STENCILING & MARKING SYSTEMS

OPERATION MANUAL

PIDS-DIGITAL-CE
PROGRAMMABLE INK DELIVERY SYSTEM
ALL 115 VAC MODELS

INSTALLATION - OPERATION - MAINTENANCE

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PIDS-DIGITAL-CE-US-21326

IMPORTANT NOTE

UNIVERSAL products are manufactured to exacting standards and every available step has been taken to assure your complete satisfaction. It is most important, however, that the instructions contained in this manual are read and carefully followed for best results. Failure to do so may result in unsatisfactory performance, damage to the equipment and personal injury.

TABLE OF CONTENTS

- LIMITED WARRANTY -

UNIVERSAL PIDS-Digital-CE Programmable Ink Delivery Systems are guaranteed to be free from defects in materials and workmanship for a period of 1 year from the date of purchase. Components, excluding consumable items, found to be defective during this time will be repaired or replaced free of charge if returned to the factory. Damage resulting from use of improper inks, improper installation or operation is not covered under the scope of this warranty. For warranty service please contact our Customer Service Department.

PREFACE

Universal's PIDS-DIGITAL Systems were developed as an advanced method of supplying ink "on-demand" to our line of Non-Porous Roll Coders. The new PIDS-DIGITAL Systems feature the accuracy and versatility of a powerful PLC based control, combined with the simplicity of touch screen electronic programming and accuracy of peristaltic metering pumps which automatically deliver small but precise amounts of ink to the coders at programmed intervals. The new control design receives encoder pulse inputs from the printer to automatically detect web motion and velocity and automatically adjusts ink delivery rates to maintain perfect print regardless of variations in web speed.

The ability of these systems to deliver ink to the coders from a bulk ink reservoir eliminates the need for constant monitoring of the printing system and allows production personnel to concentrate on more critical duties. This unique method of ink delivery greatly reduces inking system maintenance and ensures consistent high quality code printing. By greatly reducing the required volume of ink stored in the printers ink roll, the PIDS-DIGITAL System enables the coders to print at much higher web speeds than previously possible. A single PIDS-DIGITAL System is capable of controlling up to four peristaltic pump heads and supplying ink to 4 coders printing on the same web.

This manual covers the installation, operation and maintenance procedures for the PIDS-DIGITAL-CE Systems and these instructions must be followed carefully. If you should have any questions concerning the operation of this system, please contact our Customer Service Department for assistance before attempting to operate this equipment.

WARNING

UNIVERSAL PROGRAMMABLE INK DELIVERY SYSTEMS ARE NOT DESIGNED TO BE OPERATED IN HAZARDOUS ENVIRONEMNTS. DO NOT OPERATE THESE SYSTEMS IN THE PRESENCE OF EXPLOSIVE OR FLAMMABLE GASES, VAPORS OR DUST.

TO AVOID THE RISK OF ELECTRICAL SHOCK, SERIOUS INJURY OR DEATH, do not open the control box or remove the pump module cover when the system is connected to electrical power.

SYSTEM SPECIFICATIONS

Electrical Requirements: PIDS-100/200: 115 VAC / 60 Hz 1.0 A
PIDS-300/400: 115 VAC / 60 Hz. 1.6 A

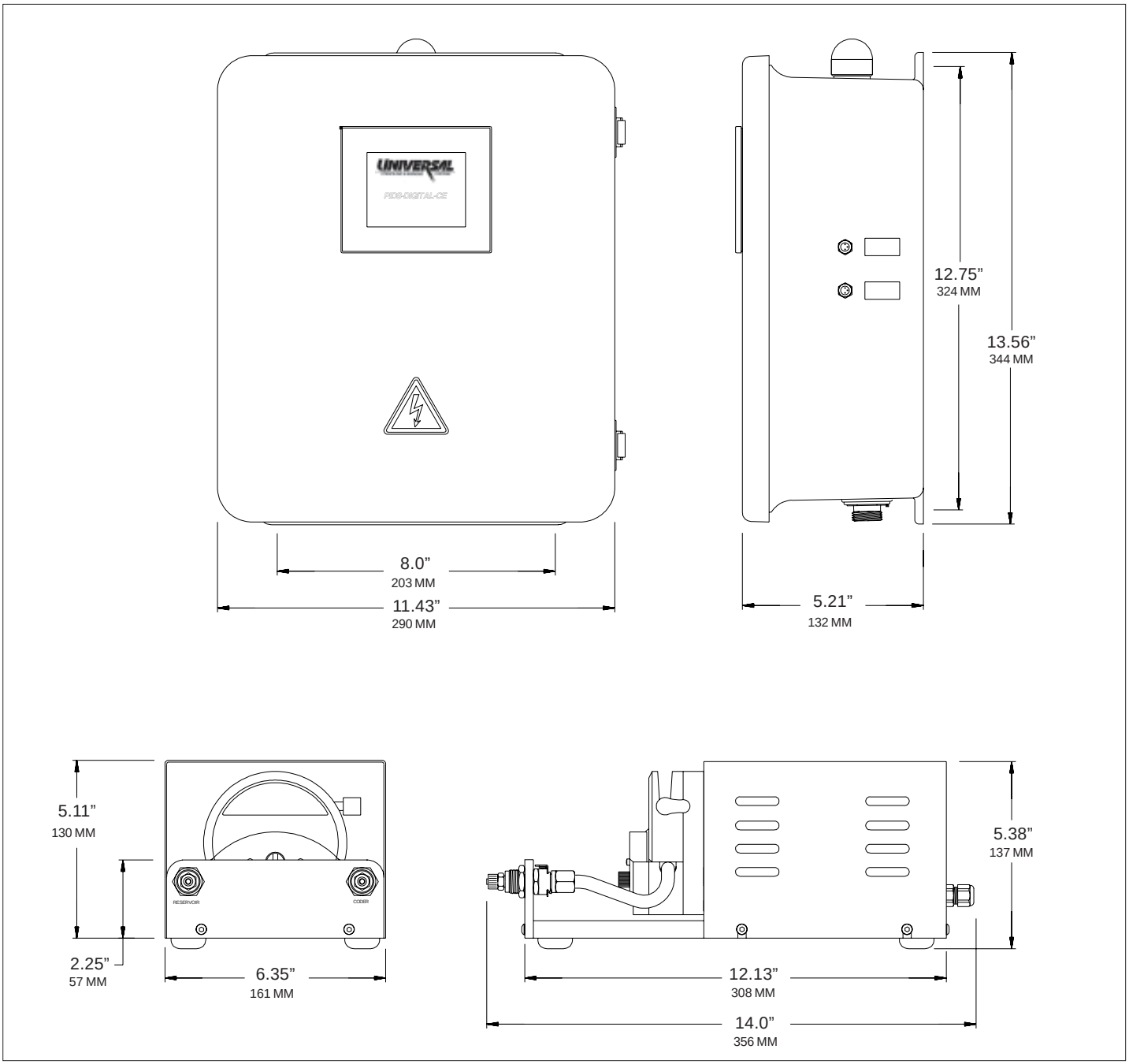
Ambient Conditions: The ambient temperature must be between 5 degrees C (41 Deg. F) and 45 Degrees C (113 Deg. F), with a relative humidity between 30% and 85% at 25 Degrees C (Non-Condensing).

The following specification diagrams include basic dimensions and approximate net weights of the various PIDS-DIGITAL-CE Systems. The minimum and maximum flow rates are also listed for your reference.

SPECIFICATIONS

PIDS-DIGITAL SYSTEM SPECIFICATIONS

PIDS-DIGITAL-100-CE



NET WEIGHT: *20.9 Lbs. (9.50 kg)*

MINIMUM PROGRAMMABLE FLOW CAPACITY : *0.033 OZ/HOUR (1.0 ml/h)*

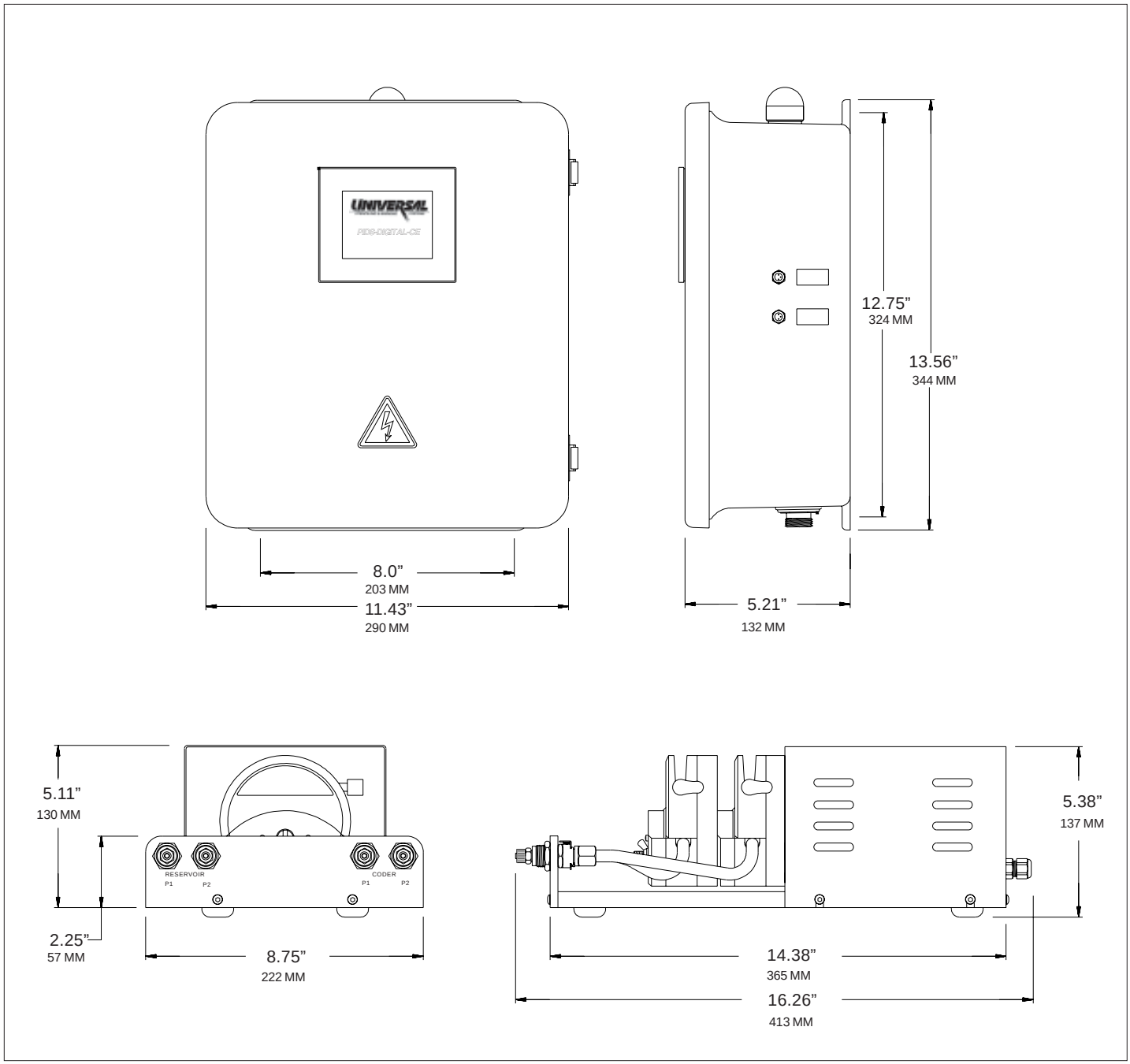
MAXIMUM PROGRAMMABLE FLOW CAPACITY : *20.25 OZ/HOUR (600 ml/h)*

POWER REQUIREMENTS: *PIDS-DIGITAL-100-CE (COMPLETE SYSTEM) 115 VAC / 60 Hz / 1A*

SPECIFICATIONS

PIDS-DIGITAL SYSTEM SPECIFICATIONS

PIDS-DIGITAL-200-CE



NET WEIGHT: *22.2 Lbs. (10.09 kg)*

MINIMUM PROGRAMMABLE FLOW CAPACITY - (PER HEAD): *0.033 OZ/HOUR (1.0 ml/h)*

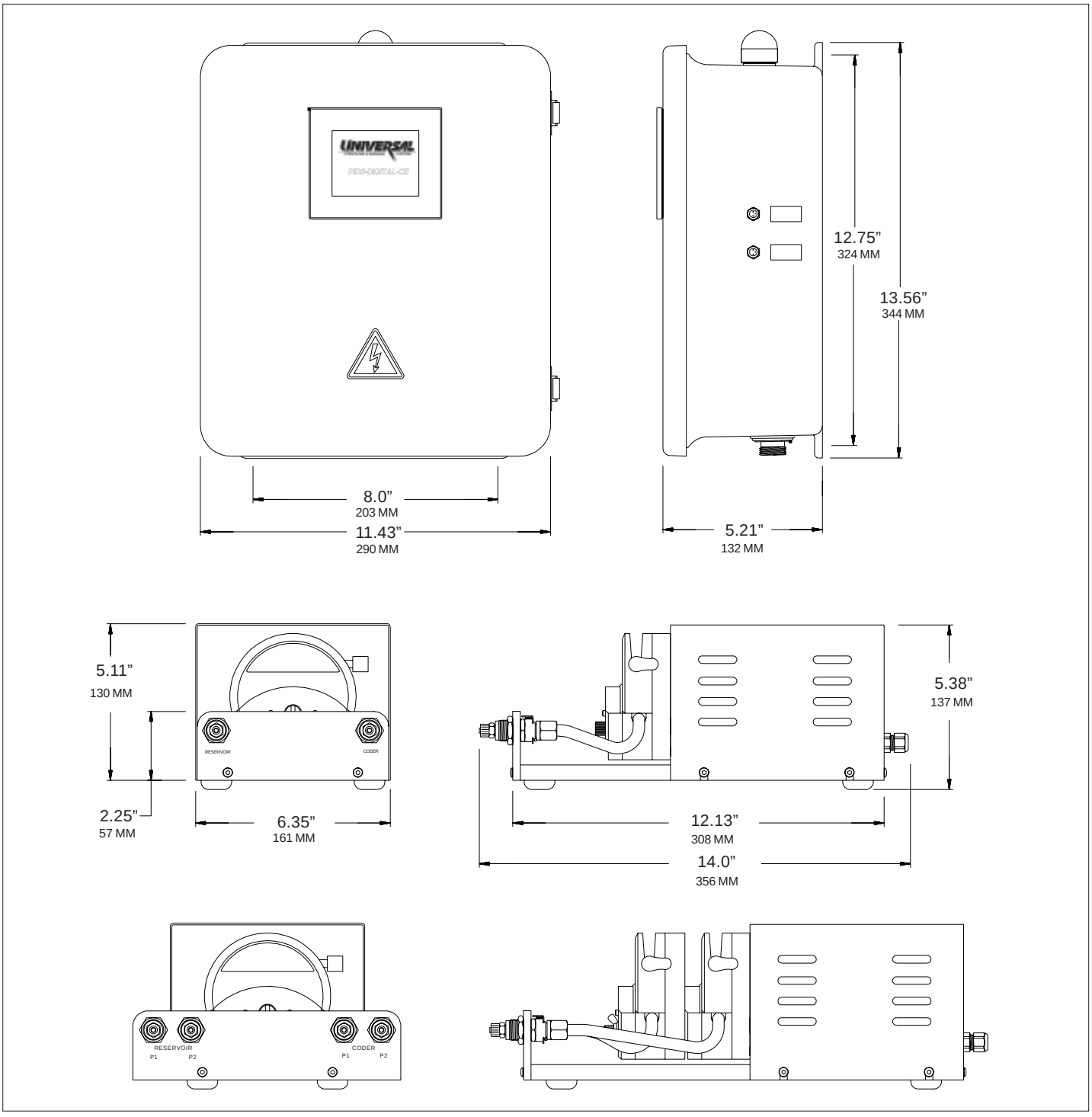
MAXIMUM PROGRAMMABLE FLOW CAPACITY - (PER HEAD): *20.25 OZ/HOUR (600 ml/h)*

