Linear Vibration Welder
5000 Series

Model VW - 5300 / 5500 / 5700 / 5900 / 5960
Model VW - 5700 / 5900 / 5960 - LPT

User's Manual
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This user’s manual documents product features, hardware, and controls software available at the time this user's manual was published.

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Dukane ultrasonic equipment is manufactured under one or more of the following U.S. Patents:
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# Revision History

<table>
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<tr>
<th>Revision Number</th>
<th>Revision Summary</th>
<th>Date</th>
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<tr>
<td>- 00</td>
<td>Initial Release</td>
<td>3/9/2017</td>
</tr>
<tr>
<td>- 01</td>
<td>Updated parts list, LPT model info, CSA details added</td>
<td>8/9/2017</td>
</tr>
</tbody>
</table>
SECTION 1

Introduction

General User Information ....................3
Welder Overview .............................4
Key Features ...............................5
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General User Information

Read This Manual First

Before operating the linear vibration welder, read this User’s Manual to become familiar with the equipment. This will ensure correct and safe operation. The manual is organized to allow a user to learn how to safely operate this equipment. The examples given are chosen for their simplicity to illustrate basic operation concepts.

Notes, Cautions and Warnings

Throughout this manual we use NOTES to provide information that is important for the successful application and understanding of the product. A NOTE block is shown to the right.

In addition, we use special notices to make you aware of safety considerations. These are the CAUTION and WARNING blocks as shown to the right. They represent increasing levels of important information. These statements help to identify and avoid hazards and recognize the consequences. One of three different symbols also accompany the CAUTION and WARNING blocks to indicate whether the notice pertains to a condition or practice, an electrical safety issue or an operator protection issue.

Drawings and Tables

The figures and tables are identified by the section number followed by a sequence number. The sequence number begins with one in each section. The figures and tables are numbered separately. The figures use Arabic sequence numbers (e.g. –1, –2, –3) while the tables use Roman sequence numerals (e.g. –I, –II, –III). As an example, Figure 3–2 would be the second illustration in Section Three while Table 3–II would be the second table in Section Three.
Welder Overview

The linear vibration welder excels at joining large assemblies and parts made from glass-filled and high performance plastics.

The VW5X00 (Vibration Welder 5300/5500/5700/5900) family is Dukane’s fourth generation linear vibration welder. These systems all share the same basic mechanical components. Software and controls are significantly improved in this fourth generation.

The VW5X00 differences are in the size of tooling they can accommodate. The tooling capacity for each model is:

**VW5300**
- 24 in. wide by 18 in. deep
- 610 mm wide by 457 mm deep

**VW5500**
- 38 in. wide by 18 in. deep
- 965 mm wide by 457 mm deep

**VW5700 and VW5700LPT**
- 52 in. wide by 24 in. deep
- 1,321 mm wide by 610 mm deep

**VW5900 and VW5900LPT**
- 72 in. wide by 24 in. deep
- 1,828 mm wide by 610 mm deep

**VW5960 and VW5960LPT**
- 62 in. wide by 24 in. deep
- 1,575 mm wide by 610 mm deep

Most VW5X00 models have the same vertical clearance of 26 inches (660 mm) between the lift table and upper springs, and have a 20-inch (508 mm) stroke. The VW5960 and VW 5960LPT has 43 inches between the lift table and the upper tool mounting plate. These machines have 29 inches (736mm) of stroke.

Unlike competing machines, the upper vibration spring is not held in place by a swing frame. It incorporates a frameless design which has less vibrating mass to accommodate heavier tooling and provide additional tooling clearance.

The hydraulic system uses a commercial, readily available, self-contained system. This allows customers to do some of their own parts replacement, and it minimizes costly field service calls.

The new and larger color operator interface is also a commercial unit containing Dukane’s field-tested and proven control software and interface. Every subassembly has been selected to provide the maximum reliability with a long and economical service life. The electrical cabinet has been redesigned to increase reliability, minimize electrical noise and meet the applicable CE regulations.
Key Features

- **Color Touch Screen Display** uses Color Active Matrix Thin-Film Transistors (TFT) for high contrast and wide viewing angle even under high ambient–lighting conditions. The display provides for all monitoring and programming of the weld cycle.

- **Intuitive User Interface** allows for quicker programming and less down time.

- **English or Spanish** menus shorten training time, reduce operator errors and broaden the usefulness of the machine. *(Other languages are available.)*

- **Built-In Diagnostics** minimize down time. Custom automation outputs are a standard feature.

- **Tooling Automation Capability** options include pick-and-place systems, conveyor pass-through and/or part feed systems. Control for automation can be added to the core software.

- **Digital Auto-Tuning** accurately and automatically adjusts the frequency of the magnetic drivers to within 0.01 Hz. This provides optimum performance for each separate tooling assembly.

- **Eliminating the Swing Frame** reduces the mass of the upper tooling bridge. This permits the welder to handle a wider range of tooling weights. It also provides more clearance for tooling.

- **Optimized Magnetic Drive Heads** enable the welder to handle heavier tooling at higher frequencies than competing units, with resulting shorter weld times.

- **Commercial Subassemblies** are used to ensure a longer and more economical service life than units built with proprietary components. These readily available items also lessen the need for expensive field service calls.

- **Reinforced Subframe** and four ultra–rigid guide rails resist side loads and provide greater stability. This results in more accurate and repeatable lift table positioning.

- **Digital Linear Encoder** is directly attached to the lift table to accurately measure and control the table's position to within 0.01mm (0.0004 inch).

- **Hydraulic Lift/Clamp System** is self–contained. Uses standard off the shelf components for ease of maintenance.

- **Weld By Time or Distance** is standard (either absolute or meltdown). Built in sensors give you the choice of triggering by position or by part contact.

- **Parameter Monitoring** with programmable upper and lower limits of time, distance, amplitude and force.

- **Auto-Ping** allows an auto-tune automatically after a selected number of cycles.

- **Selectable Trigger** by position or by zero motion.

- **A two-phase drive** has been incorporated into these 5000 Series vibration welders.

- **Standard Software** supports five part presence sensor inputs, and controls up to four programmable valves, vacuum and profiling.

- **Dedicated Sensor Input** for each programmable valve with the option to enable or bypass.
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SECTION 2

Health and Safety

General Considerations .......................................................... 9
Special Health Notice ............................................................. 11
Electrical Safety ................................................................. 11
Pneumatic Safety ............................................................... 12
Operational Safety ............................................................. 13
Hydraulic Safety ............................................................... 14
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General Considerations

Please observe these health and safety recommendations for safe, efficient, and injury-free operation of your welder. In this manual, the term *welder* and/or *machine* both refer to the linear vibration welder.

**Proper Installation** - Only operate the welder after all tooling is installed, and the hydraulic, pneumatic and electrical systems are properly setup.

**No Unauthorized Modifications** - Do not modify your welder in any way unless authorized to do so by Dukane. Unauthorized modifications may cause injury to the operator and/or equipment damage. In addition, unauthorized modifications will void the equipment warranty.

**Keep the Service Doors Closed** - Do not bypass or remove any interlocks. The magnetic drivers produce high electrical voltages which could cause injury or death. In addition, the hydraulic lift table produces more than 5,000 pounds of lift force.

**Grounded Electrical Power** - Operate this equipment only with a properly grounded electrical connection. Refer to the NEMA L16–30 wiring diagram in Figure 2-2 on Page 11. If there is any question about the grounding of your AC power, have it checked by a qualified electrician.

**Comply with Regulations** - You may be required to add accessories to bring the system into compliance with applicable OSHA regulations for machine guarding and noise exposure.

**Operate Safely** – Do not operate the welder if under the influence of alcohol or drugs. Read the warning labels on prescriptions to determine if your judgement or reflexes are impaired while taking drugs. If there is any doubt, do not operate the machine.

**WARNING**

Any fixture manufactured by a third party must comply with all OSHA and ANSI requirements. All fixtures must be guarded as necessary.

Dukane does not assume any responsibility or liability for fixtures manufactured by the customer or any third party manufacturer.

**WARNING**

Never operate the vibration welder with any of the service doors open. This is an unsafe practice and can result in injury or death.

Continued
General Considerations

**Foot Switch** - Do not use a foot switch. Using a foot switch in place of the optical touch finger switches (activation switches) violates OSHA regulations.

**System Electrical Cabling** - Electrical power must be off when connecting or disconnecting electrical cables.

**Do Not Wear Loose Clothing or Jewelry** - These or similar items can become caught in moving parts.

**Stay Alert** - Watch what you are doing at all times. Use common sense. Do not operate the equipment when you are tired or distracted from the job at hand.

**Sound Level**

The maximum allowable sound pressure in normal factory environments is 80 db. without hearing protection. Vibration welding may exceed this level depending upon the size, type, and geometry of the parts being welded. The customer is encouraged to test the level of sound produced by their application and provide employee hearing protection if the time weighted average exceeds 80 db A.

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**CAUTION**

Parts being joined with the linear vibration welder will at times vibrate at audible frequencies. Wear ear protectors to reduce annoying or uncomfortable sounds. In addition, baffles, sound enclosures, or materials that absorb sound may be located to surround the system.

