hopper.

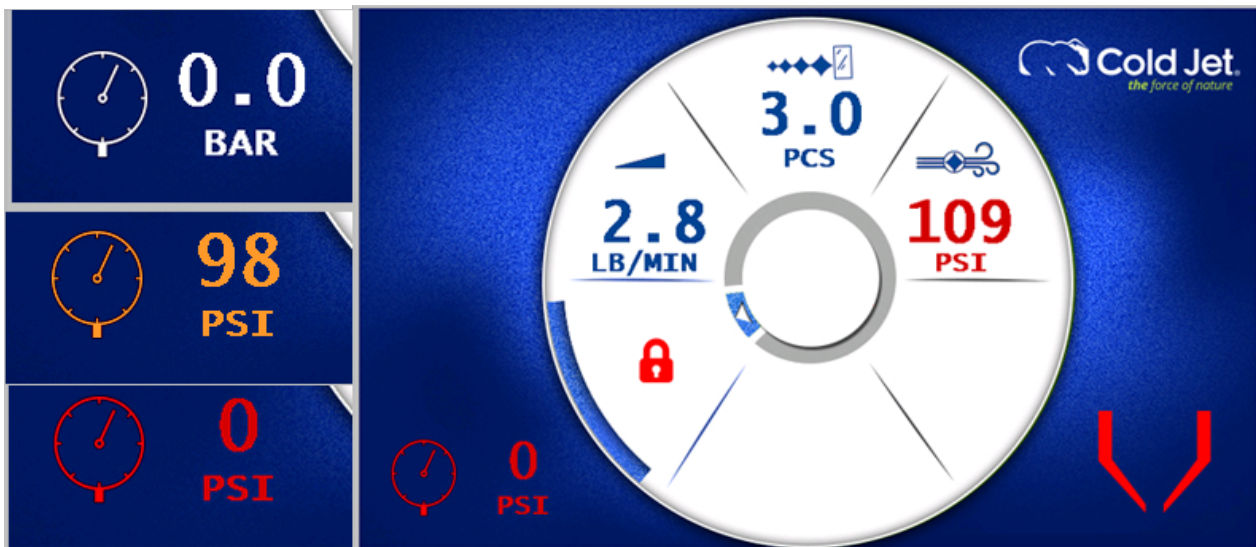


Figure 5: Numeric Color Indicator

Numbers change states much like the hopper levels. White is normal, orange is warning, and red is critical.

Operations

Unpacking the PCS 60 System

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, recyclable box(es) that contain accessories, and the packaging can be recycled.
3. Examine the machine for any external damage that may have occurred during transport.
4. Remove the back housing of the machine and examine the machine for any internal damage that may have occurred during transport.

Refer to the packing slip for a list of the components shipped with the machine. Contact Cold Jet if any damage has occurred to the shipping container or the machine (see "Contact Information" on page 17).

The following sections describe the unpacking, moving and transporting, and operations of the PCS 60. Read and follow all instructions prior to using the PCS 60.

⚠ WARNING Only trained and or certified personnel should operate or rig the PCS 60 for shipment or movement.

Transport and Storage

The following instructions are for proper transport of the PCS 60. Follow all instructions as illustrated to avoid damaging the PCS 60. It is recommended that only trained and qualified personnel use and move the PCS 60.



To transport the PCS 60, use the methods illustrated:



Do not strap over the console as this could damage the screen and components for operating the PCS 60. Strap the PCS 60 transversely as shown. Strapping the PCS 60 for long periods of time is not advised.

To transport short distances using a fork lift, use the method illustrated:



Secure the PCS 60 before lifting or moving on a fork lift to prevent it from sliding or falling off. Lift the tires a 3-5 inches (8.5-12.5 cm) off the ground to move the machine.

To lift the PCS 60, use the method illustrated:



⚠ WARNING Do not lift the PCS 60 using the front handle bar, upper handle bar, or the lower bumper as there will be no stability which could cause damage or harm to personnel.

To store the PCS 60 see section Shutting Down the PCS 60 on page 27.

Personal Protective Equipment (PPE)

⚠ WARNING Only trained and or certified personnel should operate the PCS 60.

⚠ WARNING Do not operate the PCS 60 without proper PPE.

Prior to operating the PCS 60, or loading dry ice into the hopper, proper PPE must be used. It is recommended that each operator is trained on the proper use of PPE.



Wear protective gloves.



Wear hearing protection.



Wear eye protection.



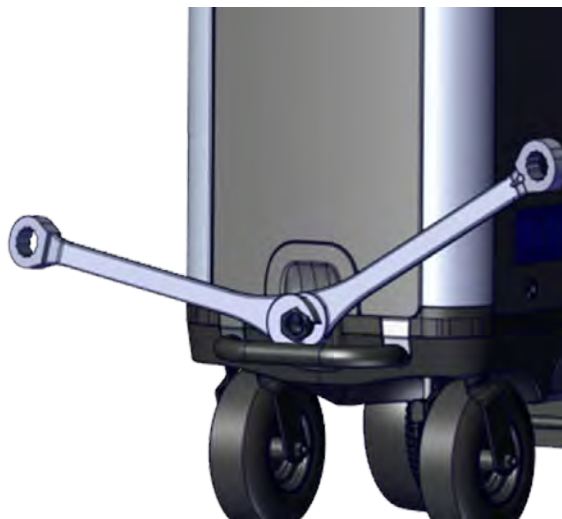
Read operator and maintenance manual.

Setting Up the PCS 60

⚠ WARNING Improper installation of hoses and adapters to the PCS 60 can cause damage to the machine or the applicators.



Do not use one wrench when tightening or replacing fittings on the PCS 60 machine or the applicators.



Always use two wrenches to install and remove hoses and accessories on the PCS 60 or the applicators.

⚠ CAUTION When attaching the blast hose, make sure to put a 1" wrench on the SST base connection of the rotary union. DO NOT rely on the polymer housing to keep it from rotating. Any connections that are frozen should be thawed by running air only through the applicator if machine has been in operation.

Follow the instructions below to set up the PCS 60:

1. Set the parking brake by pressing down (lift to release).
2. Attach the blast hose and control cable to the PCS 60.
3. Attach an applicator to the blast hose and control cable using two wrenches.



Always use two wrenches to install and remove hoses and accessories on the PCS 60 or the applicators to prevent damaging the internal components.

4. Attach a nozzle to the applicator.
5. Connect the static ground reel to the target surface.
6. Attach the power cord to the PCS 60 and then to an appropriate electrical outlet (see "PCS 60 Data" on page 8). (The machine will go into a calibration mode which will take 20-30 seconds)
7. Attach the air supply hose to the front of the PCS 60.

Maximum air supply pressure is 145 psi (10 bar)

