Operations Manual

Integrated Valve System
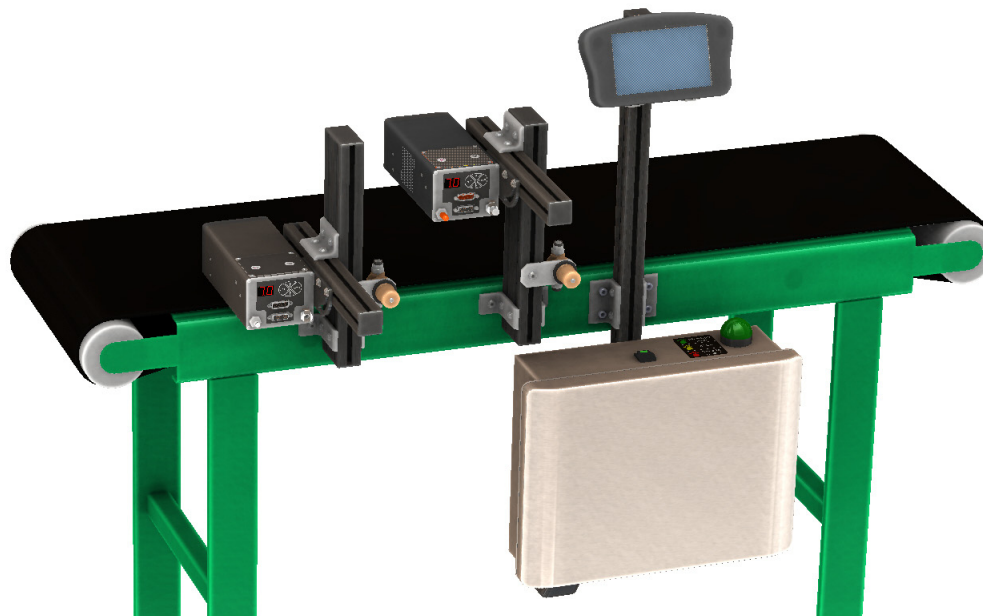
5770-017FX
Revision A

Integrated Valve Ink Jet System Operations Manual

5770-017FX

Integrated Valve

Warranty:

The Integrated Valve System, including all components unless otherwise specified, carries a limited warranty.

The inks and conditioners used with the Integrated Valve System carry a limited warranty.

For all warranty terms and conditions, contact manufacturer for a complete copy of the Limited Warranty Statement.

Section 1: Safety and Ink Usage

Following is a list of safety symbols and their meanings, which are found throughout this manual. Pay attention to these symbols where they appear in the manual.

Wear safety goggles when performing the procedure described!

Caution or Warning! Denotes possible personal injury and/or damage to the equipment.

Caution or Warning! Denotes possible personal injury and/or equipment damage due to electrical hazard.

NOTE: (Will be followed by a brief comment or explanation.)

CAUTION: The Ink Delivery System contains hazardous voltage (115/230VAC). Turn off the equipment's main power before:
- Performing preventive maintenance.
- Performing any repairs to the unit.
- Servicing the equipment in any manner.

ESD protection should be worn when servicing internal printed circuit boards.

After service to the equipment is completed, replace all protective devices such as grounding cables and covers before operating the equipment.
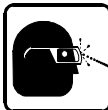
TSO ink contains ethanol and isopropanol. MEK ink contains methyl ethyl keytone. TWP ink contains ethylene glycol. It is extremely important to:
- Clean up all spills with the appropriate conditioner immediately and dispose of all waste according to local and state regulations.
- Wear safety glasses and protective clothing, including gloves, when handling all inks and conditioners.
- Store inks and conditioners under the recommended conditions found on the SDS (Safety Data Sheet).
- TWP (Porous Ink) and TSO (Non-Porous Ink) are not miscible.

Section 2: Quick Start

The figure at right illustrates a typical installation with a controller and a print head. (Cables and ink lines are not shown.)

System Components:
- Bracketry Kit (Item 1)
- Print Head (Item 2)
- Ink Delivery System (Item 3)
- Controller (Item 4)
- Power Cord (not shown)
- Serial Cable (not shown)
- Tubing (not shown)
- Software (not shown)

(Ink is not included.)

TYPICAL INSTALLATION
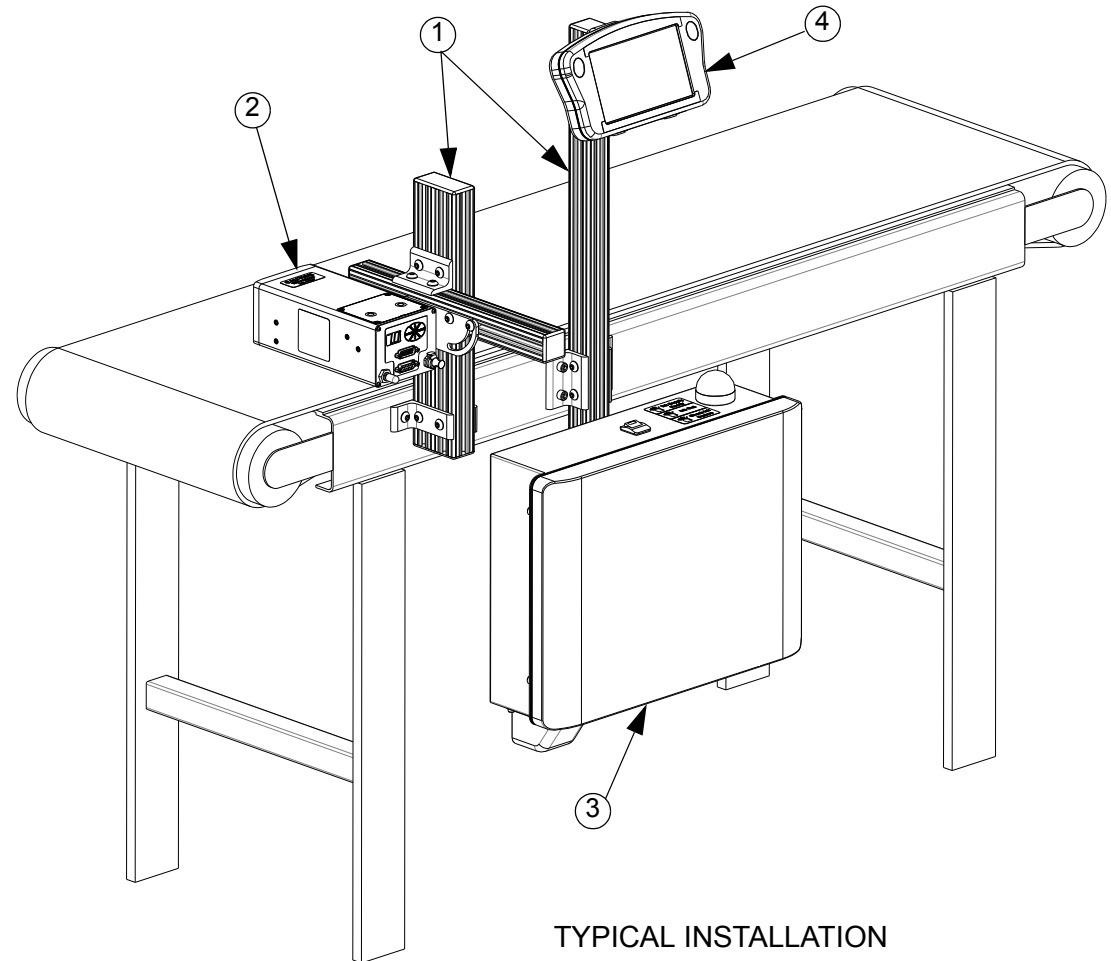
Step 1: Assemble Bracketry to Conveyor

NOTE: Mount bracketry square and level.

PRINT HEAD
CONVEYOR MOUNT
(5760-821)

CONTROLLER /
INK DELIVERY SYSTEM
MOUNT
(5765-250)

OPTIONAL T-STAND
(5765-249)
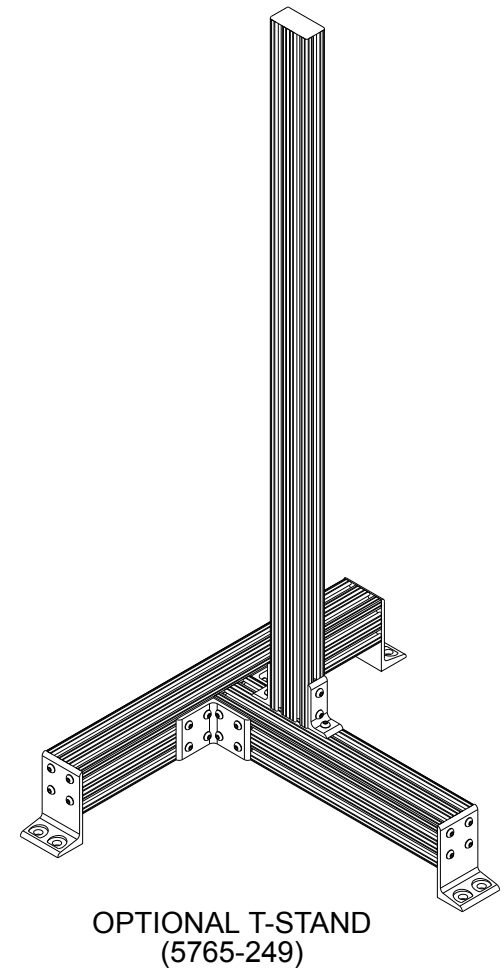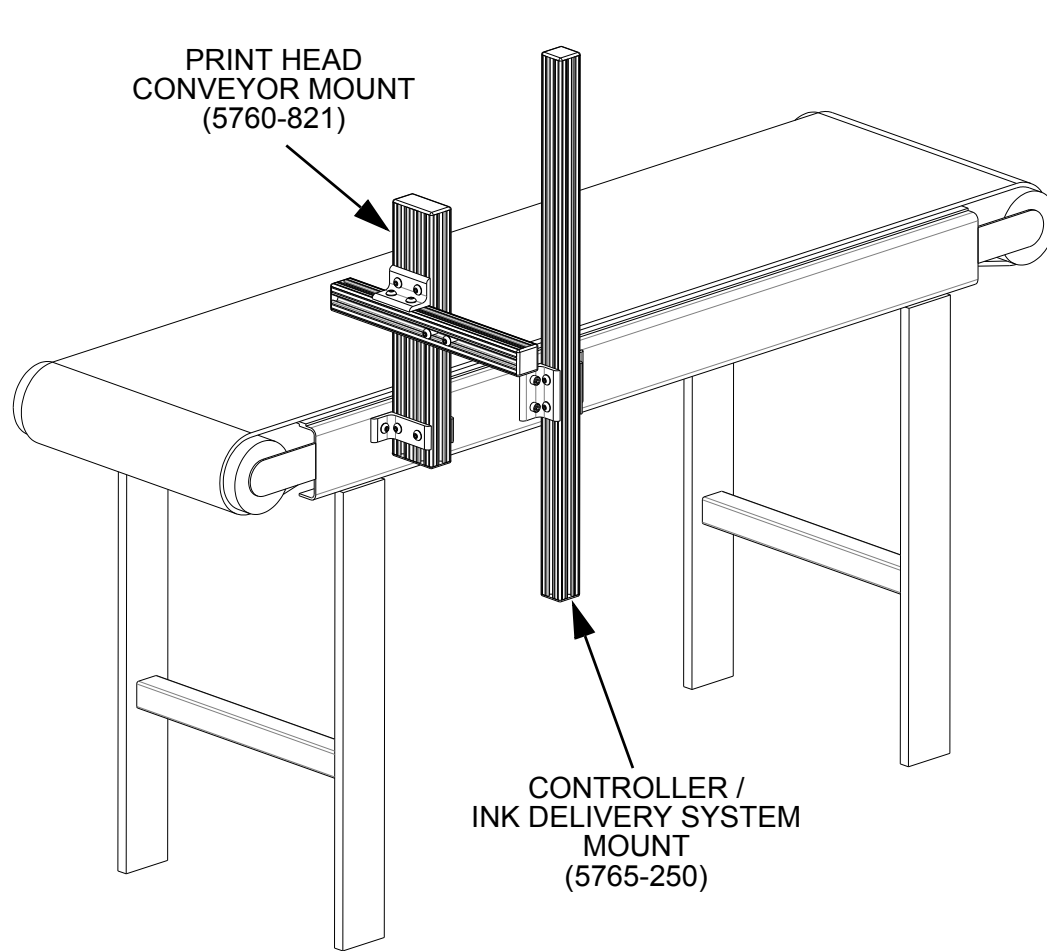
Step 2: Assemble Print Head and Regulator onto Bracketry

Print Head Bracketry Mounting Options

- Single-pole conveyor mount
- Double-pole conveyor mount
- Single-pole floor mount
- Double-pole floor mount
- Multi-panel floor mount

CONVEYOR MOUNT
(5760-821)

SINGLE-POLE FLOOR
MOUNT
(5760-355)

± 6"

VERTICAL HEIGHT OF REGULATOR
ABOVE OR BELOW PRINT HEAD -
FROM CENTER OF PRINT HEAD TO
CENTER OF REGULATOR
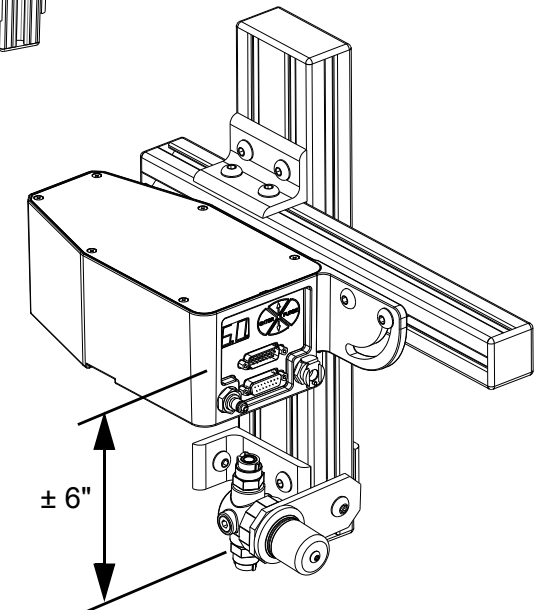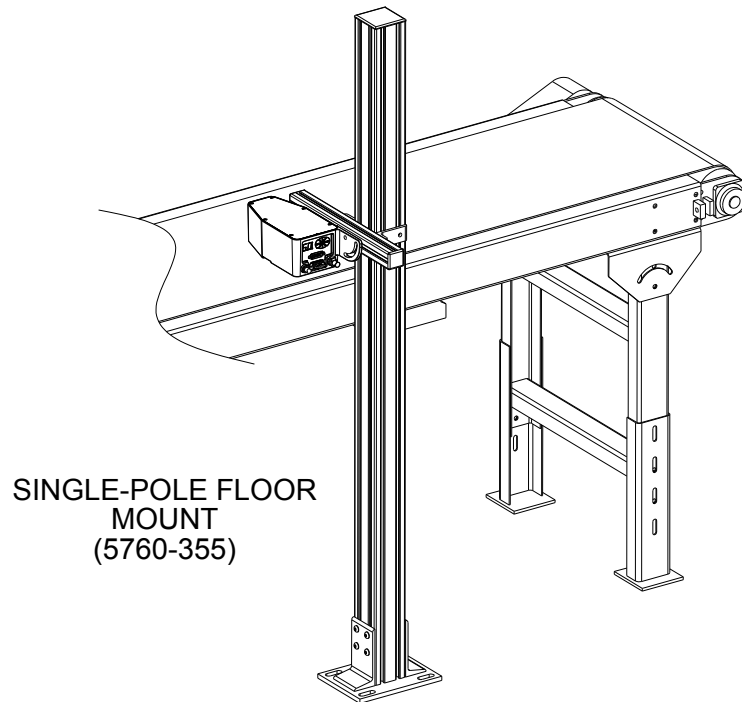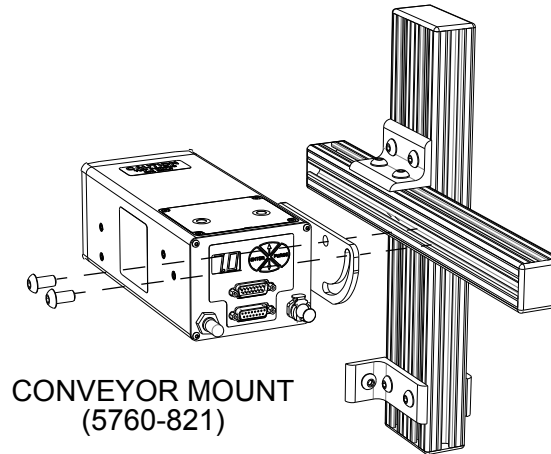
Integrated Valve

Print Heads

Each type of Integrated Valve print head has specific distances above and below the orifices, spaces in which the print head cannot print. These non-printing zones are critical when designing print head layout in multi-head applications. The figure below shows the print and non-print areas obtained when two 9 dot print heads are stacked on a vertical bracket, as in the "Single Pole Floor Mount" illustration on a previous page. See the table on the next page for specific non-printing zones for each print head model.
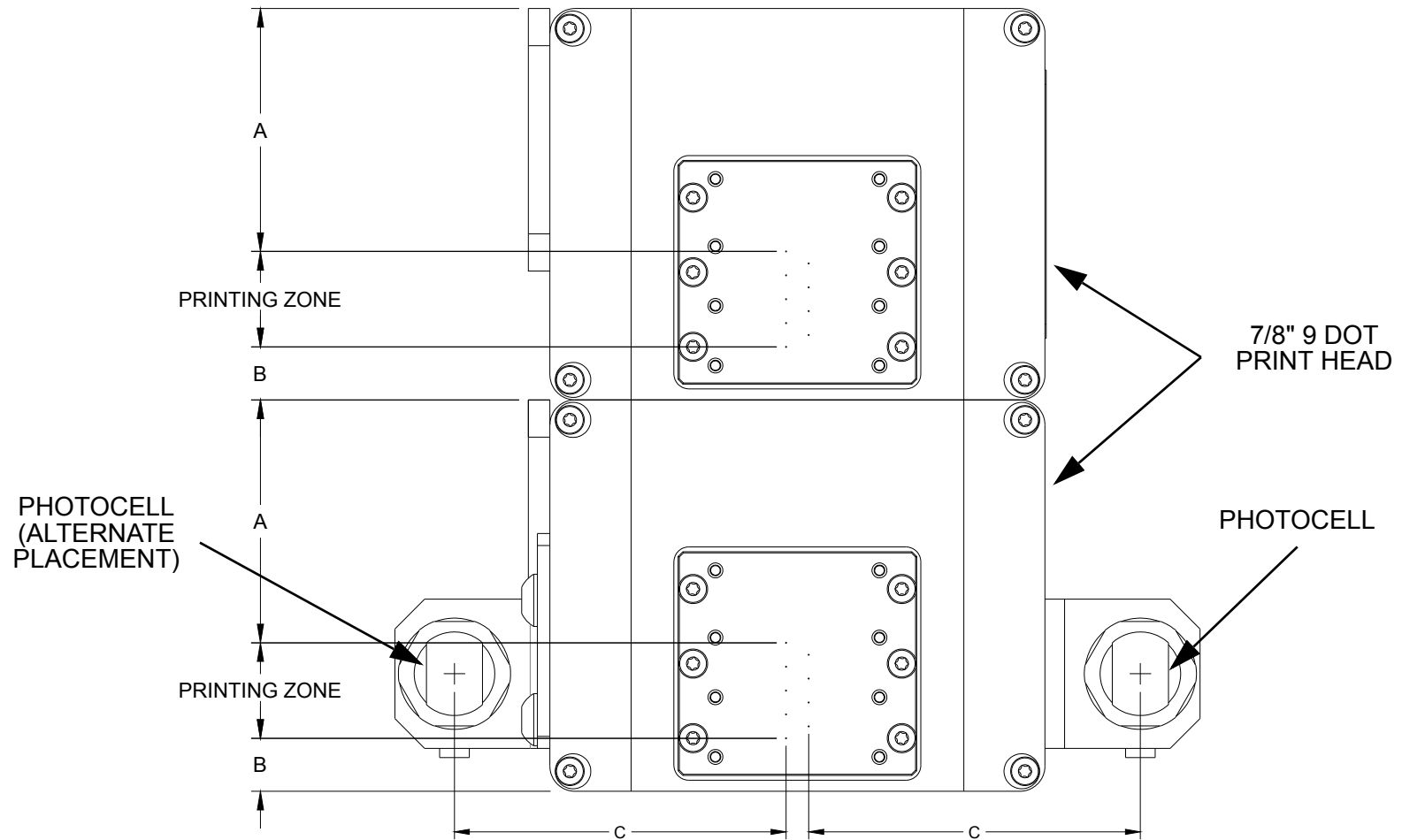
Print Head Models

The following table lists the eight models of Integrated Valve print heads and their characteristics.