POWER REQUIREMENTS: PIDS-DIGITAL-200-CE (COMPLETE SYSTEM) *115 VAC / 60 Hz / 1A*

SPECIFICATIONS

PIDS-DIGITAL SYSTEM SPECIFICATIONS

PIDS-DIGITAL-300-CE



NET WEIGHT: *34.7 Lbs. (15.77 kg)*

MINIMUM PROGRAMMABLE FLOW CAPACITY (PER HEAD): *0.033 OZ/HOUR (1.0 ml/h)*

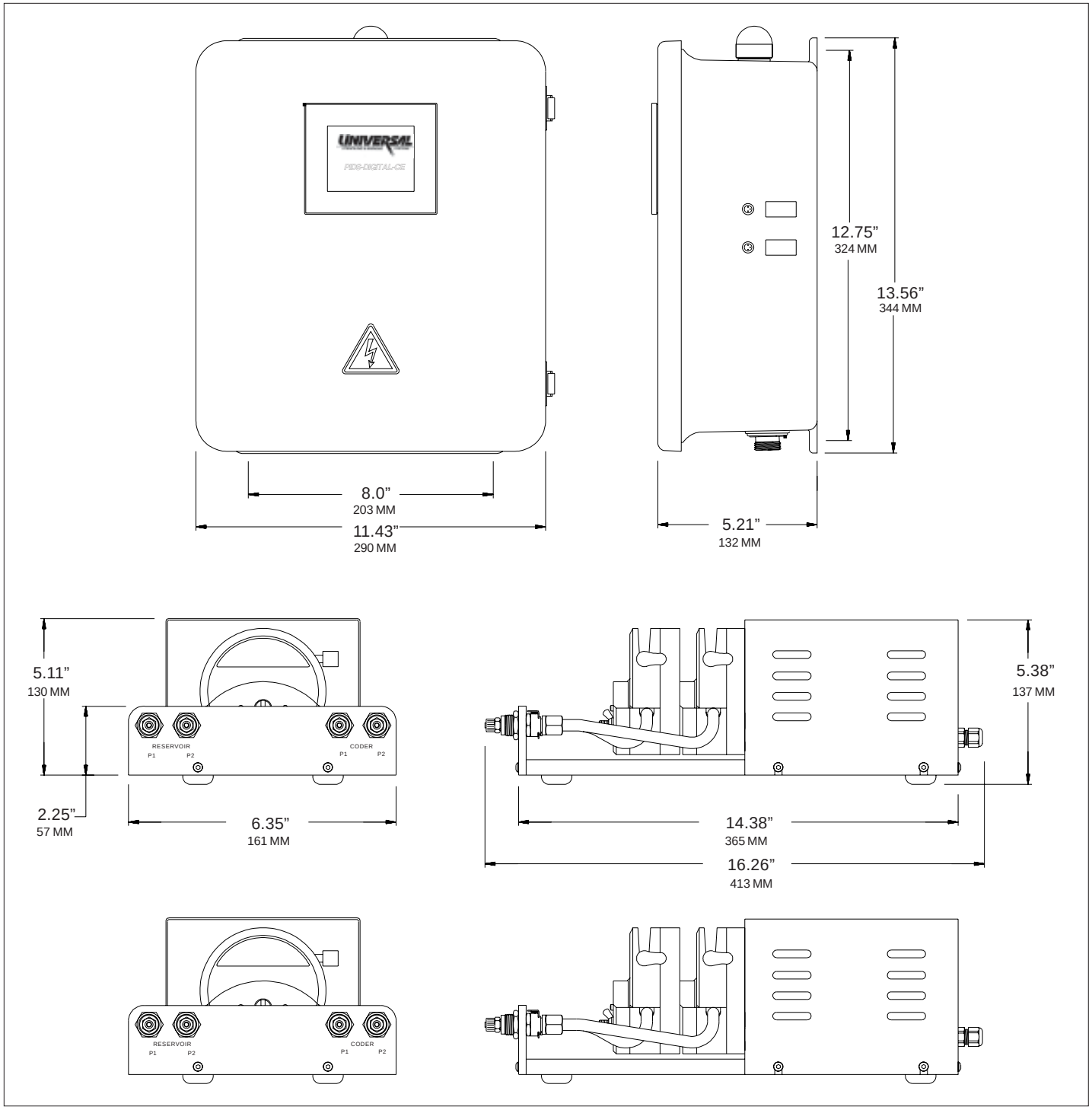
MAXIMUM PROGRAMMABLE FLOW CAPACITY (PER HEAD): *20.25 OZ/HOUR (600 ml/h)*

POWER REQUIREMENTS: *PIDS-DIGITAL-300-CE (COMPLETE SYSTEM) 115 VAC / 60 Hz / 1.6 A*

SPECIFICATIONS

PIDS-DIGITAL SYSTEM SPECIFICATIONS

PIDS-DIGITAL-400-CE



NET WEIGHT: *35.7 Lbs. (15.23 kg)*

MINIMUM PROGRAMMABLE FLOW CAPACITY (PER HEAD): *0.033 OZ/HOUR (1.0 ml/h)*

MAXIMUM PROGRAMMABLE FLOW CAPACITY (PER HEAD): *20.25 OZ/HOUR (600 ml/h)*

POWER REQUIREMENTS: *PIDS-DIGITAL-400-CE (COMPLETE SYSTEM) 115 VAC / 60 Hz / 1.6 A*

EC Declaration of Conformity

Universal Stenciling & Marking Systems, Inc.
205 15th Ave. S.E.
St. Petersburg, FL 33701 USA

Declares that the following product:

PIDS-DIGITAL-CE System

Consisting of:

PIDS-Digital-CE	Control Box
PIDS-Digital-PMA	Pump Module
USM-GFR-LLS	Reservoir w/Low Level Sensor
MRM-EC-208	Inductive Prox Sensor

Is in conformity with the following directives and standards:

Relevant Directives

EMC Directive (2004/108/EC)

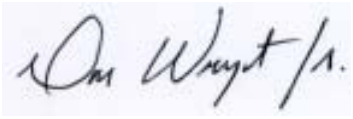
EN 61000-6-2:2005 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

EN 610000-6-4:2007+A1:2011 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Low Voltage Directive (2006/95/EC)

EN 60950-1:2006 Information technology equipment – Safety – Part 1: General requirements

The compliance declared herein is achieved when the product is properly installed and applied.



May 15, 2012
Saint Petersburg, FL USA

Donald C. Wright Jr. - President

INTRODUCTION

INSPECTING YOUR NEW PIDS SYSTEM

The PIDS-DIGITAL Systems are shipped from the factory in 3 or 4 cartons, depending on the model number you have ordered.

Each PIDS DIGITAL System contain the following components:

PIDS-DIGITAL-100-CE

1 Each - PIDS-DIGITAL-CE Control
1 Each - Single Pump Module Assembly
1 Each - Ink Reservoir w / Low Level Sensor
31 Feet - 0.25" Poly Ink Tube
1 Each - Replacement Pump Tube - 12"

PIDS-DIGITAL-200-CE

1 Each - PIDS-DIGITAL-CE Control
1 Each - Dual Pump Module Assembly
1 Each - Ink Reservoir w/ Low Level Sensor
62 Feet - 0.25" Poly Ink Tube
1 Each - Replacement Pump Tube - 12"
1 Each - Replacement Pump Tube - 18"

PIDS-DIGITAL-300-CE

1 Each - PIDS-DIGITAL-CE Control
1 Each - Single Pump Module Assembly
1 Each - Dual Pump Module Assembly
1 Each - Ink Reservoir w/ Low Level Sensor
100 Feet - 0.25" Poly Ink Tube
2 Each - Replacement Pump Tube - 12"
1 Each - Replacement Pump Tube - 18"

PIDS-DIGITAL-400-CE

1 Each - PIDS-DIGITAL-CE Control
2 Each - Dual Pump Module Assemblies
1 Each - Ink Reservoir w/ Low Level Sensor
100 Feet - 0.25" Poly Ink Tube
2 Each - Replacement Pump Tube - 12"
2 Each - Replacement Pump Tube - 18"

Inspect the contents of all the cartons. If there is any sign of damage to the cartons or products contact the ***freight carrier*** immediately.

INTRODUCTION

BASIC PRINCIPLES OF OPERATION

All of Universal's Non-Porous Printers are equipped with a patented Non-Porous Inking System which enables the use of very fast drying inks without the constant maintenance requirements normally associated with using inks of this type. The inking system assembly contains an XF Neoprene Ink Roll and a specially designed Transfer Roll Assembly which are both installed in a sealed aluminum housing to prevent rapid solvent loss through evaporation which occurs with even water based inks. See the cutaway view in (Figure 1).

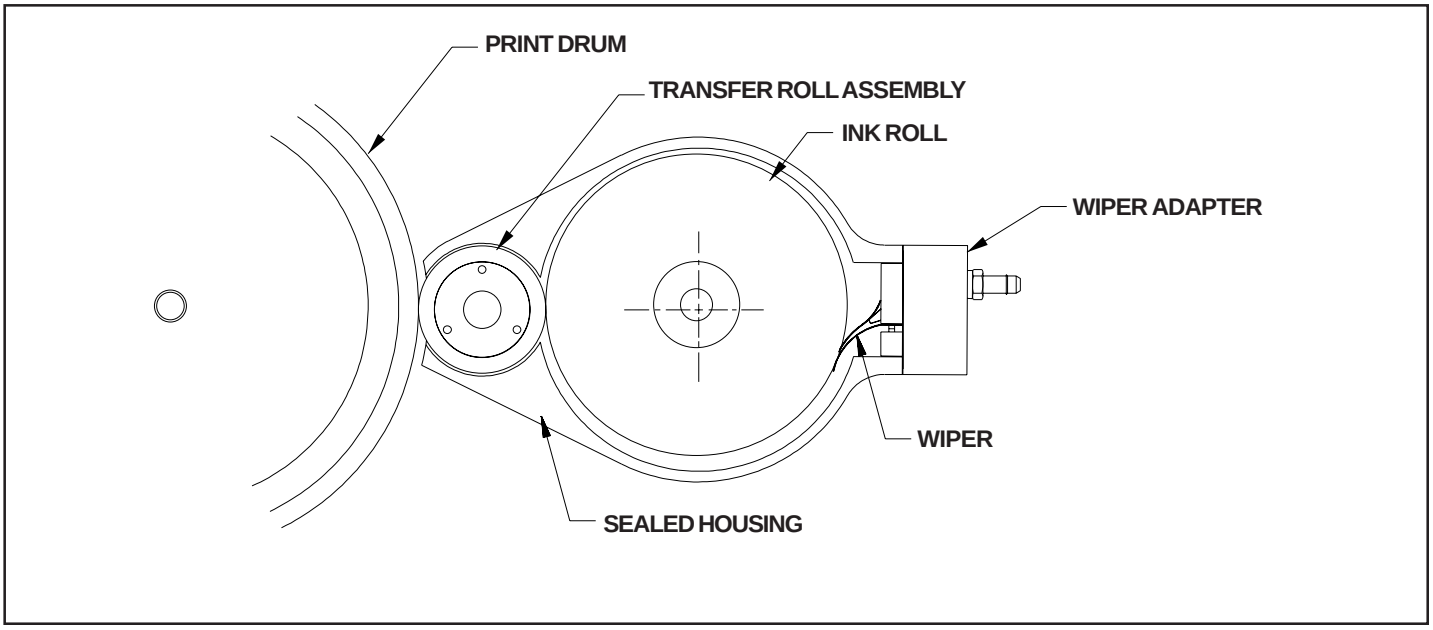


FIGURE 1

The XF Neoprene Ink Roll is a firm density, absorbent foam material which, when initially saturated with ink, serves as the primary source of ink for the printing operation. The ink roll rotates in contact with the Transfer Roll Assembly which transfers a very thin film of ink to the face of the rubber printing dies on the print drum. The large Ink capacity of the XF Neoprene Ink Roll can sustain the printing operation anywhere from a number of minutes to many hours depending on the surface area of the image being printed and the number of print cycles per hour. When the stored volume of ink in the ink roll becomes depleted, the color density of the printed image becomes light and the roll must be re-inked to restore a good print quality.

A very important consideration in any printing system is the effect caused by high print speeds. Universal Non-Porous Coders are rotary printing systems which are friction driven by contact with the web material being printed. As the velocity of the web increases, rotational speeds of the print drum, transfer roll and ink roll increase proportionally. The centrifugal force created by line speeds above 400 - 500 FPM (122 - 152 MPM) will have an adverse affect on the large volume of ink normally stored in the XF Neoprene Ink Roll. At very high speeds, ink will migrate to the surface of the roll and be thrown off the roll into the inking system housing. To prevent this undesirable condition at high print speeds, the volume of ink stored in the ink roll must be reduced to a minimal amount. Naturally, reducing the stored volume of ink in the ink roll greatly reduces the number of good quality imprints the system can produce without the need for re-inking the ink roll.

To provide a solution for this problem, the PIDS-DIGITAL-CE System was designed to enable the printer to operate with a minimal ink roll saturation level and supply very small volumes of ink to the roll at programmed intervals. Operating the printer under these conditions enables the printer to operate as web speeds up to 1,000 FPM (304 MPM) without the problems centrifugal force normally causes with a fully saturated ink roll.

INTRODUCTION

During any production printing operation, the volume of ink consumed per hour by each printer depends on the following factors:

1 - The speed of the printing, measured in print cycles per hour
2 - The total surface area of the printed image applied in each print cycle.

The surface area coverage is directly related to the size and number of text characters and/or logo dies installed on the printer. The total surface area coverage of the printed image is directly proportional to the volume of ink required to maintain good print quality.

When the printing system is operating, ink consumption rates can be accurately determined and the PIDS-DIGITAL-CE System can then be programmed to supply a specific volume of ink to the coder for every 'X" number of print cycles. The program will continue to supply the required volume of ink to the coder regardless of the number of print cycles per hour which changes with variations in line speed.