8. Turn the air supply on and allow the air hose to pressurize.

The PCS 60 automatically bleeds air pressure when idle

9. Once the PCS 60 is set up, go to "Starting the PCS 60" on page 22.

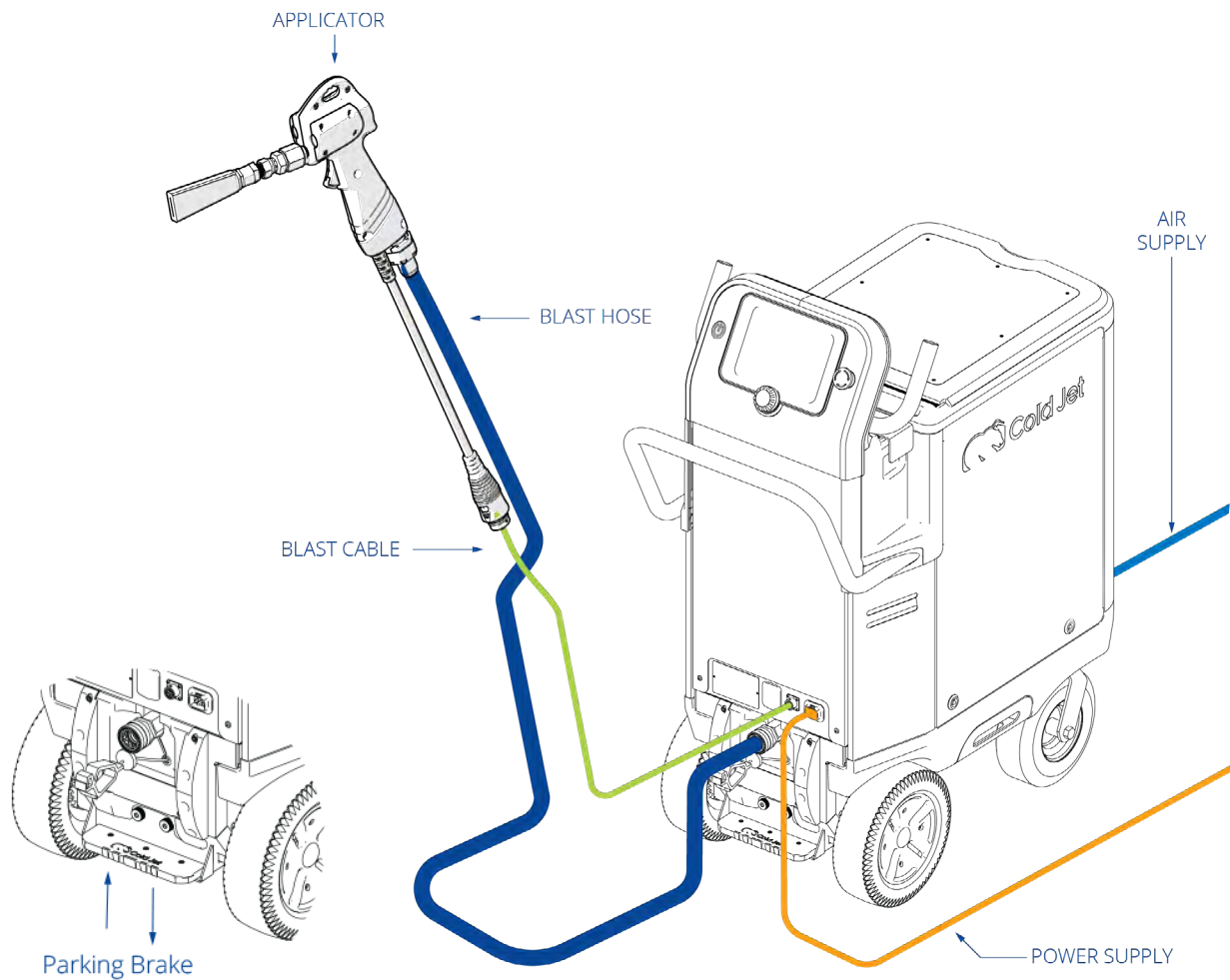


Figure 6: Setting Up the PCS 60



WARNING

Do not use the applicator body or handle for leverage when tightening the the blast hose to the applicator. Always use two wrenches to prevent damaging the applicator and fittings.

Compressed Air Supply

For best results while blasting, incoming air supply must be as free of oil and dirt as possible. It is recommended that the incoming supply air— filters, oil filters, and water separators are continuously monitored to ensure the PCS 60 receives the air your machine use is specified for. The compressed air must have a low moisture level for optimal and continued performance. It is recommended that the moisture content of the supply air meet the minimum class 3, ISO 8573-1 at standard intermittent usage and class 2, ISO 8573-1 at continuant non-stop blasting at PCS=0.3mm.

Starting the PCS 60

⚠ WARNING Never blast the display screen area of the PCS 60 with dry ice as this will cause permanent damage to the screen.



Follow these instructions to start the blasting job:

1. On the control panel, press the red power button to turn the PCS 60 on.

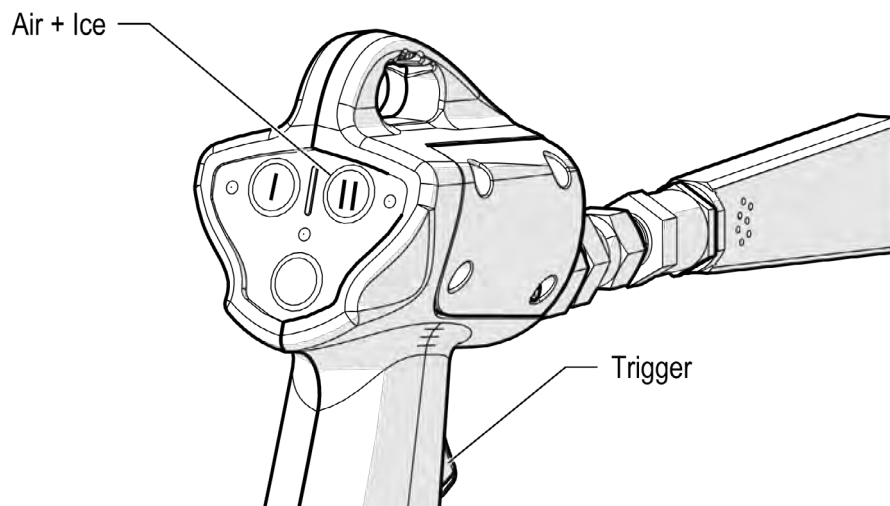


Figure 7: Power Button ON Status

2. Purge the system:

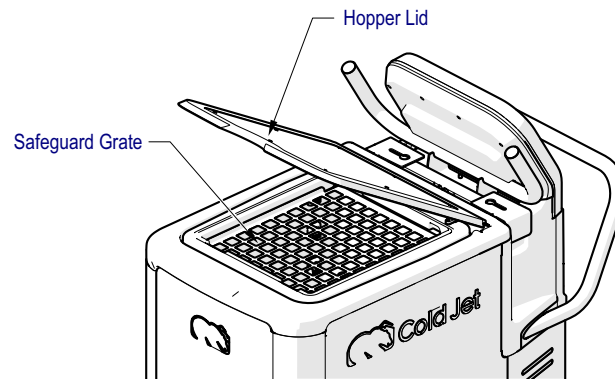
Always purge the system with compressed air during start-up, after breaks, and before loading dry ice. This will remove any accumulated moisture, water, and ice in the system.

- a. On the Performance and Precision applicator, press the air+ice button (II) to activate (green light indicates ON and pressing the II button again will set the system to OFF).
- b. Using the rotary encoder dial, navigate to the feed rate indicator on the home screen and adjust it to the maximum setting.
- c. On the applicator, pull the trigger and blast for 10 seconds.
- d. Set the feed rate to its minimal setting.



3. Load or reload dry ice into the hopper:
 - a. On the Performance and Precision applicator, press the air+ice button (II) to deactivate (green light OFF). This will also deactivate the applicator.
 - b. On the PCS 60, open the hopper lid leaving the Safeguard Grate in place.

Opening the safeguard grate will cause the PCS 60 to shut down automatically. The grate is a safeguard to prevent coming into contact with the doser at the bottom of the hopper.



- c. Check the hopper for the presence of any foreign material or condensate and clean or remove as necessary.
 - d. Load the hopper with 3 mm dry ice pellets.

⚠ CAUTION Use only 3mm dry ice pellets for blast media. The use of any other media will lead to loss of warranty coverage

- e. Close the lid.

The Sure Flow Hopper system is a feature designed into the PCS 60 that will keep the ice flowing in the insulated hopper and a sealed lid while the hopper is in use and idle for a short period of time. The vibrator for the PCS 60 will intermittently operate with short bursts to ensure the ice continues flowing or dropping toward the bottom of the hopper. The activation, duration, and interval of the Sure Flow can be adjusted in the advanced menu (activation of the vibrator during blasting is not selectable and is always on). The settings for the thumper and ramrods may be changed by the operator in the advanced menu of the PCS 60 to adjust the frequency and time of the thumper. The PCS 60 is equipped with a magnetic switch on the safe guard grate for safety. Should the safe guard grate be opened while the PCS 60 is operating, it will go into idle until the it is closed at which time normal operations may begin. There is no need to set-up the machine again.

Blasting Dry Ice Particles

For optimum performance while blast cleaning with the performance applicator or the precision applicator:

- Position the PCS 60 and blast hose to prevent kinking and allow for maximum maneuverability.
- Hold the nozzle perpendicular to surface being cleaned at a distance of 2-6 inches (5-15 cm).
- To find the optimum feed rate, start at 0 and gradually increase until the desired cleaning result and/or cleaning performance is achieved.
- Use a lower feed rate when the air pressure is below 50 psi (3.4 bar).