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**CAUTION**

When making cable connections to system equipment or disconnecting cables from system equipment, make sure electrical power to the system is turned off, and AC power cords are removed from their receptacles. After the cables have been securely connected and the connections and cable routing checked a final time, the power may be restored.
Special Health Notice

Certain plastic materials, when being processed, may emit fumes and/or gases that may be hazardous to the operator’s health. Proper ventilation of the work station should be provided where such materials are processed. Inquiries should be made to the U.S. Department of Labor concerning OSHA regulations for a particular plastic prior to processing with Dukane welding equipment.

Electrical Safety

AC Power Receptacle

The power cord used on the Dukane vibration welder, Models 5300, 5500, and 5700, has a three-pole, four-blade, grounding type plug designed for 3-Phase 480 VAC at 30 Amps. The 480 VAC 3-Phase plug configuration is shown in Figure 2-1. It is designed to be plugged into a 480 VAC, 3-Phase, 30 Amp, NEMA type L16-30R receptacle as shown in Figure 2-2.

**NOTE:** Models 5900 and 5960 are not supplied with a power cord.

Do not alter the plug or receptacle in any way. Do not use an extension cord. If there is any question about the grounding or phasing of your AC power, have it checked by a qualified electrician. See custom input voltage note in Section 13 – Specifications - AC Power.

AC Power Disconnect

Always turn off the AC power at the disconnect switch before opening any of the service doors or attempting any maintenance on the welder. The recommended practice is to also tag and lock out the disconnect switch. The CE-compliant AC disconnect is standard. Turn the switch to the off position as shown, then pull the center horizontal bar out to insert a lockout as shown in Figure 2-3. The handle style AC disconnect, which is also available, is shown in Figure 2-4 with a lockout and tag.

Electrical Cabinet Door

The electrical cabinet service door is mechanically interlocked to the CE-compliant AC power disconnect. The cabinet door cannot be opened without first turning off the AC power.
Pneumatic Safety

Always isolate and lock out the compressed air before performing any maintenance on the vibration welder. The isolation and lockout device is shown in Figure 2-5. The safety isolation device is installed externally, and is in series with the internal compressed air filter. When activated, this device will isolate the compressed air supply from the air filter and pneumatic actuators in the welder. This device complies with OSHA regulations.

Compressed air can develop a considerable amount of force. The force is large enough to inflict serious injury. The vibration welder uses two air cylinders which convert the air pressure to mechanical movement for opening and closing the front access door.

With the rear service doors open, you can see the compressed air filter and pressure regulator on the left side. This is shown in Figure 2-6. The filtered air is fed to the air distribution manifold and pneumatic valves. Refer to Section 11 - Maintenance for information on the filter element and how to replace it.

**WARNING**

Never operate the vibration welder with the electrical service door open. This is an unsafe practice and can result in injury or death.
Operational Safety

The service doors are interlocked to prevent access while the welder is energized. If either of the hydraulic doors are opened, the vibration welder will shut down. The electrical cabinet service door is shown in Figure 2-7. It cannot be opened without first turning off the CE-compliant AC disconnect. The rear hydraulic service doors are identified in Figure 2-8.

The front loading area is protected by a sliding access door. This door is operated by two air cylinders which are driven by compressed air. The door raises at the start of a welding cycle to prevent access to the tooling and lift table. The door also serves as part of the sound enclosure. Sensors on the access door will stop the welder if the compressed air fails and allows the door to open partially during a weld cycle.

The safety light curtains prevent any access to the loading area once the machine cycle has started and before the access door is fully closed. Breaking the light beam while the door is in transition will cause the machine to halt operation. The light curtains are identified in Figure 2-7.

WARNING
Never attempt to remove the filter housing while the compressed air is on. Turn off the compressed air using the pneumatic lockout device, and make sure the pressure gauge reads zero.
Hydraulic Safety

The hydraulic system is self-contained. It normally operates at between 1,000 and 1,200 psi. It is however capable of operating up to 1,500 psi. It is unsafe to attempt to bypass the interlocks and operate the welder with the rear service doors open. The interlocks are located at the top of the electrical and hydraulic service doors. Figure 2-9 shows a door interlock device and the mating receptacle in the cabinet.

The vibration welder may be shipped with the hydraulic fluid reservoir full or drained, depending on whether the destination is local or international. Before operating the welder, hydraulic fluid must be added to the reservoir if it is empty. This is covered in Section 3 – Installation, Hydraulic Drive.
SECTION 3

Installation

Unpacking .................................................. 17
Welder Placement ........................................ 17
AC Power ................................................... 19
Compressed Air ............................................ 21
Hydraulic Drive ........................................... 22
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Unpacking

The vibration welder is normally shipped on a skid with tie-down boards inserted through the forklift channels and bolted to the skid (see Figure 3-1). If tooling was ordered, it may be left installed if the alignment is complex. If the tooling is heavy, it may be removed from the welder and packaged separately. The welder may be shipped with the hydraulic fluid reservoir full or drained, depending on whether the destination is local or international. System documentation was placed in a pocket at the inside bottom of the electrical service cabinet door (see Figure 3-2). This material includes: the user's manual, electrical, pneumatic, and hydraulic diagrams, and bills of material. Store the documents there for safekeeping and future reference. The forklift channel cover plates are also in a box in the electrical cabinet.

Welder Placement

Ventilation

When plastic materials are being processed, they may emit fumes and/or gases that could be hazardous. Make sure you have adequate ventilation whenever these plastics are processed.

Part Handling Considerations

Allow space on either side of the vibration welder for material handling, work pieces, and fixtures. Consider whether the operator is sitting or standing. The operator should be at a comfortable height relative to the activation switches to prevent operator fatigue. Provide ample room so the movement of the operator does not interfere with part handling. Also allow room for future expansion of automation equipment or pass-through conveyor systems. See the space requirements drawings in Section 13 - Specifications.

Energy Sources

Refer to Section 13 - Specifications for the AC power requirements and for the compressed air requirements of your model.
Floor Area

The floor area required for the vibration welder depends on the model and capacity of the machine. Detailed dimensions are given in Section 13 – Specifications. The left side of the welder does not require access and can be placed close to a wall if desired. The front of the welder should have a minimum clear space of at least 36 inches for the operator work area. The total minimum recommended floor area is listed in Table 3-I.

<table>
<thead>
<tr>
<th>VW Model</th>
<th>Width (in/m)</th>
<th>Depth (in/m)</th>
</tr>
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<tbody>
<tr>
<td>5300</td>
<td>48 / 1.22</td>
<td>112 / 2.84</td>
</tr>
<tr>
<td>5500</td>
<td>125 / 3.18</td>
<td>105 / 2.67</td>
</tr>
<tr>
<td>5700 &amp; 5700 LPT</td>
<td>143 / 3.63</td>
<td>117 / 2.97</td>
</tr>
<tr>
<td>5900 &amp; 5900 LPT</td>
<td>163 / 4.14</td>
<td>127 / 3.23</td>
</tr>
<tr>
<td>5960 &amp; 5960LPT</td>
<td>158 / 4.00</td>
<td>130 / 3.30</td>
</tr>
</tbody>
</table>

Table 3-I Minimum Floor Area by Model

Forklift Channels

The vibration welder has built-in forklift channels. Cover plates for the front and rear channels are supplied. The front channels are shown in Figure 3-3. Directly above the channels the stenciling reads LIFT HERE. The rear forklift channels are shown in Figure 3-4 without the cover plates installed. During shipping, tie-down boards are inserted through these channels to secure the welder to the skid as shown in Figure 3-1.

Determine your forklift requirements by referring to Section 13 – Specifications, for approximate machine weight.

Once the welder is positioned in its final location, secure the four cover plates over the front and rear forklift channels. The cover plates have 1.5 inches of sound-absorbing foam on their back to act as acoustic dampers to reduce the reverberations emitted from the forklift channels. The covers are shown in Figure 3-5. The covers must be installed so the vibration welder will meet the specified sound emission requirements of 80 dBA during operation.

WARNING

Do not operate the vibration welder without the front and rear forklift channel cover plates. These plates serve as acoustic dampers to reduce the reverberations from the steel channels.
Leveling

The vibration welder is leveled at the factory. The feet are self-leveling to an extent. If your floor is close to level, no adjustment should be required. You should, however, check the lift table with a 3-foot carpenter's level to verify the trueness of the machine’s level. We recommend that the vibration welder be leveled to within one-half degree. One-half degree corresponds to approximately five-sixteenths of an inch vertical deviation across 36 inches, or 9mm over 1000mm (\(\tan 0.5° = 0.00873\)). If any adjustment is required, the feet have lock nuts on threaded studs to level the welder.

AC Power

AC Requirements

Refer to Section 13 - Specifications, Power Requirements, AC Power.
AC Disconnect Switch

The AC power cord is directly connected internally to the AC disconnect switch. To turn the AC power OFF, twist the red circular knob counterclockwise until it is pointing left to the Green OFF position as shown in Figure 3-6. To turn the AC power ON, twist the red knob clockwise until it is pointing up as shown in Figure 3-7.

Disengaging Switch Coupling

To open the electrical cabinet, the CE-compliant disconnect switch must be in the OFF position as shown in Figure 3-6. First, unlock the door handle if it is locked. Pull the door handle out and then twist it to the left. This will release the door latch. Then, press the yellow tab on the disconnect housing against the red knob while keeping the switch in the OFF position as shown in Figure 3-8. This will release the knob coupling from the disconnect shaft and allow you to pull the door open.