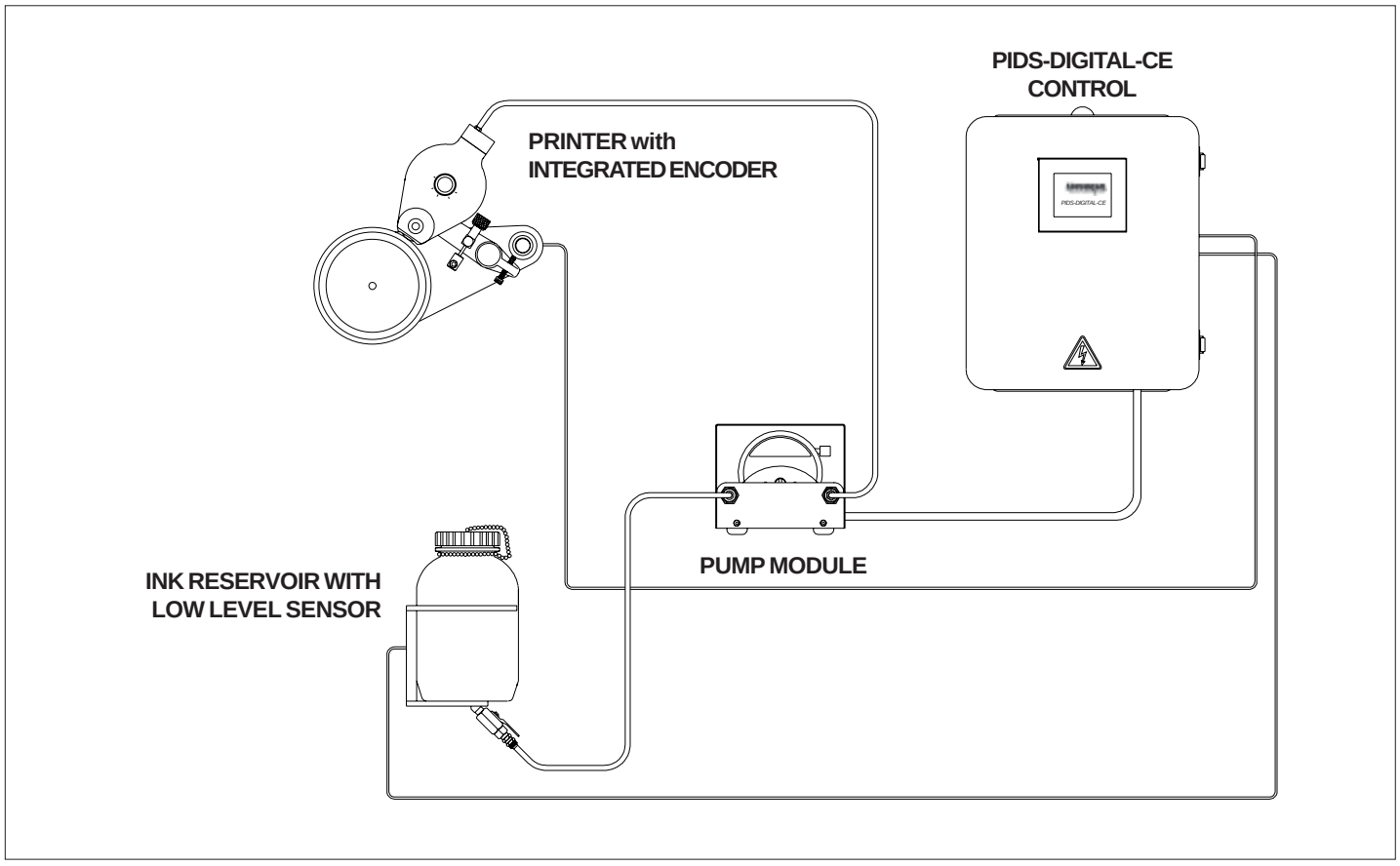


FIGURE 2

Using a peristaltic metering pump, the ink is fed from the Ink Reservoir to the XF Neoprene Ink Roll in the printer which stores and releases the ink automatically during printing. Peristaltic Pumps are used in this system to provide accurate metering of dye or pigmented inks while isolating the ink from direct contact with any of the Pump's moving parts. Since the ink in this system is completely contained in a closed series of tubes, the ink is never exposed to atmosphere where solvent loss through evaporation could occur. This design ensures that ink viscosities will not be affected by solvent loss and therefore, print quality and ink drying times will remain consistent throughout the printing operation.

INTRODUCTION

To enable the PIDS Control to constantly monitor the number of print cycles being applied by the printer, a separate friction driven encoder would normally be required. To eliminate the need for this ancillary piece of equipment, a slight modification to the Non-Porous Printer was made which enables it to serve as a low resolution encoder.

This simple but effective solution includes the installation of a small inductive proximity sensor on the printer base plate and the installation of 4 steel targets in the aluminum print drum. When the print drum is rotating and the steel targets pass the inductive proximity sensor, an electrical pulse is generated. (Figure 3). This modification allows the printer to serve as an encoder with a resolution of 4 pulses per revolution. Although this is extremely low resolution for a typical encoder, only 1 pulse per revolution is required to supply the control with adequate information to execute the program requirements. Three additional steel targets were installed to enable the control to calculate reasonably accurate web velocity data for operator reference.

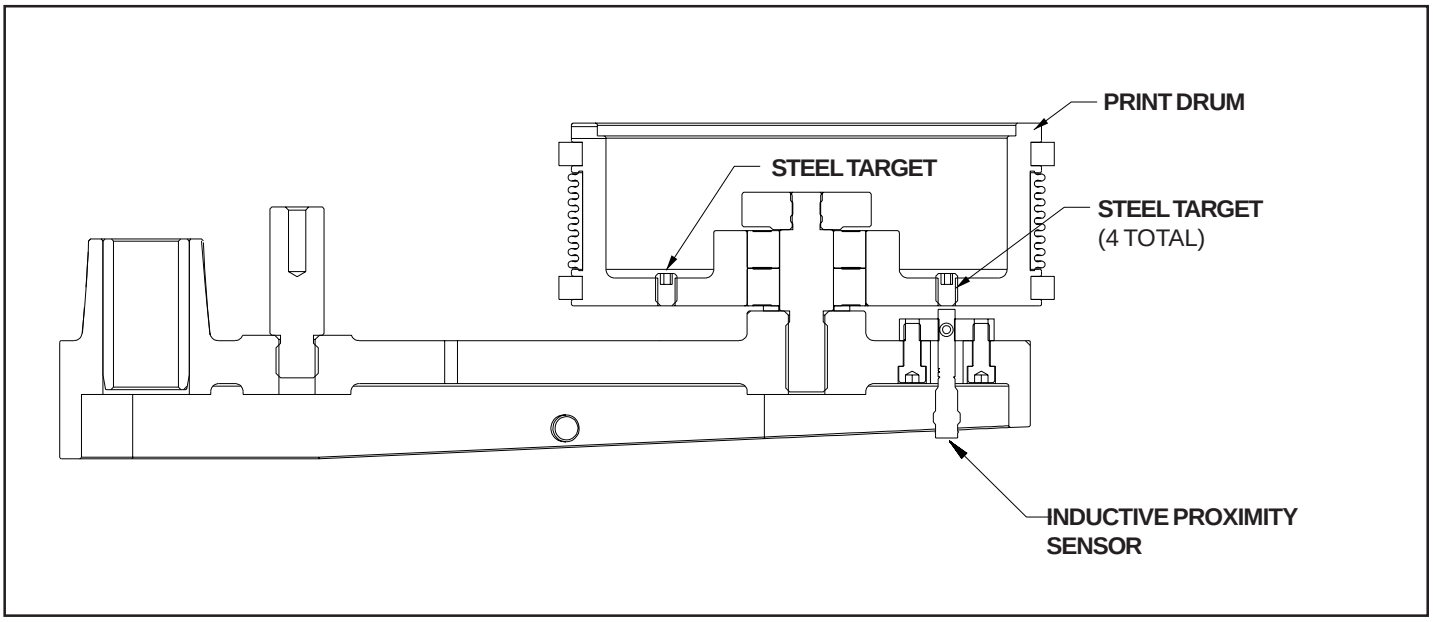


FIGURE 3

In addition, the velocity data is used to prevent pump output when the web velocity falls to a speed that generates 2 pulses per second or less. If the pump turns on at velocities below this pulse rate, the ink would not be evenly distributed around the circumference of the ink roll.

A PLC (Programmable Logic Controller) in the system's control box receives the pulse signals from the inductive proximity sensor whenever the print drum is rotating. This information is stored in the PLC's memory and is used for controlling the function of the pump module and to calculate web velocity.

Programming the PIDS-DIGITAL-CE System: Although it is possible to accurately calculate the exact surface area covered by any specific graphical image, these calculations are very complex and require some fairly sophisticated software to perform. Since this is not a practical procedure to perform in the field, a much simpler solution is to program the control using a simple visual observation technique and capability of the control system's program. This process will be explained later in the instructions.

ADAPTING THE PIDS-DIGITAL SYSTEM TO A CODER

Although the PIDS-DIGITAL Systems can be adapted to supply ink to a variety of different coding systems, this manual specifically covers applications involving Universal's line of Non-Porous Coders. Connecting the PIDS-DIGITAL System to a Universal Non-Porous Coder requires the use of a special adapter for the Coder's inking system. A Wiper Adapter assembly is used with Top Mounted Coders in continuous web printing applications.

The Wiper Adapter System is particularly effective when printing with large characters, codes or logo dies. Since the entire face of the Ink Roll is evenly coated with ink with this system, the resulting code prints are very uniform in color density across the full print width.

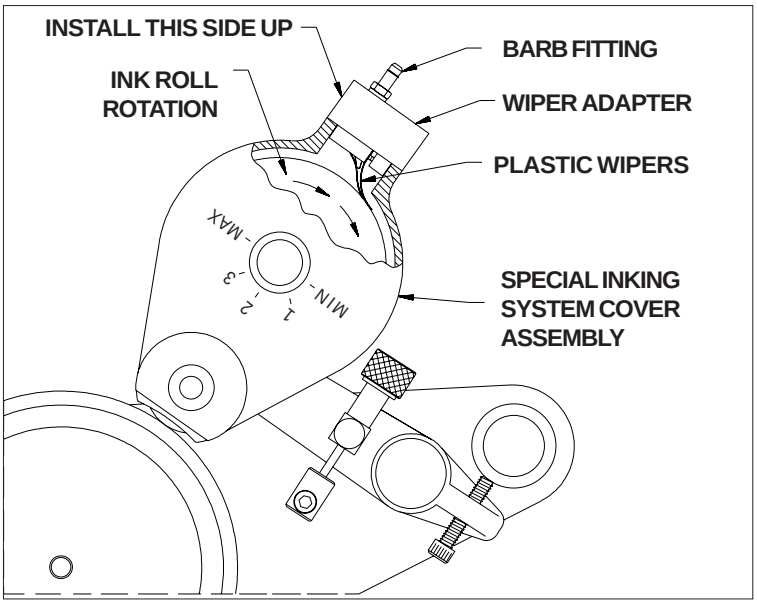


FIGURE 4

WIPER ADAPTERS

Wiper Adapters are designed for use only with Top Mounted Coders. The Wiper Adapter shown in (Figure 4) consists of two thin and extremely flexible plastic Wipers mounted in an aluminum holder. The assembly is installed in a special Non-Porous Inking System Cover Assembly and secured in place with a thumb screw. The ink supplied from the PIDS DIGITAL Pump Module is injected through a rubber check valve between the two plastic Wipers. The tandem Wipers transform the ink from a small diameter stream into a wide film of ink which is then "wiped" completely across the face of the XF Neoprene Ink Roll as the Ink Roll rotates. Since the ink is applied directly to the face of the Ink Roll, the affect on print quality is nearly instantaneous.

TOP MOUNT CODERS: If your Non-Porous Coder was ordered from the factory specifically for use with a PIDS System, the Inking System Cover on the Coder will have a rectangular hole in the end as shown in (Figure 5).

For a retrofit installation of a PIDS-Digital System on a coder which was not originally manufactured for this use will require the coder to be returned to the factory for modification of the Inking System Cover and installation of the Inductive Proximity Sensor.

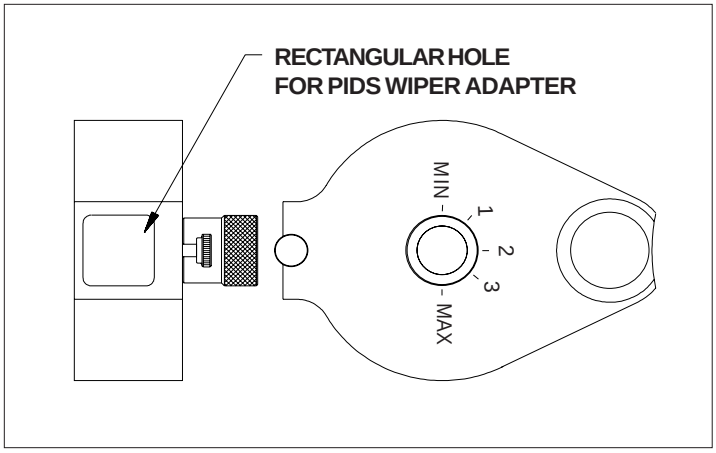


FIGURE 5

The Wiper Adapters for the Top Mount Coders are very easy to install, but they are, by design necessity, very fragile and must be handled and installed carefully to prevent damage.

To install the Wiper Adapter, hold it with the side marked "**INSTALL THIS SIDE UP**" facing up as shown in Figure 6. While rotating the Print Drum in the normal direction, so the Ink Roll will turn, slowly insert the plastic Wipers into the rectangular hole in the cover. Rotating the Print Drum during this procedure ensures that the plastic Wipers orient themselves in the proper direction relative to the Ink Roll. When the Adapter is fully seated in the Inking System Cover, tighten the thumb screw to secure it in place. (Figure 6) shows a properly installed Wiper Adapter.

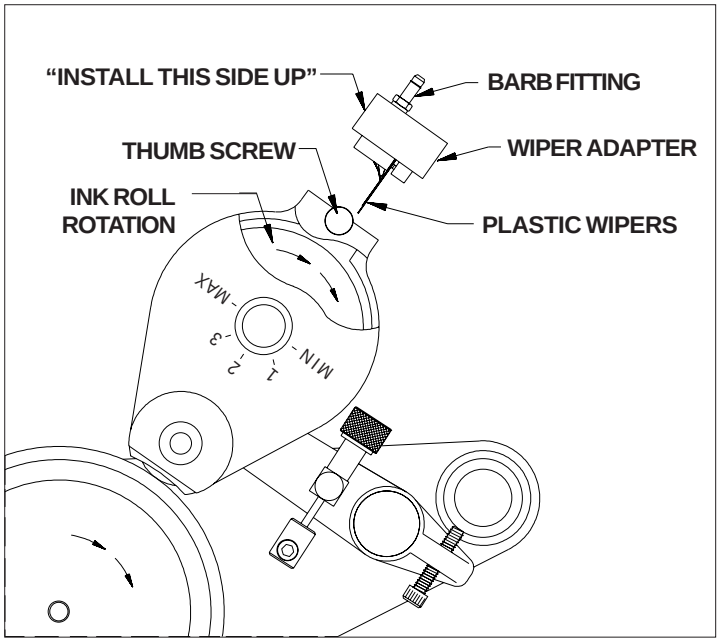


FIGURE 6

INSTALLATION

SELECTING THE APPROPRIATE LOCATION

The Installation process should begin by inspecting the area where the printing operation is performed and selecting an appropriate location to mount the PIDS components. The entire PIDS-DIGITAL System should be mounted as close to the printer as possible. In order to program the control, you will need to be close enough to the Coder to visually observe the printed marks.

It is advisable to keep the length of your 0.25" O.D. Poly Ink Feed Tubes as short as possible and route them from the Reservoir to the Pump Module and from the Pump Module to the Coder(s) in a way that protects them from damage. You will also want to mount the Ink Reservoir in a location which is easily accessible for filling.

To prevent the possibility of electrical interference, do not route the cable from the Inductive Proximity Sensor on the coder or the Capacitive Proximity Sensor in the Ink Reservoir in close proximity with electric motors or in wiring harnesses with other high voltage cables. These two sensor cables should be routed to the control separately from other electrical cables.

Once you have found a suitable location for the PIDS System, the following steps will guide you through the installation process.