Follow the instructions below to start blasting dry ice particles:

1. On the performance or the precision applicator, press the air/ice control (II) to activate (green light ON).
2. It is recommended to start blasting next to the target (but in a safe place) and move onto the target.
3. Move the nozzle back and forth keeping it perpendicular to the surface being cleaned.
4. Monitor the hopper level and reload dry ice pellets as needed:
 - a. On the applicator, the status light will be solid red when the hopper is full and start flashing when the hopper level is low to empty.
 - b. On the control panel, the hopper level is indicated by the color of the hopper icon. Green is full, yellow is half-full, and red is empty.
5. Adjust settings or select a recipe:
 - a. To adjust the settings:
 - i. Use the rotary encoder dial to adjust the feed rate, blast pressure and particle size.
 - b. To select a recipe:
 - i. Use the rotary encoder dial to navigate to the Settings screen then to the Recipe screen.
 - ii. Use rotary encoder dial to select the recipe menu and adjust it to the desired recipe numbered 1-9 (see "Recipes" on page 28).



Shutting Down the PCS 60

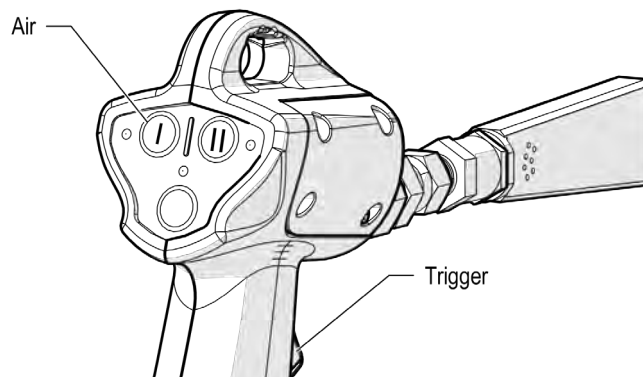
Follow the instructions below to shut down the PCS 60:

Always remove any remaining dry ice from the hopper if shutting down the PCS 60 for more than 15 minutes to prevent the internal mechanics and/or nozzle from freezing.

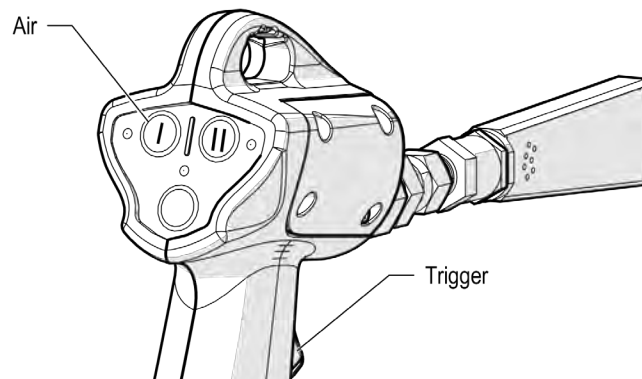
1. Using a plastic scoop, remove any unused ice from the hopper then close the lid.

⚠ CAUTION Be careful to avoid coming into contact with the doser at the bottom of the hopper

2. On the applicator:
 - a. Press the air button (I) to activate (blue light on).



- b. Pull the trigger to blast for 10 seconds.
- c. After blasting, press the air button (I) again to deactivate (blue light off). This should also deactivate the applicator.



- d. Remove nozzle from applicator



CAUTION

Do not touch nozzle with bare hands during or immediately after use. Always wear protective gloves

3. On the control panel, press the power button to turn the PCS 60 OFF (the power button will turn red).



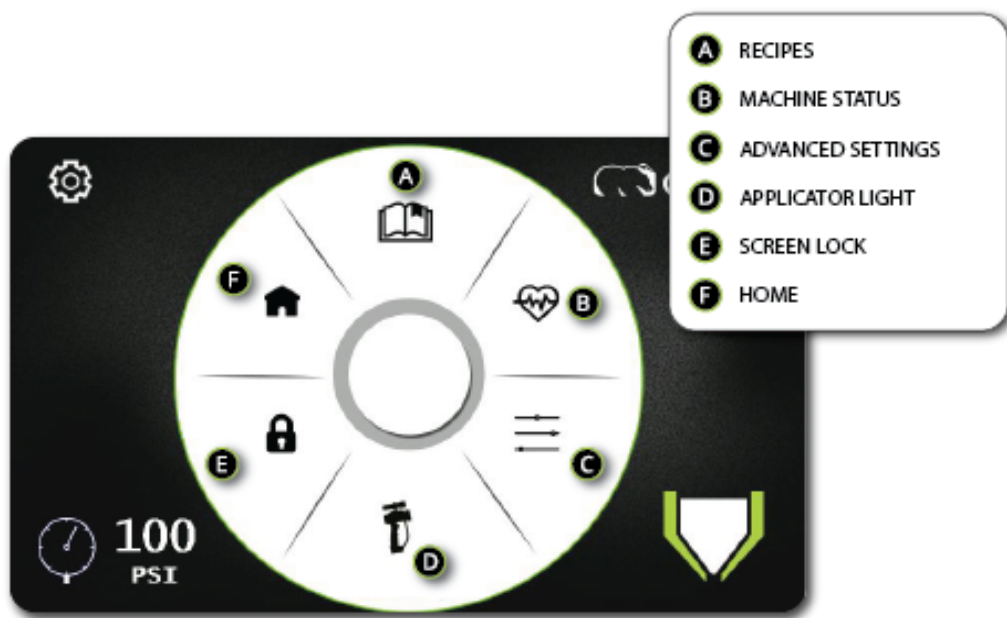
4. Turn off the compressed air supply. The PCS 60 will automatically bleed any remaining pressure.

There is no need to bleed the air pressure from the PCS 60. The PCS 60 automatically bleeds air pressure during proper shut down of the PCS 60. It also automatically bleeds for approximately two seconds every 30 minutes of trigger time during operation.

5. When all the air pressure is bled off, disconnect the air supply hose from the PCS 60.
6. Unplug the power cord from the PCS 60 by depressing the tangs on the cord collar.
7. If transporting the PCS 60 to a different location, disconnect all cables and hoses from the PCS 60 first and stow them on retractable hooks.
8. If storing the PCS 60, disconnect all cables and hoses and stow them on retractable hooks. Store the PCS 60 in a dry space free of dirt and debris. Keep out of direct sunlight.

Password

The following screens describe how to lock the screen so that the blaster settings cannot be changed.



1. From the settings screen, select "E" using the rotary encoder dial to access the screen lock screen.



2. Using the rotary encoder dial, select the top blank line of the password entry screen and press the dial once.
3. Select a number and press the dial again to enter the selected number.
4. Repeat until three numbers have been populated.
5. Dial to the bottom "save icon" and press the rotary encoder dial to save the password.
6. Repeat steps 1-4 to activate the screen lock.
7. The green "lock icon" in the upper left corner will change to red.
8. If the screen has been locked, repeat steps 1-4 with existing password and the screen will unlock.

Recipes

The following screens describe the recipe functions for the PCS 60. Recipes are useful for saving optimal settings for the machine for different types of surfaces. This saves time when switching from one type of surface to another. Below describes how to save recipes and how to recall for use.



Figure 8: Recipe Screen

1. To access the Recipe screen:
 - a. From the Home screen, use the rotary encoder dial to select settings then recipes.
2. To select a recipe:
 - a. Using the rotary encoder dial, navigate to the Recipe Menu (A).
 - b. Rotate the dial left or right to scroll through recipes 1-9 (B).
 - c. Press the dial to select the desired recipe.
3. To create a recipe:
 - a. Using the rotary encoder dial, navigate to and adjust the Blast Pressure (C), Particle Size (D), and Feed Rate (E).
 - b. Once settings are adjusted, navigate to numbered recipe (B) and press to save.
4. Using the rotary encoder dial, navigate to the home icon (F) and press to return to the Home screen.