Part Number	Type	Characteristics	Non-Print Base Area (B)	Non-Print Top Area (A)	Total Non-Print Area (A+B)	Photocell to First Dot (C)
5770-008P500	1/2" 9 Dot Porous	Prints 1/4", 5/16" and 1/2" tall characters on porous substrate	.84"	2.04"	2.88"	2.78"
5770-008N500	1/2" 9 Dot Non-Porous	Prints 1/4", 5/16" and 1/2" tall characters on non-porous substrate.	.84"	2.04"	2.88"	2.78"
5770-008P875	7/8" 9 Dot Porous	Prints 7/16", 5/8" and 7/8" tall characters on porous substrate.	.44"	2.04"	2.48"	2.78"
5770-008N875	7/8" 9 Dot Non-Porous	Prints 7/16", 5/8" and 7/8" tall characters on non-porous substrate.	.44"	2.04"	2.48"	2.78"
5770-003P1000	1" 18 Dot Porous	Prints 1/4", 3/8", 1/2" and 1" tall characters on porous substrate.	1.33"	1.15"	2.48"	3.10"
5770-003N1000	1" 18 Dot Non-Porous	Prints 1/4", 3/8", 1/2" and 1" tall characters on non-porous substrate.	1.33"	1.15"	2.48"	3.10"
5770-003P2000	2" 18 Dot Porous	Prints 1/4", 3/8", 1/2", 1" and 2" tall characters on porous substrate	.82"	.64"	1.46"	3.10"
5770-003N2000	2" 18 Dot Non-Porous	Prints 1/4", 3/8", 1/2", 1" and 2" tall characters on non-porous substrate	.82"	.64"	1.46"	3.10"

Integrated Valve

Step 3: Install Ink Delivery System and Controller

CONTROLLER

INK DELIVERY SYSTEM
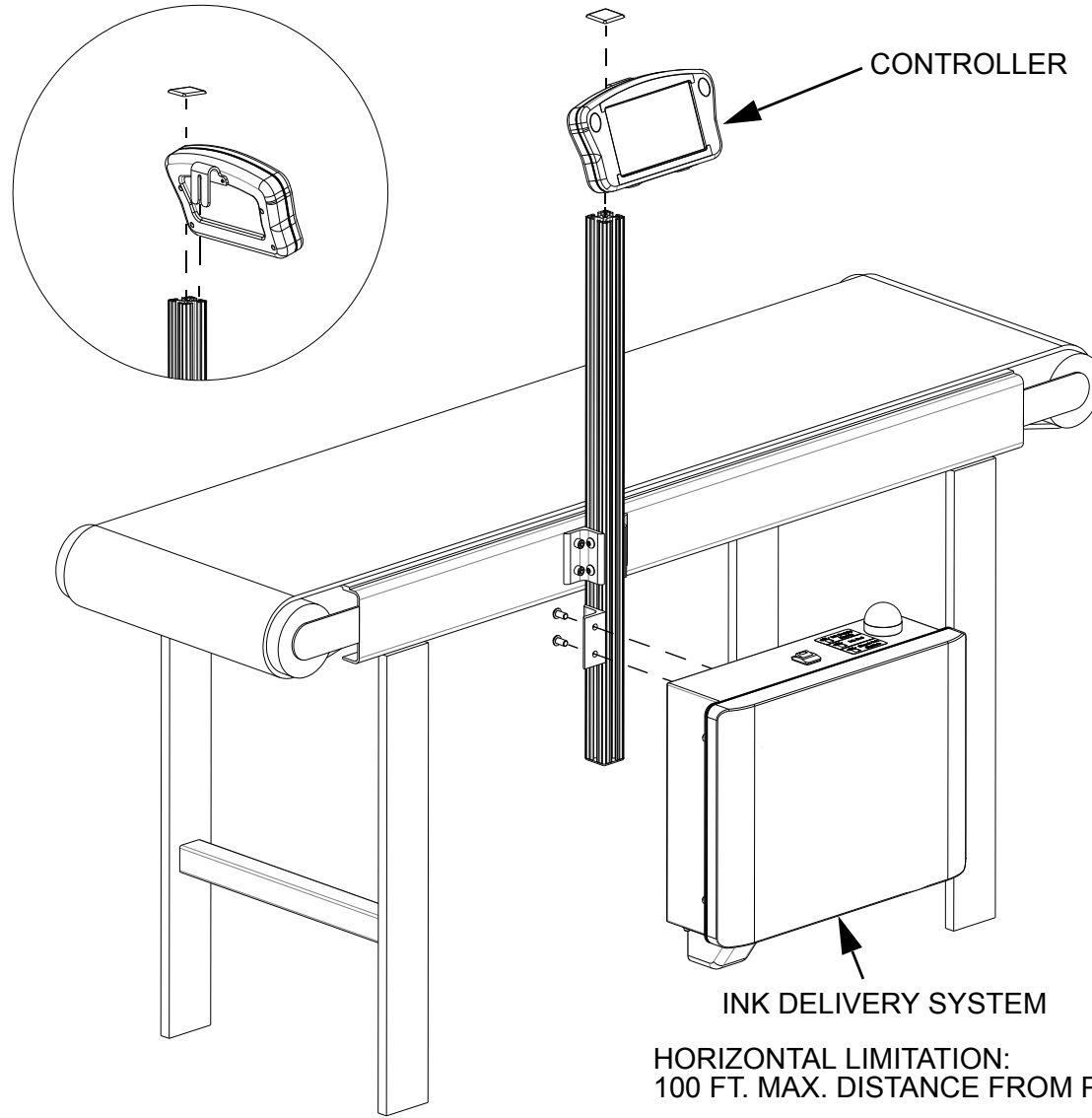
HORIZONTAL LIMITATION:
100 FT. MAX. DISTANCE FROM PRINT HEADS

VERTICAL LIMITATION:
20 FT. BELOW HIGHEST PRINT HEAD

Integrated Valve

Step 4: Electrical Connections

INK DELIVERY SYSTEM

INK SUPPLY FLOAT CONNECTION

INTERNAL CIRCUIT BOARDS

ROUTE CABLES THROUGH BULKHEAD FITTING

POWER CORD

PRINT HEAD CABLE

PHOTOSENSOR CABLE

ENCODER CABLE

TASK 2 INTERFACE BOARD CONNECTIONS

TASK 1 INTERFACE BOARD CONNECTIONS

SYSTEM CONNECTIONS

COM1   ETHERNET   USBs   COM2

INTERNAL CIRCUIT BOARDS

Integrated Valve
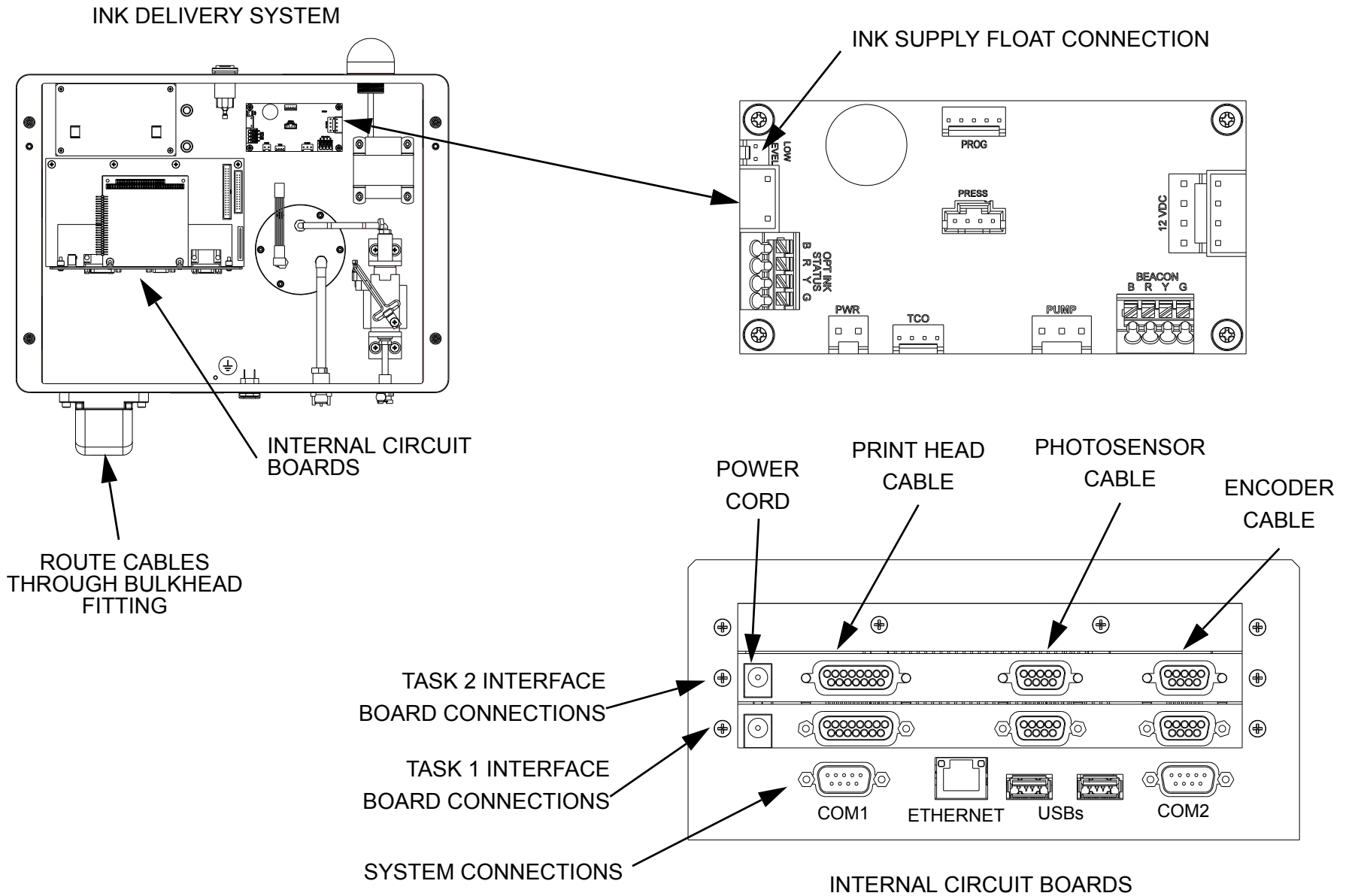
Step 5: Electrical Cable Connections

All controller cables must be routed through the Strain Relief Cable Clamp in the bottom of the Ink Delivery System.

1. Refer to the diagram for typical electrical cable installation and routing.

2. Connect the power cord(s), photosensor(s), and encoder(s) to their appropriate sockets.

3. Install the print head cable(s) to the appropriate interface board sockets. Route print head cable(s) under the conveyor for connection to the print head(s).

NOTE: It is recommended that the Task 1 Print Head be closest to the Controller.

4. Plug the Ink Delivery System into appropriate outlet.
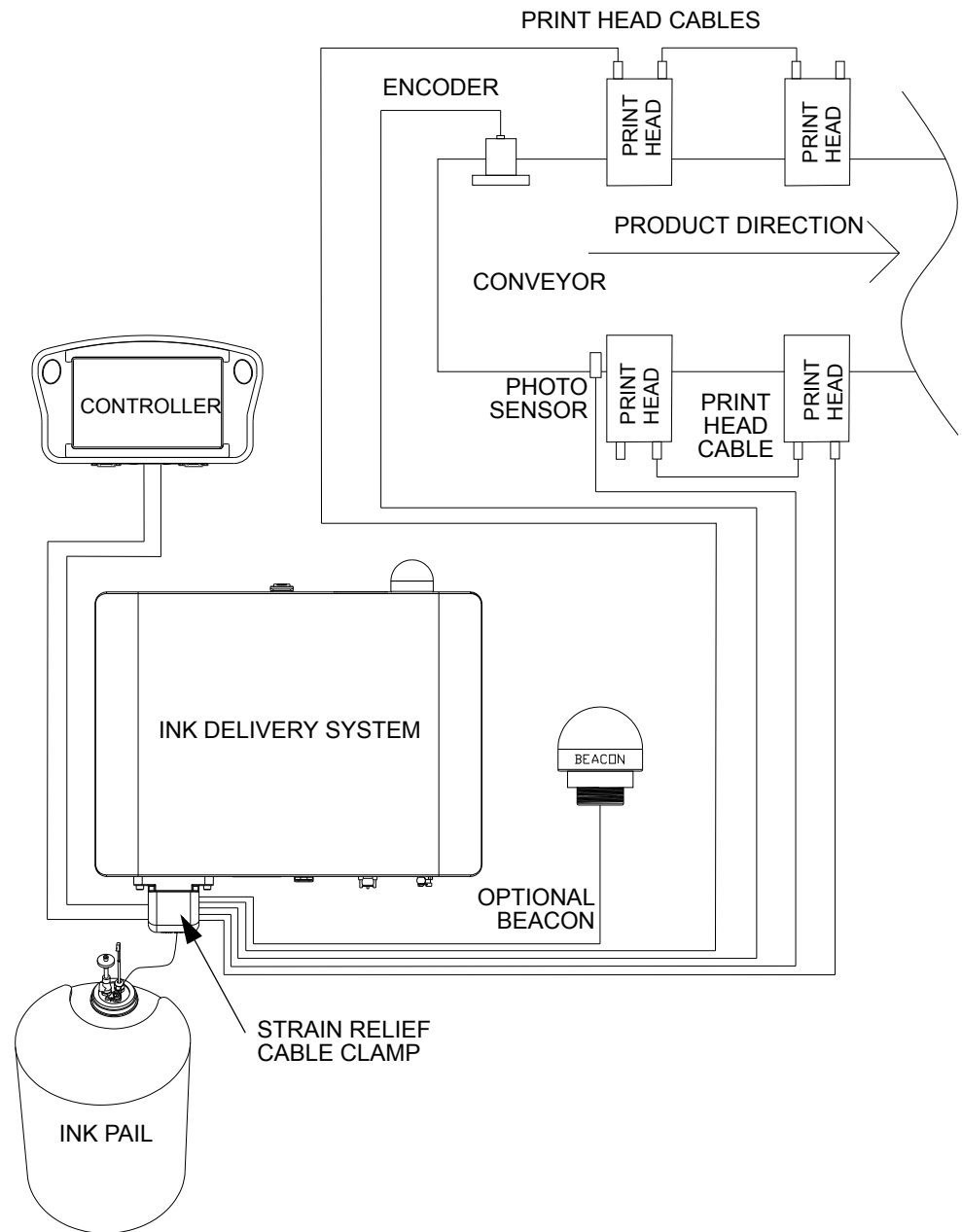
Step 6: Mount Photosensor and Encoder

Photosensor

1. Position the photosensor (5760-383) upstream from the first print head. The maximum placement distance is 685,9mm [27in] from the photocell to the print head.

2. The photosensor depth range can be adjusted. The photosensor normally has a range of about 762mm [30in], but can be adjusted down to about 152,4mm [6in]. (Refer to the photosensor manufacturer's instruction sheet for instructions on adjusting the range)
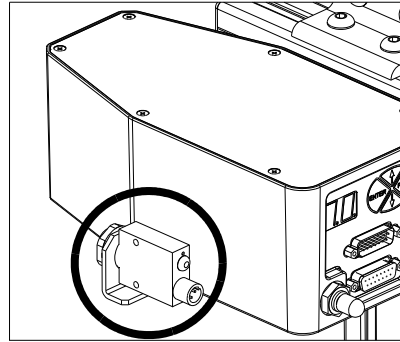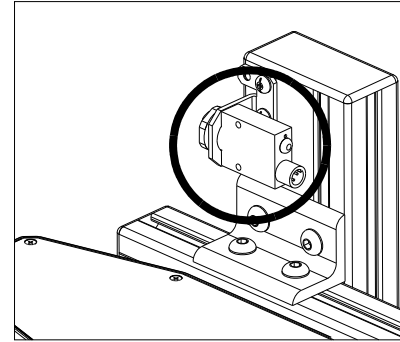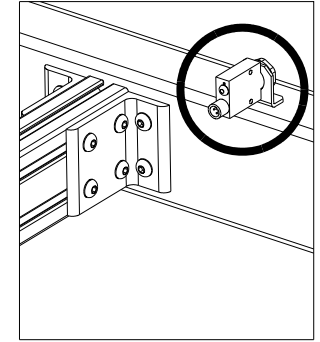
Print Head   Bracketry   Conveyor

Encoder

CAUTION: Do not jam the encoder wheel against the surface of the conveyor. A radial force of over 18,14 kg [40 lbs.] will reduce the life of the bearings.

Conveyor

Encoder

Encoder Wheel

Spring
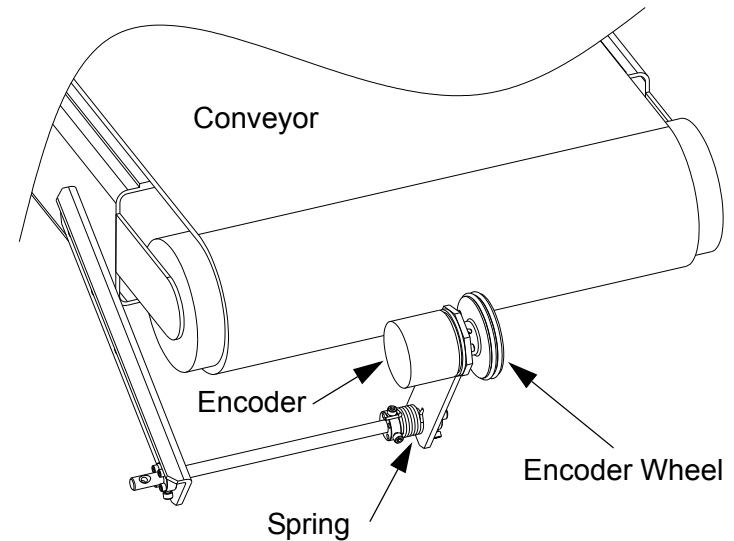
RECOMMENDED INSTALLATION

Step 7: Install Tubing

Connecting the Ink Supply

Wear eye protection and use appropriate safety equipment when working with ink.

1. Place a pail of ink within eight feet of the Ink Delivery System.
2. Unscrew the shipping cap from the pail. Insert the cap assembly and tighten snugly by hand.
3. Connect the 1/8" ink supply line from the "Filtered Ink Inlet" quick disconnect on the Ink Delivery System to the female coupling on the ink cap assembly.
4. Connect Level Detect Sensor to "Low Level" port of PCB on inside of Ink Delivery System. (See "Ink Delivery System Wiring Diagram for Non-European Countries (115V)" on page 42.)

CAUTION: Porous ink must be used with a porous Ink Delivery System. Non-porous ink must be used with a non-porous Ink Delivery System. The Ink Delivery System <u>cannot</u> be flushed to use a different ink type.

Tool required: 5-Gallon Ink Cap Wrench (1301-830).