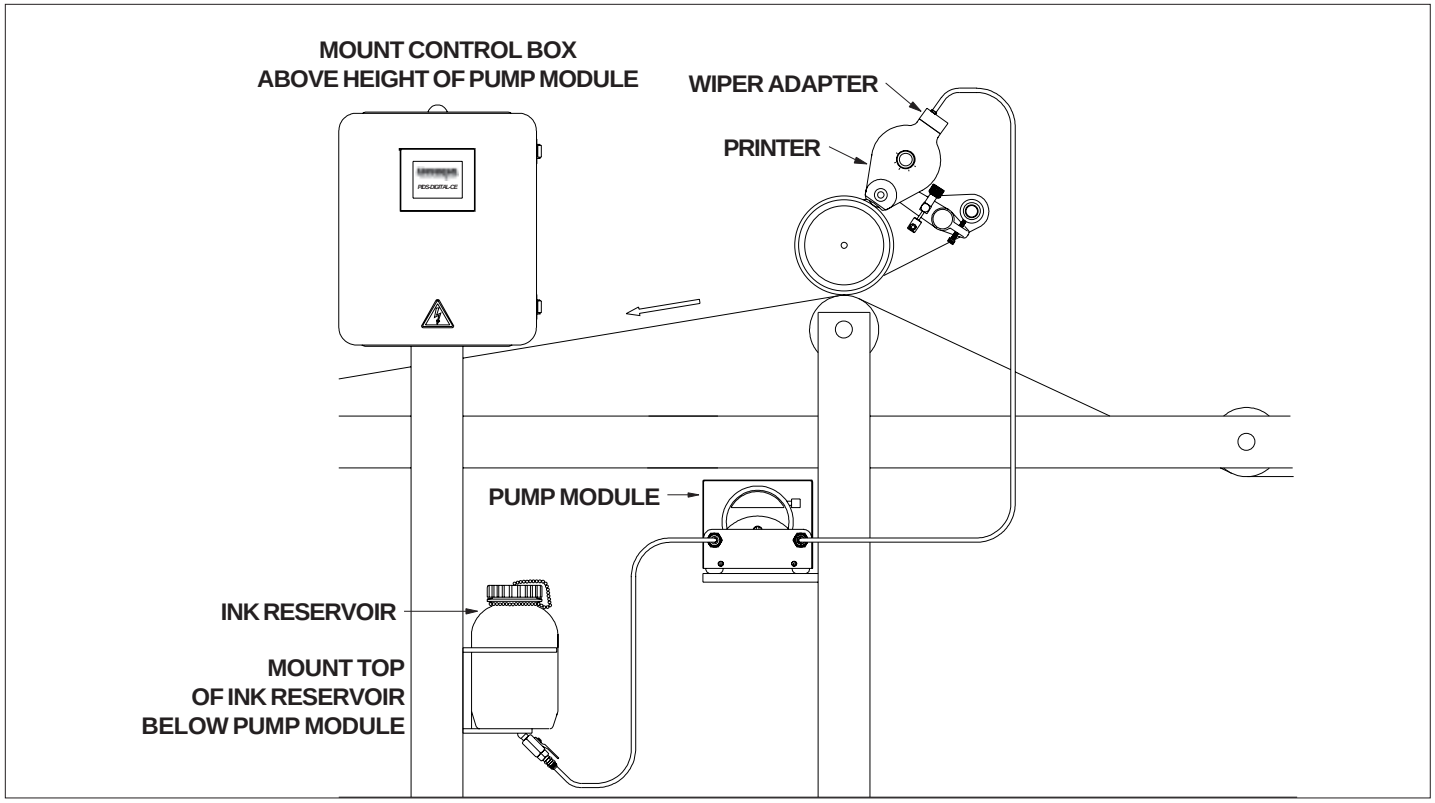


FIGURE 7

CONNECTING THE PIDS SYSTEM TO A CODER

1 - Mount the Ink Reservoir on a vertical surface with the top of the Ink Reservoir slightly below the bottom of the Pump Module and within close proximity of the same as shown in (Figure 7).

Note: Mounting the Ink Reservoir below the vertical height of the Pump Module is a safety consideration and will prevent the ink in the Reservoir from draining out should an Ink Pump Tube failure occur.

2 - Connect a length of the Polyethylene Ink Tube from the Ink Reservoir to the fitting on the Pump Module marked *"RESERVOIR."* Repeat this process for each Pump Module.

DO NOT FILL THE INK RESERVOIR WITH INK AT THIS TIME.

3 - Connect a length of the Polyethylene Ink Tube from the fitting on the Pump Module marked *"CODER"* and route this tube to the Coder and connect it to the barb fitting on the Wiper Adapter. Repeat this process for each Pump Module.

***4* - Mount the Control Box vertically above the Pump Module and Ink Reservoir in a convenient location for programming and near a suitable, properly grounded electrical receptacle.**

***5* - Plug the Pump Module cable(s) into the plug receptacles located on the bottom of the control box marked *PUMP MODULE #1* and *PUMP MODULE #2* as shown in (Figure 8).**

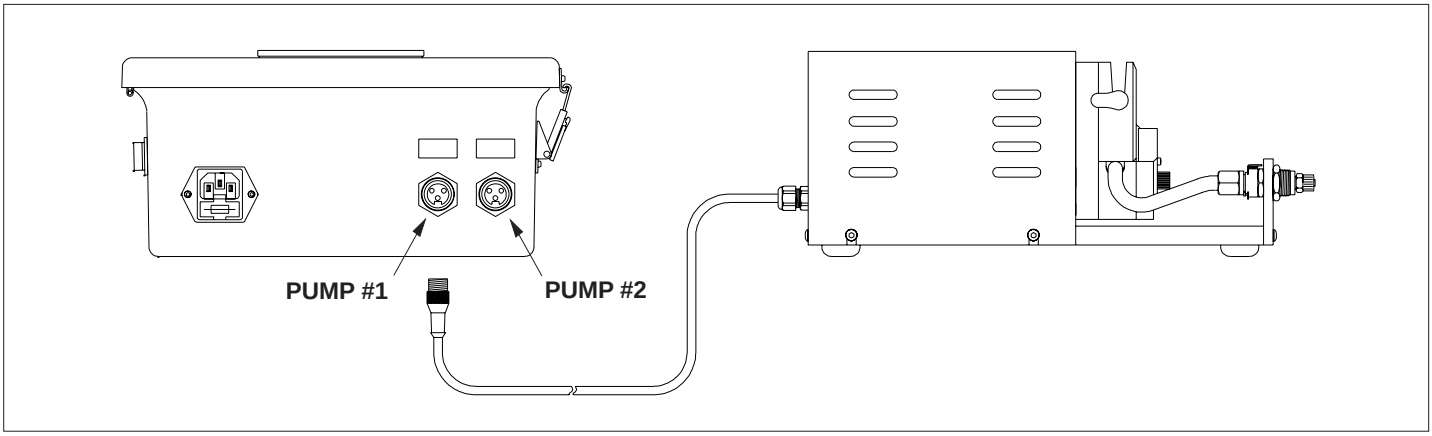


FIGURE 8

DO NOT CONNECT THE SYSTEM TO ELECTRICAL POWER AT THIS TIME.

***6* - Plug the cable from the Capacitive Sensor on the Ink Reservoir into the control box connector marked RESERVOIR as shown in (Figure 9).**

***7* - Plug the cable from the Inductive Proximity Sensor on the Printer into the control box connector marked CODER.**

FIGURE 9

INSTALLATION

SELECTING AN APPROPRIATE INK

Universal offers a variety of inks for use in the PIDS-DIGITAL Systems for porous surfaces and non-porous surfaces. The PIDS-DIGITAL Systems are compatible with a wide variety of free flowing marking inks containing water, glycol, and other combinations however, these systems are **not** compatible with petroleum or MEK base inks. The suitability of a particular ink for use in these systems can be determined by their compatibility with the rubber Pump Tubes, the polyethylene Ink Reservoir and the polyethylene Ink Tubes.

If you are unsure of the compatibility of the ink you have selected, a physical test can be performed to determine compatibility. If for any reason you need to use an ink which is not offered by Universal, you will need to test the ink for compatibility with both the PIDS System and the Coder.

To check compatibility of your ink with the Pump Tubes, cut two 1 inch (25.4mm) lengths of Pump Tubing and submerge one of the pieces in a small sealed container of your ink. Soak the tube in the ink for 24 hours and then remove it and compare it to the second piece. If the tube shows any signs of swelling in either diameter or length, the ink solvents are not compatible and the ink should not be used in this system. Using an ink which is not compatible with the Pump Tubing could result in a Pump Tube rupture.

To test the ink in a Universal Non-Porous Coder, a similar soaking test of the XF Neoprene Ink Roll will quickly determine compatibility. Fully saturate a dry NP-XC1 or NP-XC2 XF Neoprene Ink Roll with ink and let it soak for 24 hours. After soaking, accurately measure the outside diameter of the Ink Roll. The ideal O.D. for the saturated roll is 3.5 inches (88.9mm). If the diameter is larger than 3.57 inches (90.67mm), then the ink is not compatible and should not be used. Using an Ink Roll which has swelled to a diameter larger than 3.57 inches (90.67mm) will result in excess ink being transferred to the die face, and possible contact of the Ink Roll surface with the inside of the Inking System Cover which will result in leakage.

PREPARING THE INK ROLL

A primary advantage of using the PIDS DIGITAL System is that ink can be delivered to the Coder in very small volumes at regular intervals during the printing operation. This capability eliminates the need for the Ink Roll in the Coder to store large volumes of ink to support the printing operation. When the Ink Roll contains less ink, the force required to rotate the Roll is reduced and it also minimizes the undesirable effect of centrifugal force on the Roll at high rotational speeds.

When preparing the Coder for use with a PIDS DIGITAL System, it is important to understand the performance characteristics of the Ink Rolls used in Universal Non-Porous Coders. These Ink Rolls are manufactured from an open cell XF Neoprene material which absorbs ink through capillary action like a sponge. The absorption rate of the material is greatly increased after all of the microscopic cells in the material have been dampened with ink.

1 - DO NOT INSTALL A DRY INK ROLL ON THE PRINTER.
2 - DO NOT INSTALL A FULLY SATURATED ROLL ON THE PRINTER.
3 - THE INK ROLL MUST BE PROPERLY PREPARED FOR USE WITH A PIDS-DIGITAL SYSTEM.

To prepare the Ink Roll for use, it should first be thoroughly saturated with ink in order to dampen all of the cells using the same manual process described in all of the Non-Porous Coder Manuals. After the initial inking, at least half of the ink content should be removed by squeezing the roll over a clean container. Preparing the Ink Roll in this manner will ensure that the ink delivered by the PIDS DIGITAL System will be absorbed immediately by the surface of the Roll. When the Ink Roll is reinstalled on the Coder in this condition and the printing operation is started, the printed codes should begin to show signs of needing more ink very rapidly. It is necessary for the print quality to be slightly less than perfect in order to program the PIDS-DIGITAL System properly.

CONTROL SETUP PROGRAMMING

INTRODUCTION

Universal has made every effort to make programming the PIDS-DIGITAL systems as easy as possible. The color touch screen display or “HMI” provides multiple screen displays which are accessed by pressing function buttons on the active screen.

Where data input is required by the programmer, there are HELP screens available to guide you through the data input process. Just press the HELP button and you will be taken to a help screen. Pressing the BACK button will take you back to the previous screen. On screens where the home ICON buttons appear, pressing this button will take you to the home screen.

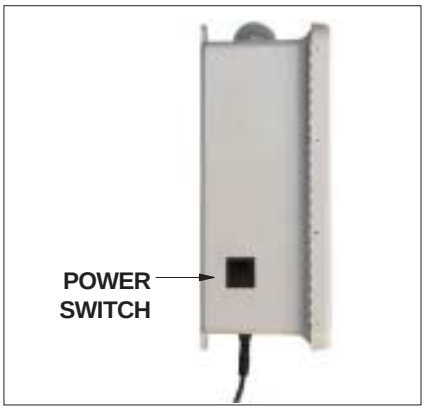
Since the PIDS-DIGITAL Systems are designed to operate with a variety of printer models and different installation configurations, there are several initial programming steps which must be completed to identify the specifics of your installation. These initial programming steps only need to be completed one time during the initial setup of the system. The following pages will guide you through the process but most of the programming requirements are briefly covered by the help screens.

CONTROL SETUP PROGRAMMING

1 - Plug the Power Cord on the Control Box into an appropriate electrical receptacle.

2 - Press the Power Switch on the left side of the control box to the "ON" position.

The HMI screen will indicate "Now Booting Up ..." and the Home Screen will appear.



PIDS-DIGITAL-CE Control Box

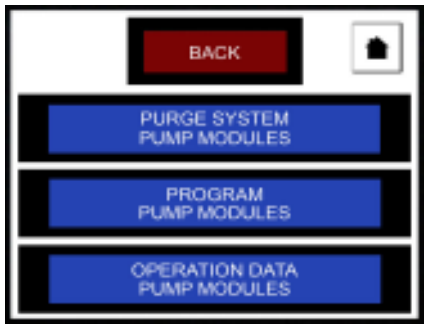
The color touch screen interface on the PIDS-DIGITAL System is designed to guide the operator through the programming sequence and provides HELP screens for each data entry page. The program data entry pages are password protected to prevent unauthorized personnel from changing the program but allows operator access to all necessary operational screens.

3 - Press the SETUP button on the home screen.

Home Screen

4 - Press the PROGRAM PUMP MODULES button.

Note: Pressing the "BACK" button on any page will return you to the previous screen. Pressing the Home Icon button will return you to the Home screen.



Setup Options Screen

5 - To enter the Pass Code, use the key pad to enter the correct code number and then press the "ENT" button. If you enter the incorrect pass code number by mistake, press the "CLR" button and re-enter the pass code.

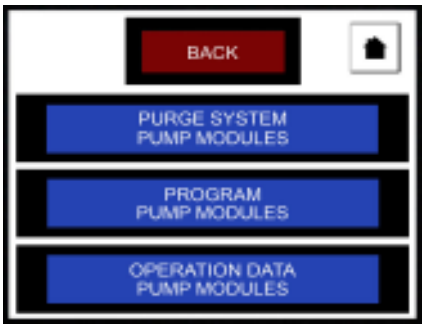
Note: After entering the correct pass code, you will have 30 minutes to make programming changes. After 30 minutes, you will be returned to the "SETUP OPTIONS" screen and the system will once again be password protected. Making additional program changes will require pass code re-entry.

Password Protection Screen

CONTROL SETUP PROGRAMMING

The Password Protection Screen is designed to prevent unauthorized personnel from changing the system program. A Pass Code card has been provided with this manual for use by the system programmer and should be stored in a safe location. If you reached the Password Protection Screen by mistake and want to escape this screen, press the **"ESC"** button on the key pad.

6 - Press the PROGRAM PUMP MODULES button again.



Setup Options Screen

7 - Press the ENTER PRINTER INFORMATION button.

The Program Options Screen lists the specific program functions available which can be accessed in any sequence. Initially, start with ENTER PRINTER INFORMATION.

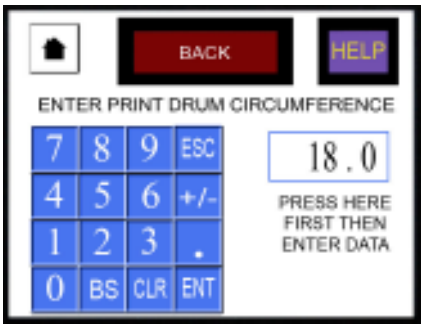
Note: The PIDS Systems can be used with several different Universal Printers. You must enter the correct information for your printer so the program will function properly.

Program Options Screen

8 - Press the rectangular data window (where the number 18.0 is shown) and then, using the key pad, enter the circumference of your printer including the decimal (.) then press the *"ENT"* key.

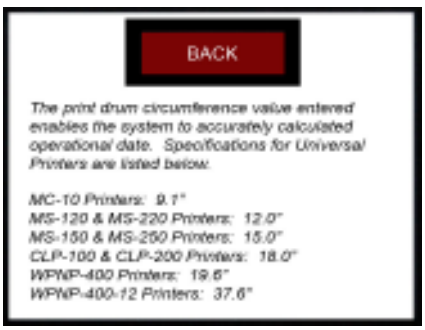
If you enter the incorrect Information, press the data window, press "CLR" and enter the correct number. Next, press the "BACK" button to return to the Program options Screen.