Advanced Settings

The advanced settings screen is for setting up preferences for the PCS 60 such as units of measure, thumper time and more. If dry ice begins clumping in the hopper the thumper and ramrod frequency and time can be increased to help the flow of dry ice while blasting.

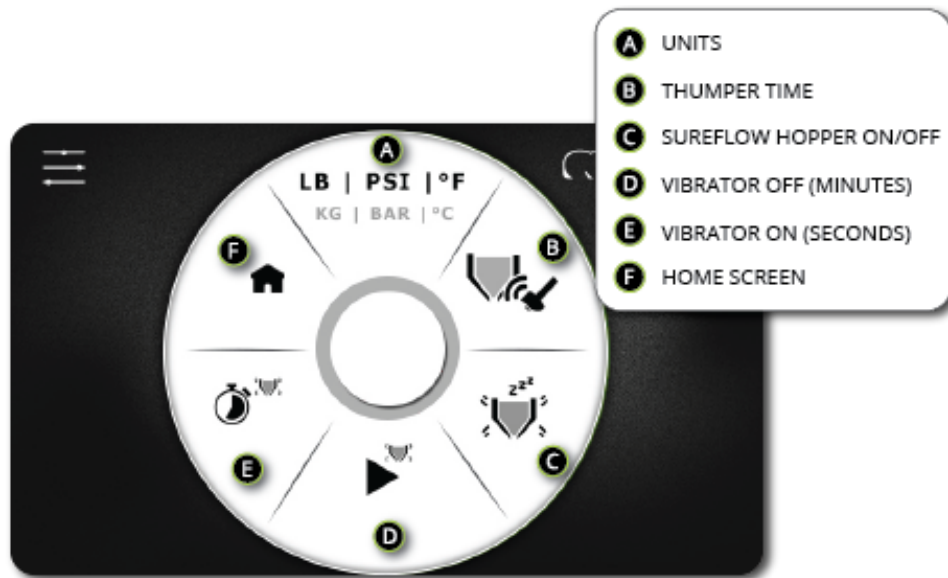


Figure 9: Advanced Settings Screen

1. To access the Advanced Settings screen:
 - a. From the Home screen, use the rotary encoder dial to select settings then advanced settings.
2. To change the units of measurement (A):
 - a. Using the rotary encoder dial, navigate to units and press to select.
 - b. Toggle between US standard (LB | PSI | °F) or metric (KG | BAR | °C) and press to select.
3. To change the thumper and ramrod settings (B, C, D, and E):
 - a. For thumper and ramrod time (B), use the rotary encoder dial to adjust the timing in between the thumper/ramrods (in seconds).
 - b. The SureFlow hopper on/off (C) operates based on the vibrator on/off values when dry ice is detected at the second mid hopper level sensor.
 - c. For vibrator on (D), adjust the number of seconds the hopper will vibrate. For vibrator off (E), adjust the number of minutes between vibrations.

Emergency Stop

The emergency stop button is used in the event that the PCS 60 must be shut down immediately. If any event occurs that could cause harm to personnel or equipment then use the emergency stop to shut down the PCS 60. The Emergency stop button is a push pull button. Once pushed, the button must be rotated clockwise to reset. Then reset the PCS 60 on the screen.

⚠ CAUTION Do not use the emergency stop button to shut down the PCS 60 for anything other than an emergency



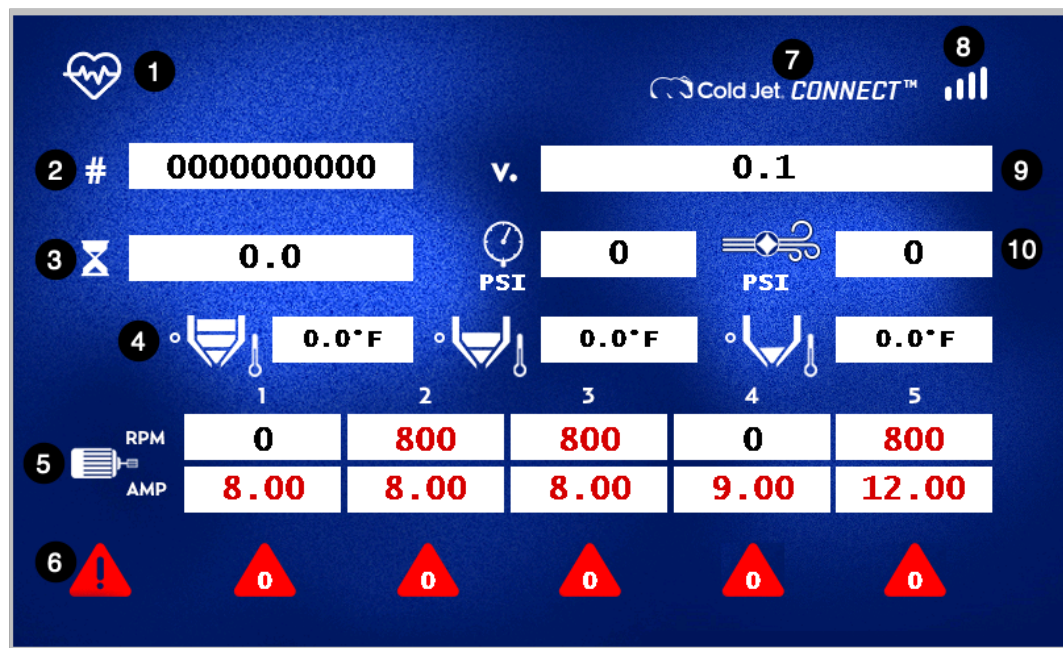
Reset Screen

The reset screen appears if the emergency stop has been activated or the safeguard grate has been removed. When the reset screen appears, first correct the issue. If the emergency stop has been activated — reset the emergency stop by rotating clockwise. If the safeguard grate has been removed, re-install it. Use the rotary encoder dial to press the button indicated by the animation. This will reset the machine and the splash screen, then the home screen will boot up. The PCS 60 logic will validate that the issue has been satisfied and calibrate. After calibration the machine will return to its last mode of operation and the settings will return to the settings used prior to shut down.



Status Screen

The status screen displays information about the machine such as serial number, software version, hours of operation, pressure values and hopper temperature indicators. Additionally, there is information about the operation of the doser, motors, and feeder. The PCS 60 is automatically connected via 3G/LTE service to the Cold Jet Connect™ platform where you can view the machine's operating conditions. In addition, through the machine's control panel you can initiate Diagnostic Mode when working with Cold Jet's technical service personnel which will send a sustained burst of more detailed operating data for help in evaluating technical issues. To initiate the diagnostic mode, hold the rotary encoder button down for 8 seconds.



Status Screen Legend:

1. Current Screen Indication
2. Serial Number
3. Hour Meter
4. Hopper Temperature Indicators
5. Motor Status
6. Error Codes
7. IoT Diagnostic Mode
8. Cellular Signal (if there are no signal bars the machine will not be able to connect)
9. Firmware Version
10. Incoming/Outgoing Pressure

Cold Jet CONNECT™

In the increasingly smart connected world, technology makes it easier to support and maintain your Cold Jet equipment. As part of our commitment to the support of your dry ice blasting machine, it comes with its own personal support site through coldjetconnect.com and a link to Cold Jet CONNECT™ our IoT solution providing you insight into your machine's operation, and providing direct operational communication with Cold Jet's technical support staff if and when you initiate it.

To access your machine's personal support page, scan any of the QR code labels on the machine or attached inside this operator manual. This will take you to a support site unique to this machine, providing on-line manual(s), warranty information, technical service contacts, service parts ordering, and a link to this machine's Cold Jet CONNECT™ operational view (user authentication required).



The PCS 60 is automatically connected via 3G/LTE cellular service to the Cold Jet CONNECT™ platform where you can view the machine's operating conditions. In addition, through the machine's control panel you can initiate Diagnostic Mode when working with Cold Jet's technical service personnel which will send a sustained burst of more detailed operating data for help in evaluating technical issues.



Maintenance



WARNING

Prior to any maintenance or inspection procedures, ensure that the PCS 60 is powered down and the power source is disconnected. Ensure that the air supply is closed, bled off, and the air supply hose is disconnected from the PCS 60.