Ink out to Ink Delivery System

Ink Filter

Level Detect Sensor Cable

Air Filter

Ink Out

Float Sensor

5-Gallon Ink Pail

INK CAP ASSEMBLY
(5760-307: 5 GALLON)
(5760-309: 30 GALLON)
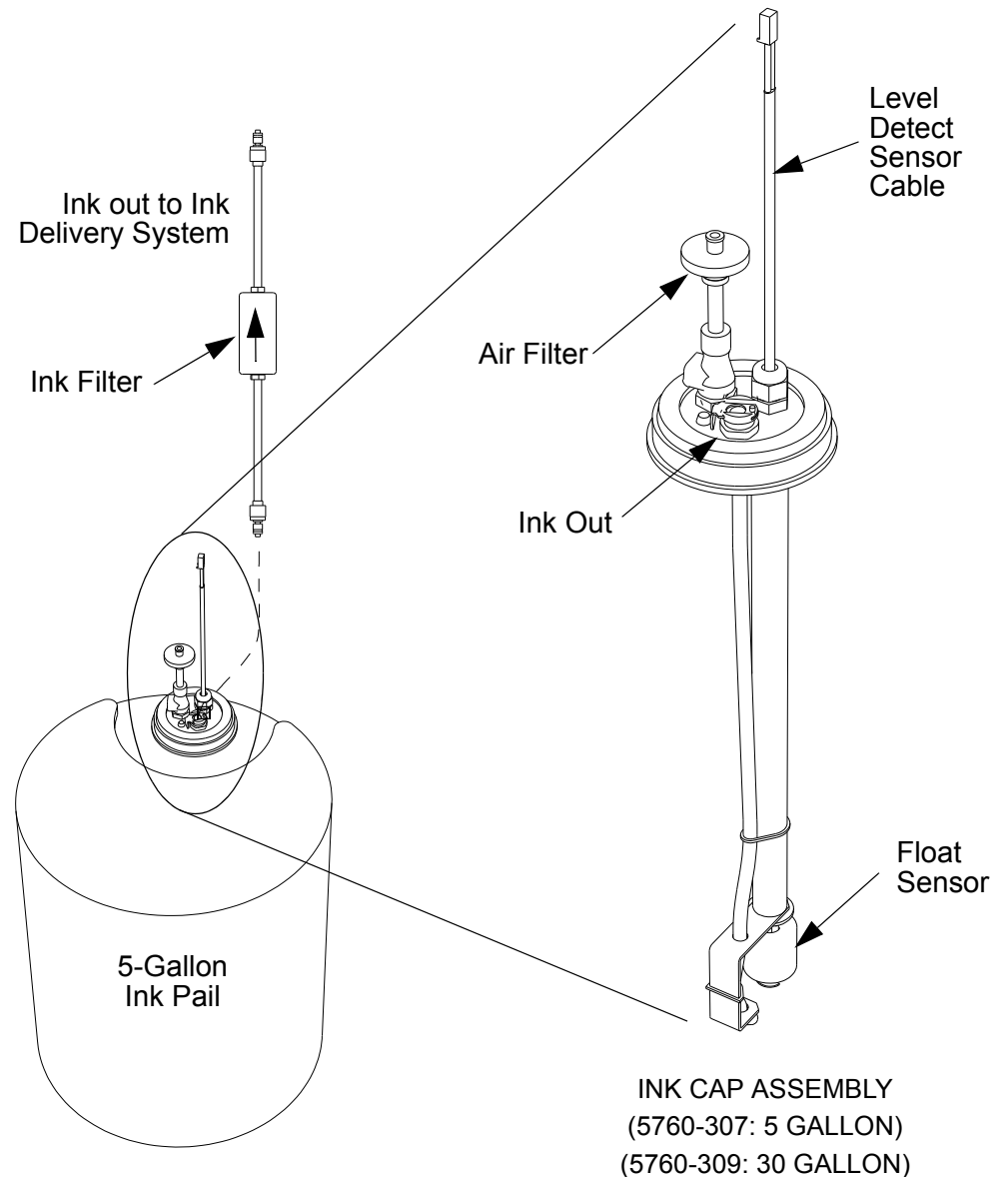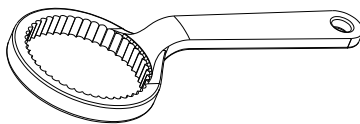
Integrated Valve

NOTE: Do not attempt plumbing this system before all mechanical mounting is completed.

CAUTION: Do not connect print head cables. This step will be completed during the ink tubing line bleed procedure.

1. Refer to diagram at right for typical print head plumbing connections.

INCORRECT

CORRECT

1/4" ID TUBING
(1301-875)

SPLICE TEE FITTING
(FROM PRINT HEAD REG-
ULATOR KIT) INTO TRUNK
LINE AS REQUIRED

INK DELIVERY SYSTEM

PRINT
HEAD
& REG

CONVEYOR

PRINT
HEAD
& REG

TUBING KIT
(5760-310)

FILTER

INK

EFFLUENT KIT
(5750-503)

WASTE

IN-LINE SHUTOFF

Metal
Tab

PUSH BOTH PIECES TOGETHER TO
ALLOW FLOW.
PUSH METAL TAB DOWN TO PARTIALLY
SEPARATE AND STOP FLOW.

PRIME MAIN TRUNK LINE (SEE INSTRUCTIONS ON NEXT PAGE)

Integrated Valve

Prime Main Trunk Line

1. Make all connections shown on previous page.
2. Ensure the Effluent Kit in-line shutoff valve is not allowing flow.
3. Power on the Ink Delivery System.
4. Allow flow through the Effluent Kit in-line shut-off valve until the entire trunk line is primed with ink.
5. Stop flow and set effluent bottle aside.

Prime Print Heads

1. Connect regulator assembly between previously primed trunk line tee fitting and print head.
2. Ensure the effluent in-line shutoff valve is **not** allowing flow.
3. Connect the effluent bottle to the back of the print head.
4. Allow flow through in-line shutoff valve until the effluent line is primed with ink.
5. Stop flow through the shut-off valve and disconnect the effluent bottle from the print head.
6. Disconnect the effluent bottle when finished.
7. Hold a clean, absorbent cloth in front of the print head. Press and hold the Purge button on back of print head for five seconds.
8. Confirm theprint head reads 7.0 ± 0.5 psig in a non-printing state. If outside of range, see "Setting Ink Pressure" on page 26.
9. Follow above steps for all remaining heads.
10. System is primed.

Metal Tab

CLOSE SHUTOFF VALVE

OPEN SHUTOFF VALVE

REGULATOR KIT
(5701-501 NON-POROUS OR
5701-502 POROUS)
(FACTORY SET TO 7 psig)

TRUNK LINE

PRINT HEAD

INK DELIVERY SYSTEM

CONVEYOR

PRINT HEAD

TRUNK LINE

TRUNK LINE

WITHIN 8'

IN-LINE SHUTOFF

INK SUPPLY

WASTE

EFFLUENT KIT
(5750-503)

TRUNK LINE

7.0 ENTER PURGE

PURGE BUTTON
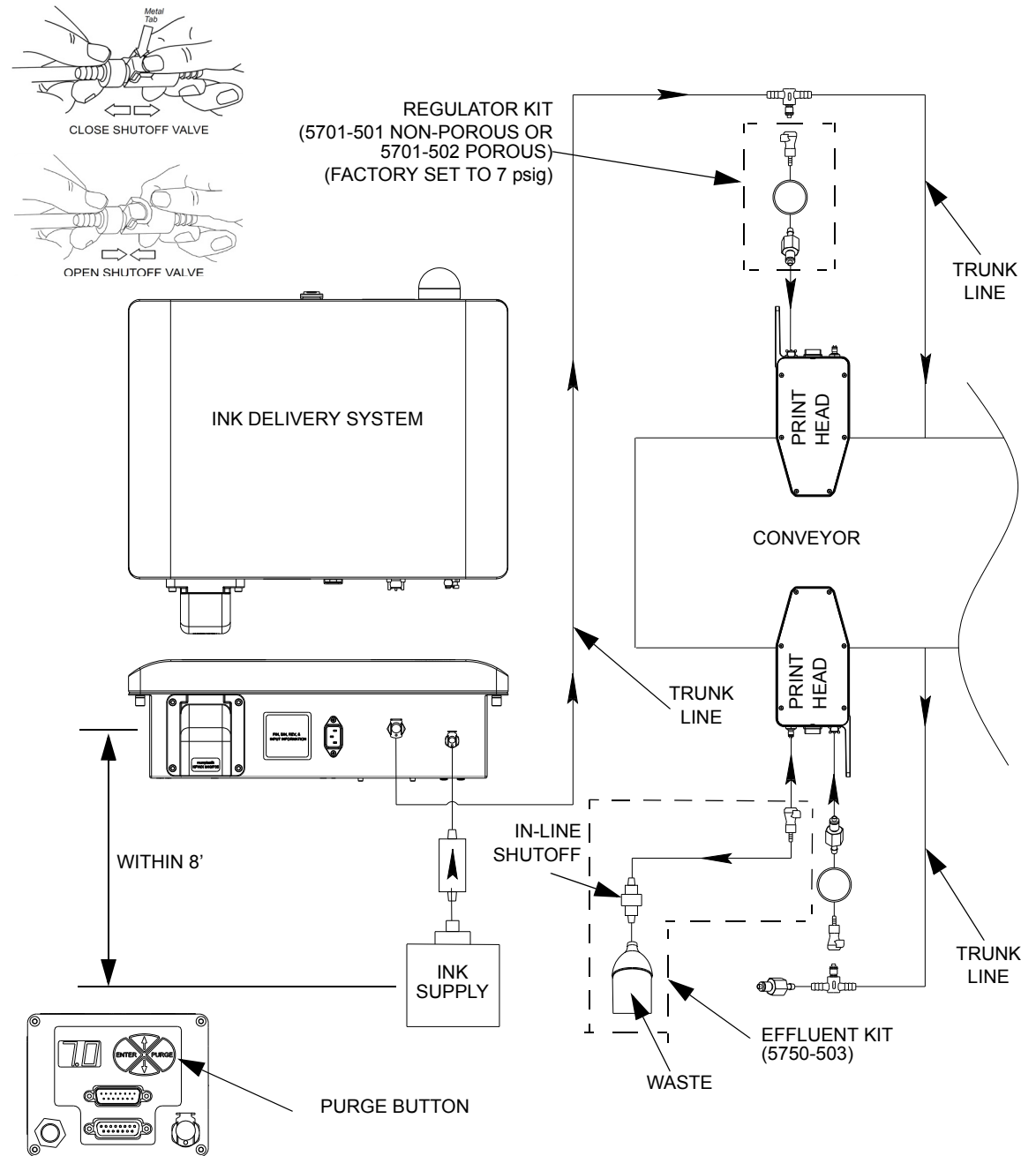
Step 8: Configure the Print Head via the Controller

NOTE: It is recommended that there is no message printing when re-doing the print head setup. If the warning message ("Changing the print head setup while printing may cause print problems. Continue?") is displayed, click **No**, then cancel the setup. Return to the Message Screen and cancel the print message before proceeding.

1. Select the **More** menu option, then select **Task Settings**,

2. Touch the **Redo Print Head Setup** button.

3. Touch the box that represents the direction the product will move on the conveyor (as seen while standing in front of the Controller or Task 1 Print Head).

4. Touch the up/down arrows to set the number of print heads on each side of the conveyor.

5. Touch the **Next>** button.

6. Touch the first print head in the daisy chain. (If there is only one print head, this step is bypassed.)
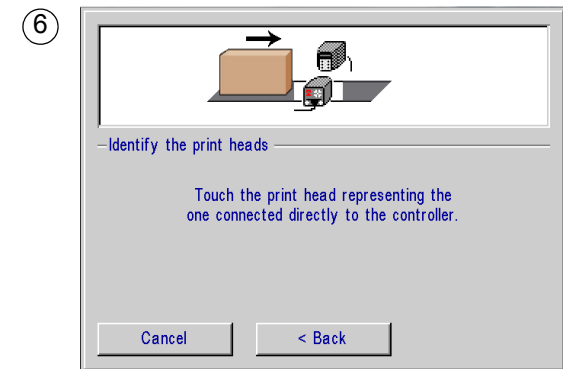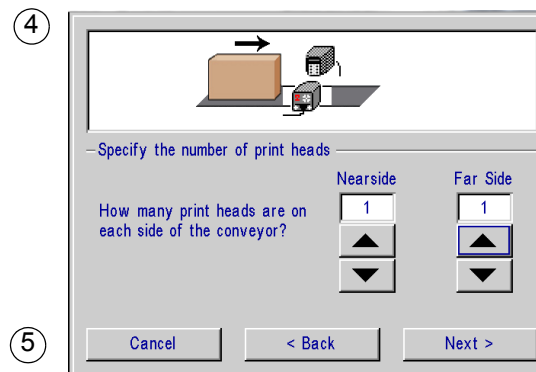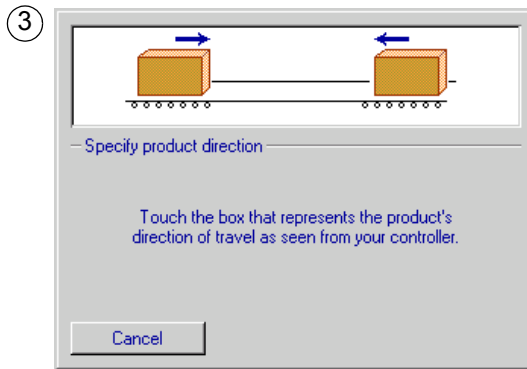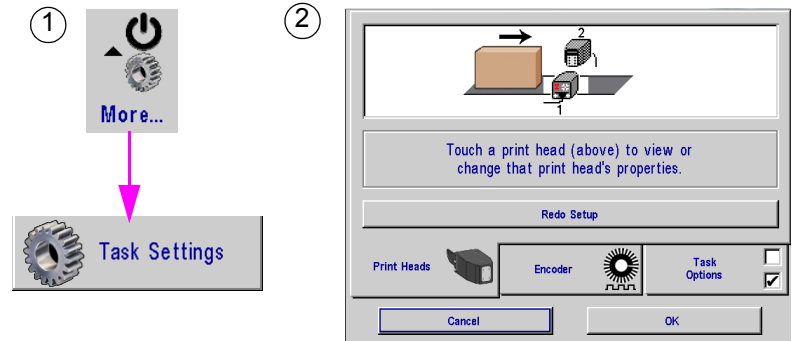
NOTES:
- The first print head in the daisy chain should be the top print head in the system, as this one will be printing the top line of data and will be the first one prompted to enter data.
- The procedure may be aborted by pressing Cancel or the Escape key at any time without changing the current print head setup.
- Repeat above steps for Task 2.
- Each Task can power up to eight (8) 9 dot or four (4) 18 dot print heads (total of 72 dots).

7. Select the Print Head Type from the drop-down box.

8. Enter the distance between the photosensor and the vertical centerline of the print head. This may need to be fine-tuned after print setup.

9. Select the Encoder tab and touch the External Encoder icon.

10. If Internal Encoder is selected, type in the speed.

11. Select the **Print Heads** tab, then touch the next head to highlight it and continue setup.

12. Touch the **OK** button. Print Head setup is now complete.
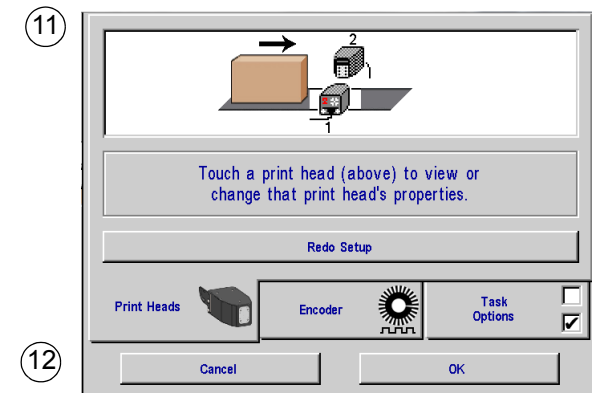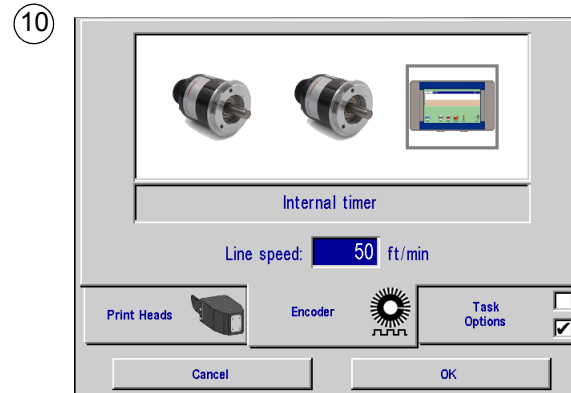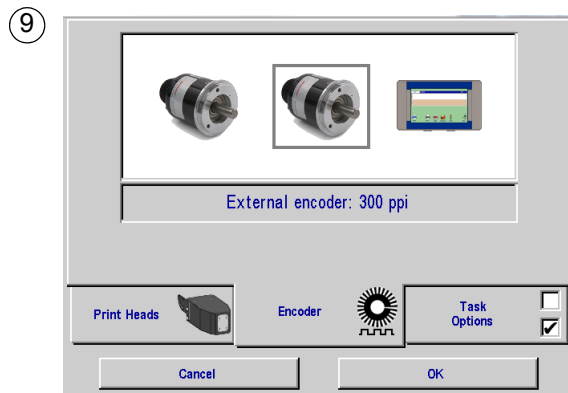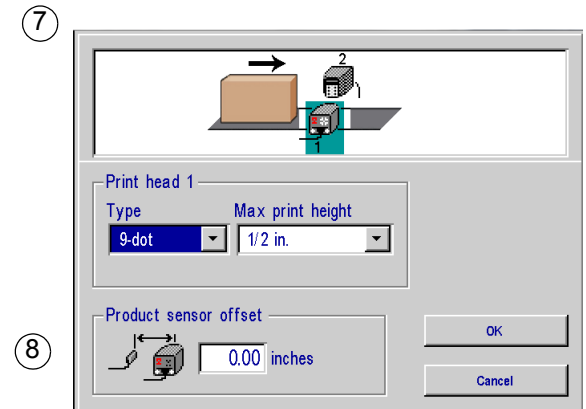
Touch any print head on the display to review or change the properties for that head. Touch the **Redo Print Head Setup** button to repeat the setup procedure using the new setup as the default. Touch **OK** to return to the **Home Screen**.

Step 9: Create a Message

NOTE: Additional information on messages can be found in the Controller Manual (5765-384).

From the **Home Screen**, select the **Messages** button, then select the **New** button.
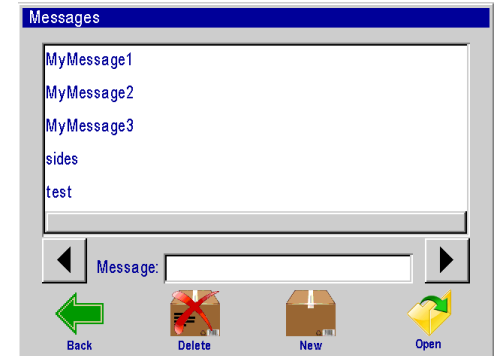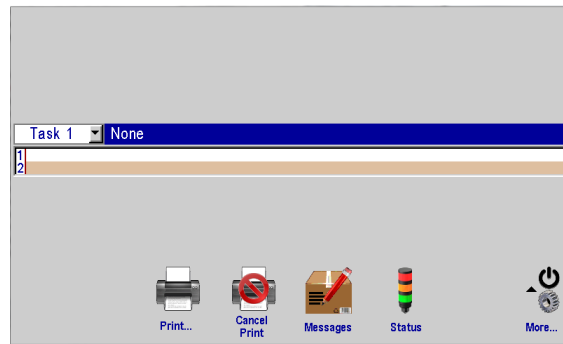
Create and save the message, then exit the message editor.