Note: The circumference size must be entered in inches - not millimeters.



Printer Information Screen

The PIDS-DIGITAL Control needs to know the Circumference of the Print Drum on the Printer you are using. The "HELP" screen on the right list's the print drum circumference for each printer. (You can press the "HELP" button to get to this screen.) Press the "BACK" button to escape the "HELP screen and return to the Enter Information Screen.



Help Screen

9 - Press the PROGRAM PURGE RUN TIME button.

Program Options Screen

Note: The Purge Run Time is the amount of time the pump module(s) will run continuously when the PUMP START button is pressed on the PURGE SYSTEM PUMP MODULES screen. It takes approximately 75 seconds of run time to fill 1 meter of ink tube. This PUMP START button is used whenever the operator wants to manually run the pump in a continuous manner.

10- Press the up and down arrow buttons to set desired PURGE RUN TIME. Each press of the button adds or subtracts 25 seconds to the run time.

Program Purge Run Time Screen

The time value entered is not critical but is a safety feature to prevent the pump from running for long periods of time in case the operator is distracted while purging the ink lines. When purging the ink lines, the PUMP START button can be pressed as many times as necessary and the PURGE function can be stopped instantly by pressing the PUMP STOP button.

Next: Press the BACK button to return to the Program Options Screen

11 - Press the PROGRAM AUTO RUN TIME button.

Program Options Screen

12 - Use the Up and Down arrow keys to set the AUTO RUN TIME.

Program Auto Run Time

This is the length of time the pump will run during each cycle when the program is running automatically during the printing operation. This value should normally be set to 6 seconds for a 25mm print width printer. A value of 6 seconds will pump approximately 1ml of ink to the printer on each run cycle.

Press the HELP button for additional information.

Do Not Enter Any Information in the **Program Operating Interval** or the **Adjust Operating Interval** Screens at this time. These functions cannot be programmed until the system is primed and the printing operation is started.

PRIMING THE SYSTEM WITH INK

Before the final programming can be completed, the Ink Reservoir must be filled with ink and all of the Ink Tubes must be primed with ink.

Several factors should be considered before filling the Reservoir with ink. The type of ink being used will determine how much ink should be placed in the Reservoir. If you are using a dye base ink, the Reservoir can be filled to within 2" of the top.

If you are using a pigmented ink, you should be aware of the fact that the pigments in all pigmented inks tend to settle out of solution when stored without agitation for prolonged periods of time. To minimize this problem, the Reservoir should be filled with only enough ink to last one or two days of operation. When refilling the Reservoir with pigmented inks, the supply container should be shaken vigorously to re-disperse the pigments prior to filling the PIDS-DIGITAL System Ink Reservoir.

WARNING: The electrical controls in this system are not designed to be operated in explosive atmospheres. Contamination of the Control Box or Pump Module with flammable inks may cause a fire hazard and must be avoided. If contamination should occur - immediately disconnect the system from the electrical supply and do not operate the system until all traces of solvent vapor are removed.

1 - With the valve on the Ink Reservoir in the closed position (Figure 10), fill the Ink Reservoir approximately 1/2" above the ink level sensor.

2 - Open the valve on the Ink Reservoir and check to ensure that all the tube fittings are tight and free from leaks.

3 - Rotate the lever on the Pump Head to the right (clockwise) to clamp the Pump Tube in position for operation. Be sure the V-Shaped Tube Retainers seat directly over the Pump Tube (Figure 10). If your system has two Pump Heads, duplicate this procedure for each Head.

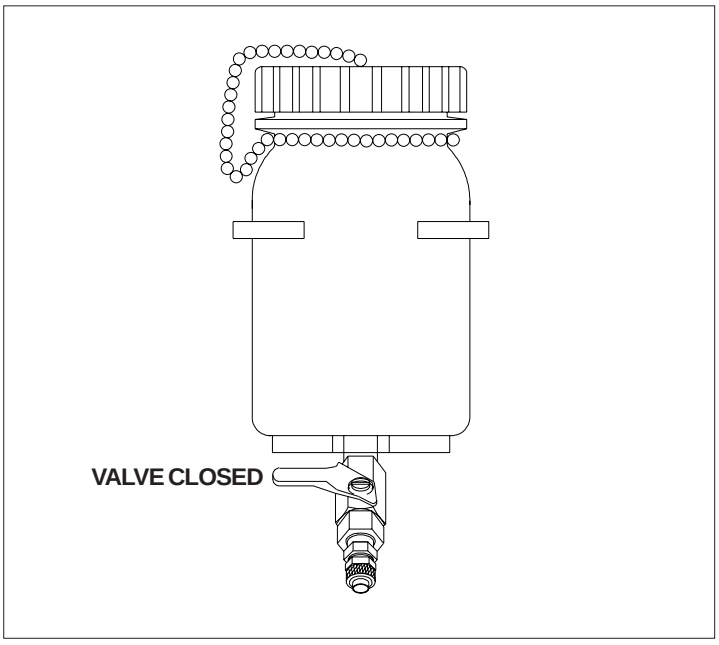


FIGURE 10

PRIMING THE SYSTEM WITH INK

Peristaltic pumps have a tendency to pull the Pump Tube into the Head during operation. The spring-loaded V-Shaped Retainers on either side of the Pump Head are designed to prevent this action. If during operation you notice that the Pump Tube is being pulled into the Pump Head, open the Pump Head and reposition the Pump Tube. To reposition the Pump Tube, rotate the lever on the Pump Head to the "**UN-CLAMPED**" position. Center the Pump Tube in the Pump Head and move the Clamping Lever to the "**CLAMPED**" position (Figure 11)

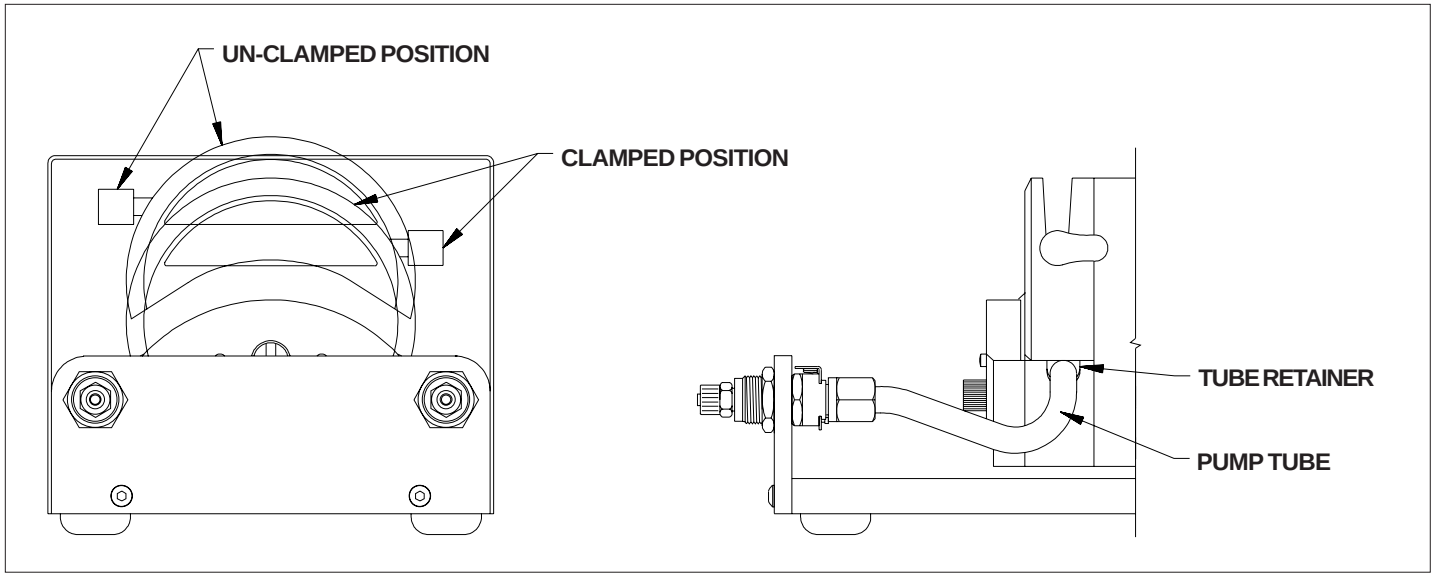
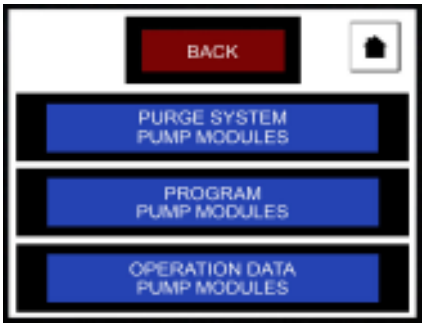


FIGURE 11

4 - Press the SETUP button on the Home Screen.

Home Screen

5 - Press the PURGE SYSTEM PUMP MODULES button.



Setup Options Screen

PRIMING THE SYSTEM WITH INK

6 - Remove the Wiper Adapter(s) from the Printer(s) and hang it in a small container to catch any excess ink as the ink fills the ink tubes and Wiper Adapter. The ink travels very slowly during the purge process so only 1 or 2 ml should drip from the Wiper during this process. Place the container with the Wiper Adapter above the height of the pump to ensure the ink completely fills the ink tube and pushes all the air out of the tubes.

Purge Ink Lines

7 - Press the PUMP START button and the pump will begin to run. You may need to lift the ink reservoir above the height of the pump module until the ink begins filling the ink tubes on the Coder output side of the pump.

The programmed purge time (which you programmed previously) will display on the screen as RUN TIME REMAINING in seconds. Ink will be pumped from the Ink Reservoir through the pump head and it will begin to fill the ink tubes. It will take approximately 75 seconds for the ink to travel 1 meter through the tubes. If the pump stops before the tubes are filled with ink, press PUMP START again as necessary to re-start the pump. When ink begins to drip steadily from the Wiper Adapter, press the PUMP STOP button to turn the pump off.

Purge Ink Lines Screen

Note: For users with multiple head pump systems. It is very unlikely that the ink feed lines to your Coders are the same exact length and therefore ink may reach one of the Adapters before the other. If this happens, as soon as the ink reaches the first Adapter, press the STOP PUMP button. Rotate the Pump Head Lever of the fully primed line to the "UN-CLAMPED" position. This will prevent any additional ink from being pumped to that Adapter when the Pump is turned back on. Press the PUMP START button again and continue priming the remaining Ink Feed Tube. As soon as the ink reaches the last Coder Adapter, press the PUMP STOP button. Rotate the Pump Head Lever on the disabled Pump Head, back to the "CLAMPED" position.

8 - Using a paper towel to catch any ink drips, carefully remove the Wiper Adapter from the container and reinstall it in the printer and secure it in place with the Thumb Screw.

The system is now ready for Final Programming.

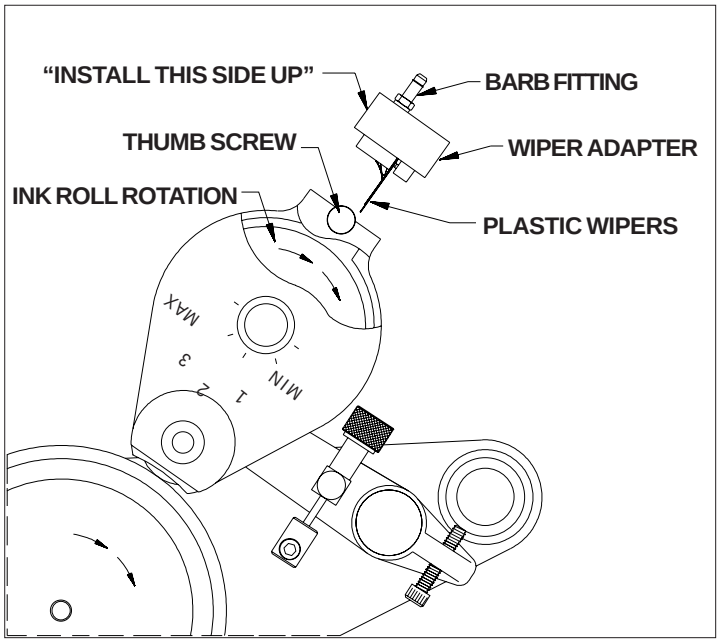


FIGURE 12

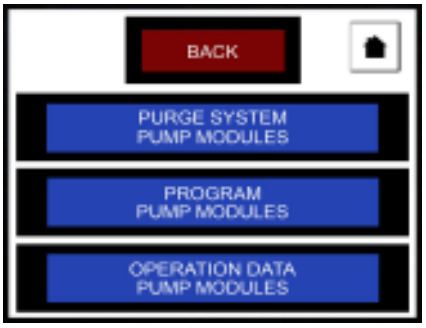
FINAL PROGRAMMING

The final step in programming the system must be performed while the web is running and the printers are operating. Since the ink rolls on the printers were initially saturated with ink and then most of the ink was squeezed out of the rolls, the print quality will very rapidly become light indicating a need for more ink.

1 - Press the SETUP button on the Home Screen.

Home Screen

2 - Press the PROGRAM PUMP MODULES button.



Setup Options Screen

3 - Press the PROGRAM OPERATING INTERVAL button.

Note: If your Pass Code access time has expired you will need to re-enter your Pass Code to enter this next screen.

Program Options Screen

Note: Programming the operating interval requires the operator to visually observe the print quality on the web.

FINAL PROGRAMMING

4 - Start the printing operation and visually observe the print quality.

5 - When the print density starts to become light, indicating a need for more ink, press the START button.

This will immediately turn the pump on for the programmed run time (normally 6 seconds for a 25 mm print width printer). You should see an almost immediate improvement in the print density. Pressing the START button also immediately activates a pulse capture function in the PLC which begins storing the number of pulses captured from the printer's encoder during this process in memory. A pump RUN indicator on this screen and an accumulated pulse count register provide references to what is taking place during this process.

Program Operating Interval Screen

6 - Visually observe the print quality and press the STOP button as soon as the print density starts to become light again.

When the STOP button is pressed, the total number of pulses captured during this process will be stored in the PLC's memory and used to cycle the pump on and off when the program is run in the automatic mode.

Program Operating Interval Screen

It is important to note that if you are printing a very small amount of text on the web at a relatively slow speed, it may take several minutes for the print density to become light. With larger text images being printed and higher speeds, the print density may become light in a less than a minute.

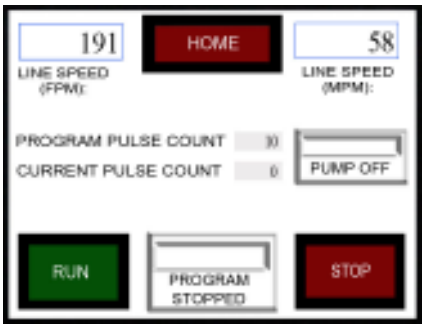
7 - After the STOP button has been pressed, press the HOME button and return to the Home Screen

8 - Press the OPERATION button on the Home Screen.

Home Screen

9 - Press the RUN button at the bottom of the screen to start the program running in the automatic mode.

When the RUN button is pressed, the pump will immediately turn on for the programmed run time and the print density will show an immediate improvement. The program status indicator will confirm that the program is running.



Operation Screen

The two data windows on this screen show the **Programmed Pulse Count** and the **Current Pulse Count**. When the current pulse count is equal to the programmed pulse count, the pump will turn on again. When the pump stops running, the current pulse count will reset to 0 and will begin accumulating pulses for the next cycle.