To close the door, press the yellow tab on the disconnect housing against the red knob while keeping the switch in the OFF position. This opens the coupling lock. Push the door closed to engage the coupling, but do not force it. When the shaft coupling is engaged, release the yellow tab. Then, twist the door handle back to the right, and push the handle in to latch the door securely.
Compressed Air

The welder requires a supply of clean, dry, compressed air at 75 to 90 psi. The connection is made using 1/2 inch O.D. tubing at the pneumatic lockout device shown in Figure 2-5 and 7-2. The filter and regulator are inside the hydraulic cabinet and are shown in Figure 3-9.

The compressed air from the pneumatic lockout enters from the left. The filtered air exits to the right. The embossed arrow on the housing, below the pressure gauge indicates this airflow direction. The filtered air is fed up to the air distribution manifold above the filter (see Figure 2-6), which contains the pneumatic control valves. Each pneumatic device has its own remotely-controlled valve unit and flow controls. Adjusting the valves and flow controls is covered in Section 9 – Optimizing Performance.

The pressure gauge displays the pressure of the filtered air. It is calibrated in psi. To adjust the pressure, lift the adjustment knob until the orange band is visible at the base of the knob. Turning the knob clockwise (when viewed from above) will increase the pressure. Push the knob back down to its locked position to prevent any changes in the setting.

The front cover of the gauge can be removed to adjust the set points. Twist the cover counterclockwise about 1/8 th of a turn and gently pull to remove the cover. Position the two green pointers at the desired lower and upper limits. They are normally set at the factory to about 75 psi and 85 psi (5.1 bar and 5.7 bar respectively). These pointers are only visual indicators and do not override the regulator setting.

The canister below the pressure gauge contains the air filter and moisture trap. The air filter is self-draining of any accumulated moisture by means of a drain hose which exits the bottom of the machine. Keep this in mind if moisture draining to the floor could cause a problem. The filter has an internal float, and will empty under pressure when approximately 25 cm³ = 25 ml (0.85 ounce) of water has accumulated.

Refer to Section 11 - Maintenance, for complete information on the instructions for replacing the filter element.

**WARNING**

Never attempt to remove the filter housing while the compressed air is on. Turn off the compressed air using the pneumatic lockout device and make sure the pressure gauge reads zero.
Hydraulic Drive

Self–Contained System

The lift table is raised and lowered by hydraulic pressure. The hydraulic system has its own motor, pump, filter, reservoir, cooling system and programmable regulator. The valves and pressure regulator are controlled by parameters contained in a setup file and controlled by the welder’s PLC.

The drive unit is shown in Figure 3-10. The hydraulic pump is capable of generating a maximum of 1,500 psi (102 bar). The pressurized fluid drives a hydraulic cylinder which is located under the table and has a maximum stroke of 20 inches (508 mm). The maximum lift or clamp force available at the piston is a function of the hydraulic cylinder diameter. The specifications for each model are given in Table 3-II. The maximum programmable force is less than the available force. The program limits are given in Section 6 – Touch Screen, Page 64.

**Figure 3-10** Hydraulic Drive Unit

<table>
<thead>
<tr>
<th>VW Model</th>
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<th>Scale Factor</th>
<th>Max. Available Lift Force at Piston</th>
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<tr>
<td>5300</td>
<td>2</td>
<td>3.14</td>
<td>3140</td>
</tr>
<tr>
<td>5500</td>
<td>2</td>
<td>3.14</td>
<td>4710</td>
</tr>
<tr>
<td>5700 &amp; 5700LPT</td>
<td>2.5</td>
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</tr>
<tr>
<td>5900 &amp; 5900LPT</td>
<td>2.5</td>
<td>4.91</td>
<td>7360</td>
</tr>
<tr>
<td>5960 &amp; 5960LPT</td>
<td>(2) 2</td>
<td>4.71</td>
<td>7065</td>
</tr>
</tbody>
</table>

1 lb = 0.4536 Kg; 1 lb = 4.448 Nt; 1 Nt = 1 Joule/meter

**Table 3-II** Lift/Clamp Force by Model
Adding Hydraulic Fluid

The vibration welder may be shipped with the hydraulic fluid reservoir full or completely drained, depending on whether the destination is local or international. Before operating the welder, hydraulic fluid must be added to the reservoir if it is low or empty. The reservoir has a capacity of 20 U.S. gallons (75.7 liters). Normal operating level is about 18.5 gallons (70 liters). This corresponds to a sight glass reading of 50%.

Note, model VW5300 reservoir has a capacity of 10 gal (38 liters).

Dukane suggests DTE® 25 because of it's higher temperature breakdown rating. Refer to Table 11-I for hydraulic fluids equivalent to DTE® 25.

To fill the reservoir, unscrew the filler cap shown in Figure 3-11. Pull out the strainer/filter. Add hydraulic fluid until the sight glass level gauge reads 50% as shown in Figure 3-12. There will still be fluid in the hydraulic cylinder so it is not necessary to completely fill the reservoir. Replace the strainer/filter and screw the filler cap back on. After the table has been cycled a few times, recheck the fluid level. It may be necessary to add more hydraulic fluid if the sight glass level has dropped below 50%.

CAUTION

Hydraulic fluid level should be maintained so that it always shows in the fluid level sight glass. This is important to prevent condensation from collecting on the inside of the reservoir and the heat exchanger tubes.
This page intentionally left blank
Control Panel Layout ........................................ 27
Operational Switches ......................................... 29
   Light Curtain .................................................. 30
   AC Utility Outlet ............................................. 31
   Vacuum On/Off Button .................................... 31
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Control Panel Layout

The control panel contains all of the switches, indicator lights and the display to set up and operate the vibration welder.

The control panel is shown in Figure 4-1. Brief explanations of the primary panel controls are given below.

A Color Touch Screen Display

This touch screen uses color active matrix thin–film transistors (TFT) for high contrast and wide viewing angle even under high ambient lighting conditions.

The display provides for all monitoring and programming of the weld cycle.

Refer to Section 6 - Touch Screen for information about the function of the screen and its menus.

B Main Power (light)

When the main AC switch is turned on, this light is energized by the power supply, and it lights up. When this is lit, MAIN POWER indicates the +24V control power supply is ready.

C In Cycle (light)

The green IN CYCLE light is lit whenever the vibration welder is in the RUN mode. The light flashes when the welder has started a weld cycle.

When the weld cycle is done, the flashing stops and a steady green appears. The light goes out when the welder is switched to SETUP mode.

D Alarm (light)

The red ALARM light flashes during any kind of alarm condition such as the E-STOP button being pushed or when a service door is open. The light flashes in either the RUN or SETUP modes, and continues to flash, until the alarm condition has been cleared.
E E-STOP Reset (button)

Pressing the button enables the operator to reset the welder when it is initially turned on or to clear an aborted cycle caused by:

1. Pushing the EMERGENCY STOP (E-STOP) button.
2. Opening the rear service doors.
3. Required reset on initial power up.

F Hydraulic Pump On (light/switch)

The hydraulic system is turned on by pushing in the green button. When the hydraulic pump is activated, the switch is illuminated green. When the hydraulics are off, the green button is dark. The lift table cannot be moved if the hydraulics are off. This is a push-on only switch. The hydraulic pump is turned off by:

1. Pushing the EMERGENCY STOP button in.
2. Opening the rear service doors.
3. Turning off the AC power

G E-STOP (button)

The E-STOP button on the control panel is shown in Figure 4-1. The left mounting box contains an emergency stop (E-STOP) button next to the left OPERATE switch as shown in Figure 4-2. Both of these switches function the same, and pressing either switch stops the weld cycle and freezes the lift table in its current position.

Both emergency stop buttons must be in their reset position before the lift table can be lowered and the welder restarted.

NOTE
Follow the instructions shown in the message area at the top of the touch screen.
Opti-Touch Operate Switches

Located directly in front and below the sliding access door are two small mounting boxes that each contain an optical OPERATE switch. Their placement is shown in Figure 4-2.

These identical switches use Infrared (IR) sensors. They comply with OSHA and CE safety standards. The operator can begin a weld cycle using either the left or the right switch alone.

Each optical-touch switch has a small red LED in the left front illuminated whenever the power is on, as shown in Figure 4-3 and 4-5. When the operator places his finger in the tray, a second LED at the right rear also illuminates to indicate the switch has been activated.

Figure 4-2 Operate Switch, Vacuum, and E-Stop Buttons, Light Curtains, and Utility Outlet Locations

Figure 4-3 Left Operate and E-STOP Button
Light Curtain

The light curtains are identified in Figure 4-2.

The right light curtain (receiver) contains five status LEDs at the top of the housing. See Figure 4-4. If these are green, the LEDs indicate the area protected by the light curtain is clear.

If the protected area is not clear, the Status LEDs will turn red. Refer to the Light Curtain Operating Manual which is located in the system documentation storage pocket (See Figure 3-2).

If the light curtain beam is broken before the front access door has completely closed, the welder will halt.

Light curtain is active in auto mode from cycle start to door closed. Once door is closed in auto cycle, light curtains are muted (not active).

Light curtains are active when door returns home and remain active until all machine motions are completed. (Be aware if you select valves to move a slide or eject part, light curtains remain active until these motions are completed). Light curtains are also active anytime you ask for machine movement in Manual mode.