Daily

- Inspect the hopper area for any dirt or debris.
- Inspect the air and blast hoses for damage such as cuts or kinks.
- Inspect power connections for cuts, or worn surfaces. Repair or replace as necessary.
- Inspect fittings on the applicator for loose or improper connections and correct as necessary.
- Inspect applicator blast cable for wear or improper connections and correct as necessary.
- Inspect the applicator for any damage or loose parts and correct as necessary.

Weekly

- Inspect the inside of the hopper for dirt and inspect rotors for cracks, gouges, or broken surfaces.
- Verify the nozzle airflow exit end is not deformed or burred.

Troubleshooting Warnings and Error Codes

Use the table below to troubleshoot any issues with the machine. If the issue cannot be resolved, contact Cold Jet at (see Contact Information page 54). *Warnings do not shut down the PCS 60.* Warnings will display in two states. Yellow which means that an item is nearing a point that attention must be given and red which means that an item needs immediate attention.

Error's generally will cause the PCS 60 to go in to idle. An error code will display in the status screen (page 36 Status Screen item 6). An error indicates a serious fault shutting down the PCS 60 to prevent damage to the system or a error serious in nature has occurred in which case you will need to contact Cold Jet Customer Service. The PCS 60, in error shut down mode, will continue powered up but will not operate.

Warning Definitions

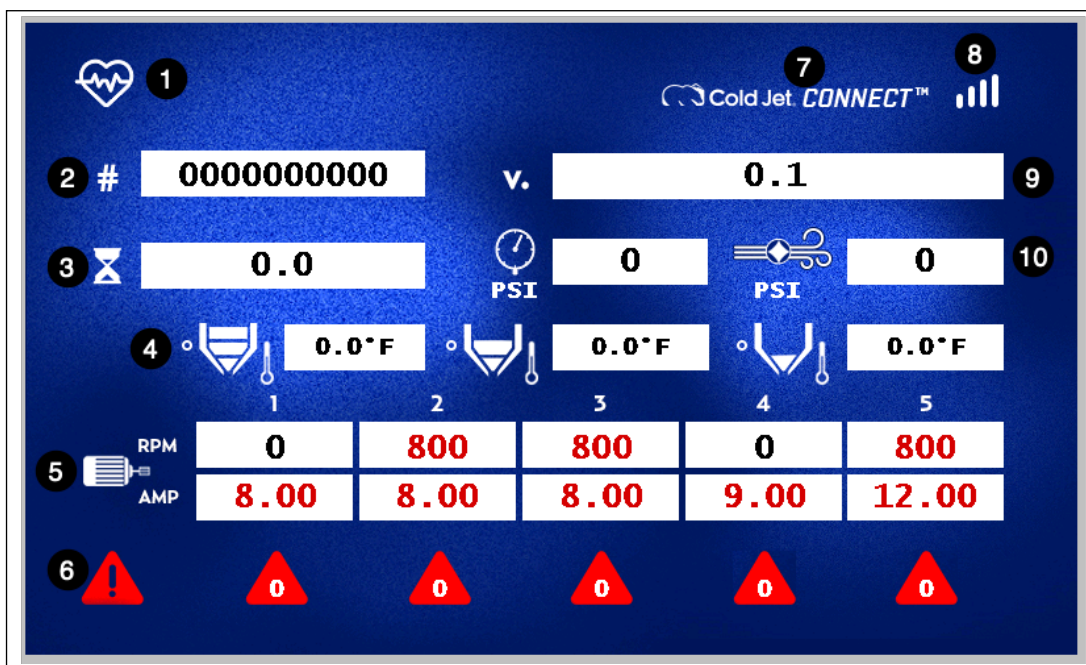
Definition	Corrective Action
No Air Pressure Occurs when the air pressure is less than 20 psi.	<ul style="list-style-type: none">• Check for sharp bends in air line• Check compressor
Low Air Pressure Occurs when the air pressure is less than the selected settings.	<ul style="list-style-type: none">• Check for sharp bends in air line• Check supply pressure• Replace air filter• Select a pressure equal or lower than the supply pressure
Doser Current Fault Occurs when the current goes above 4A. Becomes an error when the current goes above 7A.	<ul style="list-style-type: none">• Shut down the PCS 60 and inspect the hopper for any foreign materials• Remove the ice hopper and inspect that there is no foreign material or blockage• Verify that the ice pellets do not exceed 3mm in diameter
PCS CW Current Fault Occurs when the current goes above 4.5A. Becomes an error when the current goes above 8A.	<ul style="list-style-type: none">• Blaster hose clogged or frozen, clear the blaster hose and continue operation• Possible debris in the feeder system, shut down and perform a visual inspection in the hopper and feeder gears• Possible motor trouble or gear wear, if fault continues contact customer service
PCS CCW Current Fault Occurs when the current goes above 4.5A Becomes an error when the current goes above 8A.	<ul style="list-style-type: none">• Blaster hose clogged or frozen, clear the blaster hose and continue operation• Possible debris in the feeder system, shut down and perform a visual inspection in the hopper and feeder gears• Possible motor trouble or gear wear, if fault continues contact customer service
Positioning Motor Fault Occurs when the current goes above 5A. Becomes an error when the current goes above 8A.	<ul style="list-style-type: none">• Blaster hose clogged or frozen, clear the blaster hose and continue operation• Possible debris in the feeder system, shut down and perform a visual inspection in the hopper and feeder gears• Possible motor trouble or gear wear, if fault continues contact customer service

Definition	Corrective Action
<p>Feeder Current Fault</p> <p>Occurs when the current goes above 8A. Becomes an error when the current goes above 15A.</p>	<ul style="list-style-type: none"> • Blaster hose clogged or frozen, clear the blaster hose and continue operation • Possible debris in the feeder system, shut down and perform a visual inspection in the hopper and feeder rotor • Possible motor trouble or gear wear, if fault continues contact customer service
<p>Hopper Level</p> <p>When the hopper is full, the hopper display on the PCS 60 HMI will display as green. As the hopper empties, the thermo-couples in the hopper will warm and go from green to yellow and then to red indicating that the hopper is empty.</p>	<ul style="list-style-type: none"> • Add ice to the hopper • Shut down the PCS 60 and inspect the hopper for clumping or blockage • Verify that the thumper is operational • Increase the frequency of the thumper

Error Code Procedure

An error code (item 6) for the PCS 60 is a critical error. If an error code is displayed and the PCS 60 defaults to the idle mode follow these procedures.

1. Turn off the air supply.
2. Press the power button on the PCS 60 to turn the machine OFF.
3. Unplug the machine, wait 15 seconds and plug it back in to reboot the machine.
4. If the above does not work please contact Customer Support (see Contact Information page 54).



Warranty

Cold Jet® ("CJ") warrants its products ("Equipment") provided under this Agreement to be free from defects in materials and workmanship for a period of 12 months (90 days on used equipment), under normal use, maintenance and service as stipulated in the Operator's Manual, Commissioning, and Operator Training. At the discretion of CJ, failure to complete Installation, Commissioning, and Operator Training shall result in forfeit of warranty rights. CJ warrants that the equipment will be in good working order on the Date of Shipment and will conform to CJ's official published specifications.

The warranty period is 12 months (90 days for used equipment) for CJ manufactured Equipment. Original Equipment Manufacturers' warranties provided by CJ on equipment purchased under this Agreement not manufactured by CJ will be passed through to the Buyer. The warranty period commences on the Date of Shipment of the Equipment.

CJ's liability is limited to repairing or replacing, at its option, any covered part of its Equipment, which CJ has determined to be defective. Said repair or replacement will be made by CJ or its authorized representative free of charge to the Buyer during the warranty period. Any replaced part will become the property of CJ. If, after repeated efforts, CJ is unable to restore its Equipment to good working order, or to replace the defective parts all as warranted, CJ may replace the Equipment in its entirety at its discretion. Any claim must be made in writing to CJ within 30 days after the defect is discovered and any claim not made within that period shall be deemed waived or released and denied.

Warranty service provided under this Agreement does not assume uninterrupted operation of the Equipment. The suitability of the equipment for the purpose intended is not included in the warranty.