Time Code   Date Code   Message Display Area   Carton Ruler

Message Info — Next Field Button

Cursor — Field Properties

Cursor / Field Coordinates — Font Selection

On-screen Keyboard — 1 - 0.45 Y: 7

Text — Delete Button

Quick Save — Line Field

Menu —

Product Setup — Product Side

Count Code — Logo

Variable Field
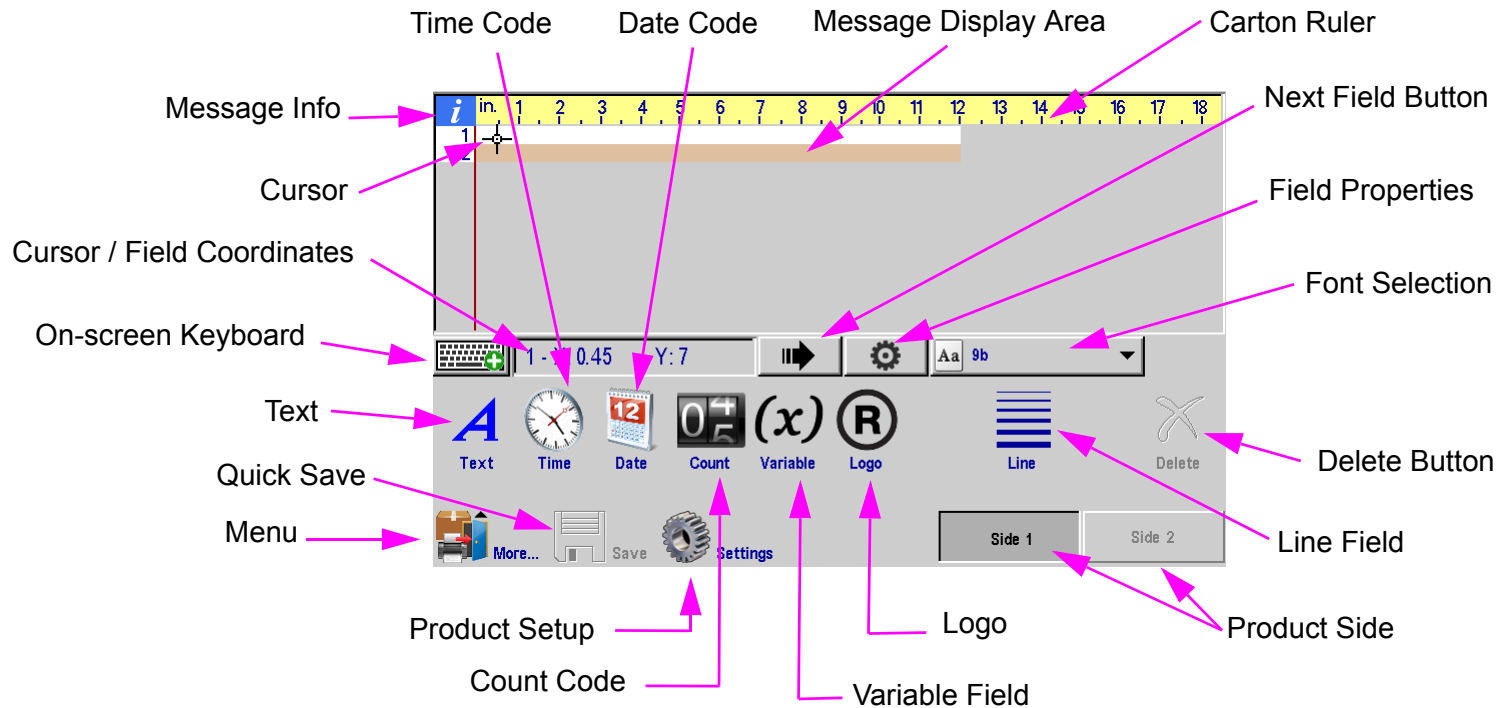
Step 10: Print a Message

1. From the **Home Screen**, press the **Print** button.
2. Select the desired message to print, and press the **Print** button.
3. The message will print on the next photosensor trigger.

①

Task 1
None
1
2
Print...
Cancel Print
Messages
Status
More...

②

Print Task 1... Local

MyMessage1
MyMessage2
MyMessage3
test

Message:
Back
Print

③

Task 1
TEST IV
1 TEST
2 TEST
Pause
Print...
Cancel Print
Messages
Status
More...
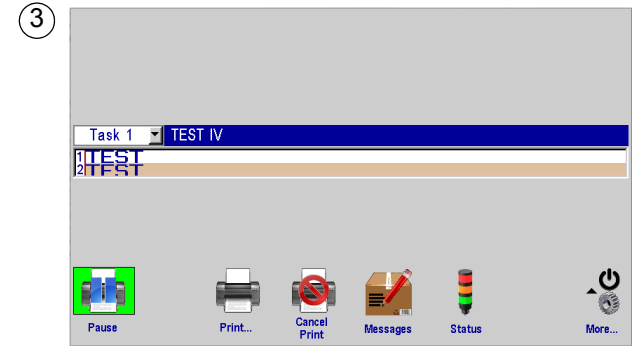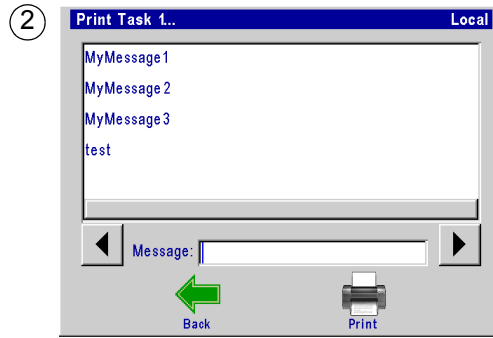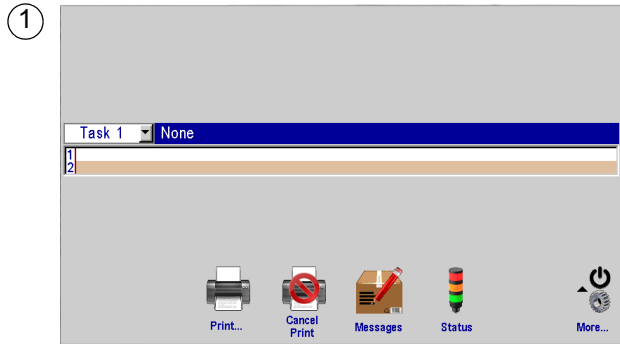
🟩 GREEN PAUSE INDICATOR
= READY TO PRINT

🟥 RED PLAY INDICATOR
= <u>NOT</u> READY TO PRINT

Section 3: Maintenance

The following are the recommended maintenance procedures to keep the ink jet system printing cleanly and efficiently.

Daily Startup

Wear safety goggles when working with industrial inks or solutions!

1. Clean print head orifice plates with the appropriate conditioner for your ink system:
   Porous Maintenance Spray (TWP): 5750-249
   Non-Porous Maintenance Spray (TSO): 5750-657
2. Inspect lines and connections for leaks, and all electrical connections and cabling for damage.

Intermittent (as required):

1. Ensure photosensor is clean and free of debris.
2. Ensure O-rings on the encoder wheel are present and not worn (cracked and/or chipped).
3. Ensure bracketry is in place and is tight.

Annually:

1. Replace encoder O-rings (5765-206).
2. Replace Ink Filter Assembly (5760-319).

Integrated Valve

Shutdowns of Seven Days or Longer

For extended shut down periods, it is recommended that the print head(s), regulator(s) and Ink Delivery System be thoroughly flushed with appropriate conditioner (see "Consumables" on page 51). To perform this procedure, an adequate supply of conditioner and an additional cap assembly (5760-307 5-Gallon Cap Assembly, or 5760-309 30-Gallon Cap Assembly) are required.

1. Insert the cap assembly into conditioner.
2. Disconnect the liquid supply line from the ink supply cap assembly and insert into the conditioner cap assembly.
3. Ensure the effluent system in-line shutoff is **not** allowing flow and connect it to the end of the ink trunk line.
4. Open the in-line shutoff to allow flow of liquid to the effluent bottle. The Ink Delivery System will turn on and draw in conditioner and pump it through the trunk line.
5. Occasionally close the effluent system to build liquid pressure.
6. Flush system until the trunk line and Ink Delivery System are clear.
7. Connect the effluent system to any of the print head bleed ports.
8. Open the effluent system to allow conditioner to flow through the regulator and print head.
9. Close the effluent system after the print head has been flushed.
10. Repeat steps 8 through 10 for all print heads.
11. Hold an absorbent cloth at the front of the print head and hold the **Purge** button until the print head runs clear through the orifices.
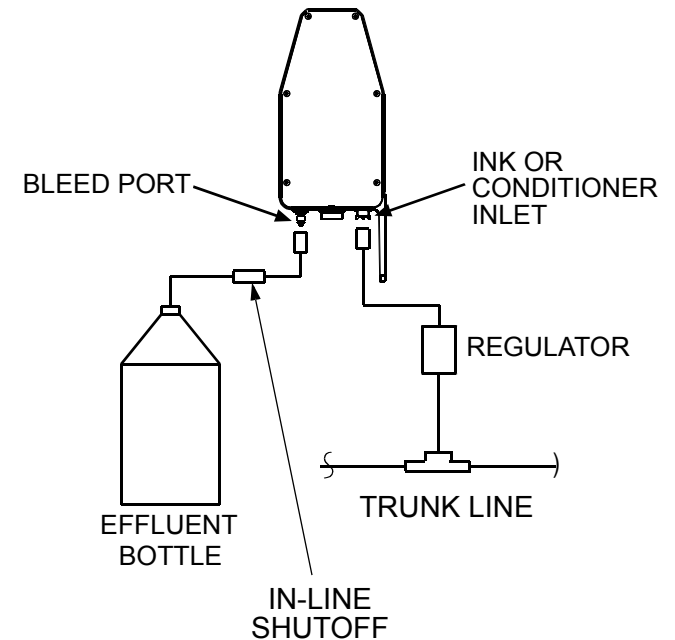
NOTE: To run print again, repeat the above procedure, except plug the liquid lines into the ink supply.

Preventative Maintenance at 2000 Hours

- Thorough cleaning of print head
- Solenoid and pulse-width adjustment for optimal dot size

Ink Delivery System Maintenance

Changing Ink Containers

CAUTION: Porous ink must be used with a porous Ink Delivery System. Non-porous ink must be used with a non-porous Ink Delivery System. The Ink Delivery System can <u>not</u> be flushed to use a different ink type.

NOTE: Any ink remaining in the bottom of the pail should be carefully poured into the new pail or disposed of in accordance with state and local regulations.

Tool required: 5-Gallon Ink Cap Wrench (1301-830).

Ink out to Ink Delivery System

Ink Filter

Level Detect Sensor Cable

Air Filter

Ink Out

5-Gallon Ink Pail

Float Sensor
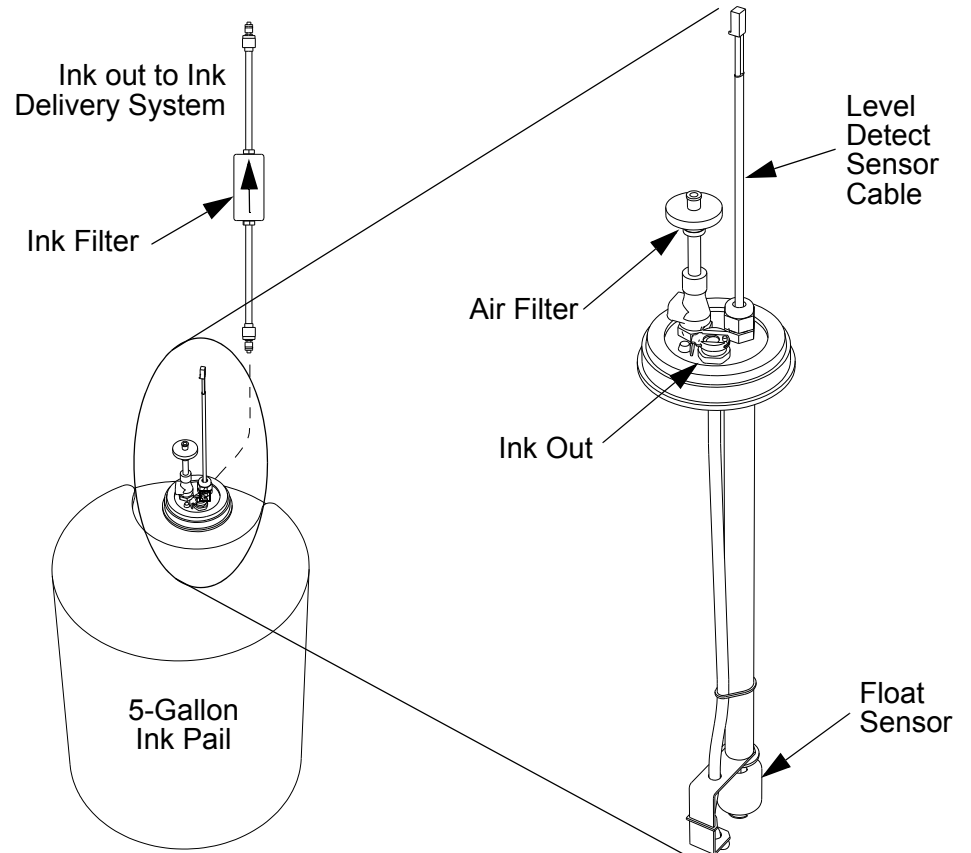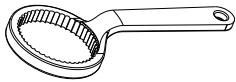
Ink Status	Beacon Status & Actions - Ink Delivery System	Beacon Color
Ink and Float Switch High	Ink system ready	Green
Ink and Float Switch Low	Replace ink container	Yellow

The following procedure explains how to change ink while the system continues to print. Determine whether the system is using porous (TWP) or non-porous (TSO) ink, and replace with the same type of ink.

Ink Regulator Maintenance & Setting Ink Pressure

Ink Regulator Maintenance

The following maintenance procedure can remove obstructions from the valve seat area of the ink regulator, restoring normal operation:

1. Unplug the ink regulator from the print head. (Ink may be used, but conditioner is preferred for this procedure).
2. Plug the ink regulator output into the effluent bottle.
3. Rotate the pressure adjustment clockwise until it stops, then counter-clockwise until it stops. Repeat 6 - 12 times.

NOTE: Monitor the fluid level in the effluent bottle to ensure that it does not overflow during this procedure.

4. Turn the ink regulator off (completely counter-clockwise), and connect it to the print head.
5. Connect the ink pressure gauge to the print head ink exit port (18 dot print heads only).
6. Increase ink regulator to desired operating pressure.
7. Purge the print head after any regulator adjustment.
8. Repeat steps 6 and 7 until correct operating pressure is achieved.
9. Monitor ink pressure while printing. Note that the pressure will drop slightly during the print cycle.
10. Check pressure 15 minutes after setting it. The pressure should be 7.0 ± 0.5 psig. Replace the regulator if it cannot maintain this range.
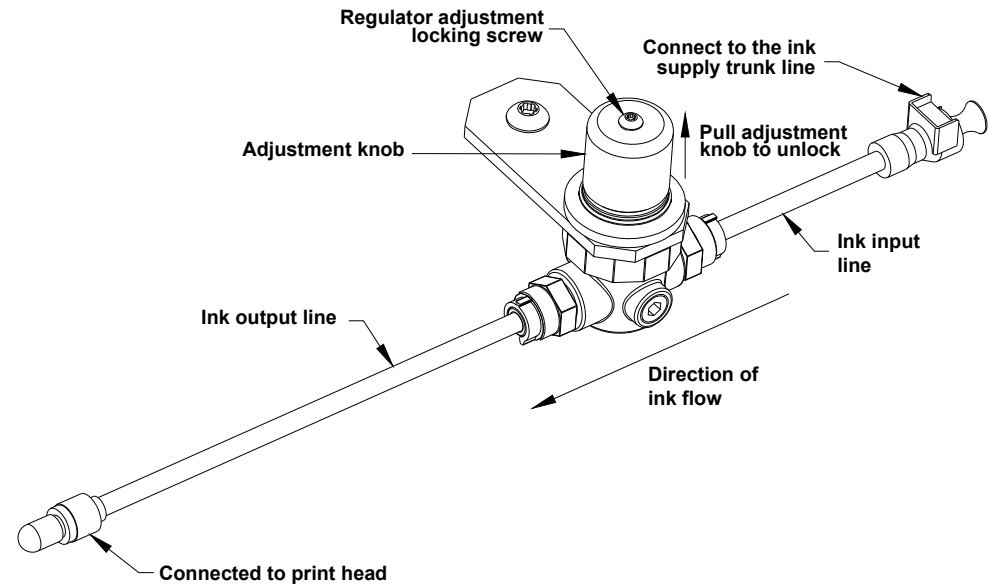
Setting Ink Pressure

NOTE: The pressure regulator shipped with the print head is pre-set at the factory and should **NOT** require adjustment. Bleed all air from regulator before adjusting set pressure.

1. Monitor the ink pressure via the LED at the rear of the print head.
2. Remove or loosen the regulator adjustment locking screw (T20 Torx screw) and pull the adjustment knob up into the unlocked position.
3. Adjust the regulator clockwise to increase pressure or counter-clockwise to decrease pressure.
4. After any adjustment to the regulator, purge ink out of the print head and onto a wipe.
5. The regulator is properly adjusted when the print head pressure is within +/- .5 psig of the operating pressure and stable after 30 seconds of a purge. If the ink regulator pressure is not stable, refer to *"Ink Regulator Maintenance & Setting Ink Pressure" on page 26*.
6. Depress the ink regulator adjustment knob to the locked position and re-install the locking screw.

Section 4: Troubleshooting

Print Head Troubleshooting

PRINT QUALITY PROBLEM	POSSIBLE CAUSE
Internal Dot Size Variation	Low ink pressure
Extra Dots	High ink pressure Pulse width set too high * Incorrect pre-load * *
Tails	Print head too far from the target Pulse width set too high * Incorrect pre-load * *
Splatter	Print head too far from the target Pulse width set too high * Incorrect pre-load * *
Undersized Dot	Low ink pressure Pulse width set too low * Incorrect pre-load * *
Stuck Open Valve	High ink pressure Pulse width set too high * Incorrect pre-load * *
Oversized Dot	High ink pressure
Off Target Printing	Print head too far from target Low ink pressure
Dot Columns Out of Alignment	Internal line speed turned on Incorrect direction selected in software
Smearing Print	Print head too close to target Incorrect ink usage for your application
Satellites	Print head too far from target
Message is Broken	Photocell is triggering multiple times per box Loose cable connections
Garbled Printing	System improperly grounded Excessive line noise
Dynamic Seepage	Pulse width set too low * Low ink pressure Incorrect pre-load * *
Static Seepage	High ink pressure Incorrect pre-load * *
Missing Dots	Pulse width set too low * Clogged orifice
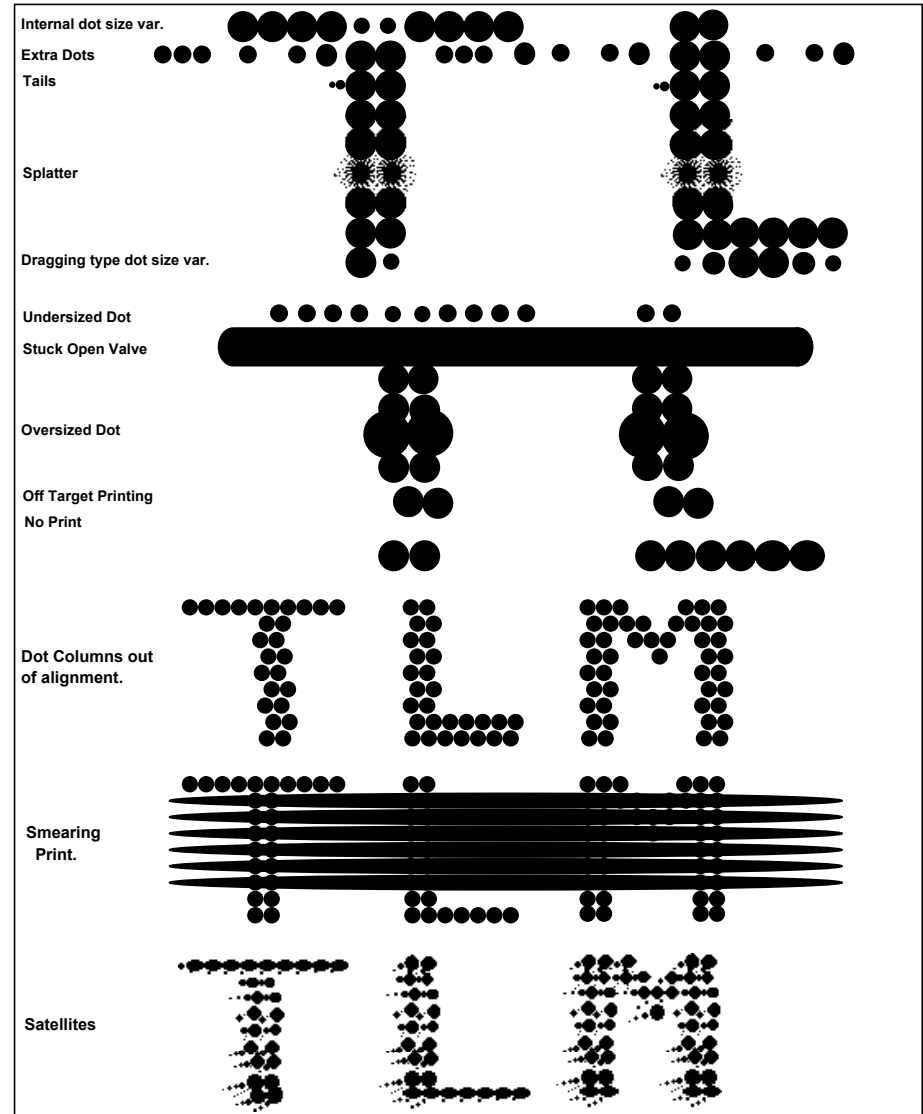
NOTES: Pre-load adjustment should be performed after all other causes are eliminated.