An additional data window on this screen displays **Line Speed** in Meters Per Minute. It is important to note that the line speed is calculated using only 4 pulses per revolution accuracy and is updated every 6 seconds. **Line Speed information is displayed for operator reference only and is not a precise measurement.**

The RUN and STOP buttons on this screen turn the automatic program On and Off. **Each time the RUN button is pressed and the automatic program is started, the pump will turn on and feed more ink to the printer to begin a new cycle.**

10 - Continue to monitor the print quality to confirm that the pump is feeding an adequate volume of ink to the printer during the production printing operation. Also take note of pulse counts and when the pump is running. If the print quality remains good, then the system is programmed properly for this particular printing operation.

If the print quality seems to get slightly light in density before the pump turns on or begins to look too wet, you can make adjustments to the program on the ADJUST OPERATING INTERVAL screen. To make this adjustment, press the Home button, Setup, Program Pump Modules and then Adjust Operating Intervals.

11 - Press the UP or DOWN arrows to adjust the pulse count for the Operating Interval.

The Adjust Operating Interval Screen allows you to make minor changes to the pulse count used for the program's operating interval. Please understand that it is always best to control the ink delivery rate by changing the operating interval rather than the pump run time.

Adjust Operating Interval Screen

The programmed pulse count interval is displayed in the data window on this screen. **You have the option to adjust the pulse count by a value of 10 or a value of 1 by pressing the appropriate UP or DOWN arrows.**

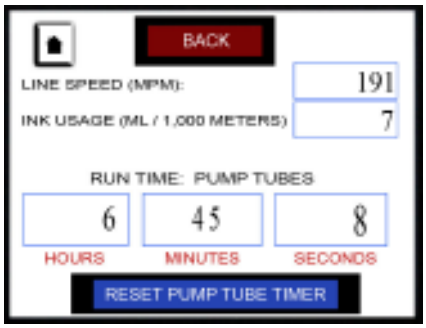
If you want to increase the amount of ink delivered to the printer, you must reduce the pulse count which makes the pump turn on more frequently. If you want to reduce the amount of ink delivered, you must increase the pulse count. These changes will immediately be reflected on the OPERATION screen.

SYSTEM OPERATION

After programming is completed, the PIDS-DIGITAL System will operate automatically any time the RUN button is pressed on the OPERATION Screen. Remember that the pump will run for a cycle each time the RUN button is pressed. Pressing the RUN and STOP buttons frequently can result in too much ink being delivered to the printer and could result in over saturation of the ink roll. If it is necessary to press the STOP button during printing, it is recommended the RUN button is not pressed again until the print quality indicates a need for more ink.

Additional data can be accessed on the Operational Data Screen by returning to the home menu and pressing the SETUP button, then pressing the OPERATIONAL DATA Button. At any time while the program is running, the operator can access the operational data screen to view the ink consumption rates and monitor the pump tube hour meter status.

The ink usage rates are calculated continuously during operation based on web travel distance and the programmed pump operating sequence. If fine adjustments are made to the program during operation, these changes will be reflected in the ink usage rates within a few seconds. Ink consumption rates are calculated on a rate per each pump head attached. Multiply the figured displayed by the number of pump heads to determine total ink consumption rate.



Reset Pump Tube Timer

SYSTEM ALARMS

The PLC in the PIDS-DIGITAL Control continuously monitors the status of two maintenance issues in the system and will trigger an alarm when either of these issues require operator attention.

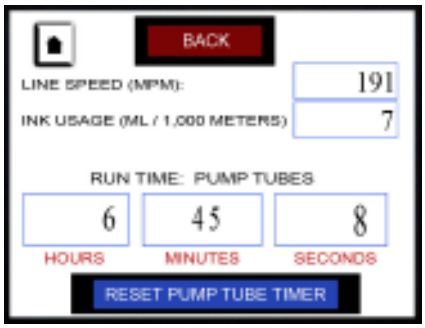
Pump Tube Alarm (Yellow Flashing Light)

The Pump Tubes used in the PIDS-DIGITAL Pump Modules are rated for continuous use well in excess of 1,000 hours before a potential for leakage develops. Since the pumps on the PIDS System only operate intermittently, there is a high probability that the tubes will become somewhat deformed and require replacement long before any leakage might occur. As a safety factor, however, the PIDS-DIGITAL Control automatically tracks the total run time of the pump and an alarm will be triggered when the pump tubes have reached 1,000 hours of operation.

Pump Tube Alarm Screen

When the pump tube alarm is triggered, the screen will change to the Alarm screen and the Yellow LED Light on the top of the control box will begin flashing to alert the operator. The pump tubes should then be replaced and the pump tube accumulated pump tube timer should be reset to 0. This alarm does not interrupt the function of the running program and the pump tubes can be replaced at the next convenient break in production. The strobe lights will continue to flash until the pump tube timer has been reset to 0.

1 - To Reset the Pump Tube Timer, go to the Operational Data Screen and press the RESET PUMP TUBE TIMER button.



Reset Pump Tube Timer

2 - To prevent accidental loss of the pump tube hour data, a second screen will require you to confirm that you want to reset the PUMP TUBE TIMER. Press the RESET PUMP TUBE TIMER button to reset the hours to 0 or press the BACK button if you want to leave the data in the register.

Reset Pump Tube Timer

Low Level Ink Alarm (Red Flashing Light)

A Capacitive Proximity Sensor which is built into the Ink Reservoir Mounting Bracket continuously monitors the ink level in the reservoir and will trigger a Low Level Ink Alarm when the ink level reaches a low volume and should be refilled. An alarm screen will appear automatically and the RED LED Light on the top of the control box will begin flashing to alert the operator. The alarm screen can be cleared by pressing the CLEAR ALARM button. The level sensor will reset automatically when the Ink Reservoir is refilled with ink and the strobe light will stop flashing.

Low Level Ink Alarm Screen

OPERATION NOTES

Variable Speed Web Printing: Since the PIDS-DIGITAL System is programmed based on the number of print cycles between delivering ink to the printer, changes in web speed will have no affect on the print quality. At higher speeds, the pulse counts are automatically received from the coder at a faster rate and the pump will cycle more frequently relative to time.

When the Web Speed Slows or Stops: To ensure even distribution of ink around the full circumference of the ink roll during a pump run cycle, the print drum must be rotating at a minimal speed. For this reason, the PIDS-DIGITAL program is designed to stop the ink feed whenever the web slows to a velocity which generates a pulse rate of less than 2 pulses per second. Normal pump operation will automatically resume when the web velocity increases to an acceptable speed.

When the web stops, the pump will not run. This automatic feature eliminates the need for the operator to manually stop the program.

At the end of the production day, however, the program should be stopped and power to the PIDS-DIGITAL System should be turned off.

MAINTENANCE

Universal Digital Programmable Ink Delivery Systems are designed to provide years of trouble free service with very minimal maintenance requirements. The only routine maintenance required on this system, aside from periodic filling of the Ink Reservoir, is to replace the Pump Tubes at regular intervals.

The Pump Tubes on these systems are made from Norton Norprene which is a very durable synthetic rubber material. During operation, these tubes undergo constant compression and flexing in the Pump Head. Although these tubes are rated for up to 3,000 hours of continuous operation, a Pump Tube failure would cause ink leakage and therefore a more conservative life expectancy is used when pumping inks. It is recommended that the tubes in the Pump Heads be replaced after every 1,000 hours of operation or every 8 weeks, whichever comes first. With a little practice, a Pump Tube can be changed in as little as 10 seconds.

CHANGING THE PUMP TUBE

1 - Press the *"STOP"* Button on the PIDS Control Box.

2 - Rotate the lever on the Pump Head to the left (CCW) to un-clamp the tube (Figure 13).

3 - Place a paper towel under the Quick Release Tube Fittings and press the *"RELEASE"* Buttons to disconnect the Pump Tube.

NOTE: There are check valves in each of the fittings to prevent ink flow from either side when the fittings are separated, but a drop or two of ink may be released during separation. It is advisable to cover the ends of the Pump Tube Fittings with a towel, while handling, since most inks will permanently stain clothing.

4 - Load a new Pump Tube Assembly into the Pump Head and re-connect the fittings.

5 - Slowly rotate the Pump Head Lever to the right (CW) and ensure that the Pump Tube is centered under the V- Shaped Pump Tube Retainers on either side of the Pump Head. When the Pump Head Lever is in the fully *"CLAMPED"* position, the operation is complete.

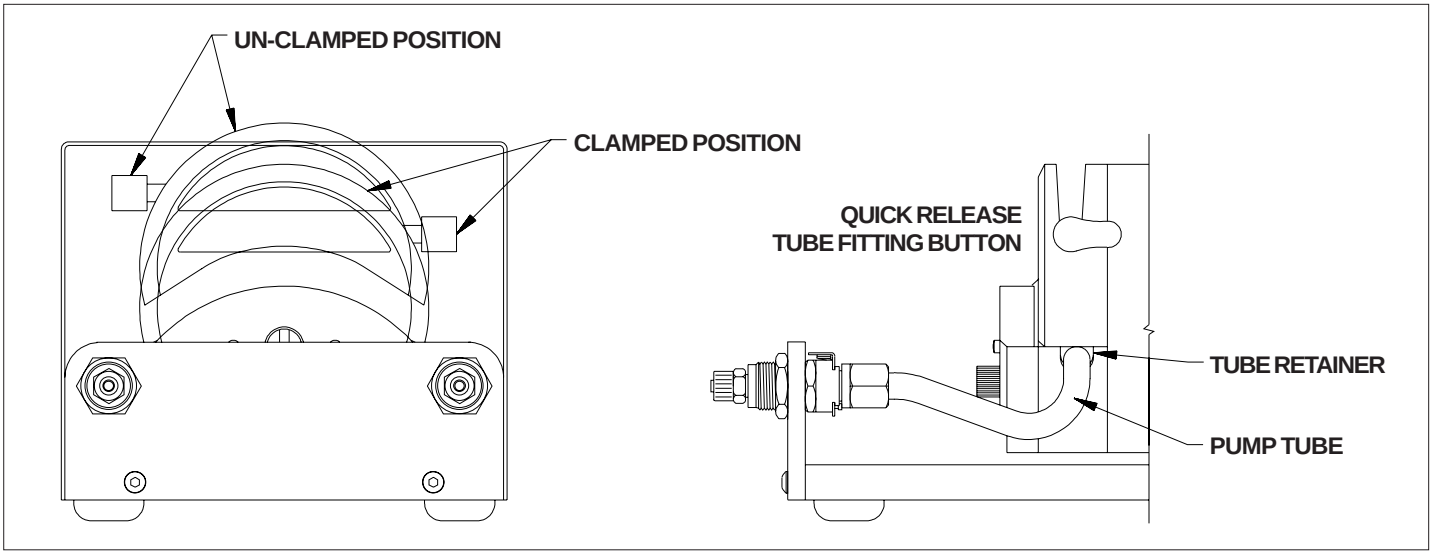


FIGURE 13

ADJUSTING THE PUMP TUBE RETAINERS

Peristaltic pumps have a tendency to pull the Pump Tube into the Pump Head during operation. The V-Shaped Pump Tube Retainers on either side of the Pump Head are designed to prevent this action when adjusted properly. These Retainers have been adjusted at the factory but if during operation you notice that the Pump Tube is being pulled into the Pump Head, the Pump Tube Retainers should be re-adjusted.

It is important to note that with proper adjustment, the Pump Tube Retainers slightly compress the Pump Tube when the Pump Head Lever is in the "**CLAMPED**" position. Care must be taken to ensure that the Retainers are not set too tight or restriction of the Pump Tube may occur.

To adjust the Pump Tube Retainers, rotate the lever on the Pump Head to the "**UN-CLAMPED**" position. Press in on the Tube Retainer Levers (one on each side of the Pump Head) and move it down one notch. Center the Pump Tube in the Pump Head and move the Pump Head Lever to the "**CLAMPED**" position being sure that the Pump Tube is centered under the V-Shaped Pump Tube Retainers on either side of the Pump Head. Repeat this procedure as necessary until the Pump Tube remains in place during operation.

ADJUSTING THE INK RESERVOIR LOW LEVEL SENSOR

The Ink Reservoir utilizes a capacitive proximity sensor to determine when the volume of ink reaches a low level. On the standard USM-GFR-64-LLS (64 Fluid Ounce / 1.8927 liter) Reservoir, this sensor will be activated when the remaining free volume of ink in the reservoir is down to approximately 5 Fluid Ounces (150 - 160 ml). The ink level at which this sensor is activated is fixed and cannot be adjusted. The sensitivity of the sensor, however, is set at the factory but may require adjustment depending on the ink used in the system.

1 - Fill the Reservoir with ink to a level above the top of the Sensor.

This ensures that the sensor is reading the density of the ink through the plastic reservoir container and not just the plastic container.

NOTE: Under certain conditions the Ink Reservoir's Low Level Sensor could be susceptible to interference from RF sources of frequencies above the 80 MHz range. Installation in the close proximity to RF sources or in areas where the RF noise is untypically increased should be avoided.

FIGURE 14

2 - Using a small screwdriver, remove the plastic cover screw on the end of the sensor.

This plasitc screw covers the sensitivity adjusting screw.

FIGURE 15

3 - Using the small special adjusting tool provided with the manual, slowly turn the adjusting screw CCW (counter clockwise) until the RED LED light on top of the control begins to flash.

If the RED LED was already flashing, turn the adjusting screw in the CW (Clockwise) direction until it stops flashing, Then turn it slowly CCW until it starts to flash again.

FIGURE 16

4 - Turn the adjusting screw in the CW direction 1 full revolution to set the sensitivity.

When this step is completed, the flashing RED LED should be off. As soon as the ink level approaches the bottom of the sensor the LED will begin flashing again to alert you to a low level ink condition.

FIGURE 17

5 - Replace the plastic cover screw on the sensor.

The plastic cap must be installed to prevent dust contaminates from getting it to the sensor during operation.

FIGURE 18

REPLACING THE ELECTRICAL FUSES

In the event of a strong electrical power surge or a critical failure of an electronic component in the system, the electrical fuse in the control may be blown. If this occurs, all power will be lost and the touch screen display will turn off.

Before replacing the fuse and turning the system back on, disconnect the system from electrical power and inspect the system for any signs of electrical overload damage. These can include traces of soot around connections or the smell of something overheated. If any obvious indications of a problem exist, ***DO NOT REPLACE THE FUSE AND DO NOT TURN THE POWER SWITCH ON.***

Contact Universal's Customer Service Department for assistance.

6 - Turn the power switch on the control box to the OFF position, unplug the power cord from the electrical receptacle, then remove the power cord plug from the bottom of the control box by pulling it straight out of the power inlet module.

DO NOT ATTEMPT TO REPLACE THE FUSES WITH THE POWER ON.

FIGURE 19

7 - Using the tab on the top of the fuse compartment drawer, pull the fuse carrier drawer straight out.

FIGURE 20

8 - Install new fuses.

DANGER: Only use fuses of the same amperage and type. Using an improper fuse could cause a serious failure and may result in an electrical fire.