This warranty shall not apply and CJ shall be neither responsible nor liable for:

- A. Consequential, collateral or special losses or damages;
- B. Equipment conditions caused by abnormal conditions of use, accident, neglect or misuse of Equipment, improper storage or damages resulting during shipment as determined by CJ;
- C. The replacement of normal wear items, including but not limited to air, blast and whip end hoses;
- D. Deviation from the Equipment's prescribed maintenance programs, replacement parts, operating instructions, specifications or other terms of sale;
- E. Improper application of the product.

In no event shall CJ be liable for claims, whether arising from breach of contract or warranty claims of negligence or negligent manufacture, in excess of the purchase price.

THIS WARRANTY IS THE SOLE WARRANTY OF CJ AND ANY OTHER WARRANTIES, INCLUDING ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE, WHETHER EXPRESS OR IMPLIED BY LAW, FACT, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE, OR OTHERWISE, ARE HEREBY SPECIFICALLY EXCLUDED.



This declaration is issued under the sole responsibility of the Cold Jet group:

Cold Jet, LLC
455 Wards Corner Road
Loveland, Ohio 45140 USA

Hereby declare the following product:

Product Designation: AERO2 PCS 60

Type/Serial Number: XXXX

Is in conformity with the Council Directives:

Directive 2006/42/EU Machine Directive
Directive 2014/30/EU EMC Directive
Directive 2014/35/EU Low Voltage Directive
Directive 2011/65/EU ROHS Directive
Directive 2014/53/EU Radio Equipment

Harmonized standards applied:

EN ISO 12100:2010	EN ISO 13732-3:2008	EN ISO 14119:2013
EN 60204-1:2006/A1:2009	EN ISO 13849-1:2015	EN ISO 14120:2015
EN 1037:1995+A1:2008	EN ISO 13850:2015	EN ISO 11202:2010
EN ISO 4414:2010	EN ISO 13857:2008	EN ISO 13732-3:2008

Person in the European Community authorized to compile the technical documentation:

Cold Jet Sp.zo.o, Product Development Manager Maciej Doczekala, Łukowska 12, Oborniki 64-600, Poland

Place and Date of Issue:

Loveland, USA on February 19, 2019

Signed for and on behalf of Cold Jet, LLC:



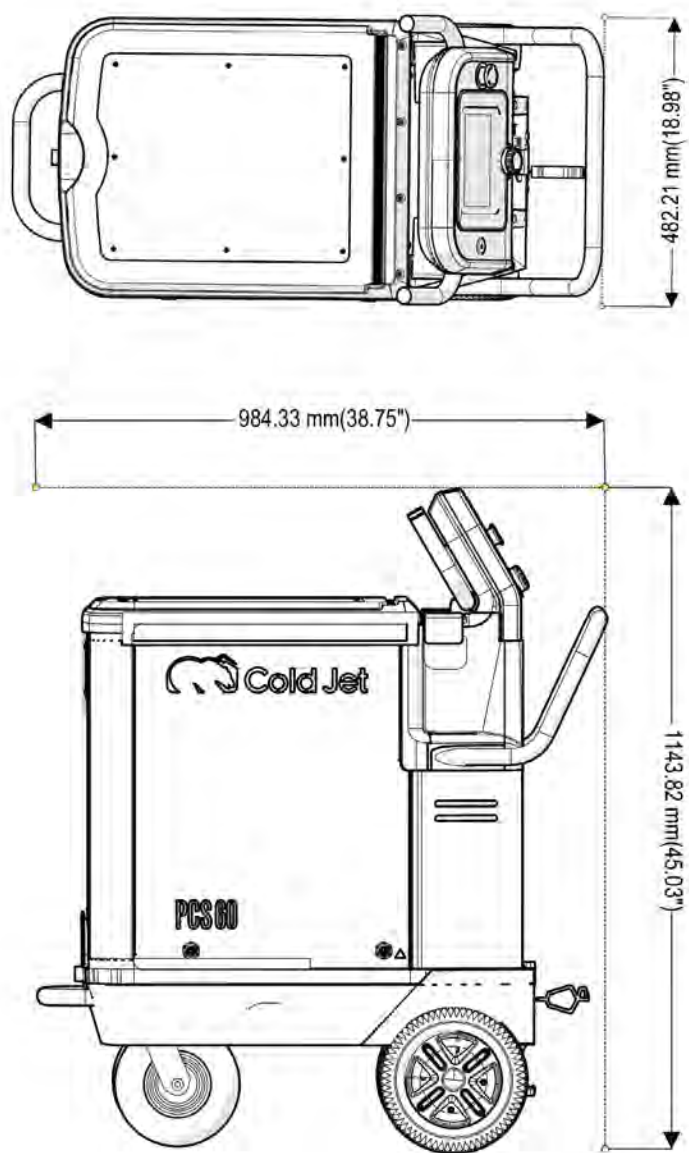
Arvid Nielsen
Director of Technology & Engineering, Sr. VP