**K AC Utility Outlet**

An AC utility outlet is provided on the front control panel (see Figure 4-2). The duplex outlet is a standard feature and has snap–close covers. For machines intended for use in North America, the outlets are rated at 4 Amps total at 120 Volts AC.

For machines configured for use outside North America, the outlets are wired for the voltage appropriate for use in the intended country of installation. The 4 Amp rating is the maximum combined current that should be drawn from the outlets. The utility outlet has its own circuit breaker in the electrical cabinet. Refer to Figure 10-2 for the location of the AC outlet breaker inside the electrical cabinet.

**L Vacuum On/Off Button**

The vacuum holds parts in place on the upper tool. This button allows the operator to control the vacuum manually. Pressing the button turns the vacuum on or off. This is typically used when setting up the machine, and when making adjustments to part placement. The feature can be used in Manual or Auto modes. See Figure 6-26 on Page 67. If Vacuum is set to “Off” or any of the vacuum settings are set to “Auto”, the vacuum switch will not work in Manual mode.

![Figure 4-5](image-url)
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SECTION 5

Normal Weld Cycle

Parts Loaded ........................................... 35
Initiate Weld Cycle ................................. 35
Access Door Closes ................................. 35
Clamping Phase ................................. 36
Welding Phase ....................................... 36
Hold Phase ........................................ 36
Release Phase ........................................ 37
Parts Removed ....................................... 37
This page intentionally left blank
Parts Loaded

Both Parts in Lower Tooling

The most common arrangement places both parts in the lower tooling, with the part designed to mate with the upper tooling placed on top. Some parts are self-aligning, some have small tabs or breakaway pins and sockets. These are ideally suited to be loaded together into the lower tooling.

Upper Part in Upper Tooling

Trying to place two parts that are not self–aligning in the lower tooling in a production environment, can result in crushed parts if they are not accurately positioned. Parts which are not self-aligning or present alignment problems require the upper part to be held in the upper tooling. The upper tooling may have an optional vacuum retention feature to hold the part in place. This configuration is shown in Figure 5-1. The button to activate the vacuum retention is located either in place of the left operate switch or on a separate switch housing next to the right operate switch and reset button.

Initiate Weld Cycle

The operator places parts in the tooling, making sure the light curtain beam is not obstructed. The operator then presses both Opti-Touch operate switch to initiate a weld cycle. The green IN CYCLE indicator (C in Figure 4-1), starts flashing, and the welder executes the currently loaded setup file. Each setup file determines the weld mode, vibration amplitude, weld pressure and contains values for all the required parameters.

Access Door Closes

As soon as the green IN CYCLE indicator starts to flash, the front access door starts to close. As the door slides up, hydraulic pressure causes the lift table to begin rising. During the access door transition, the area protected by the light curtain beam cannot be broken. If this protected area is penetrated before the door closed sensor is activated, the door will immediately stop. To recover from a light curtain fault, press the HOME MACHINE button. Reference Section 8 – Machine Operation, Home Procedure, Page 109.
If the compressed air supply is not turned on, the door will not be able to move. In this case, the lift table will begin to move, but will stop after a short time because the door-open sensor has not been released. Again, the welder will stop and must be reset.

Clamping Phase

As the access door begins to close, the lift table rises until it reaches either the preset trigger position or zero motion is achieved (depending on whether trigger-by-position or trigger by zero motion force is selected). This is illustrated in Figure 5-2.

Welding Phase

When the table reaches the trigger point, the magnetic drive heads are energized for the programmed time (typically a few seconds) or until the programmed collapse distance is achieved. This is illustrated in Figure 5-3. The drive head vibrates the upper part against the fixed lower part, under relatively high pressure which results in frictional heating. This heating melts the joint surfaces and continues until the melt layer has sufficiently penetrated the material. The frequency of vibration is between 200 and 240 Hz, and the total vibration amplitude can be set to between 0.020 and 0.070 inches (0.5 to 1.8mm). The weld cycle can be set to run for a predetermined time (0.01 to 30.00 seconds) or until a specified collapse distance (0.10 to 8.00mm) is achieved.

Hold Phase

After the welding phase is complete, the parts are held together under pressure for the hold time. This allows the molten plastic to fuse together and solidify. Clamping under pressure while the bond hardens. This clamping also corrects any warping problems by forcing the parts into the proper geometry. The hold pressure is specified separately from the welding pressure to control flash and produce a stronger weld by reducing shear thinning.

NOTE
Hold time should be no less than half of actual weld time. It is usually best to set hold time equal to weld time.
Release Phase

The lift table now lowers to its starting or load position as illustrated in Figure 5-4. At the same time, the access door begins to open. Again, the area protected by the light curtain cannot be penetrated until the access door is fully open. If the protected area is penetrated during the door transition, the welder will immediately stop and must be reset.

Parts Removed

Once the access door is fully open and the table is at the load position, the IN CYCLE light will stop flashing. Now the assembled part can be removed as illustrated in Figure 5-5. A new set of parts is installed in the tooling, and the weld cycle can be started again.
SECTION 6
Touch Screen

Introduction ..................................................... 41
Screen Layout ..................................................... 41
Button Appearance ............................................. 42
Making Selections .............................................. 44
Virtual Keyboard and Keypad .................... 45
Top Button Bar - Quick Look ....................... 46
Side Button Bar - Quick Look ....................... 47
Logging In and Out .......................................... 49

Operation ......................................................... 53
Run Mode ......................................................... 53
Setup Mode ....................................................... 54
Operate Screen ................................................ 55
Setup Screen ..................................................... 62
Tool Setup Screen ......................................... 72
Utilities Screen ............................................... 78
I/O Table .......................................................... 89
Alarms Table ..................................................... 91
Touch Screen Banner ........................................ 99
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Introduction

This section will orient the operator to the touch screen features and to its basic operation.

Screen Layout

At the top of the touch screen, messages about the welder operation appear in the Banner position. See the figure below.

See Section 6 - Touch Screen Banner for a listing of possible messages.

Primary buttons are large and grouped in one of two location bars – top and side bars as shown in the figure below.

NOTE

A touch screen button is activated with the gentle, firm touch of a finger. When active, the touch cell changes color - in most cases this means from a lighter shade to a darker shade of color. Some buttons have an added indicator: a virtual LED that becomes green when activated and turns red when deactivated.

Figure 6-1 Button Bars
Large Button Appearance

When touched and activated, large buttons change appearance as shown in Figure 6-2. When a large button on the side bar is touched, the button changes color - from light gray, to dark gray. If a button has a virtual LED indicator, when activated, the LED is GREEN; when deactivated, the LED is RED. The top button bar shown in Figure 6-2 illustrates five buttons with virtual LEDs. Four are deactivated and one is activated.

![Machine ready for setup screen](image)

**Figure 6-2** Large Active Buttons
Small Button Appearance

Small buttons are shown as being touched (changing from deactivated to activated, or vice versa) when their border and interior change color. When enabled, the interior and border change from DARK GRAY to LIGHT GRAY. When active, the interior becomes GREEN.

See the examples in Figure 6-3. Also see Valves and Sensors as a part of the Tool Setup screen description below.
Making Selections

From a Pull-down Menu

In the example shown in Figure 6-4 - a detail of the Tool Setup menu - Valve 1 will extend At Cycle Start.

To make this selection:

1. Touch the Valve 1 Extend box. The box activates, and the pull-down menu appears as shown.
2. From the pull-down menu, touch AT CYCLE START. The selection is highlighted.
3. Confirm the selection by touching AT CYCLE START a second time. The confirmed selection will then appear in the Valve 1 Extend box when not selected.

Button Availability

Buttons that are available are distinct with black lettering. Buttons not available are less readable, and their lettering is white. See the example shown in Figure 6-5.

Button availability can be based on the user's login, or current selections.

![Figure 6-4 Pull-down Menu Detail](image)

![Figure 6-5 Button Availability](image)
Virtual Keyboard

When it's necessary to fill in an entry box with text a virtual keyboard appears, as shown in Figure 6-6.

1. Touch the appropriate keys, and the results appear in the preview area.

2. When finished making the entry, touch the ✔ key.

3. Whatever was entered in the preview area is then accepted.

Figure 6-6  Virtual Keyboard

Virtual Keypad

When there is a need to fill in a numeric entry box a virtual keypad appears, as shown in Figure 6-7.

1. Touch the appropriate keys, and the results appear on the keypad display.

2. When finished making the entry, touch the ✔ key.

3. Whatever was entered in the preview area is then accepted.

Figure 6-7  Virtual Keypad
Top Button Bar - Quick Look

Units of Measure - Push this button to change the units of measure displayed on the screen.
M = Metric System; E = English System.

Job File - The file name identifying the current setup.

Date and Time - These values are assigned by the interface.

Job Description - A description of the current setup.

Tool ID - An identifier assigned by the interface.

Figure 6-8  Top Button Bar

Main Buttons

The main buttons in the top button bar are Operate, Setup, Tool Setup, Utilities, I/O Table, and M/E.

Use of these buttons is related to the panel mode that has been selected – Run Mode or Setup Mode.

In Run Mode, Operate, I/O Table and M/E can be used.

In Setup Mode, Operate, Setup, Tool Setup, Utilities, I/O Table and M/E can be used.

The uses of the buttons are described in the next section - Operation.
Side Button Bar - Quick Look

Dual-function Button:
Run Mode/Setup Mode.

Table Up, Table Down buttons control raising or lowering the lower fixture table.