* Refer to "Print Head Pulse Width Adjustment" on page 30.

* * Refer to "Print Head Pre-Load Adjustment" on page 31.

Print Head Troubleshooting (continued)

Symptom	Possible Cause	Possible Solution
No print (some or all dots)	Ink or debris blocking printhead orifice(s)	1. Use the proper can of conditioner to wipe off front of print head. 2. Place a wipe over the print head front. 3. Press **Purge** button on the print head & listen for "buzzing" sound. 4. If 9 or 18 dots of ink are on the wipe, print head is functional. 5. If solenoids buzz and no ink on the wipe, follow Ink pressure steps. 6. If solenoids do not buzz, check cables and controller.
		Follow "Broaching the Front Plate" on page 31".
	Ink line supply pressure	1. Stop printing. 2. OK if Pressure ≥ 10 psig w/5770-743 gauge at end of trunk line.
	Ink pressure at Print Head	1. Stop printing. 2. OK if Pressure = 7 ± 0.5. 3. Adjust regulator if needed.
	Ink pressure at Print Head Regulator	1. Stop printing. 2. Remove regulator from print head and trunk line. 3. Plumb regulator between pressurized conditioner and effluent bottle. 4. Open and close regulator 6 times. 5. Re-plumb into system as before. 6. Replace regulator if all above fails.
	Incorrect Task selected on the controller	Confirm the correct Task selected on Home screen.

	Encoder input	Confirm the encoder wheel has two (2) black O-rings (5765-206).
		Check the encoder and cable for damage.
		Check connection at controller end of cable.
		Check status screen on controller.
		    a. Set encoder input to EXTERNAL.
		    b. Manually spin the encoder. A number should be displayed.
		    c. If no number is displayed, replace encoder (5760-820-IJ).

	Photocell input	Check status screen on controller
		    a. Place product in front of photocell.
		    b. Photocell input should be indicated.
		Check sensor for GREEN LED (Power) and ORANGE LED (Object Present).
		Check if photocell sensor face is dirty.
		Check for damage to sensor and/or cable.
		Re-teach sensor, following instructions printed on photocell.
		Consider replacing with reflective-type sensor.
		Replace (5760-383) if some or all above fails.

Print Head Troubleshooting (continued)

Symptom	Possible Cause	Possible Solution
Poor print	Dot size variation	Low ink pressure *
	Oversized dots	High ink pressure *
	Extra dots OR Stuck open valve	High ink pressure * Pulse width too high ** Incorrect preload ***
	Tails OR Splatter	Print head too far from target Pulse width set too high ** Incorrect preload ***
	Undersized dots OR Dots seeping during print	Low ink pressure * Pulse width too low ** Incorrect preload ***
	Dots seeping during NO print	High ink pressure * Incorrect preload ***
	Smearing print	Print head too close to product Incorrect ink for application
	Satellites OR Off-target print	Print head too far from product

	Dot columns out of alignment	Check system setup screen on controller
		    a. If using an encoder, set encoder input to EXTERNAL
		    b. If not, actual line speed does not match INTERNAL value
		    c. Confirm direction of product travel

	Cannot read print	Confirm proper system grounding Excessive electrical noise near system Check encoder ****

NOTES: * Consult "No Print" - Ink pressure related solutions on previous page.

                 ** Consult "Print Head Pulse Width Adjustment" on page 30.

                 *** Consult "Print Head Pre-Load Adjustment" on page 31. (CAUTION: This procedure is difficult to perform.)

                 **** Consult "No Print" - Encoder input solution on previous page.

Print Head Pulse Width Adjustment

If printed dots are over- or under-sized, pulse width adjustment may be required. Hold down the **Up** and **Down Arrows** simultaneously. The last channel to be accessed will be displayed. Press the **Enter** button. The pulse width setting will be displayed. This value is relative and can range between 30 and 80. The higher the value, the larger the dot size, and vice versa. **Pulse width is set at the factory to ideal performance. Caution should be used when changing pulse width; if it is set too low it can affect startup, if it is set too high it can cause premature internal failures.** If a pulse width is changed, the **Enter** button must be pressed to save the new value(s). Press the **Down Arrow** until "Pr" is displayed. Press **Enter** to exit to the Home screen.

NOTE: If the **Enter** button is not pressed, the display will revert to the Home screen after 30 seconds and the pulse width value will **not** be saved.

LED DISPLAY

PRINT HEAD CABLE INLET

PUSH BUTTON
MEMBRANE SWITCH

ENTER PURGE

INK INLET, SUPPLY PORT

PRINT HEAD CABLE EXIT.
DAISY CHAIN TO NEXT
PRINT HEAD.

INK OUTLET, BLEED PORT
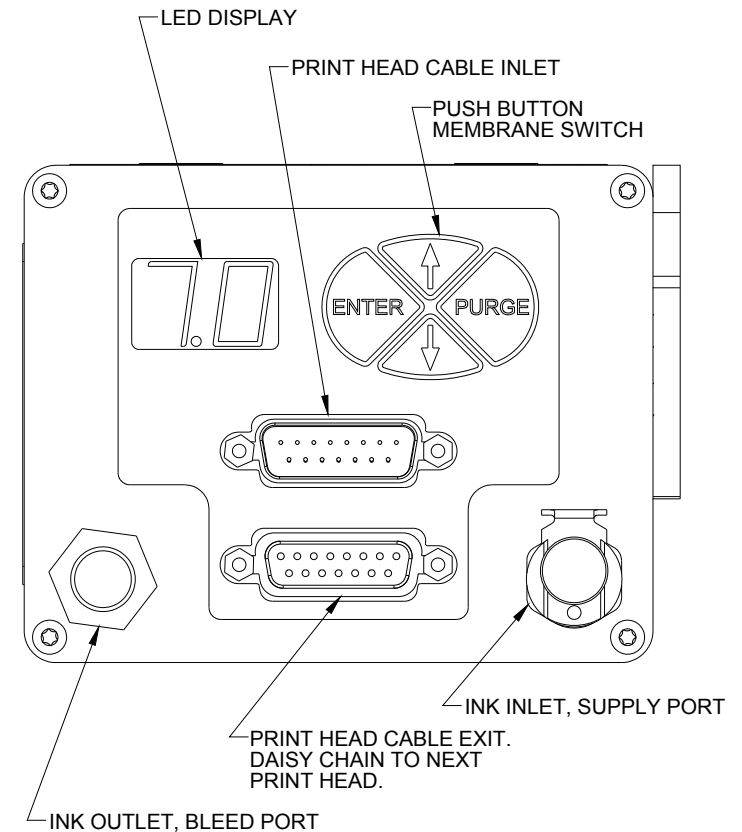
Broaching the Front Plate

CAUTION: Failure to follow the broaching instructions can result in damage to the print head.

0.10 inch

1902-857
ORIFICE CLEANING KIT

1. Wipe the front plate with a conditioner-wetted towel.
2. Make sure the broach pin does not extend out of the handle more than 0.10 inch.
3. Identify the missing dot from a print sample.
4. Carefully insert the broach pin into the orifice until the handle touches the front plate. Remove the pin and create a print sample.
5. Spray the front plate with conditioner and run another print sample.

Channels

1
2
3   (Missing)
4
5
6
7
8
9
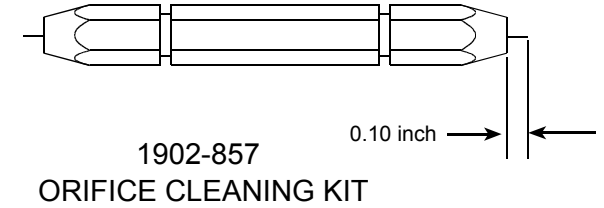
CAUTION: Broaching too much may damage print quality.
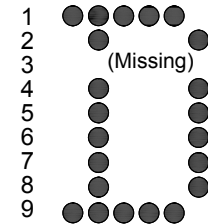
Print Head Pre-Load Adjustment

NOTE: If a valve is under pre-loaded, increasing the pre-load can correct the print problem. If the valve is over pre-loaded, damage may occur. Consider this before proceeding. The manufacturer is not responsible for damage caused by over adjustment of the pre-load.

If a print head is leaking when not printing, it requires solenoid preload adjustment, using the tool shown at right:

1. Adjust the regulator to 9.0 psig.
2. Remove the top cover and do a Channel Purge. Wipe off the front plate.
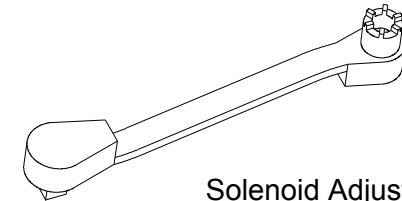
Solenoid Adjustment Tool
(5770-201)

Integrated Valve

3. Use the diagrams at right and below to locate the adjustment nut that corresponds to the leaking orifice.

4. Using the solenoid adjustment tool, SLOWLY AND CAREFULLY turn the adjustment nut <u>counter-clockwise</u> approximately 1/8 turn to add additional pressure to the piston.

REAR INTERNAL VIEW OF SOLENOID
ADJUSTMENT NUT LOCATION ON
SOLENOID MOUNTING BLOCK

VIEW OF FRONT PLATE
IDENTIFING ORIFICE
LOCATION

CAUTION: Solenoid adjustment must be made by trained personnel only!

Preload pressure: 9 psig
Operating pressure: 7 psig

18-DOT PRINTHEAD

VIEW OF FRONT PLATE
IDENTIFING ORIFICE LOCATION

REAR INTERNAL VIEW OF
SOLENOID ADJUSTMENT NUT
LOCATION ON SOLENOID
MOUNTING BLOCK

9-DOT PRINTHEAD

5. Channel Purge and wipe the front plate.

6. If no leakage is observed after 1 minute, then replace the print head enclosure cover. If leakage continues, then repeat the pre-load adjustment procedure until leakage stops.

7. Adjust regulator pressure to 7.0 ± 0.5 psig.

SOLENOID
ADJUSTMENT NUT

SOLENOID
ADJUSTMENT
TOOL
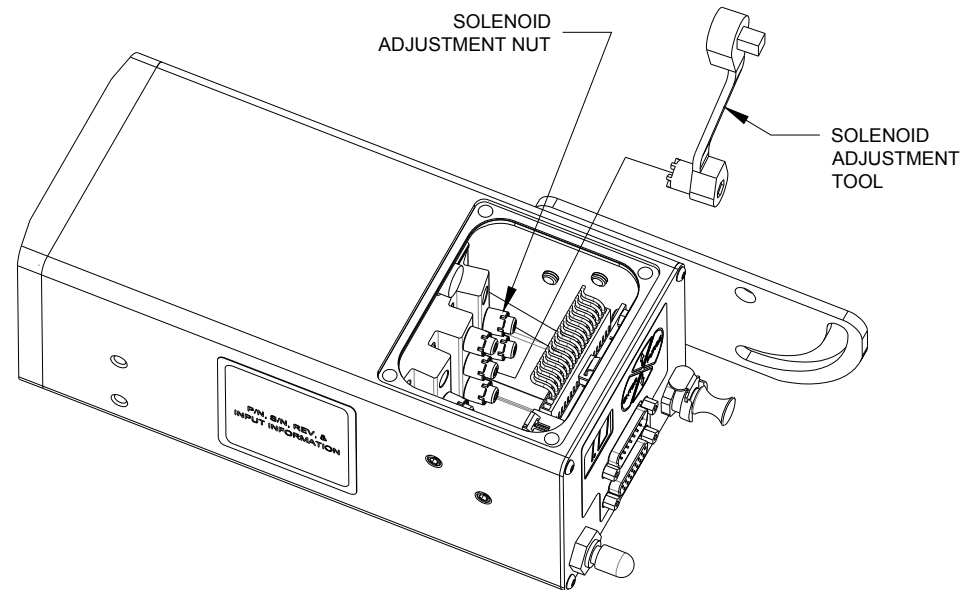
Appendix A: System Specifications

System
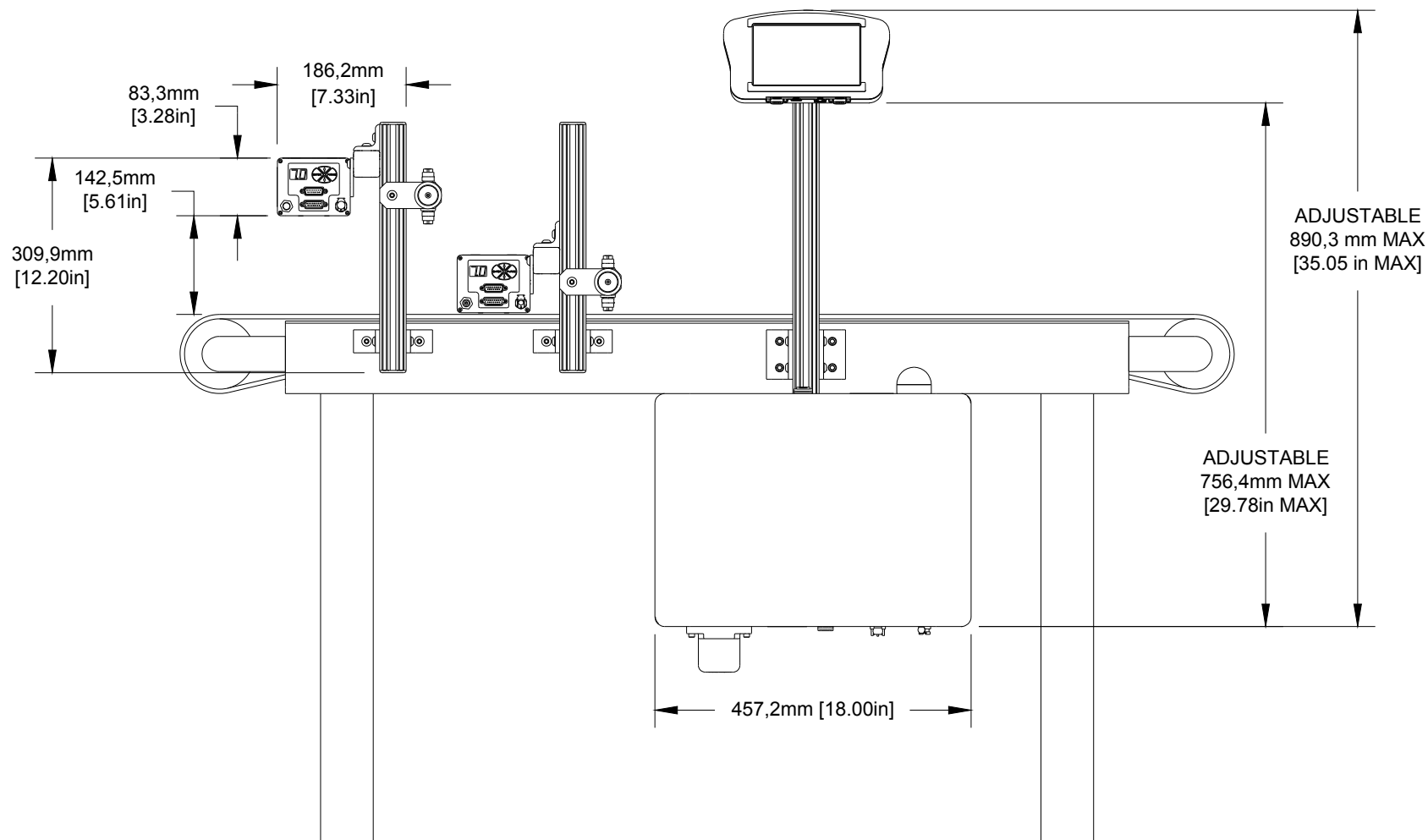
TYPICAL SYSTEM INSTALLATION

9 Dot Print Head
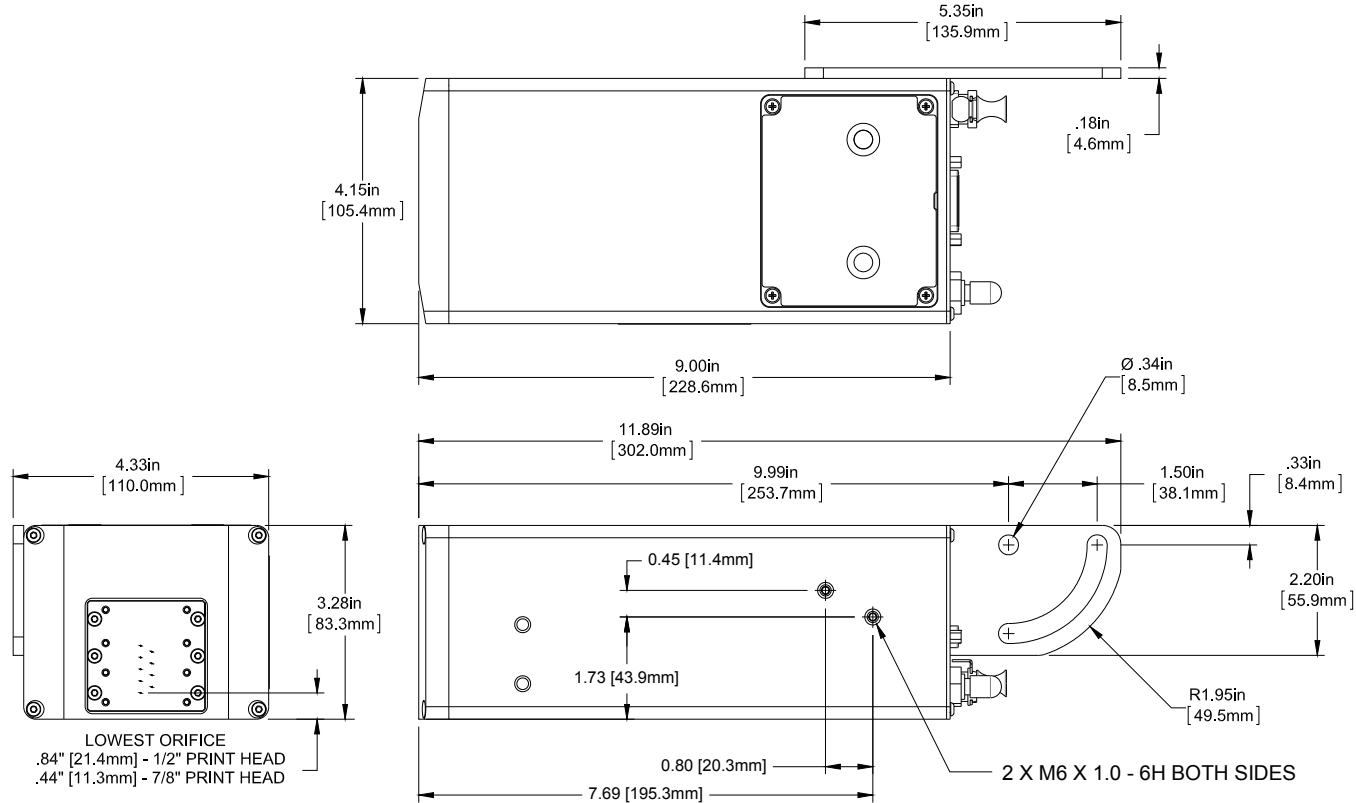
Weight
4.5 lbs [2.0 kg]
Enclosure
Paint over anodized Aluminum
Electrical
15 VDC input from controller
Ink Filtration
25 micron in-line
Print Speed
Up to 650 ft/min (Print Resolution Dependent)