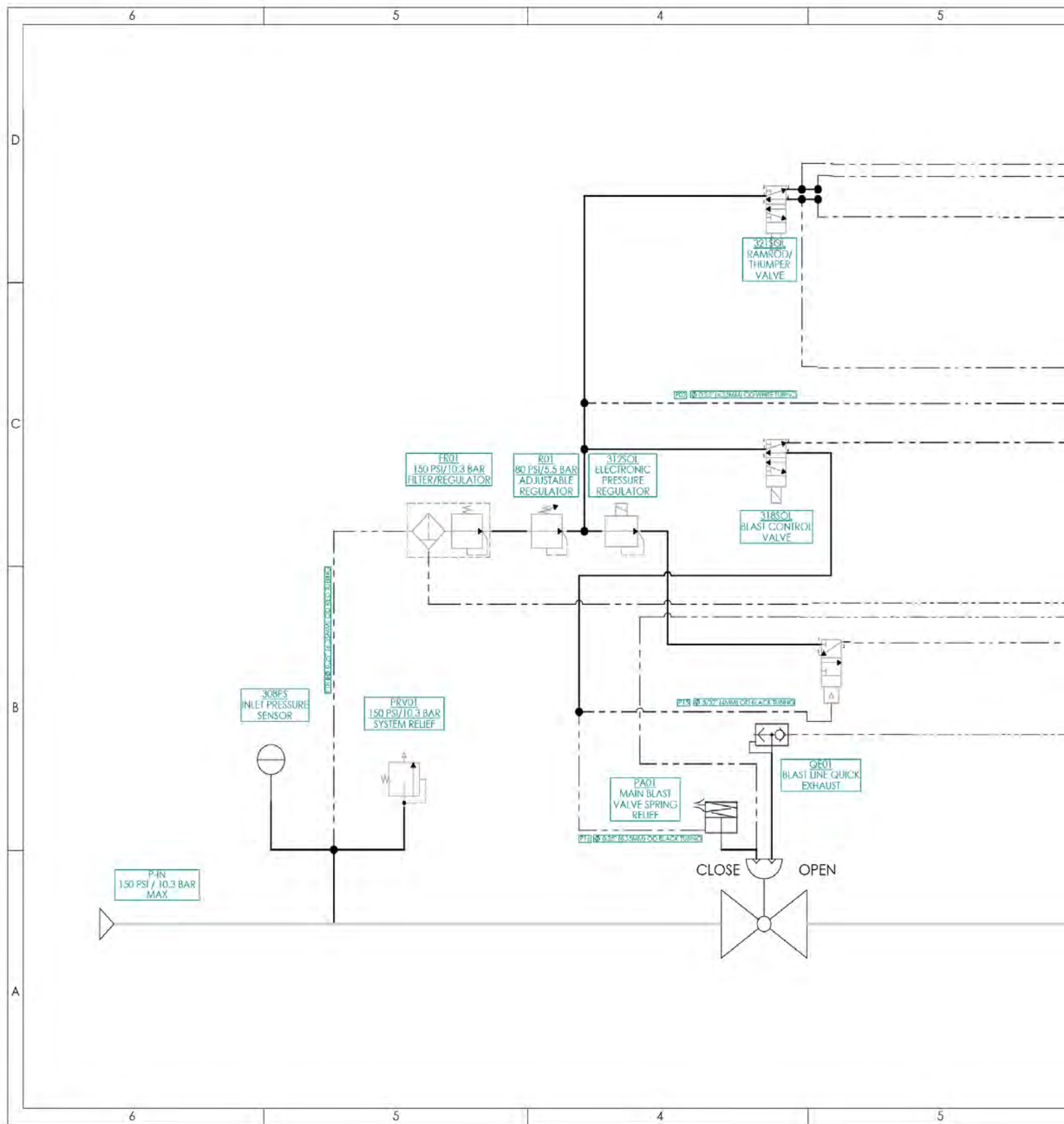


Technical Schematics

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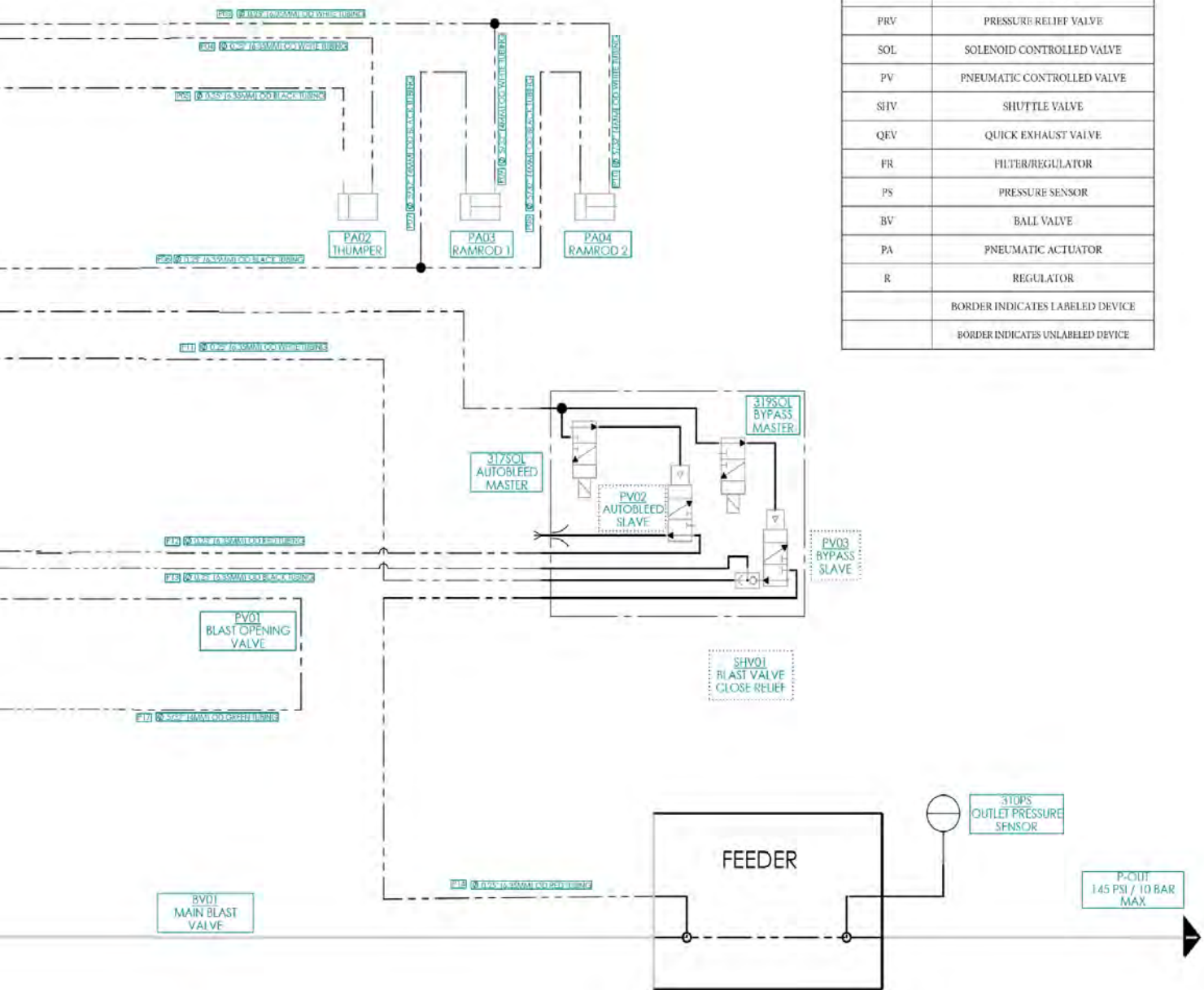
PCS 60 Dimensional Drawing





PCS 60 Pneumatic Drawing

DEVICE LEGEND	
P	PNEUMATIC LINE
PRV	PRESSURE RELIEF VALVE
SOL	SOLENOID CONTROLLED VALVE
PV	PNEUMATIC CONTROLLED VALVE
SHV	SHUTTLE VALVE
QEV	QUICK EXHAUST VALVE
FR	FILTER/REGULATOR
PS	PRESSURE SENSOR
BV	BALL VALVE
PA	PNEUMATIC ACTUATOR
R	REGULATOR
BORDER INDICATES LABELED DEVICE	
BORDER INDICATES UNLABELED DEVICE	