Alarms - Provides access to a list of alarms.

Help - Provides help for the feature being used.

Logged In - Who is currently logged in.

Sliding Door - Control opening and closing the front door.

Home Machine - Brings the welder to a starting point.

Language - Choose a primary and secondary display language.

Figure 6-9 Side Button Bar

Sliding Door

Touch the Sliding Door button, and its pop-up window appears as shown in Figure 6-10 below. Touch either Close or Open continuously until the door comes to the desired position.

Table Up / Table Down

Touch the Table Up and Table Down buttons to manually raise and lower the lower fixture table.

Figure 6-10 Sliding Door Pop-Up Window
Home Machine

Homing the machine brings the welder to a defined starting point. To home the machine:

1. Touch and hold the Home Machine button until the door moves to its fully open position, and the table moves down to its starting position.
2. Release the Home Machine button.
3. The machine is now at its starting point.

Alarms

(Alarms are covered at the end of this section)

Choose a Language

Language refers to the language that appears on the panel display screen.

Below the Alarms button are buttons for primary and secondary language choices.

Flags provide a visual cue for whatever language has been chosen. In the figure to the right, English, as identified by the flag of the United States, is the language for the primary choice. Spanish, as identified by the Mexican flag, is the language for the secondary choice.

How to Select a Language

1. Go to the Utilities Screen.
2. Go to Secondary Language Selection pull-down menu.
3. Select a language.

Context Help

A Context Help key is located near the bottom of the side button bar, and is context-sensitive. Touch this key for helpful information related to the currently displayed information on the main screen.

A help window appears, when the Context Help button is touched.
Logging In and Out

Log In

Create User Profile - First Time Log In/Change Password

After the machine has been powered up, complete the login procedure as follows:

1. If the screen is not already active, a touch will activate it. The screen may take a few seconds to respond.

2. **Setup Mode** must be active as shown in the figure below. (If in **Run Mode**, toggle the **Run Mode** button and it changes to **Setup Mode**.) Touch the **Utilities** button on the top button bar. The green indicator on the button means the Utilities menu has been activated, and is shown on the main screen as shown in Figure 6-12 below.

![Figure 6-12 Log In - 1](image-url)

Utilities is active.

Setup Mode is active.

Touch, **Change Password**.
3. Create a new user profile and set the password:
   a) Login as Administrator.
   b) **Setup Mode** must be active.
   c) Go to the **Utilities** screen.
   d) Under Create New User, enter a user name in the New User Name field.
   e) Select a user level using the New User Level pull-down menu.
   f) Press the **Create User** button to accept.
   g) The default password will always be 1234.
   h) Log out as administrator.
   i) Login using the new user name and password.
   j) Go to the **Utilities** screen, to change your password.
   k) Under Change User Password, Enter 1234 in the Current Password field.
   l) Enter a new password and press the **Change Password** button to accept.
   m) Logout. Then finish the process with a login to test the new password.

4. **Delete User** – Under Delete Selected User, select a user’s name from the User to Delete pull-down menu. Then touch the **Delete User** button to remove the name from the list. Only an administrator can delete a user.

5. **Save/Restore Users** – Use this button to import and export user information to and from a USB memory device. Only an administrator can import and export user information.

---

**Figure 6-13  Log In - 2**

The user who is currently logged in.
Log In – After Creating a User Profile

1. Touch the Log In box in the upper left-hand corner – the one with the name of the user that is currently logged in.

2. A User Login window appears.

3. Select the name from the drop-down list. A password entry box appears, and the virtual keyboard appears. See Figure 6-14 below.

4. Enter the password. When finished making the entry, touch the key.

5. The Log In box will show who is logged in. User Login will close when the correct password is entered.

Figure 6-14 Log In Keyboard
Log Out

1. To log out, touch the Log In box.
2. A User Login window appears.
3. Touch the Logout button on the User Login window.
4. Confirm that logout is completed by checking what appears in the Log In box. It should show "OPERATOR".
Operation

Run Mode

Figure 6-15 below shows that the dual-function mode button (Setup / Run) has been pressed so that Run Mode is active.

Notice the limited number of choices available while in Run Mode:

**Top Button Bar** – Operate, I/O Table, and M/E are available.

**Side Button Bar** – Home Machine, Alarms, Language (Primary and Secondary), and Context Help are available.

![Run Mode is active.](image)

Figure 6-15  Run Mode is Active
Setup Mode

Figure 6-22 below shows that the dual-function mode button (Setup / Run) has been pressed so that Setup Mode is active. Notice that ALL choices are available for Setup Mode along the top button bar and bottom button bar:

- Top Button Bar – Operate, Setup, Tool Setup, Utilities, and I/O Table.
- Side Button Bar – Sliding Door, Table Up, Table Down, Home Machine, Alarms, Language (Primary and Secondary), and Help.

Figure 6-16  Setup Mode - Operate Screen

NOTE
Refer to Operate View for more information about the Operate screen.
Operate View (Run & Setup Mode)

While in Run Mode or Setup Mode, touch the Operate button on the top button bar to activate the Operate screen. See figure 6-17 for a sample screen. Definitions of fields and buttons are shown below.

![Operate View](image)

**Figure 6-17** Run Mode - Operate Screen

While in Run Mode, the Operate screen functions as a monitoring display. Cycle information can be reviewed live. No system programming can be done from this screen. Alarm Limits, History, Event Log, and Graph are available button choices within the Operate screen.

**Definitions and Functions**

**Weld Time** – The amount of time the vibrating head generates frictional heat across the work surface.

**Hold Time** – The amount of time the lift table maintains the clamping portion of the weld cycle. This allows the welded surface to become solid. Hold time will start after the weld time has been reached.
Total Collapse – A combination of weld and hold distance.

Weld Force – The force that is applied across the work piece during the weld time.

Amplitude – This peak-to-peak value is the total amount of horizontal movement of the tooling.

*For example:* An amplitude of 1.3mm means the upper tooling fixture is driven 0.65mm to the left, back to the center, then 0.65mm to the right. The fixture goes back to center for a total cycle amplitude of 1.3mm.

System Force – This is the force that the hydraulic system is generating at a given moment.

Force Across Part – The force that is applied across the work piece.

Frequency – This is the frequency at which the tool is running.

Part Counter – This is the total number of parts processed.

Suspect Part Counter – This is the total number of suspect cycles.

Drive Current – The amount of current output by the drive.

Reset Part Counter – This button has no sub screens and resets the part counter to zero. *Only the Process Engineer or the Administrator can reset the counter.*
Alarm Limits (Run & Setup Mode)

**Optional** – If *latch On suspect part* is enabled with the password set, then the alarm limit screen will pop up automatically when there is a process fault. A password is required to gain access to the machine controls on the HMI. All the process values on the screen are read only. Programming the process limits is done in Setup Mode. See **Section 6 - Setup** for more information.

Figure 6-18 shows how the Alarm Limits pop-up window appears on the Operate screen.
**Upper Limit** – This is the maximum allowable value that could occur during a weld cycle. A green background for the entry box means the actual value is less than the upper limit. As is the case in the example, a red background for the entry box indicates the actual value is greater than the maximum value.

**Actual** – This refers to the current values taken from the cycle in progress.

**Lower Limit** – This is the minimum allowable value that could occur during a weld cycle. A green background for the entry box means the actual value is greater than the lower limit. A red background for the entry box means the actual value is less than the lower limit.

Touch the **Close** button to close the Alarm Limits pop-up window. This button will only function if a password is entered or if a password is not required.

---

**NOTE**

The close button will only work if a password is not required.
History (Run & Setup Mode)

Touch the **History** button to activate the History screen. A sample screen and definitions of terms are shown in Figure 6-19.

The **History** screen can display cycle data up to 24 hours. A new history file is created every 24 hours. The machine will save the last 100 days of cycle data. Files that are older than 100 days will be overwritten. Red cells indicate values that are out of range.

- Touch the **Page Up** button to move up 10 entries.
- Touch the **Page Down** button to move down 10 entries.

**Save to USB** – Touch the Save to USB button to copy the most current History Log to USB 1 or USB 2. If you would like to copy more than one History Log, go to Utilities>Data Log Control>History Log - to view options.
Event Log (Run & Setup Mode)
The Event Log makes a record of every event. It records the user, which setup is used, and any process parameters that are changed. The Log also keeps a record of the old values and new values. The Log can display previous events up to 24 hours old. A new log file is created every 24 hours. The machine will save up to the last 100 days of events. Files that are older than 100 days will be overwritten.

**Save to USB** – Touch the Save to USB button to copy the most current Event Log to USB 1 or USB 2. If you would like to copy more than one Event Log, go to Utilities>Data Log Control>Event Log - to view options.

**Figure 6-20** Run Mode - Event Log
Graph (Run & Setup Mode)

Touch the **Graph** button to activate the Graph screen. A sample screen and definitions of terms are shown in Figure 6-21.

![Graph Screen](image)

**Figure 6-21** Run Mode - Graph Screen

The graph illustrates a graph of the Total Collapse, Amplitude, and Force for the last cycle.
Setup (Setup Mode Only)

The Setup view is only selectable when in Setup Mode. Setup is used to program most elements of the weld cycle.

Touch the Setup button on the Top Button Bar to activate the Setup screen.

A sample screen and definitions of terms are shown below.