FIGURE 21

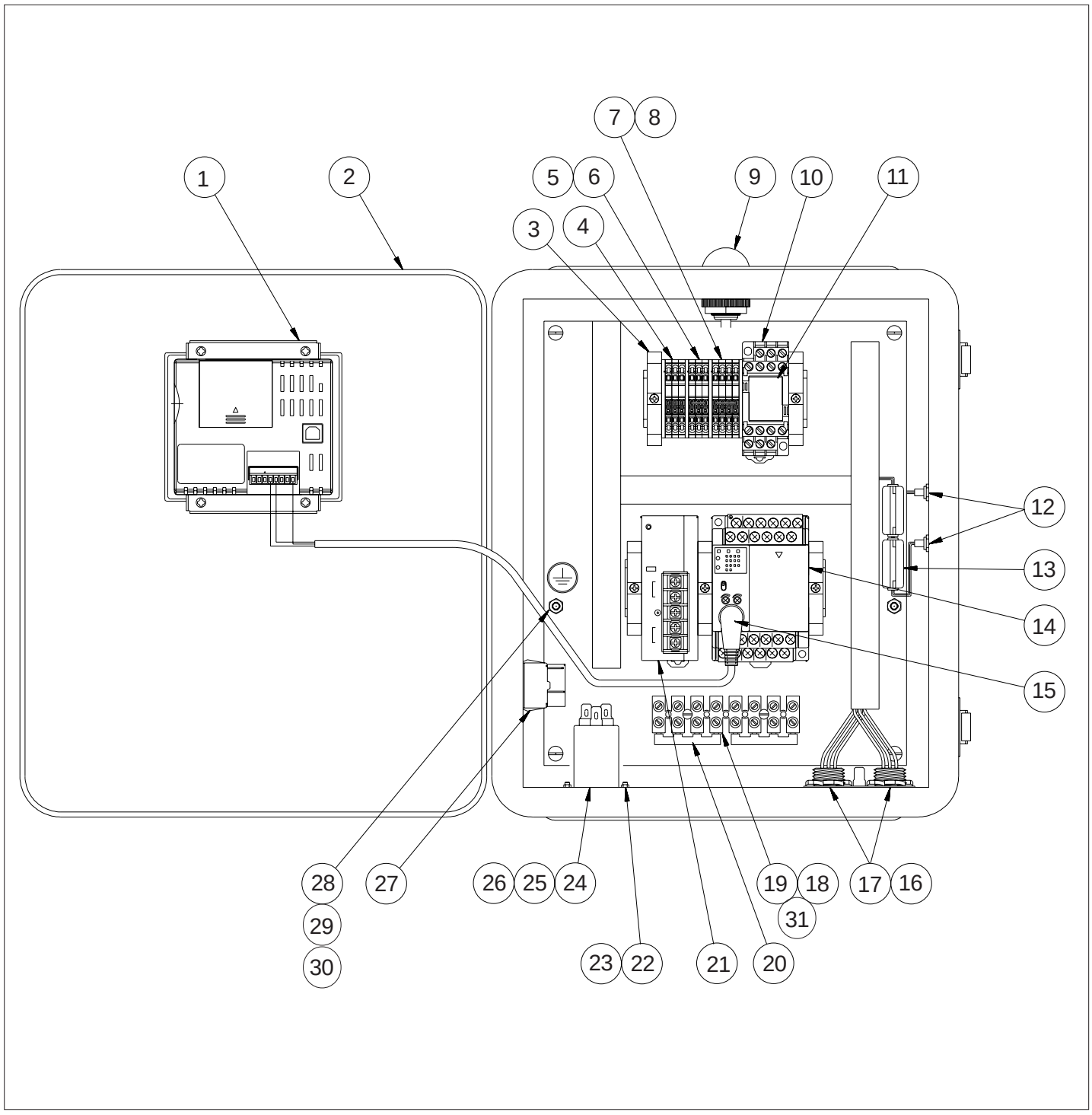
9 - Push the fuse compartment drawer back into the power inlet module - it will snap in place when fully installed.

Re-install the power cord, plug the power cord back into the power receptacle and turn the power switch to the ON position.

If the control display does not power up, contact a qualified electrician or contact Universal's Customer Service Department.

FIGURE 22

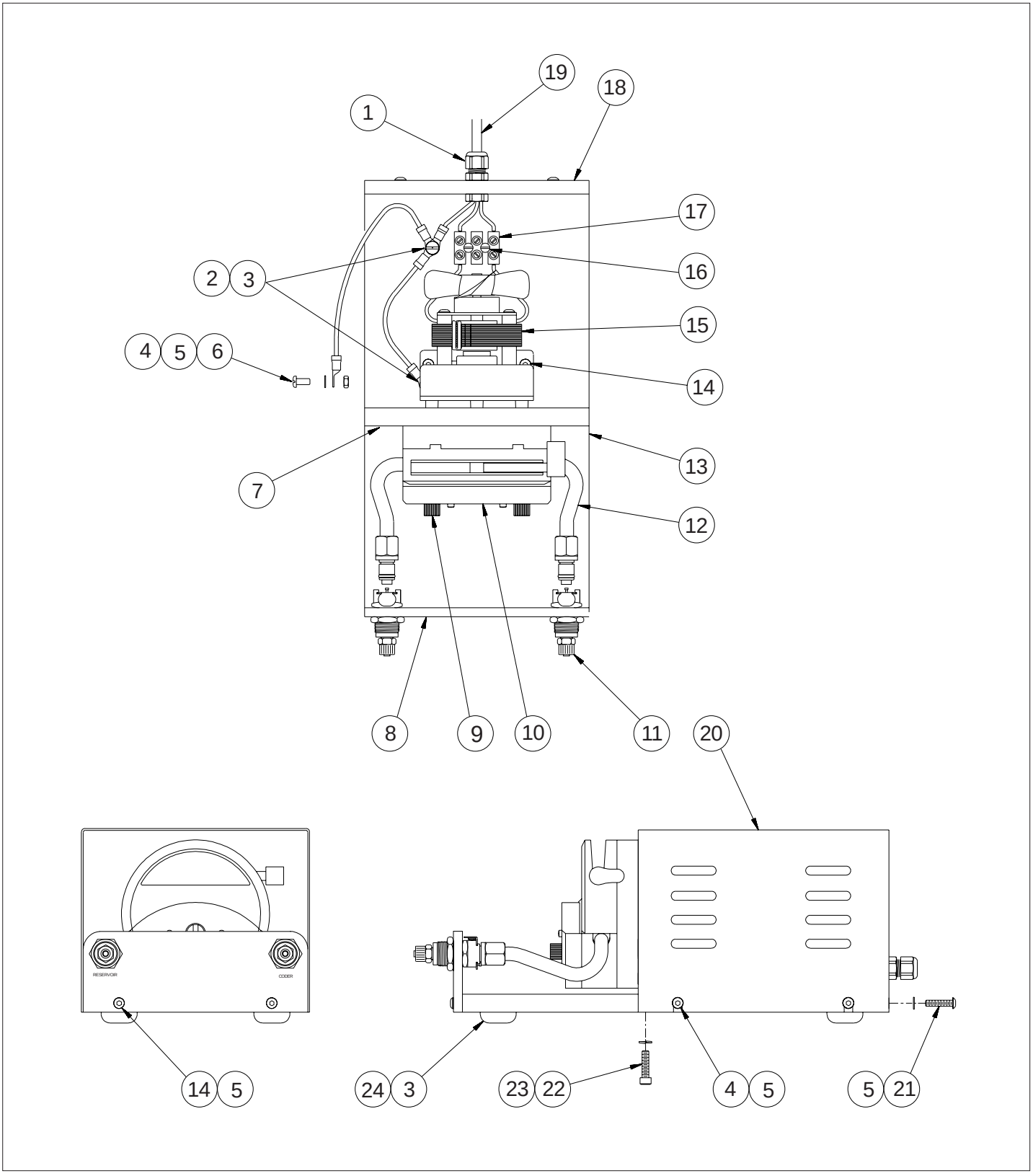
PIDS-DIGITAL-CE CONTROL BOX
PROGRAMMABLE INK DELIVERY SYSTEM



PIDS-DIGITAL-CE CONTROL BOX
PROGRAMMABLE INK DELIVERY SYSTEM

KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	MRM-EC-176	1	PANASONIC HMI
2	MRM-EC-171	1	ENCLOSURE, 12 X 10
3	MRM-EC-170	5	END BRACKET, 35 MM DIN RAIL
4	MRM-EC-189	3	PHOENIX GROUND MODULE
5	MRM-EC-190	3	PHOENIX GRAY FEED TERMINAL
6	MRM-EC-198	1	PHOENIX 3-POSITION PLUG-IN BRIDGE
7	MRM-EC-191	4	PHOENIX BLUE FEED TERMINAL
8	MRM-EC-193	1	PHOENIX 4-POSITION PLUG-IN BRIDGE
9	MRM-EC-179	1	BANNER RED & YELLOW EZ LIGHT
10	MRM-EC-85	1	14-PIN SOCKET BASE
11	MRM-EC-86	1	24 VDC CONTROL RELAY
12	MRM-EC-187	2	TURCK 3-PIN FEMALE M8 RECEPTACLE
13	MRM-EC-207	2	FERRITE CORE, WURTH ELECTRONIX 74271142
14	MRM-EC-174	1	PANASONIC FPX SERIES PLC
15	MRM-EC-175	1	PANASONIC HMI TO PLC COMM CABLE
16	MRM-EC-178	2	TURCK FEMALE MICROFAST AC RECEPTACLE
17	PIDS-65	1	RECEPTACLE GROUND PLATE
18	MRM-EC-05	1	8 POLE TERMINAL STRIP
19	PIDS-15	2	SCREW, #6-32 BH SLOT
20	MRM-EC-199	2	EURO STRIP EXT. JUMPER, 4-POLE
21	MRM-EC-173	1	PANASONIC 24 VDC POWER SUPPLY
22	MRM-EC-194	2	SCREW, #4-40 FHS - ZINC PLATED
23	MRM-EC-195	2	NUT, #4-40 - ZINC PLATED
24	MRM-EC-205	1	POWER ENTRY INLET MODULE, SHAFFNER FN 9260-2-06
25	HQCD-158912	2	PIDS-100/200: FUSE, 1 A (5 X 20) 230 VAC
	HQC-161264		PIDS-300/400: FUSE, 1.6 A (5 X 20) 230 VAC
26	DD-75107-01	1	POWER CORD, 115V
27	MRM-EC-197	1	ROCKER SWITCH ON / OFF
28	5121-709	2	SCREW, 10-32 X 0.5 RHS
29	PIDS-70	2	KEPS NUT, 10-32
30	HC-518	2	NUT, 10-32
31	PIDS-71	2	KEPS NUT, 6-32

SINGLE PUMP MODULE
PIDS-100-PMA-D-CE
PROGRAMMABLE INK DELIVERY SYSTEM

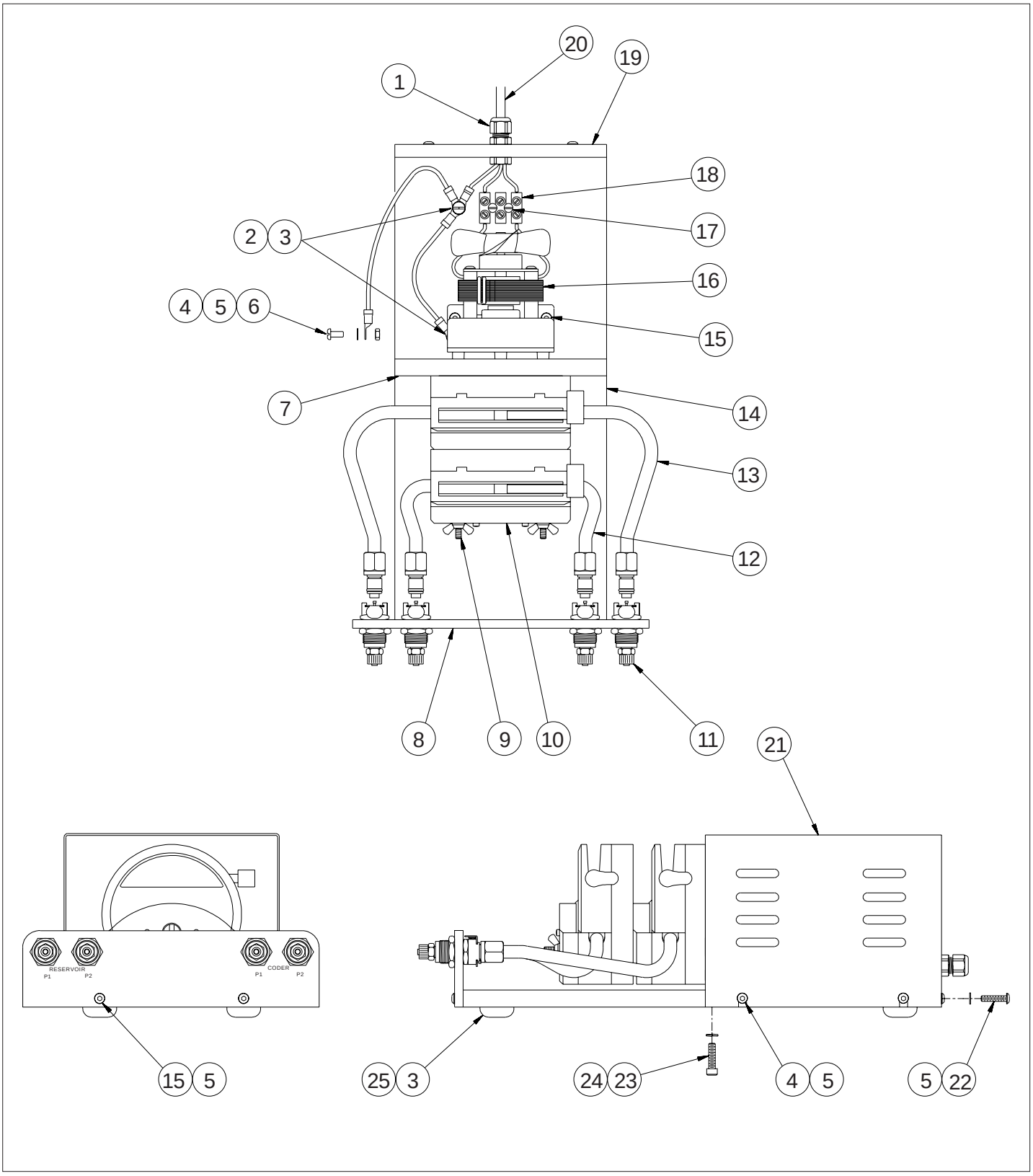


SINGLE PUMP MODULE
PIDS-100-PMA-D-CE
PROGRAMMABLE INK DELIVERY SYSTEM

KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	MRM-EC-146	1	STRAIN RELIEF - STRAIGHT-THRU FITTING
2	PIDS-68	2	#10 SPRING WASHER, INT TOOTH - ZINC PLATED
3	5121-709	6	SCREW, 10-32 X 1/2" RH SLOT ZINC
4	MS-33Z	5	SCREW, 8-32 X 3/8" BHC - ZINC PLATED
5	PIDS-67	9	#8 SPRING WASHER, INT TOOTH - ZINC PLATED
6	PIDS-69	1	#8 HEX NUT - ZINC PLATED
7	PIDS-04	1	PUMP HEAD MOUNTING PLATE
8	PIDS-05	1	PUMP MODULE FRONT PLATE
9	PIDS-47	2	MOUNTING HARDWARE - SINGLE PUMP HEAD
10	PIDS-01	1	EASY LOAD PUMP HEAD
11	PIDS-40	2	QUICK RELEASE COUPLING - PANEL MT BODY
12	PIDS-PTA1	1	PUMP TUBE ASSEMBLY - 12"
13	PIDS-03	1	PUMP MODULE BASE PLATE
14	HP-10Z	4	SCREW, 8-32 X 1/2" BHC ZINC PLATED
15	PIDS-02-115	1	PUMP MOTOR, 6 RPM - 115 VAC
16	PIDS-15	2	SCREW, 6-32 X 3/4" BH SLOT - ZINC PLATED
17	MRM-EC-03	1	TERMINAL BLOCK - 3 POS. INTL.
18	PIDS-06	1	PUMP MODULE BACK PLATE
19	MRM-EC-177	1	TURCK MALE MICROFAST AC CORDSET
20	PIDS-08	1	ALUMINUM COVER FOR PUMP MODULE
21	PIDS-17Z	2	SCREW, 8-32 X 3/4" BHS - ZINC PLATED
22	PIDS-10Z	2	SCREW, 10-32 X 3/4" SHC ZINC PLATED
23	PIDS-66	2	#10 LOCK WASHER ZINC PLATED
24	1199-138	4	RUBBER FOOT
	* CT-02	31 FT.	NATURAL POLY 1/4" O.D. TUBE