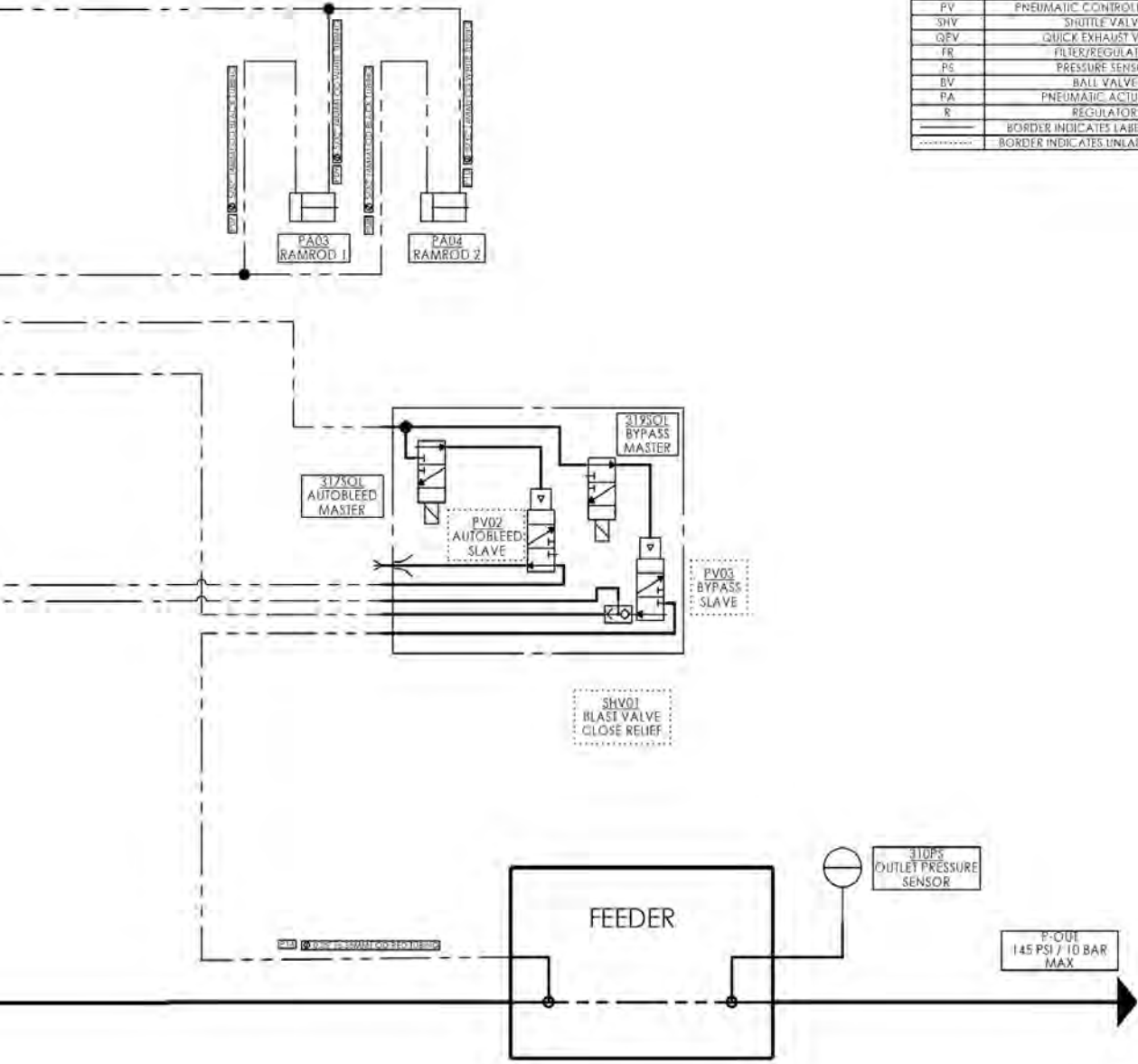


A	B	C	D
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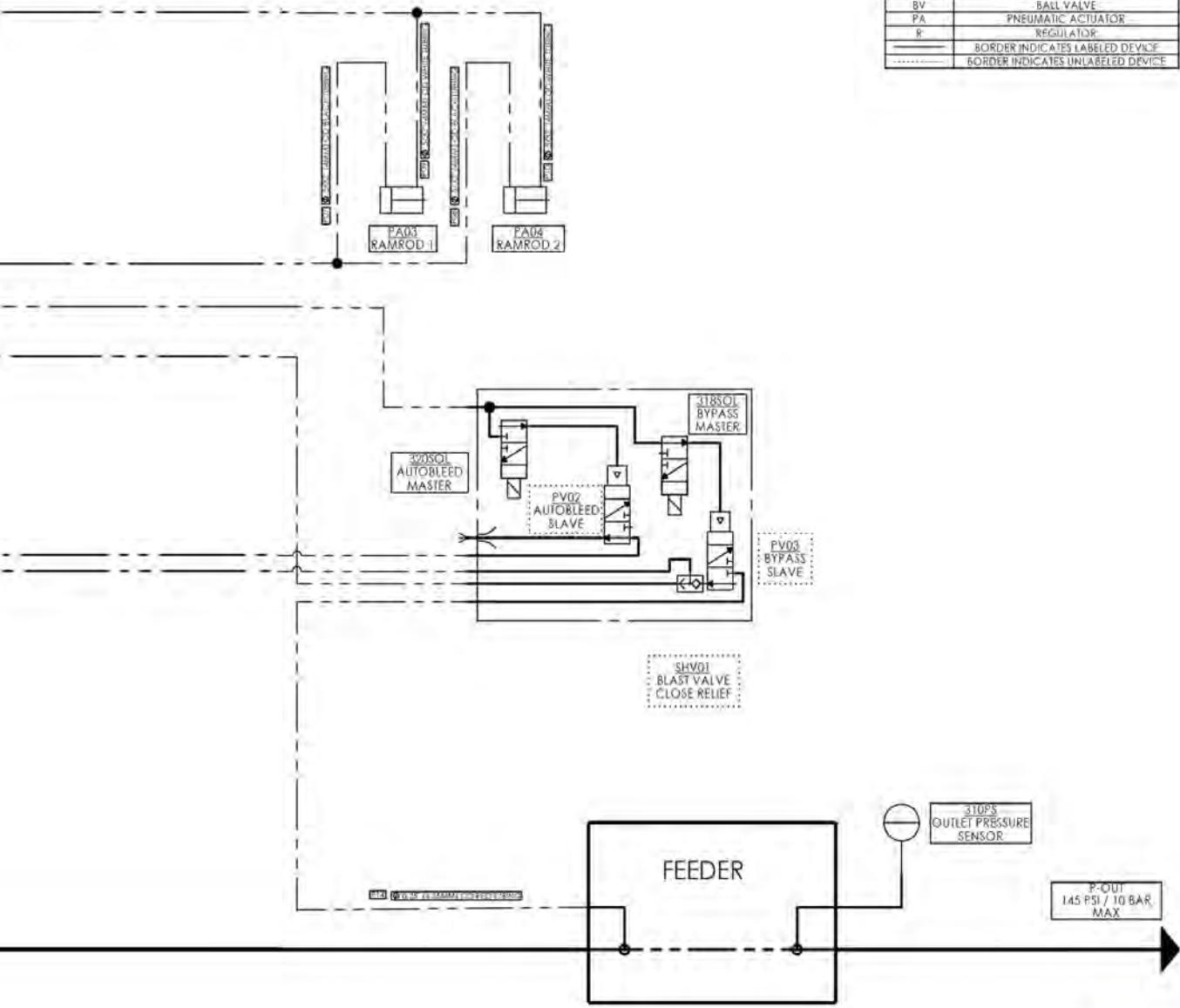
PCS 60 3G/2G Communication

DEVICE LEGEND:	
P	PNEUMATIC LINE
PRV	PRESSURE RELIEF VALVE
SOL	SOLENOID CONTROLLED VALVE
PV	PNEUMATIC CONTROLLED VALVE
SHV	SHUTTLE VALVE
QEV	QUICK EXHAUST VALVE
FR	FILTER/REGULATOR
PS	PRESSURE SENSOR
BV	BALL VALVE
PA	PNEUMATIC ACTUATOR
R	REGULATOR
BORDER INDICATES LABELED DEVICE	
BORDER INDICATES UNLABELED DEVICE	



PCS 60 LTE Communication

DEVICE LEGEND	
P	PNEUMATIC LINE
PRV	PRESSURE RELIEF VALVE
SOL	SOLENOID CONTROLLED VALVE
PV	PNEUMATIC CONTROLLED VALVE
SHV	SHUTTLE VALVE
QEV	QUICK EXHAUST VALVE
FR	FILTER/REGULATOR
PS	PRESSURE SENSOR
BV	BALL VALVE
PA	PNEUMATIC ACTUATOR
R	REGULATOR
BORDER INDICATES LABELED DEVICE	
BORDER INDICATES UNLABELED DEVICE	





[illegible]

Contact Information

Find the customer support and technical services contact information for your region in the table below.

USA - Cold Jet, LLC (World Headquarters) 455 Wards Corner Road Loveland, Ohio 45140	24-Hour Customer Support Phone (US): +1-800-777-9101 Phone (Outside US): +1 (513) 576-8981 Email: service@coldjet.com
Canada - Cold Jet Canada 1727 Industrial Road, Unit 1 Cambridge, Ontario N3H 5G7	Phone: +1-800-337-9423 Ext. 501 After Hours Support: +1-800-777-9101 Email: service@coldjet.com
Latin America - Cold Jet Latinoamérica San Alberto 404 P2 Col. Residencial Santa Barbara San Pedro Garza Garcia, Nuevo Leon Mexico 66226	Phone: +52 (81) 1097-0445 After Hours Support: +1 (513) 576-8981 Email: soporte@coldjet.com
Belgium - Cold Jet bvba (European Headquarters) Zone 1 Researchpark 330 B-1731 Zellik	Phone: +32 (0) 13 53 95 47 After Hours Support: +1 (513) 576-8981 Email: service.eu@coldjet.com
Germany - Cold Jet GmbH Obere Industrie Strasse 1 54595 Weinsheim	Phone: +49 (0) 6551 9606-0 After Hours Support: +1 (513) 576-8981 Email: service.eu@coldjet.com
Spain - Cold Jet Madrid Edificio Foro de Somosaguas, Planta 2 Oficina 14 Pinar de Somosaguas 89 Bis 28223 Pozuelo de Alarcón	Phone: +34 91 426 79 63 After Hours Support: +1 (513) 576-8981 Email: service.eu@coldjet.com
China Room 113, Building 2 Huguang East Road No. 89 Minhang, Shanghai 201108	Phone: +86 21 5296 7161 After Hours Support: +1 (513) 576-8981 Email: service.cn@coldjet.com
Japan/APAC 1-20-4 Ishiwara, Sumida Tokyo 130-0011	Phone: +81 3 6869 2665 After Hours Support: +1 (513) 576-8981 Email: service.apac@coldjet.com