Ink Type
Porous (Water Based)
Non-Porous (Alcohol or MEK Based)
Operating Pressure
7 psig ink input
Environment
Ambient operation temperature: 40°F to 104°F (10°C to 40°C)
Operating humidity: 10 - 90% non-condensing

Integrated Valve

18 Dot Print Head
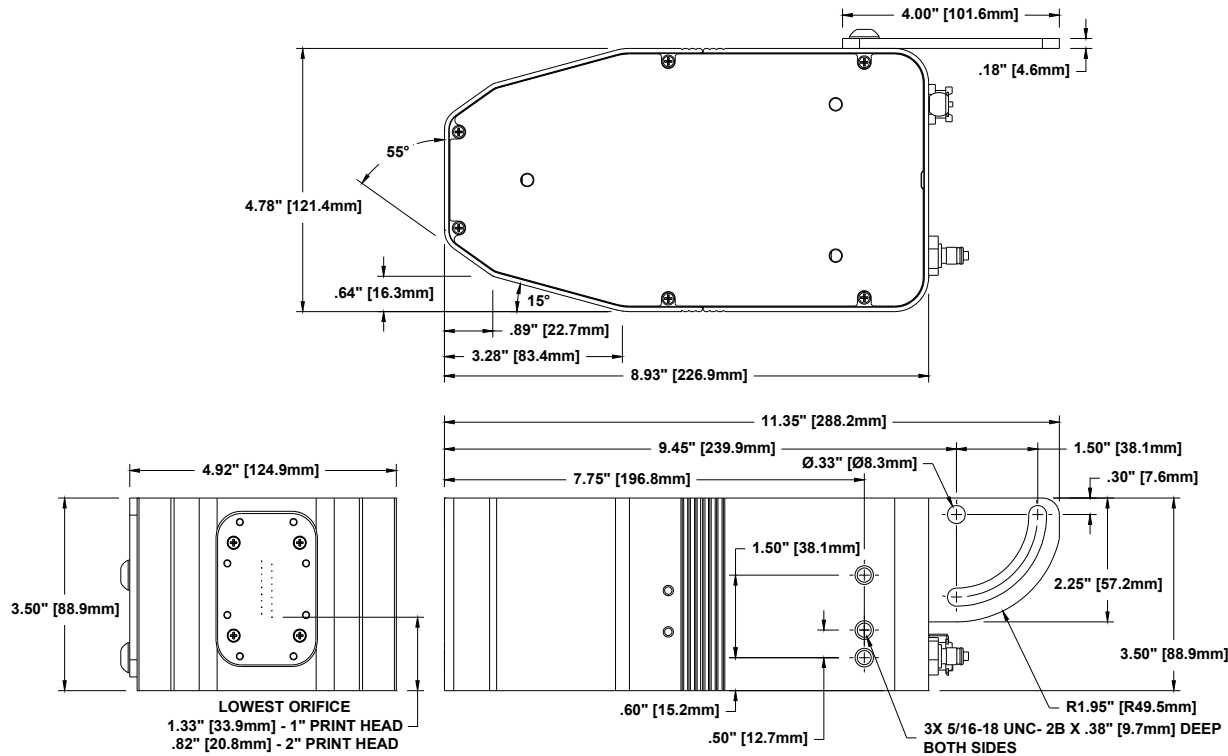
Weight

6.2 lbs [2.8 kg]

Enclosure

Anodized Aluminum

Electrical

15 VDC input from controller

Ink Filtration

25 micron in-line

Print Speed

Up to 650 ft/min (Print Resolution Dependent)

Ink Type

Porous (Water Based)

Non-Porous (Alcohol or MEK Based)

Operating Pressure

7 psig ink input

Environment

Ambient operation temperature: 40°F to 104°F (10°C to 40°C)

Operating humidity: 10 - 90% non-condensing

Ink Delivery System

Size

Height: 336,6mm [13.25in]

Width: 457,2mm [18.0in]

Depth: 142,2mm [5.6in]

Weight: 10.1kg [22.2 lb]

Cable and Plumbing Clearance: 3" from the bottom of the Ink Delivery System

Enclosure

Stainless Steel

Mounting

Modular brackets included

Ink Filtration

100 micron absolute (5760-319 Kit, Ink Filter Assembly)

Electrical

2.3 A max @ 115 VAC

1.35 A max @ 230 VAC

Normal Operating Pressure Range

18 psig to 26 psig (approximately)

Cable Ports

Ink low level

Power cord

Plumbing Ports

Filtered ink inlet

Pressurized out port to print heads

Environment

Ambient operating temperature: 40°F to 104°F

Operating humidity: 10-90%, non-condensing

Tubing Limitations

Maximum horizontal tube length = 100 ft

Maximum vertical tube length (bottom of Ink Delivery System to bottom of highest print head) = 20 ft
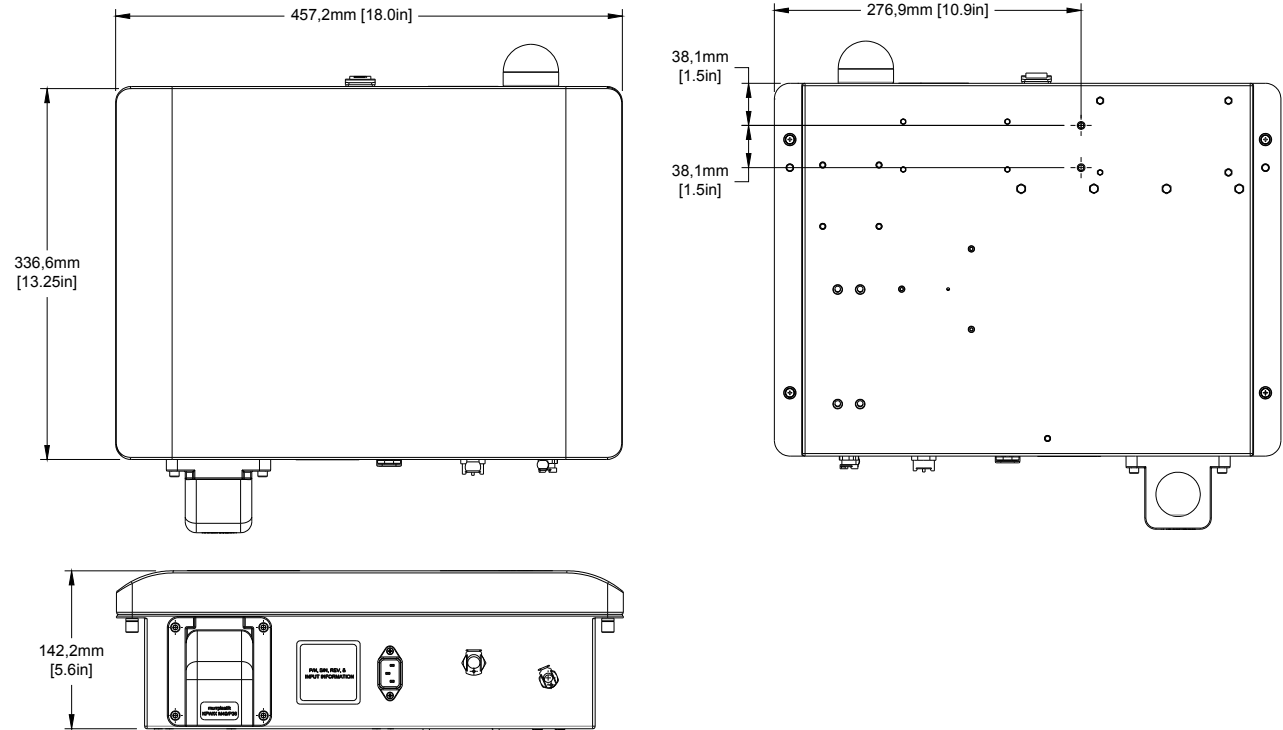
Ink Supply Limitations

Maximum height above Ink Delivery System (top of ink supply to bottom of Ink Delivery System) = 8 ft

Maximum distance below Ink Delivery System (top of ink supply to bottom of Ink Delivery System) = 8 ft

Maximum horizontal distance between top of Ink Delivery System and bottom of supply = 8 ft

Print Head Limitations

Up to (8) 9 dot or (4) 18 dot

Any combination totaling 72 dots

Hand-Held Controller

Size

Height: 133n4mm [5.25in]
Width: 240,0mm [9.45in]
Depth: 39,4mm [1.55in]
Weight: .50kg (1.1lb)

Enclosure

Black ABS Plastic

Electrical

15 VDC supplied from print head power supply: 90-260 VAC, 50/0 Hz, 1.5A max

Ports

(2) RS-232 Ports, (1) USB Port
(1) 100 base-T Ethernet Port

Environment

Ambient operating temperature: 5°C to 40°C (40°F to 104°F)
Operating humidity: 10-90%, non-condensing

User Interface

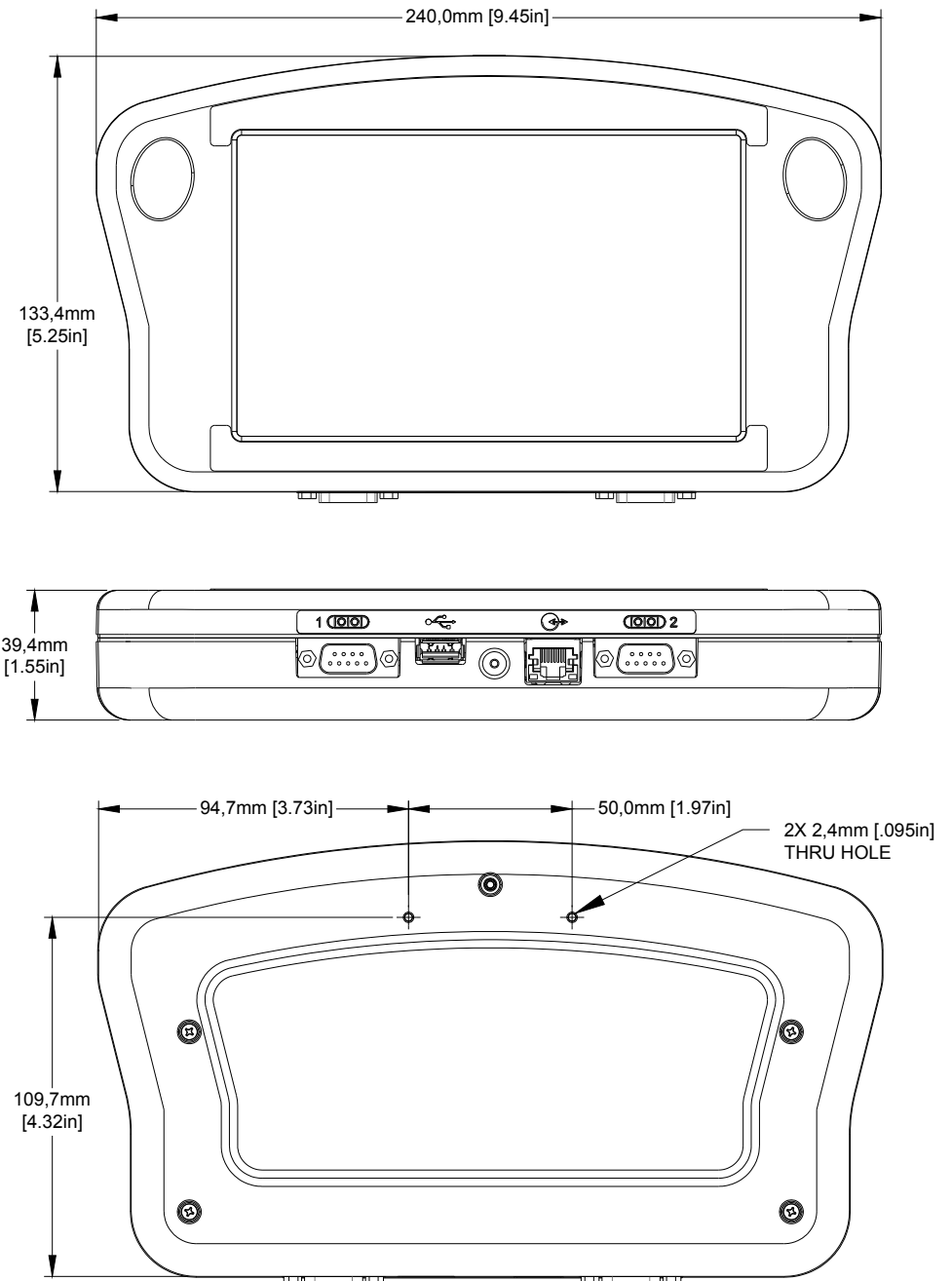Type: Graphical User interface keyboard: on screen QWERTY

Display

178mm [7in] LCD with touch screen, 800 x 480 pixels

Fonts

Unicode

Storage

512 MB flash memory

Appendix B: Theory of Operation

Functional Description

The ink jet system prints text, autocodes (such as product counts or time and date stamps) and/or graphics onto products as they travel by conveyor past stationary print heads. Print can be on any one of, or a combination of, the product's sides, top, or bottom. The conveyor speed is monitored using a variable speed encoder or a built-in fixed speed encoder. Products are detected using a photosensor. The information to be printed is defined as a message and is programmed into the controller via a user interface.

Print Head Daisy Chain(s)

Multiple print heads are attached in a daisy chain configuration. The first print head plugs into a Print Head Interface Board (Task 1), the second print head plugs into the first, the third plugs into the second, etc. A daisy chain can be up to 72 dots long (eight 9 dot heads, four 18 dot heads, or a combination of 9 dot and 18 dot heads totaling no more than 72 dots), and a system can have one or two daisy chains (one for each Print Head Interface Board).

Please note that power is applied to the print heads even when the system is "turned off." The only way to remove power from the print heads is to pull the barrel connect plug(s).

Photosensor (5760-383)

The photosensor detects when a product is about to pass by the print heads and signals the Controller to start a print cycle. The photosensor signal is active low, and it must remain low for at least one encoder pulse. Once a print cycle starts it continues to completion regardless of what the photosensor signal does.

The Controller is compatible with through-beam, retro-reflective, and diffused photosensors that work at 15VDC and have a current sinking (or open collector) output. The photosensor plugs into the Print Head Interface Board (Task 1).

Encoder (5760-820-IJ)

The encoder determines the time period between the printing of individual columns, or the print speed. As a product's speed increases, the time period between columns must decrease, that is, the print speed must increase, to maintain consistent column-to-column spacing. The system has two encoder options, external and internal. Use the external encoder where the conveyor speed fluctuates. You can use the internal encoder when the conveyor speed is constant.

The **external encoder** is a 5VDC optical encoder. The encoder's wheel is sized such that the encoder outputs 300 pulses per inch of product travel. The external encoder plugs into the Print Head Interface Board (J4), and its signal goes to the FPGA where it is used to time the sending of column data to the print head.

The **internal encoder** signal is a constant frequency pulse stream generated on the Print Head Interface Board. A programmable counter circuit in the FPGA divides the board's 16 MHz clock by a value calculated from a line speed entered during system setup. When the user selects the internal encoder, a switch in the FPGA disconnects the external encoder signal from the print timing circuits and connects the output from the counter circuit.

Integrated Valve

Integrated Valve Print Head

Integrated Valve inkjet technology utilizes electronically controlled solenoid valves to open and close the flow of pressurized ink through a series of holes, channels, and small orifices. Regulated ink pressure is supplied to the rear of the print head. While the print head is printing or purging, ink is flowing through the inlet port, tubing, filter, and finally into the valve control mechanism. When the print head printed circuit board receives data signals from the controller via the print head cable, a microcontroller on the pcb generates pulses to the appropriate solenoids. These solenoids in turn, connect directly to a sealing piston. The sealing piston presses against a membrane that seals off the flow of ink to the appropriate orifice(s). When the solenoid is energized the piston pulls away from the sealing membrane and ink pressure allows flow of ink through that channel and out the orifice. The time that the solenoid is powered on is called the pulse width; therefore, if the pulse width is increased, the valve is allowed to flow more ink (bigger dot).

Pressure is monitored via a sensor that is teed into the print head bleed tubing. The sensor sends voltage signals to the display board that are scaled and displayed as gage pressure on the rear of the print head.
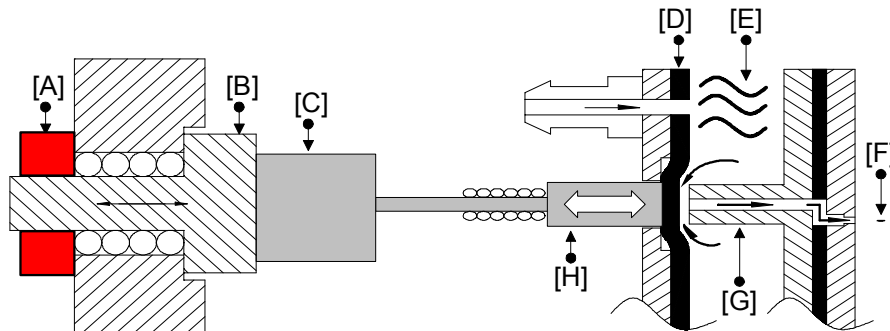
[A] Adjustment nut [E] Ink
[B] Bushing   [F] Ink droplet
[C] Solenoid   [G] Chamber plate post
[D] Membrane   [H] Piston

Integrated Valve
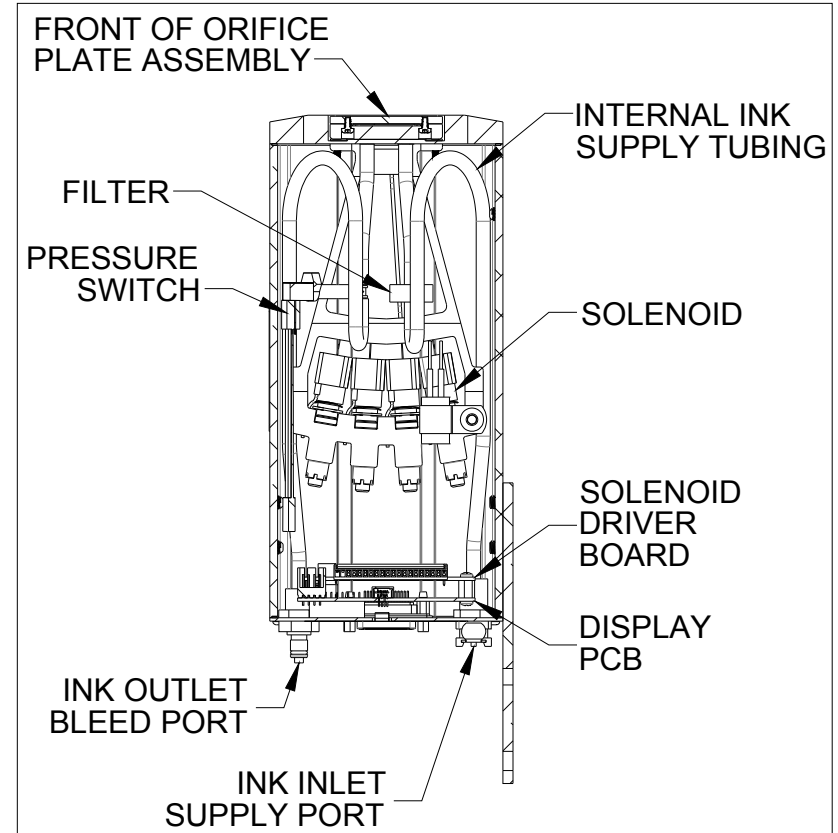
Print Head Display and Keypad Operation

Initial Startup and Power Save: When the print head is connected to the electronic cable, the display shows the center decimal point to signify there is power. This is the Power Save mode. This mode saves energy by not powering all the LED display segments. The print head has full functionality in Power Save mode. Any of the four push buttons on the membrane switch will illuminate (wake up) the display. When awake, the display will always start in the Home Screen.