![Figure 6-22 Setup Mode - Setup Screen](image)

### Part Description

This is used to uniquely identify this setup. The name of the setup can be up to 21 characters long.
**Trigger By**

Choose from two trigger methods:

**Trigger by Zero Motion** – This position is variable and determined using a set of unwelded parts. Vibration is triggered when the lift table stops movement, indicating that the parts are clamped.

This trigger method is advised when parts are inconsistent in height or warped such that the welder is used to "flatten" the parts into shape prior to welding.

When "Trigger by Zero Motion" is chosen, a user will also set a table slowdown position. This ensures that the welder will not crush unwelded parts by collapsing them at full speed. A pop-up window appears as is seen in Figure 6-23 below. This aids in setting up the table slowdown position.

The real time position of the table appears in the Table Position box.

1. Place a set of unwelded parts in the tool.
2. Close the tool manually until desired table position is reached.
3. Press the Set Table Slowdown button to set the position.
4. A message is displayed confirming table shutdown has been set.

**Trigger by Position** - Vibration begins when a programmed table height is reached.

This trigger method is advised when parts are fragile and / or are very consistent in height.

This trigger method automatically sets the table slowdown position to 2" (50mm) before the programmed trigger position.

Program the desired position in the Table Position entry box.
Weld By

Choose from two weld modes.

**Distance** – This is the amount of added collapse (distance) needed beyond the starting weld position. Welding continues at the specified pressure until the weld distance is achieved, or until the weld time limit has been reached.

**Time** – Maintains friction across the work piece until the weld time has elapsed.

*Both modes have a Hold Time that starts after the primary mode limit (distance or time) is reached.*

Weld Amplitude

This is the total amount of horizontal vibrational movement of the tooling. This is a peak-to-peak value. An amplitude of 1.3 mm, for example, means the upper tooling fixture is driven 0.65 mm to the left, back to center, then 0.65 mm to the right and back to center for a total cycle amplitude of 1.3 mm.

*Program limits for amplitude:*

- **Minimum** – 0.0197 inches / 0.5 mm
- **Maximum** – 0.070 inches / 1.778 mm

**Segments** – Use the pull-down menu next to Weld Amplitude to select between 1 and 5 segments. The example in Figure 6-23 above shows that 1 Segment has been chosen, and the distance is 0.500 mm. Segment 1 amplitude can be programmed for (0.0) amplitude if two or more segments are active.

Weld Distance

This sets the meltdown (collapse) distance (when welding by distance).

Weld Force

This is the hydraulic force being applied in an upward direction on the lift table during the weld.

Weld Time

The amount of time the vibrating head generates frictional heat across the work surface. Each weld segment has its own weld time.

Hold Force

The amount of force applied upward on the lift table during the hold time.
Hold Time
This is the amount of time the lift table maintains its clamping force on the work allowing the welded surface to solidify. Hold time starts after the primary mode limit (distance or time) is reached.

Frequency
Welding frequency is the rate of vibrational movement done at the resonant frequency of the system to maximize energy transfer.

Table Home Position
The table height an operator will use to load parts. The table height is programmable between 20mm and 500mm (.784 and 19.68 inches)

Trigger Limits
See Figure 6-24 for the Trigger Limits window. Set maximum trigger, minimum trigger, and set position from this window. This trigger limit is intended to alarm if the following conditions are detected during a weld cycle:
   a. Parts not loaded.
   b. A welded part is present.
   c. Parts not loaded properly.

These limits indicate that the table must stop moving under clamp position somewhere between the Trigger Maximum and Trigger Minimum or a fault is generated. Trigger Set represents the ideal location for parts clamping to occur.

Touch the DISABLE button when no trigger limits are desired.

Figure 6-24 Setup Mode - Set Trigger Limits
Table Options

The Table Options screen allows the operator to set these parameters:

- Table up and down speeds (in Setup Mode),
- Table position,
- Part clamp speed,
- Table lift pressure (force),
- Table cart position, and
- Tool change position.

Table Up Speed in Setup

Adjust the table Up speed (how quickly the table travels up) - in Setup Mode only.

Table Down Speed in Setup

Adjust the table Down speed (how quickly the table travels down) - in Setup Mode only.

Part Clamp Speed

Controls the deceleration speed prior to engaging the work piece. Deceleration occurs 50mm before your trigger position or table slow down setting.

Table Lift Pressure

The pressure the table uses during Setup mode and In Cycle when weld and hold forces are not used.

Table Cart Position

When the Move to Table Cart button is pressed, the table travels to the programmed table cart position.

Tool Change Position

When the Move to Tool Change button is pressed, the table travels to the programmed tool change position.

Figure 6-25  Setup Mode - Table Options

NOTE

Using a table cart is a quick and safe way of installing and removing tooling from the lift table.
Upper and Lower Limits

The limits section of the screen deals with setting upper and lower suspect part limits for some main welding variables: Time, Total Collapse (Distance), Amplitude and Force.

When each weld cycle is finished, the welder compares actual returned values with the programmed limits. If the values equal or exceed the limits, the part is considered suspect.

Setting the Limits:

1. Touch the entry box for the value to be entered, and the virtual keypad appears allowing the user to make a numerical entry.
2. Continue entering values in the entry boxes for both upper and lower limits until finished.

**NOTE**

Any limit set to zero will be ignored. Any combination of upper and lower limits or no limits are possible. The value of an upper limit must always be greater than the value of a lower limit.
Autotune Mode

Use this feature to automatically determine the resonant frequency of the vibrating Assembly.
(The upper assembly includes the springs, carriers and tooling.)

Before using the Autotune feature, attach the upper tooling securely to the springs and torque it to specifications. The linear vibration welder frequency is nominally 220 Hz. When Autotune is complete, a message is displayed.

*NOTE*

The acceptable frequency range is 195 Hz – 240 Hz.

*NOTE*

If Autotune is performed with no upper tool installed, the machine will alarm. This alarm can only be cleared after a successful Autotune is done.
(An acceptable frequency range was reached, and the upper tool is installed.)

Touch this button to start the Autotune.

Touch this button to turn Auto-Ping OFF and ON.

Touch this button to reset the Auto-Ping counter.

Touch this button to test the tool after it has passed the Autotune test.

Tool Frequency: Resonant frequency of the upper assembly. The welder runs the tool at this frequency.

**Weld Amplitude** – See Operate view > Weld Amplitude.

**Frequency** – See Operate view > Frequency.

**Current Amplitude** – This is the amplitude at the moment the Autotune or Run Tool tests are made.

**Q Factor** - The current Q Factor value.

**Stored Q Factor** - The Q Factor value from the last saved setup. This can be useful when changing tools back and forth to verify the Q Factor value is relatively the same as before.

**Auto-Ping** - When on, this feature automatically does an Autotune after a selected number of cycles are completed. The operator sets the counter with a preset range between 1 and 300 cycles.

*NOTE*

What is Q Factor?
It is the system’s resonance quality factor. It is used to determine how quickly a weld fixture’s amplitude decays. If a tool has been changed, this value can be used to detect changes in the system from the previous time the tool was used. Problems with springs or loose bolts may account for changes in Q Factor.

Figure 6-27  Autotune Pop-up Window
NOTE

Why use Auto-Ping?
Under certain conditions, the temperature of parts may vary over time resulting in changes to the resonant frequency of the tool. With auto-ping the welder automatically compensates for these changes by periodically measuring the resonant frequency. Auto-ping resets the welder running frequency to match the current resonant frequency of the upper fixture parts.

Benefits: welder parts run cooler, and there is reduced energy use. This results in lower stresses to welder parts and extends equipment life.

Figure 6-28  Tool Weight Compensation Pop-up Window

Touch this button to reset the part counter.

Touch this button to reset the suspect part counter.

Touch this button to open the Tool Weight Compensation pop-up window.

This feature allows the operator to make an adjustment for the weight of the tool and table. The adjustment is called the offset.

System Force - The force of the hydraulic system at any given moment is System Force. During Tool Weight Compensation, the pressure begins at idle pressure. It builds until enough force is available to move the table and the lower tool.

Offset Force - The force required to move the lift table and the lower tool.

Tool Weight Compensation - Touch this button to turn feature on or off. Green means ON; red means OFF.

Capture Offset - Touch this button to start the tool weight compensation process. The Sample In Progress bar starts to fill up.

NOTE

A message is displayed when Auto-Ping reaches the maximum preset cycle range. Once acknowledged, the machine resumes pinging.
New Job Description - Save As: Maximum 30 characters.

Files are read from a USB flash drive connected to any of the USB ports.

Panel Memory: Files are read from a compact flash card.

New Job Name - Save As: Maximum 8 characters with no spaces in between, and no special characters.

List of Setups: Names and descriptions.

Memory device status.

Figure 6-29  File Control Pop-up Window

Touch the **Save Setup** button to save the current setup.

Touch the **Reload Setup** button to reload data to the current setup.

Touch the **File Control** button to open the file control (Setup) pop-up window.

Touch the **Save Setup** button to save the process parameter to a selected setup.

Touch the **Save As** button to save the data with the name given as New Job.

Touch the **Load Setup** button to load the setup that is currently selected.

Touch the **Erase Setup** button to erase the setup that is currently selected.

Touch the **Copy to USB** button to copy selected setup to a USB flash drive.

Touch the **Copy All Files** button to copy all setups from HMI Memory (Compact Flash) to a USB flash drive.