* ITEM NOT SHOWN

DUAL PUMP MODULE
PIDS-200-PMA-D-CE
PROGRAMMABLE INK DELIVERY SYSTEM

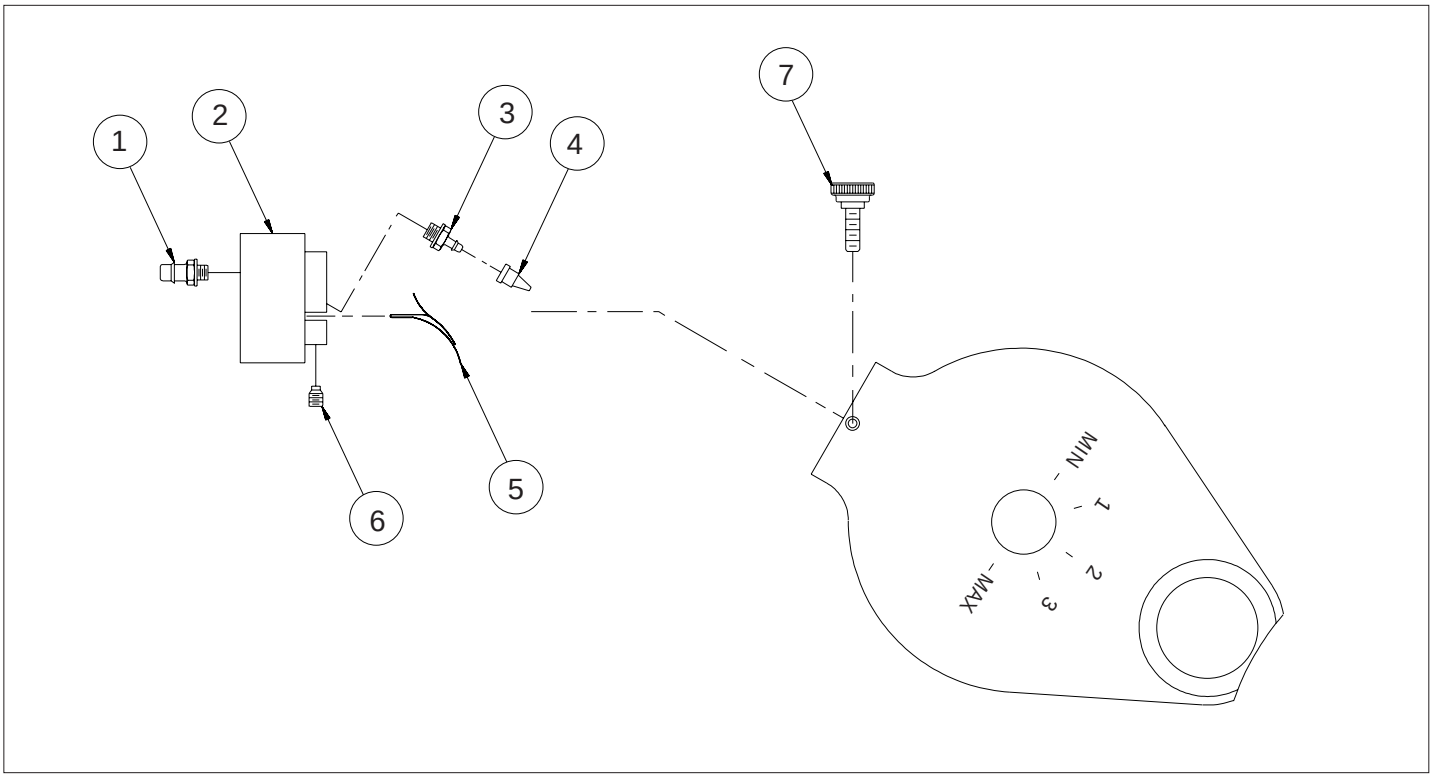


DUAL PUMP MODULE
PIDS-200-PMA-D-CE
PROGRAMMABLE INK DELIVERY SYSTEM

KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	MRM-EC-146	1	STRAIN RELIEF - STRAIGHT-THRU FITTING
2	PIDS-68	2	#10 SPRING WASHER, INT - ZINC PLATED
3	5121-709	6	SCREW, 10-32 X 1/2" RH SLOT ZINC
4	MS-33Z	5	SCREW, 8-32 X 3/8" BHC - ZINC PLATED
5	PIDS-67	9	#8 SPRING WASHER, INT - ZINC PLATED
6	PIDS-69	1	#8 HEX NUT - ZINC PLATED
7	PIDS-04	1	PUMP HEAD MOUNTING PLATE
8	PIDS-13	1	PUMP MODULE FRONT PLATE
9	PIDS-14	2	MOUNTING HARDWARE - DUAL PUMP HEAD
10	PIDS-01	2	EASY LOAD PUMP HEAD
11	PIDS-40	4	QUICK RELEASE COUPLING - PANEL MT BODY
12	PIDS-PTA1	1	PUMP TUBE ASSEMBLY - 12"
13	PIDS-PTA2	1	PUMP TUBE ASSEMBLY - 18"
14	PIDS-12	1	PUMP MODULE BASE PLATE
15	HP-10Z	4	SCREW, 8-32 X 1/2" BHC ZINC PLATED
16	PIDS-02-115	1	PUMP MOTOR, 6 RPM - 115 VAC
17	PIDS-15	2	SCREW, 6-32 X 3/4" BH SLOT - ZINC PLATED
18	MRM-EC-03	1	TERMINAL BLOCK - 3 POS. INTL.
19	PIDS-06	1	PUMP MODULE BACK PLATE
20	MRM-EC-177	1	TURCK MALE MICROFAST AC CORDSET
21	PIDS-08	1	ALUMINUM COVER FOR PUMP MODULE
22	PIDS-17Z	2	SCREW, 8-32 X 3/4" BHS - ZINC PLATED
23	PIDS-10Z	2	SCREW, 10-32 X 3/4" SHC - ZINC PLATED
24	PIDS-66	2	#10 LOCK WASHER - ZINC PLATED
25	1199-138	4	RUBBER FOOT
	* CT-02	62 FT.	NATURAL POLY 1/4" O.D. TUBE

* ITEM NOT SHOWN

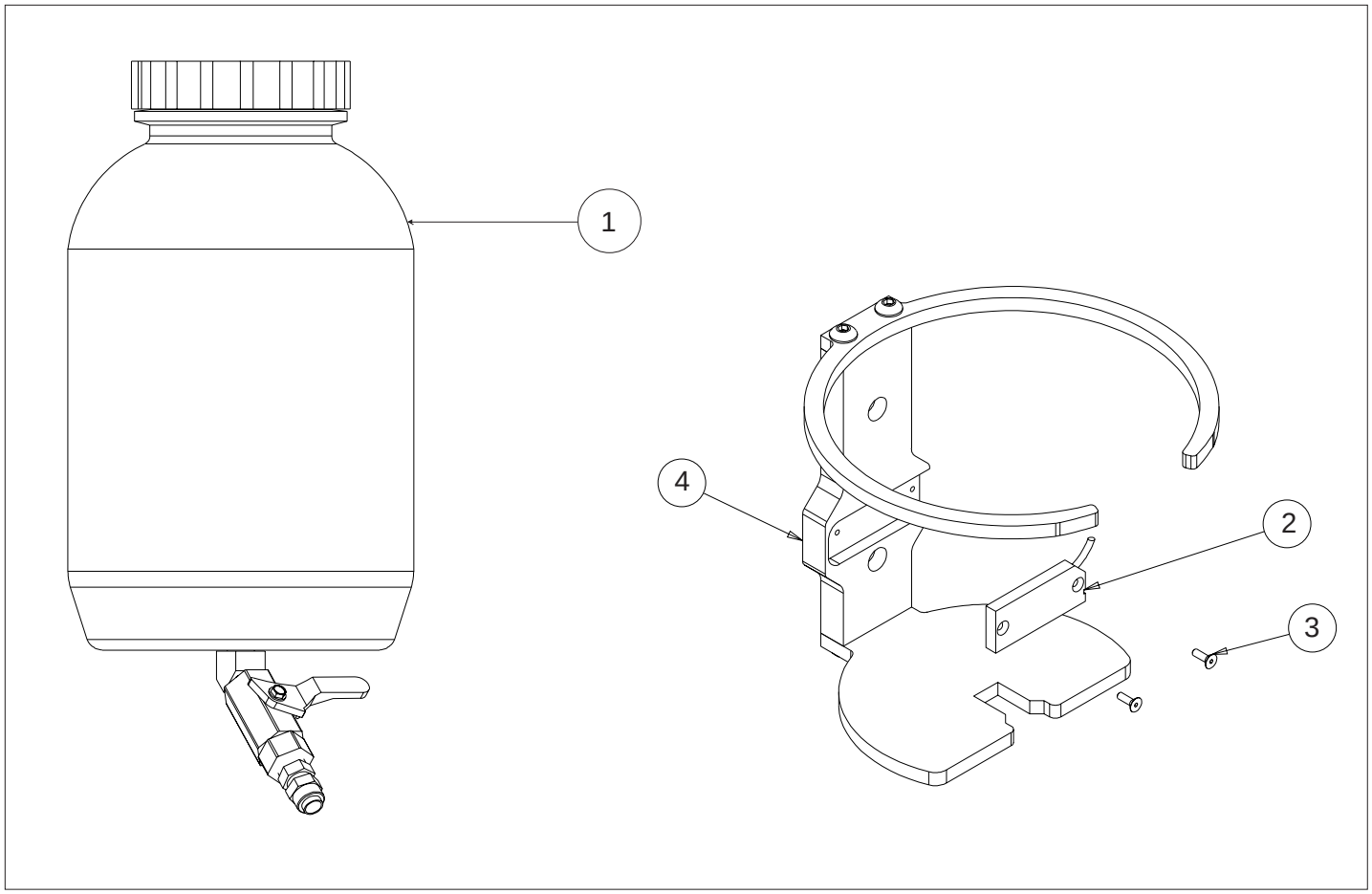
WIPER ADAPTER
PIDS-WA1, PIDS-WA2 & PIDS-WA4



KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	MRM-PC-70	1	10-32 BARB FITTING X 1/8" I.D. TUBE
		2	10-32 BARB FITTING X 1/8" I.D. TUBE, FOR WPNP
2	PIDS-37	1	WIPER BLOCK, 1-1/8" NON-POROUS
	PIDS-38		WIPER BLOCK, 2" NON-POROUS
	PIDS-58		WIPER BLOCK , WPNP
3	MRM-PC-69	1	10-32 BARB FITTING X 3/32" I.D. TUBE
		2	10-32 BARB FITTING X 3/32" I.D. TUBE, FOR WPNP
4	PIDS-16	1	CHECK VALVE, DUCK BILL
		2	CHECK VALVE, DUCK BILL, FOR WPNP
5	PIDS-35	1	PLASTIC WIPER, 1-1/8" REPLACEMENT
	PIDS-36		PLASTIC WIPER, 2" REPLACEMENT
	PIDS-57		PLASTIC WIPER, 4" REPLACEMENT, WPNP
6	CF-05	2	NYLON TIP SET SCREW, 8-32 THREAD
		4	NYLON TIP SET SCREW, 8-32 THREAD, WPNP
7	PIDS-48	1	THUMB SCREW ASSEMBLY, 8-32 THREAD
	PIDS-64	2	THUMB SCREW ASSEMBLY, WPNP

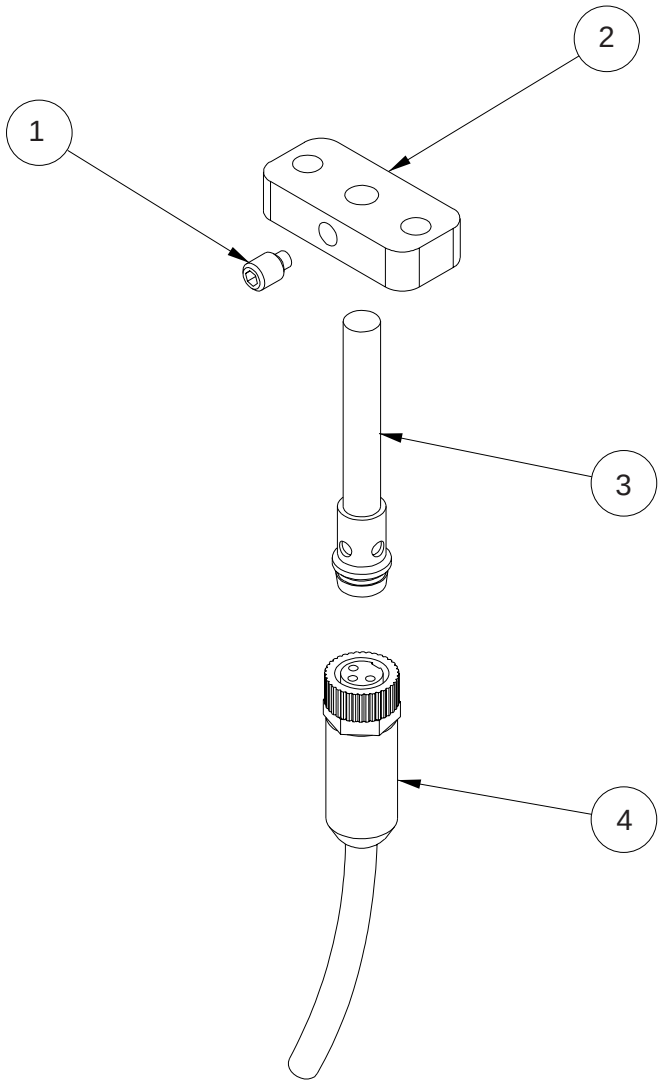
GRAVITY FEED INK RESERVOIRS WITH LOW LEVEL SENSOR

USM-GFR-64-LLS 64 OZ. / USM-GFR-128-LLS 128 OZ.



KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	USM-GFR-64-RBA	1	64 OZ RESERVOIR BOTTLE ASSEMBLY, W/O BRACKET ASSEMBLY
	USM-GFR-128-RBA		128 OZ RESERVOIR BOTTLE ASSEMBLY, W/O BRACKET ASSEMBLY
2	MRM-EC-183	1	INK LEVEL CAPACITIVE PROXIMITY SENSOR
3	MRM-EC-194	2	SCREW, #4-40 X .375 FHS
4	USM-GFR-64B-LLS	1	64 OZ. LOW LEVEL SENSOR RESERVOIR BRACKET & ASSEMBLY
	USM-GFR-128B-LLS		128 OZ. LOW LEVEL SENSOR RESERVOIR BRACKET & ASSEMBLY

INDUCTIVE PROXIMITY SENSOR



KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	CF-05	1	SET SCREW, 8-32 NYLON TIP
2	PIDS-61	1	SENSOR MOUNTING BLOCK - PLASTIC*
3	MRM-EC-208	1	TURCK INDUCTIVE PROX SENSOR
4	MRM-EC-206	1	CABLE, INDUCTIVE PROX - 3 METER *

*NOTE: THE NON-CONDUCTIVE PLASTIC MOUNTING BLOCK MUST BE USED FOR CE COMPLIANCE PURPOSES.

*NOTE: CONNECTING A CABLE LONGER THAN 3 METERS WILL NOT BE CE COMPLIANT.

PUMP MODULE CORD CONNECTION