Inactivity: After 30 seconds of inactivity in the Home screen, the display will change to Power Save mode. If the LED display is in any other mode such as Purge or Pulse Width Adjustment, the LED display will default to the Home Screen after 30 seconds of inactivity, then Power Save mode (an additional 30 seconds).

Home Screen: The LED state after waking up the print head display or the default after 30 seconds of inactivity. It displays the print head pressure in psi (pounds per square inch).

Purge button: The Purge button can be used in two different ways, one, to purge all channels at once, or two, to purge one channel at a time.   From the **Home** screen, press and hold the **Purge** button on the rear membrane switch for one second. All of the channels will fire/eject ink for two seconds. If you continue to hold the **Purge** button, then the print head will purge ink until you release the button. To purge individual channels, press the **Enter** button once then the **Up** and **Down** arrows to select the desired channel (e.g. 1 through 9). Again, press and hold the **Purge** button for one second. Ink will eject from the selected channel for two seconds. To return to the **Home** screen, press the **Down** arrow button until "Pr" is selected, and then press **Enter**. Otherwise, the print head will automatically return to the Home screen after 30 seconds of inactivity.

Pulse Width Adjustment: Hold down the **Up** and **Down** arrows simultaneously. The last channel to be accessed will be displayed. Press the **Enter** button. The pulse width setting will be displayed. This value is relative and can range between 15 and 65. The higher the value, the larger the dot size, and vice versa. Generally, pulse width adjustment on a new print head is not recommended. These values are factory set. However, it may be necessary to increase pulse widths if there are long print head cable lengths in the daisy chain. Decreasing the pulse widths will likely result in missed dots at first start-up. If a pulse width is changed, the **Enter** button must be pressed to save the new value(s). Again, press the **Down** arrow until "Pr" is displayed. Press **Enter** to exit to the Home screen.

NOTE: If the Enter button is not pressed, the display will revert to the Home screen after 30 seconds and the pulse width value will not be saved.

Enter Button: This button is used to move from one function to the next or saving pulse width adjustments.

Up and Down Arrows: These buttons are used to select channels, enter Pulse Width Adjustment mode, and to adjust the pulse width values up or down.

"Er" Display Code: If the display on the rear of the print head shows a flashing decimal, this means the print head has been driven in excess of its normal printing range and is now in overdrive protection. Pressing any of the four buttons on the rear of the print head will reveal the "Er" code. Consult the factory. To clear the code, press the **Enter** button on the rear of the print head. Note that this code will only clear when the print head is not being over-driven.
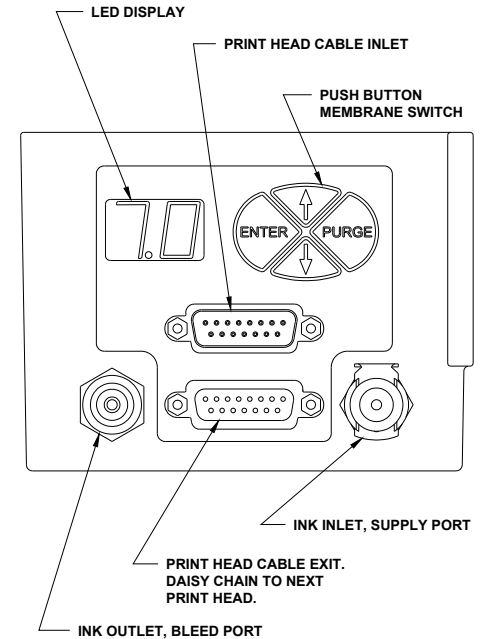
REMOTE PRINT HEAD PURGING
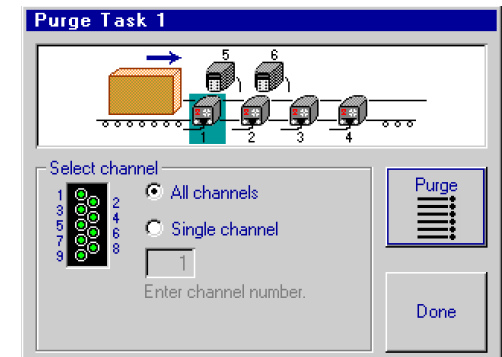
1. On the **Home Screen**, select **More**, then select **Purge.**
2. Select desired print head.
3. Hold a lint-free wipe in front of print head.
4. Choose **All channels** or **Single channel**.
5. Press the **Purge** button. Ink will eject from the print head for a few seconds.

Integrated Valve

Ink Delivery System Features

The Ink Delivery System provides ink to the print heads. In addition to pumping ink from the supply container, the Ink Delivery System is programmed with the following features:

1. *Continuous monitoring and maintenance of ink line pressure.* Whenever the pressure drops to a level of 18 psig, the Ink Delivery System pump turns on until the pressure reaches 26 psig.

2. *Ink supply "low" detection.* A float sensor mounted to the end of the ink cap assembly in the ink container informs the Ink Delivery System when the container is almost empty. The Ink Delivery System then alerts the operator by turning on the beacon light.

Beacon Status

1. Green Beacon: Indicates ink system is ready.
2. Yellow Beacon: Indicates ink is low.
3. Red Beacon: Indicates ink is out or there is a broken ink line.
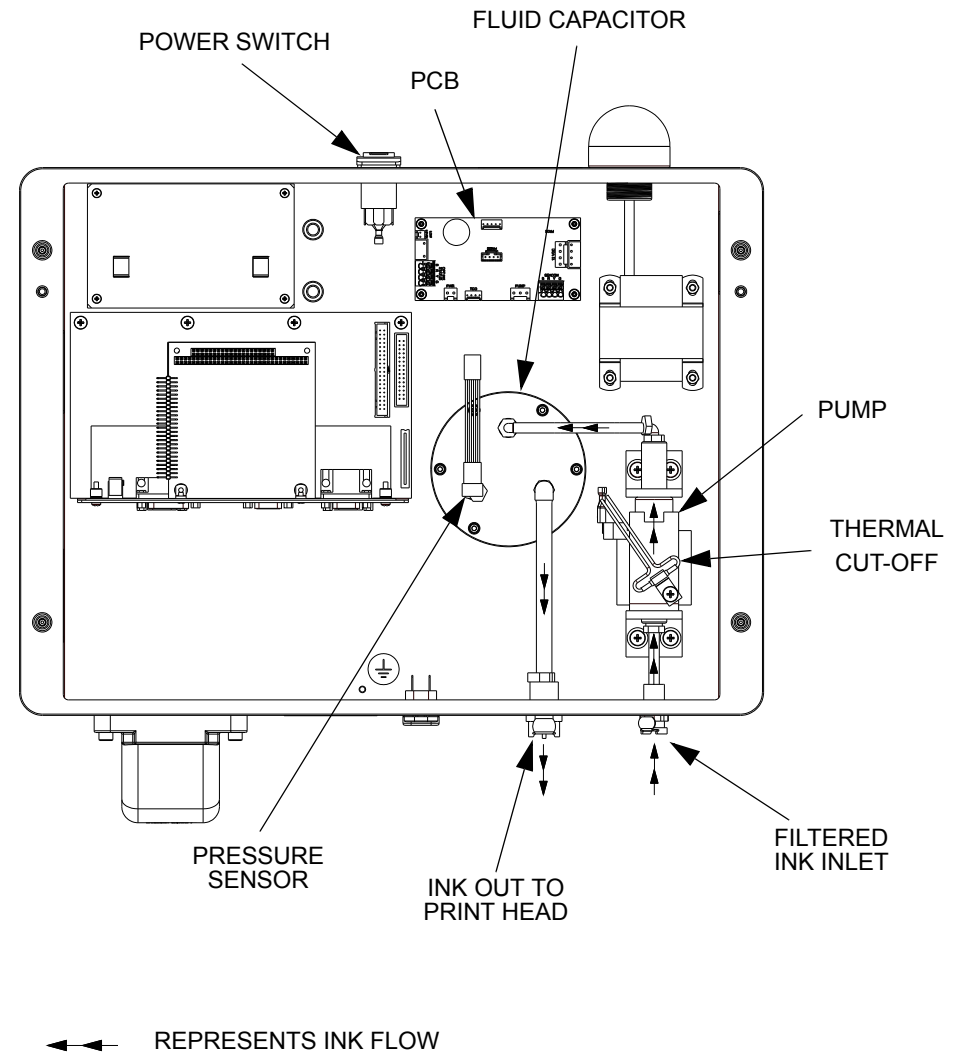
Appendix C: Interconnect Diagrams

Ink Delivery System Wiring Diagram for Non-European Countries (115V)
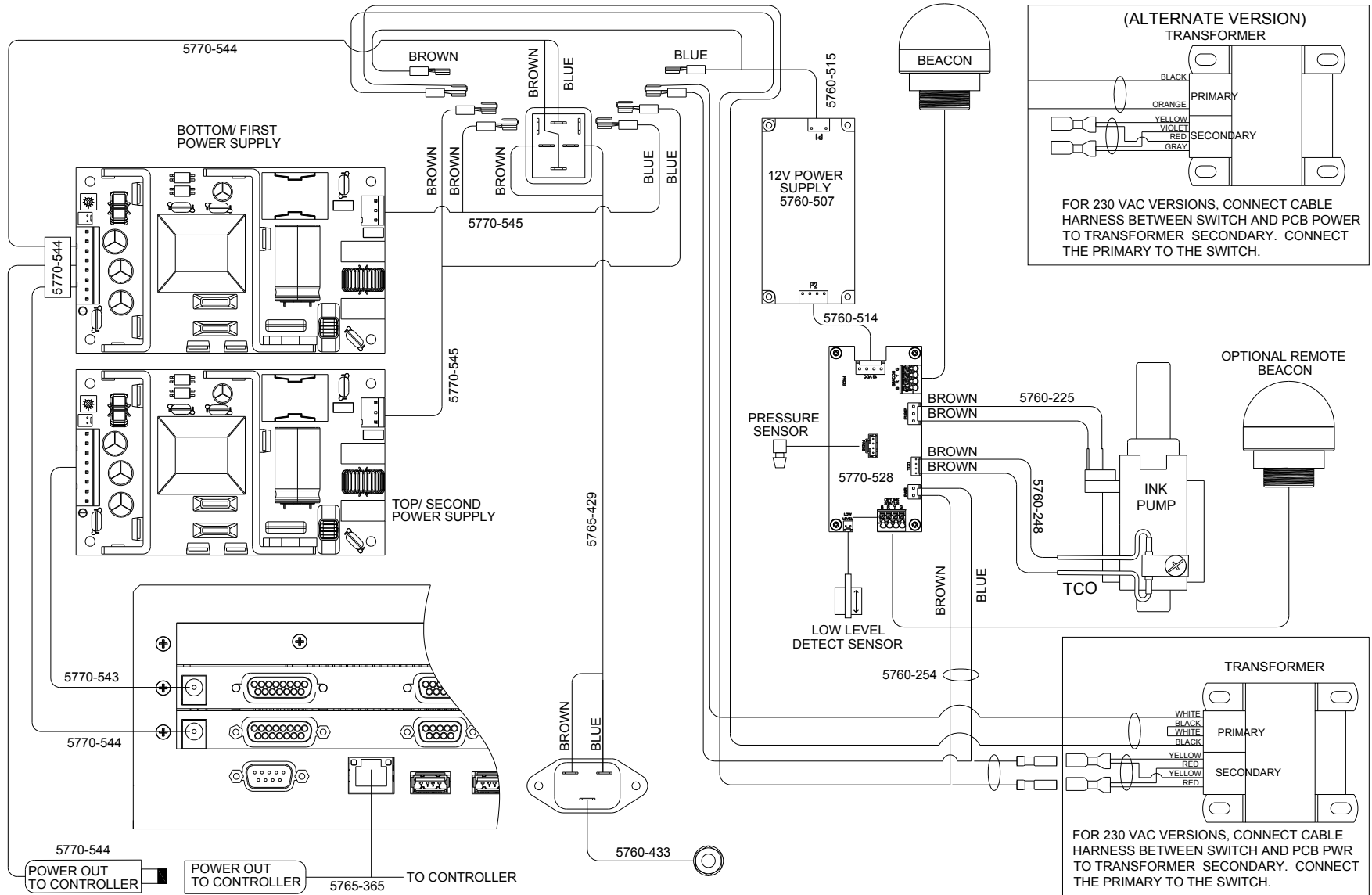
Integrated Valve

Ink Delivery System Board Test Points

Test Points: TP1, TP4: (TP1 - TP4) = 1.2mV/PSI at the pressure sensor
              TP2:   0.1V/PSI of pressure
              TP3:   Toggles at the end of a pressure sampling period

              TP8:   12VDC
              TP9:   5VDC

LEDs: LED1:   Yellow; indicates the pump is running

Fuses: F1:   Beacon fuse; 125V, 1A
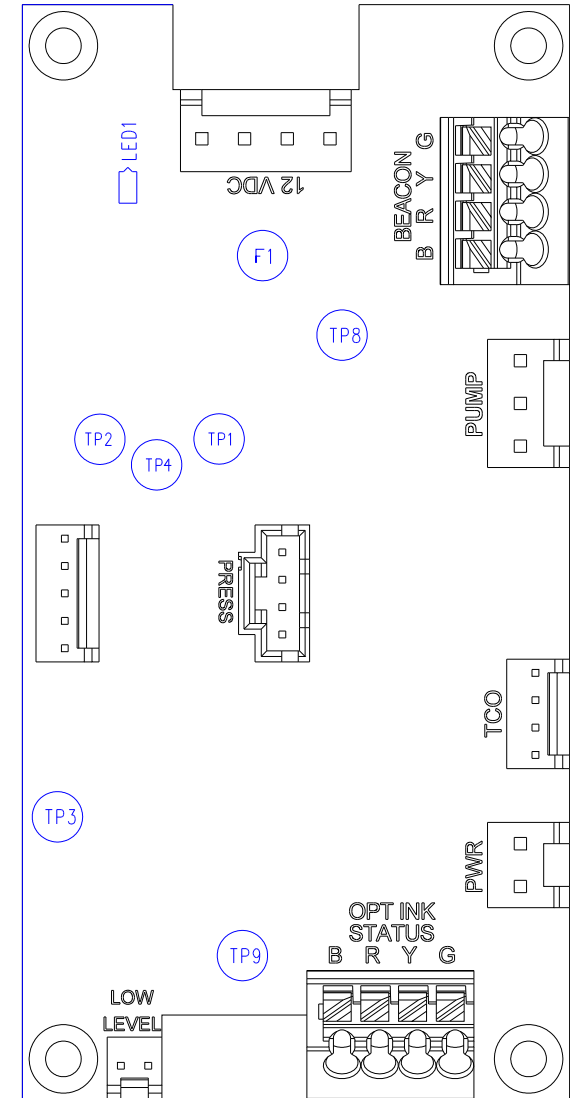
Integrated Valve Print Head
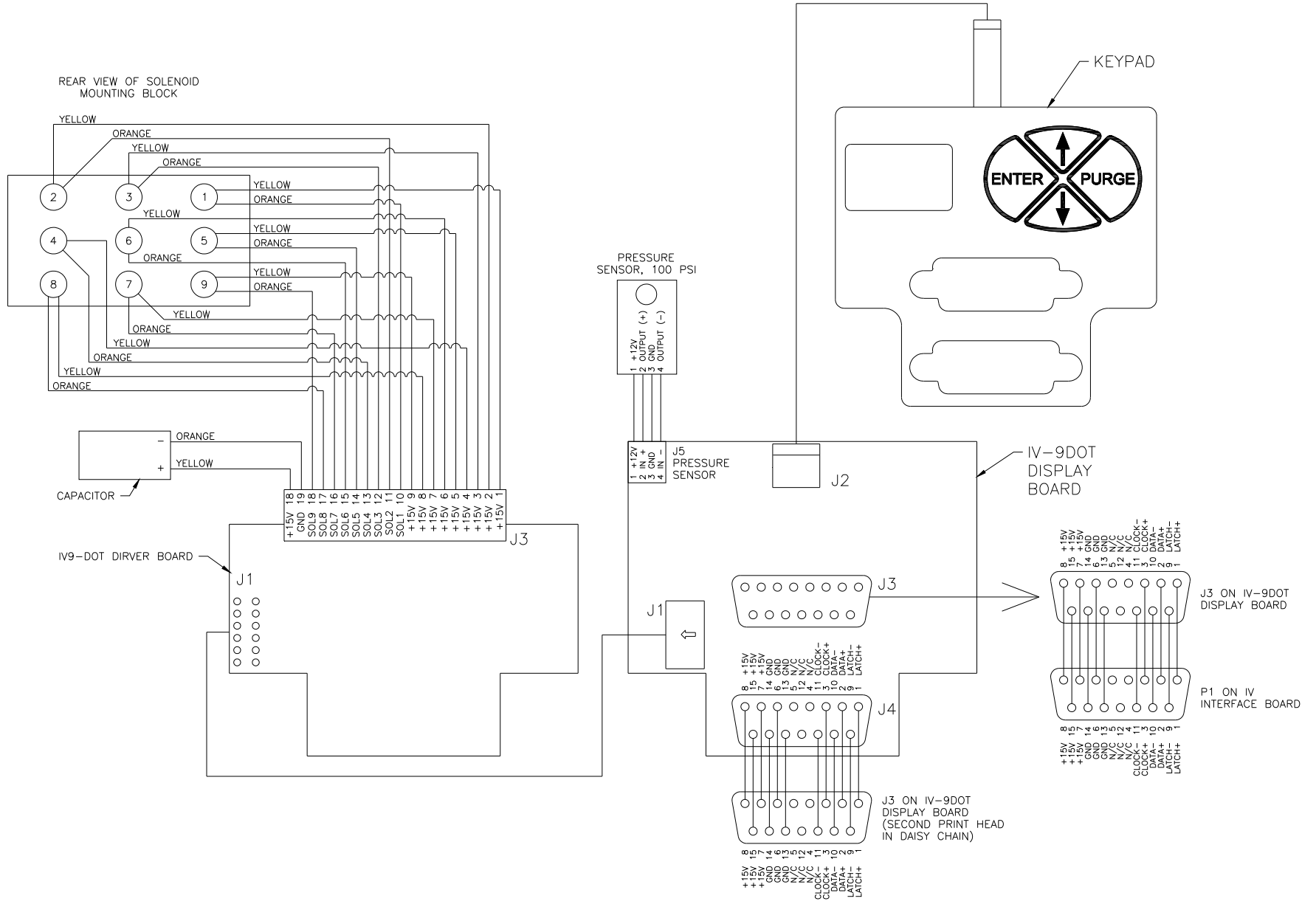
Appendix D: Maximum dpi Calculation for a Given Line Speed

The maximum line speed of an Integrated Valve print head is limited by the maximum frequency of the solenoid, which is 1000 Hz. The following steps will determine the operating frequency of the solenoids in the application. The graph on the following page can also be used to determine the maximum print resolution for a given line speed.

1. Determine the values for:

- Line speed in feet per minute: If a tachometer is not available, the line speed can be estimated by measuring the conveyor belt and using a stop watch to time one complete revolution of the belt. For example, a 20-foot, 7-inch conveyor belt takes 34 seconds to make a complete revolution. Divide 60 seconds by the number of seconds per revolution (34 in this case). Multiply the resulting number by the length of the belt (21 feet in this example; always round up to the next foot for this calculation). The answer is 37 feet per minute (60/34 x 21 = 37).

- Print resolution in dots per inch (dpi): Print resolution is selected through the software. This setting is measured in dots per inch; a setting of 4 denotes 4 dots, or print columns, per inch. Resolution can be set from 4 to 25 dpi.

2. The operating frequency of the solenoids can be determined with these two parameters by following the next two steps:

- Determine the line speed in inches per second. Divide the line speed in feet per minute by 5 to get inches per second. A line speed of 200 feet per minute is equal to 40 inches per second (200/5 = 40).