Touch the **Copy to CF** button to copy all setups from a USB flash drive to compact flash on the HMI.
Create a Setup

1. Select and enter process parameter(s).
2. Go to File Control.
3. Enter job name, and description.
4. Press the Save As button.
5. The setup should now be added to the setup list.

Edit a Setup

1. Select the desired setup.
2. Press Load Setup.
3. Edit the process parameters.
4. Press Save Setup to update the setup.
5. To verify that the change was made to the updated setup, press Load Setup.
6. Check the parameters that were changed.
Tool Setup (Setup Mode Only)

Tool Setup relates to programming the valves and sensors associated with the welder’s tooling. Touch the Tool Setup button on the top button bar to activate the Tool Setup screen.

See Figure 6-30 for a sample screen.

![Tool Setup Screen](Image)

**Figure 6-30** Tool Setup Screen
VALVES

In Figure 6-31 on the previous page Valve 1 is shown as an active valve. The valve is programmed to extend at CYCLE START, and it will retract AT START OF HOLD. Table 6-I shows the selection possibilities for Extend and for Retract.

<table>
<thead>
<tr>
<th>Extend</th>
<th>Retract</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF - Disabled</td>
<td>AT END OF HOLD</td>
</tr>
<tr>
<td>AT CYCLE START</td>
<td>AT START OF HOLD</td>
</tr>
<tr>
<td>AT DOOR CLOSED</td>
<td>AT TABLE HOME</td>
</tr>
<tr>
<td>AT TABLE HOME</td>
<td>AT DOOR OPEN</td>
</tr>
<tr>
<td>AT EJECT</td>
<td>AT START OF WELD</td>
</tr>
<tr>
<td>AT START OF WELD</td>
<td></td>
</tr>
<tr>
<td>PART LOCATORS</td>
<td></td>
</tr>
<tr>
<td>(only on valve 1)</td>
<td></td>
</tr>
</tbody>
</table>

Table 6-I  Valve Extend, Retract Selections

CONFIGURABLE I/O

Valves and Valve Sensors Status

The tables below provide a key to the status symbols used with the valves and valve sensors.

Table 6-II  Valve Status

<table>
<thead>
<tr>
<th>Valve Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Valve disabled (dark gray)</td>
</tr>
<tr>
<td>01</td>
<td>Valve enabled (light gray)</td>
</tr>
<tr>
<td>01+</td>
<td>Valve extending (green)</td>
</tr>
<tr>
<td>01-</td>
<td>Valve retracting (green)</td>
</tr>
</tbody>
</table>

Table 6-III  Valve Sensor Status

<table>
<thead>
<tr>
<th>Valve Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor disabled (dark gray)</td>
<td></td>
</tr>
<tr>
<td>Sensor enabled (light gray)</td>
<td></td>
</tr>
<tr>
<td>Output ON (yellow)</td>
<td></td>
</tr>
<tr>
<td>Sensor ON (green)</td>
<td></td>
</tr>
</tbody>
</table>

NOTE
Each valve is paired with extend and retract sensors.
### Part Presence Sensor Status

The table below provides a key to the status symbols used with the Part Present sensors.

<table>
<thead>
<tr>
<th>Part Present Sensor Status</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="Sensor disabled (dark gray)." /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Sensor enabled (light gray)." /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Output ON (yellow)." /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Sensor ON (green)." /></td>
</tr>
</tbody>
</table>

**Table 6-IV** Part Present Sensor Status

---

### Vacuum Sensor Status

The table below provides a key to the status symbols used with the Vacuum sensors.

<table>
<thead>
<tr>
<th>Vacuum Sensor Status</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="Sensor disabled (dark gray)." /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Sensor enabled (light gray)." /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Output ON (yellow)." /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Sensor ON (green)." /></td>
</tr>
</tbody>
</table>

**Table 6-V** Vacuum Sensor Status
Vacuum Setup

Touch the **Vacuum Setup** button to setup vacuum operation.

For each vacuum sensor, select whether to ENABLE or BYPASS the vacuum function.

When enabled, you can select:

- OFF
- MANUAL ON/AUTO OFF
- MANUAL ON/MANUAL OFF
- START OF WELD/AUTO OFF
- START OF WELD/MANUAL OFF
- AUTO ON/AUTO OFF
- AUTO DELAY
- AUTO LIGHT CURTAIN
- OFF DURING WELD

**Figure 6-31** Test Valves Pop-up Window

**Test Vacuum** – Touch the **Test Vacuum** button to test the vacuum function.
Touch the **Save Setup** button to save the current setup.

Touch the **Reload Setup** button to reload data to the current setup.

Touch the **File Control** button to open the File Control pop-up window.

Touch the **Test Valves** button and the Test Valves pop-up window appears as shown below.

### Figure 6-32  Test Valves Pop-up Window

#### Stanchion Detect
When enabled, detects when the stanchions are extended. If so, the weld cycle will not operate. Stanchions need to be retracted to run a weld cycle.

Buttons on the pop-up window allow the operator to test for proper valve operation. Each valve can be tested for its functions - to extend and to retract. When a button is pushed, it activates a function of the valve, and the button’s virtual LED changes from red to green. See the valve status explanation that follows.
Valves and Sensors

Naming

Valve Name - Maximum of 15 characters, the name is saved with the setup.

Sensor Name - Maximum of 15 characters, the name is saved with the setup.

NOTE

Valve names and sensor names are now presented in fault messages when a specific valve or sensor faults out.

Figure 6-33  Valve/Sensor Naming
Utilities (Setup Mode Only)

Utilities relates to system settings, calibration, security, diagnostics, and data management. Touch the Utilities button on the top button bar to activate the Utilities screen. A sample screen is shown in Figure 6-34. Definitions of terms are shown below as well.

**Utilities Screen**

**Secondary Language Selection**
Choose 2nd language.

**Data Logging In**
Set Metric or Standard system as default.

**Change User Password**

**Create New User**

**Delete Selected User**

**NOTE**
See Section 6 - Logging In and Out.
System Setup (Utilities)

Touch the System Setup button at the top left of the Utilities screen to activate the System Settings screen. A sample screen is shown in Figure 6-35.

![System Settings](image)

There is only one screen in the System Settings window:

- Display Settings – IP Address, Subnet Mask, Date and Time are located here. All of these settings may be changed to suit the application.
Calibration XDUC (Position Transducer)

Touch the Calibration XDUC (Position Transducer) button at the top of the Utilities screen, to activate the calibration screen shown in Figure 6-36 below.

Figure 6-36 Utilities > Calibration - Position Transducer Pop-up Window

NOTE
The position transducer was calibrated at the factory and normally will not need to be calibrated again. However, calibration would be needed for any replacement transducer.

(Continued on next page.)
Calibration Sequence
1. Remove the tool before calibrating.
   Use Table Up/Down touch keys to control the table.

2. Raise the table until it stops.

3. Press the accept button and the right opti-touch.

4. Lower the table until it stops.

5. Press the accept button and the right opti-touch.

Voltage Delay
Allow 1 to 3 seconds for the PLC to detect normal operating voltage before the Voltage Overload alarm is triggered.

Current Delay
Allows 1 to 3 seconds for the PLC to detect normal operating current before Current Overload alarm is triggered.

Feedback Delay
Allows 1 to 3 seconds for the PLC to detect a feedback signal, before No Feedback Detected alarm is triggered.

Input
   Raw – Transducer output value being read from the analog input card.
   Volts – Transducer output voltage.
Valve Calibration

This feature is for use by servicing personnel only.

**Figure 6-37  Calibration - Valve**

Valve calibration needs to be carried out by the maintenance personnel or manufacturer’s service technicians after the valve is replaced.

**PSI Feedback:** The hydraulic pressure feedback read from the analogue input card.

**System Force:** The force of the hydraulic system at any given moment.

**Offset Force:** The force required to move the lift table and the lower tool.

**Hold Force:** The force used during the hold time.

**Force Across Part:** The actual force applied to the parts. (System Force - Offset Force).
SDM (System Diagnostics Manager)

For technician use only.

Five sample screen images are shown in Figures 6-38 through 6-42.

Figure 6-38  System Diagnostics Manager > System
Figure 6-39  Systems Diagnostics Manager > Software
Figure 6-40  Systems Diagnostics Manager > Hardware
Figure 6-41  Systems Diagnostics Manager > Logger
Figure 6-42  Systems Diagnostics Manager > Profiler
Energy Savings
The system will shut off its hydraulic pump, enclosure fan, work light and vacuum after being idle for the amount of time specified in the menu.

Data Log Control
Transfers the event log, alarm history and history log from PLC memory to USB drive in CSV format.

Tool ID On/Off
Touch to turn on/off the Tool ID function and automatically retrieve the job settings when the PLC detects the ID bits.

Dry Cycle On/Off
Touch to turn on/off the Dry Cycle function. During Dry Cycle, the machine will run through a normal cycle, but the head will not activate. This is a good option for testing machine function without touching parts.

Change Password Help
Touch the Change Password Help button to get instructions on changing the current password.

Create User Help
Touch the Create User Help button to get instructions on creating a new user.
I/O Table (Run & Setup Mode)

With I/O Table the user can monitor the status of all input and output cards.

Table and Door Buttons

Four buttons for moving the table up and down and for opening and closing the front door are all conveniently located at the bottom of the I/O screen as shown in Figure 6-43 above. These buttons are ONLY available in Setup Mode.