- Multiply the number of inches per second by the dpi setting to determine the solenoid operating frequency in Hz (cycles per second). Printing at 25 dpi, at a line speed of 40 inches per second, would result in a frequency of 1000 Hz (40 x 25 = 1000).
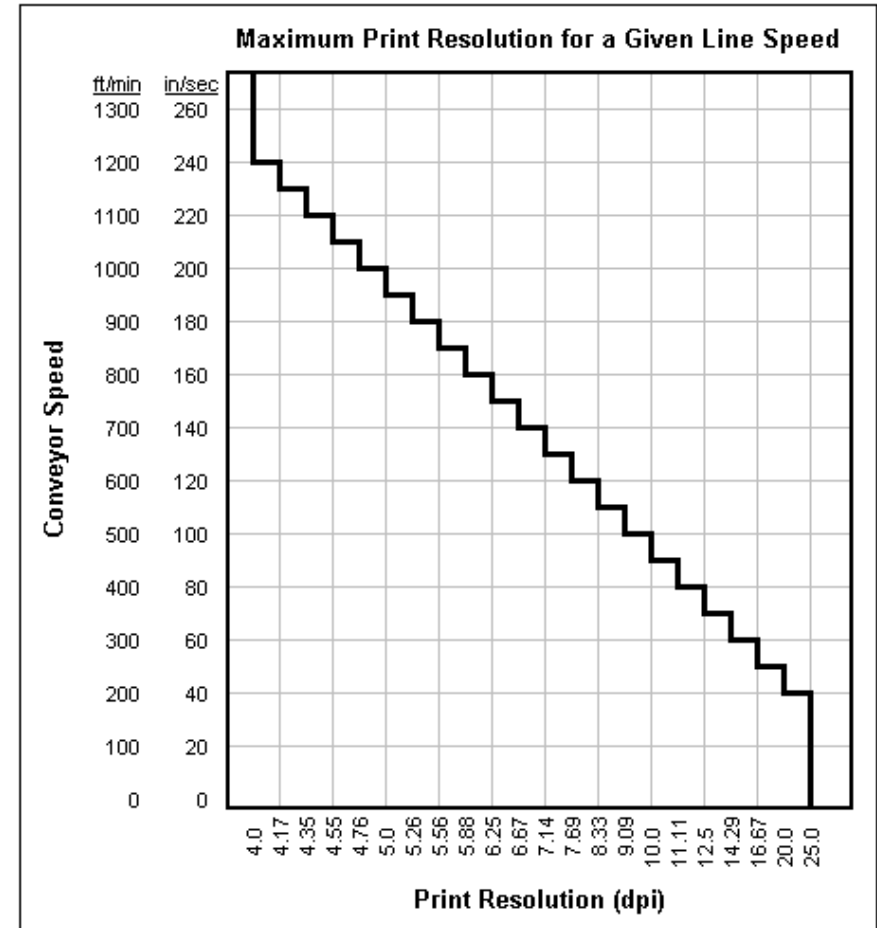
The operating frequency of an Integrated Valve print head must be less than or equal to 1000 Hz. If it exceeds 1000 Hz, the print head will have reliability and print quality problems. In such a case, the best solution is to decrease the print resolution, which will decrease the operating frequency.

To determine the maximum print resolution for a given conveyor, divide 1000 by the conveyor speed in inches per second. Using the previous example, 1000 divided by 40 inches per second equals 25 dpi maximum print resolution. Even if a higher resolution is desired, the Integrated Valve print head is not capable of it without encountering performance and reliability problems.

Appendix E: Part Numbers

System Part Numbers

The Ink Jet System is available with the following components, options and service kits:

Item	Part No.	Description
		Controller
1	5780-017FXV	Controller, Marksman HHI Plus
		Standard Integrated Valve Print Heads
2	5770-008P500FX	1/2", VXJET-9, Porous
	5770-008N500FX	1/2", VXJET-9 Non-Porous
	5770-008P875FX	7/8", VXJET-9, Porous
	5770-008N875FX	7/8", VXJET-9, Non-Porous
3	5770-003P1000FX	1", VXJET18X, Porous
	5770-003N1000FX	1", VXJET18X, Non-Porous
	5770-003P2000FX	2", VXJET18X, Porous
	5770-003N2000FX	2", VXJET18X, Non-Porous
		Ink Delivery System Assemblies
4	5770-016DV1PFX	Stainless Enclosure, Domestic, Porous
	5770-016DV1NFX	Stainless Enclosure, Domestic, Non-Porous
	5770-016EV1PFX	Stainless Enclosure, European (220 V), Porous
	5770-016EV1NFX	Stainless Enclosure, European (220 V), Non-Porous
		(Contact your Provider for additional variations.)

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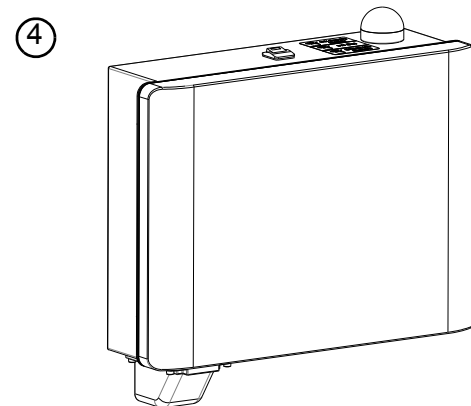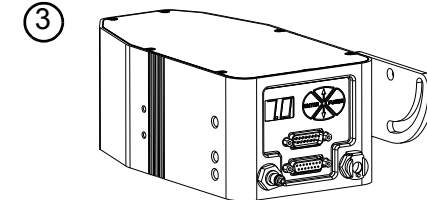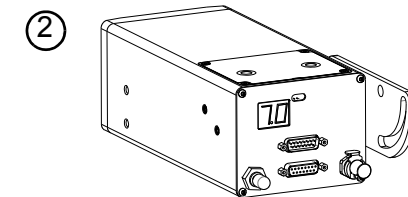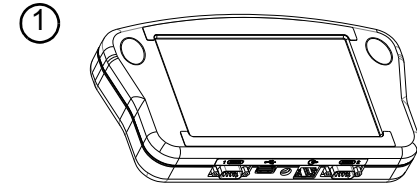
Bracketry

Part No.	Description
	Print Head Bracketry
2464-561	X-Y Linear Adjustment Bracket Kit, Tool-Less
5760-354	Multi Print Head Conveyor Mounting Kit (Requires Single Print Head Kits)
5760-355	Print Head Floor Mounting Kit (Requires Single Print Head Kits)
5760-356	Multi Print Head Floor Mounting Kit w/24" Bar (Requires Single Print Head Kits)
5760-357	Multi Print Head Floor Mounting Kit w/44" Bar (Requires Single Print Head Kits)
5760-365	Linear Adjustment Bracket Kit, Single Axis, Tool-Less
5760-821	Single Print Head Conveyor Mounting Kit, 9 Dot and 18 Dot
	Controller/Ink Delivery System Bracketry
5760-352	T-Base Mounting Kit
5765-250	Conveyor Mounting Kit
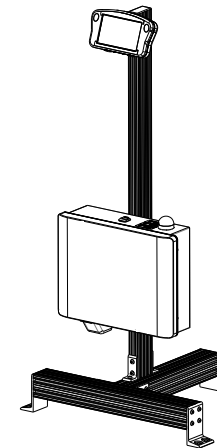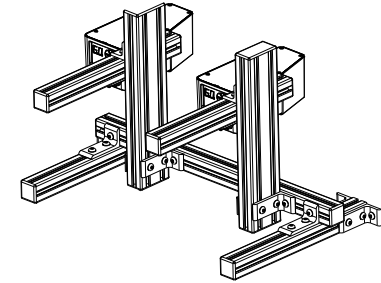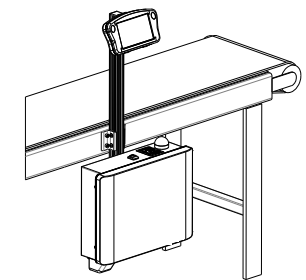
CONVEYOR MOUNT

T-BASE MOUNT

Ink Delivery System Assembly Kits

Item	Part No.	Description	Contents - Quantity
(not shown)	5760-248	Fuse Kit	Light Fuse - 2
1	5770-246	PCB Replacement Kit	PCB - 1
2	5760-315	Pump Replacement Kit, 115VAC	Pump - 1
3	5770-247	Internal Tubing and Fittings Kit	Fitting 5700561 - 1; Fitting 1900758 - 1; Fitting 5700889 - 2; Fitting 5361310 - 2; Fitting 6105149 - 1; Clamp, 1/4" OD Tube 5760276 - 2; Tubing, 1/4" 1303561 - 5-3/4"; Tubing, 3/8" OD 1303562 - 4-3/8"; Clamp, 3/8" OD Tube 5760277 - 1
4	5760-389	Thermal Cutoff Kit	TCO Assembly - 1
5	5770-234P	Fluid Capacitor Replacement Kit, Porous	Fluid Capacitor Assembly - 1
	5770-234NP	Fluid Capacitor Replacement Kit, Non-Porous	
6	5760-808	Pressure Sensor Kit, 100 psig	Pressure Sensor Assembly - 1
7	5760-307	5 Gallon Ink Cap Assembly	Cap Assembly - 1
8	5760-310	Inlet-Outlet Tubing and Filter Kit	Tubing Filter Assembly, Tank to Ink Delivery System 5700026 - (1) 8' Assy; Tubing, Trunk Line 1301875 - 25'; Fitting 5700508 - 1; Fitting 5361315 - 3; Cable Tie 6105393 - 6
9	5760-319	Ink Filter Kit, Ink Supply	Tubing Filter Assembly, Tank to Ink Delivery System 5700026 - (2) 8' Assy

FILTER ASSEMBLY WITH TUBING AND FITTINGS

FILTER ASSEMBLY ONLY

9 Dot Print Head Replacement Part Kit

Item	Part No.	Description	Contents - Quantity
1	5701-501	Ink Regulator (Non-Porous)	Ink Regulator Assembly with Tubing and Bracket
	5701-502	Ink Regulator (Porous)	
2	5770-200	Sealed DB Caps	Sealed Caps - 2
3	5770-203	PCB Stack	PCB Stack Assembly - 1
4	5770-205	Internal Tubing and Fittings	Pressure Sensor Assembly 5765432 - 1; Pre-Formed Tube 5770444- 2; Hi-Temp Tubing 1303561 - 6"; Filter 5760629 - 1; Fitting 1900758 - 1; Fitting 1900401 - 1; Fitting 2460120 - 1; Clamp 5760276 - 1
5	5770-217	Enclosure Cover Gasket	Gasket - 1
6	5770-219	Adapter Mounting Plate Kit, 9 Dot Print Head to Round Bracket	Adapter Plate 5770369 - 1; Photocell Bracket 5760434 - 1; Screw 5082001 - 4; Screw 5101511 - 2

18 Dot Print Head Replacement Part Kits

INK REGULATOR

Item	Part No.	Description	Contents - Quantity
1	5701-501	Ink Regulator (Non-Porous)	Ink Regulator Assembly with Tubing and Bracket
	5701-502	Ink Regulator (Porous)	
2	5770-200	Sealed DB Caps	Sealed Caps - 2
3	5770-220	PCB Stack	PCB Stack Assembly - 1
4	5770-221	Internal Tubing and Fittings	Pressure Sensor Assembly 5765432 - 1; Hi-Temp Tubing 1303561 - 27.5"; Filter 5700835 - 1; Fitting 1900758 - 1; Fitting 1900401 - 1; Fitting 2460120 - 1; Clamp 5760276 - 1; Cover Screws 5101710 - 6
5	5770-222	Enclosure Cover Gasket	Gasket - 1

Consumables

Inks, Conditioners and Maintenance Sprays

The following is a partial list of inks offered. Your sales representative can advise you on the proper ink for your application.

Part No.	Description	Package	Part No.	Description	Package
Porous Inks			**Non-Porous Inks**		
2600928F	Conditioner, TWP (Water-Based)	5 Gallon	2600199F	Conditioner, TSO Non-Porous (Alcohol-Based)	5 Gallon
2601016F	Ink, TWP-1 Black, Porous (Water-Based)	5 Gallon	2600201F	Ink, TSO-1 Black, Non-Porous (Alcohol-Based)	5 Gallon
2601021F	Ink, TWP-101 Black, Porous (Water-Based)	5 Gallon	2600227F	Ink, TSO-101 Black, Non-Porous (Alcohol-Based)	5 Gallon
2600947SCF	Ink, TWP GB-SC Black, Porous (Water-Based)	5 Gallon	2600970F	Ink, TSO-3100 Black, Non-Porous Fast Dry (Alcohol-Based)	5 Gallon
5750249	Maintenance Spray, TWP, Cans	2/case	2600981F	Conditioner, TSO-4000, Non-Porous (MEK)	5 Gallon
			2600986F	Ink, TSO-4400 Black, Non-Porous (MEK)	5 Gallon
			5750657	Maintenance Spray, TSO-NP, Cans	2/case

Part No.	Description	Package	Part No.	Description	Package
Porous (Water-based) for Pressurized Ink Can			**Non-Porous (Alcohol-based) for Pressurized Ink Can**		
5750-242	Conditioner, TWP, Cans	2/case	5750-650	Conditioner, TSO-SC, Can	2/case
5750-243	Ink, TWP-101 Black, Cans	6/case	5750-651	Ink, TSO-3100 Black, Can	6/case
5750-246	Ink, TWP-3 Green, Cans	6/case	5750-652	Ink, TSO-2 Red, Can	6/case
5750-244	Ink, TWP-2 Red, Can	6/case	5750-657	Maintenance Spray, TSO, Can	2/case
5750-249	Maintenance Spray, TWP, Can	2/case			

NOTE: Porous and Non-Porous Inks are not miscible.

Service Parts and Optional Equipment

FITTING, VALVE, 1/8" TUBING, IN-LINE (1900-757)

TUBING, 1/8" ID, TANK LINE (1301-468)

FILTER

FITTING, VALVE, IDS INK INLET PORT (1900-758)

PRINT HEAD

FITTING, VALVE, PRINT HEAD INK INLET PORT (1900-758)

FITTING, VALVE, 1/8" TUBING, IN-LINE (1900-757)

FITTING, VALVE, PRINT HEAD BLEED PORT (1900-401)

REGULATOR

REGULATOR

TUBING, 1/8" ID, PRINT HEAD SUPPLY LINE (1301-468)

INK LOW LEVEL DETECT

POWER CORD

FITTING, VALVE PRESSURIZED INK OUTLET (5700-561)

FITTING, VALVE, 1/8" TUBING, IN-LINE (1900-757)

FITTING, VALVE, TANK INK CAP (1900-758)

FITTING, VALVE, 1/4" TUBING, IN-LINE (5700-209)

TUBING, 1/4" ID TRUNK LINE (1301-875)

FITTING, VALVE, TEE, (5700-509)

FITTING, VALVE, SERVICE PORT (5700-508)

FITTING, VALVE, EFFLUENT BOTTLE (1900-405)

FITTING, VALVE, SHUTOFF (1301-699)

EFFLUENT BOTTLE (5750-503)

SEE PART NUMBERS ON NEXT PAGE

Fittings and Tubing

Item	Part No.	Description	Contents	Where Used
1	1301-468	Tubing, 1/8" ID x 1/4" OD	50 foot roll	Plumbing line between trunk line and print head
	1301-875	Tubing, 1/4" ID x 3/8" OD	50 foot roll	Plumbing trunk line from Ink Delivery System
2	5770-224	Fitting 1301-699, 1/8 Barb x 1/8 Barb In-Line Shutoff Valve	5 fittings per kit	Effluent bottle
3	5770-225	Fitting 1900-401, 1/8 Barb x 1/8 Flow Bulkhead Male Valve	5 fittings per kit	Bleed port on rear of print head
4	5770-226	Fitting 1900-405, 1/8 Barb x 1/8 Flow In-Line Female Valve	5 fittings per kit	Connects tubing to print head rear bleed port or any male fitting
5	5770-227	Fitting 1900-757, 1/8 Barb x 1/8 Flow In-Line Male Valve	5 fittings per kit	Connects tubing to print head rear ink supply port or any female fitting
6	5770-228	Fitting 1900-758, 1/8 Barb x 1/8 Flow Bulkhead Female Valve	5 fittings per kit	Ink supply port on rear of print head or Ink Delivery System
7	5770-229	Fitting 5361-331, 1/4 Barbed Tee	5 fittings per kit	Ink Delivery System Flushing System
8	5770-230	Fitting 5700-209, 1/4 Barb x 1/4 Flow Elbow Valve	5 fittings per kit	Connects ink supply trunk line to rear pressure port on Ink Delivery System
9	5770-231	Fitting 5700-508, 1/4 Barb x 1/8 Flow In-Line Male Valve	5 fittings per kit	Bleed fitting on the end of ink supply trunk line
10	5770-232	Fitting 5700-509, 1/4 Barb x 1/4 Flow Tee Valve	5 fittings per kit	Connection between ink supply trunk line and print head regulator
11	5770-233	Fitting 5700-561, 1/4 Barb x 1/4 Flow Bulkhead Female Valve	5 fittings per kit	Rear pressure port on Ink Delivery System
12	5760-310	Inlet Tubing and Filters	50' tubing, filter, quick-disconnects and fittings	Ink cap assemblies
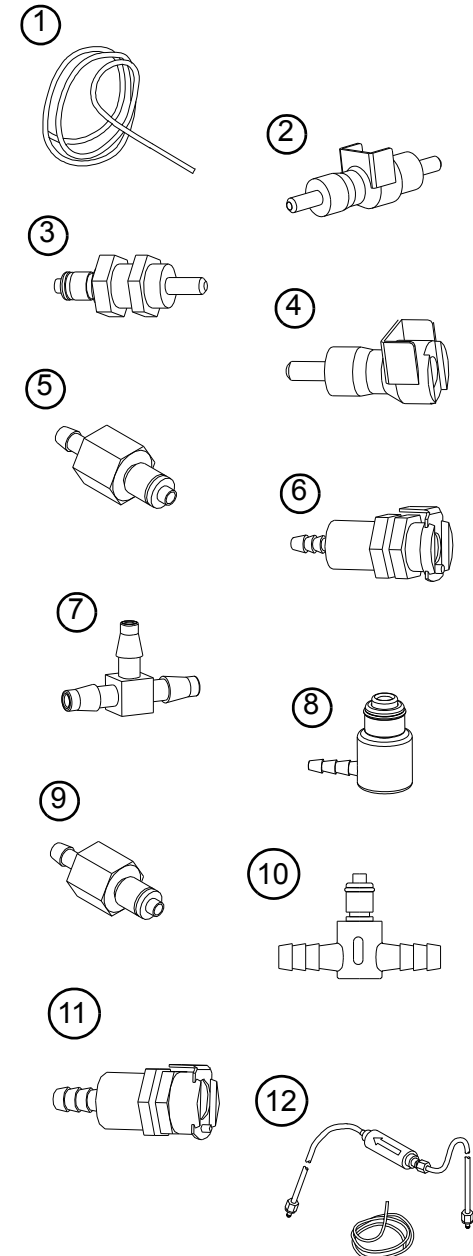
Service Parts, Tools and Optional Equipment

Item	Part No.	Description
1	1301-830	Ink Cap Wrench (Assists removal of cap from 5 gallon pail)
2	1902-964	Flush Bottle Kit (Assists flushing print head via the rear intake port)
3	1902-857	Print Head Broach Kit (Assists cleaning of orifice plate holes)
4	5700-743	Pressure Gauge (Measures ink pressure)
5	5750-503	Effluent Bottle Kit (Assists in bleeding ink or flushing conditioner through the trunk line and the print head)
6	5770-201	Solenoid Adjustment Kit (Assists in adjusting print head valve pre-load via the solenoid nut)
7	5700-245-002	Print Head Cable Assembly, 2'
7	5700-245-010	Print Head Cable Assembly, 10'
7	5700-245-025	Print Head Cable Assembly, 25'
8	5760-820-IJ	Encoder Assembly with Mounting Bracket & 25' Cable
9	5760-383	Photosensor, Diffuse Type & 20' Cable
10	2464-182-010	Encoder or Photosensor Extension Cable, 10'
10	2464-182-025	Encoder or Photosensor Extension Cable, 25'
11	5770-253	Beacon Assembly, 3 Color, LED
12	5760-307	Ink Cap Assembly, 5 Gallon
12	5760-309	Ink Cap Assembly, 30 Gallon