NOTE

Table Up, Table Down, Door Open, and Door Close buttons are active only when Setup Mode is active. The buttons are disabled in Run Mode.
Alarms

Press the ALARMS primary button on the main screen. A screen listing active alarms will be displayed.

The figure below illustrates an example active alarm message.

![Figure 6-44 Alarms - Active Message]

**Active Alarms**
Only currently active alarms are displayed. When an alarm becomes inactive, it is removed from the list.

**Scroll**
Use the UP and DOWN touch keys at the right side of the alarms screen to scroll through alarms.

**Fault Reset**
Clears the faults that have been corrected.

**Reset Alarm**
There are two ways to reset alarms. Either HOME MACHINE or FAULT RESET will reset all active alarms. If an alarm reappears immediately after a reset, then there is a problem that needs correcting before a machine cycle is allowed. The alarm message will provide enough information to aid in correcting the problem.
Alarm History

Touch this button to display the alarm history screen. See the sample screen shown in Figure 6-45 below.

Figure 6-45  Alarms - History Sample Screen
<table>
<thead>
<tr>
<th>ALARMS</th>
<th>MESSAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abort</td>
<td>Drive abort was asserted by the PLC.</td>
</tr>
<tr>
<td></td>
<td><strong>Solutions:</strong></td>
</tr>
<tr>
<td></td>
<td>□  Clear PLC alarm &amp; restart</td>
</tr>
<tr>
<td></td>
<td>□  Restart Welder</td>
</tr>
<tr>
<td>Auto-Tune Error</td>
<td>Did not find a valid tool frequency between 195 and 240Hz. Only an auto-tune will reset alarm.</td>
</tr>
<tr>
<td></td>
<td><strong>Solutions:</strong></td>
</tr>
<tr>
<td></td>
<td>□  Verify that all 12mm bolts attaching the tool to the machine are installed and torqued to [100 foot pounds].</td>
</tr>
<tr>
<td></td>
<td>□  Check that all bolts on the tool are tightened to the manufacturer's specification.</td>
</tr>
<tr>
<td></td>
<td>□  Check the upper tool weight and make sure it’s within range for the machine.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>Low or no battery.</td>
</tr>
<tr>
<td></td>
<td><strong>Solutions:</strong></td>
</tr>
<tr>
<td></td>
<td>□  Replace the battery (See section 10)</td>
</tr>
<tr>
<td>Calibration</td>
<td>A drive cycle was started before the system received all the calibration data.</td>
</tr>
<tr>
<td></td>
<td><strong>Solutions:</strong></td>
</tr>
<tr>
<td></td>
<td>□  Return to the setup menu and perform a tuning test of the tool. Check for a completely programmed welding setup.</td>
</tr>
<tr>
<td>Check Frequency Inverter</td>
<td>The inverter has faulted. Use the error code displayed on inverter and reference the manufacturer's manual for information on cause.</td>
</tr>
<tr>
<td></td>
<td><strong>Solutions:</strong></td>
</tr>
<tr>
<td></td>
<td>□  Call technical support.</td>
</tr>
<tr>
<td>Check Front Door</td>
<td>A cycle was started but the front door did not move.</td>
</tr>
<tr>
<td></td>
<td><strong>Solutions:</strong></td>
</tr>
<tr>
<td></td>
<td>□  Check the pressure setting. The valve should not be set lower than 70psi.</td>
</tr>
<tr>
<td></td>
<td>□  Check for obstructions in the door opening.</td>
</tr>
<tr>
<td>Check Front Door Sensor</td>
<td>The software has detected [door open] and [door close] sensors on at the same time. Check that sensors are functioning properly.</td>
</tr>
<tr>
<td></td>
<td><strong>Solutions:</strong></td>
</tr>
<tr>
<td></td>
<td>□  Check the wiring.</td>
</tr>
<tr>
<td></td>
<td>□  Check that sensors are functioning properly.</td>
</tr>
<tr>
<td></td>
<td>□  Check that sensors are secured and free from any obstruction.</td>
</tr>
</tbody>
</table>

Table 6-VI  Alarms and Messages (Page 1 of 6)  

Continued
<table>
<thead>
<tr>
<th>ALARMS</th>
<th>MESSAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chip Communication</td>
<td>Loss of communication on the drive board between processors.</td>
</tr>
<tr>
<td></td>
<td>Solutions:</td>
</tr>
<tr>
<td></td>
<td>□ Cycle power to the welder</td>
</tr>
<tr>
<td></td>
<td>□ Call Dukane service</td>
</tr>
<tr>
<td>Current Overload</td>
<td>The load has exceeded the drive’s capability.</td>
</tr>
<tr>
<td></td>
<td>Solutions:</td>
</tr>
<tr>
<td></td>
<td>□ Increase current delay to 3 seconds.</td>
</tr>
<tr>
<td></td>
<td>□ Auto-tune the system.</td>
</tr>
<tr>
<td></td>
<td>□ Lower weld pressure.</td>
</tr>
<tr>
<td></td>
<td>□ Call technical support.</td>
</tr>
<tr>
<td>Cycle Aborted</td>
<td>Light curtains were obstructed during a cycle, or some other fault aborted the cycle.</td>
</tr>
<tr>
<td>E-Stop or Service Door Open</td>
<td>An E-Stop has been pressed or the back service doors are open.</td>
</tr>
<tr>
<td></td>
<td>Solutions:</td>
</tr>
<tr>
<td></td>
<td>□ Clear all “E-STOP” buttons and press the “E-STOP RESET” button.</td>
</tr>
<tr>
<td></td>
<td>□ Close back doors.</td>
</tr>
<tr>
<td></td>
<td>□ Check E-Stop circuit safety relay.</td>
</tr>
<tr>
<td>Frequency Error</td>
<td>During &quot;Auto-Ping&quot; frequency has deviated more than &quot;.5Hz&quot;.</td>
</tr>
<tr>
<td></td>
<td>Only an auto-tune will reset alarm.</td>
</tr>
<tr>
<td></td>
<td>Solutions:</td>
</tr>
<tr>
<td></td>
<td>□ Verify that all 12mm bolts attaching the tool to the machine are installed and torqued to [100 foot pounds].</td>
</tr>
<tr>
<td></td>
<td>□ Check that all bolts on the tool are tightened to the manufacturer’s specification.</td>
</tr>
<tr>
<td></td>
<td>□ Check that the tool weight range &amp; balance are within machine compatibilities</td>
</tr>
<tr>
<td>Front Door Not Closed</td>
<td>Cycle has been aborted, because the front door proximity sensor did not detect anything</td>
</tr>
<tr>
<td></td>
<td>after 3 seconds of zero motion.</td>
</tr>
<tr>
<td></td>
<td>Solutions:</td>
</tr>
<tr>
<td></td>
<td>□ Check if the sensor is aligned with the target when the door is closed. If not, you</td>
</tr>
<tr>
<td></td>
<td>may need to make adjustments.</td>
</tr>
<tr>
<td></td>
<td>□ Verify you have enough air pressure to close the door. Sometimes you have enough</td>
</tr>
<tr>
<td></td>
<td>to close the door but not enough to compress the rubber seal. In this situation</td>
</tr>
<tr>
<td></td>
<td>the sensor’s target will be slightly out of its detection range.</td>
</tr>
<tr>
<td>Heartbeat</td>
<td>PLC did not detect a heartbeat from the drive.</td>
</tr>
<tr>
<td></td>
<td>Solutions:</td>
</tr>
<tr>
<td></td>
<td>□ Reset alarm message.</td>
</tr>
<tr>
<td></td>
<td>□ Check for cable connections between PLC &amp; machine.</td>
</tr>
<tr>
<td></td>
<td>□ Cycle power to the machine.</td>
</tr>
</tbody>
</table>

Table 6-VI  Alarms and Messages (Page 2 of 6)
<table>
<thead>
<tr>
<th>ALARMS</th>
<th>MESSAGE</th>
</tr>
</thead>
</table>
| Hydraulic Overload        | The hydraulic unit is drawing more current than normal, and has tripped the overload relay.  
Solutions:  
☐ Check if you have enough oil.  
☐ Check the power. Reference schematics.  
☐ Call technical support. |
| Invalid Tool ID           | Tool ID is active but no valid tool ID.  
Solutions:  
☐ Check if the tooling supports tool ID. If yes, confirm the cable is connected. If no, then turn off tool ID.  
☐ Test the cable by performing a point to point continuity test. Reference the schematics. |
| Machine Calibration       | Machine calibration required.  
Solution:  
1. Calibrate table position.  
2. Calibrate the pressure valve.  
3. Run tool weight compensation. |
| Maximum Trigger Limit     | Cycle aborted because trigger is higher than maximum trigger limit.  
Solutions:  
☐ Check the parts for proper loading.  
☐ Check the “Max. Trigger Limit” value; it may be set incorrectly.  
☐ Check “Trigger Position” value; it may be set incorrectly. |
| Minimum Trigger Limit     | Cycle aborted because trigger is lower than minimum trigger limit.  
Solutions:  
☐ Check the parts for proper loading.  
☐ Check the “Min. Trigger Limit” value; it may be set incorrectly.  
☐ Check “Trigger Position” value, may be set incorrectly. |

**Table 6-VI**  Alarms and Messages (Page 3 of 6)
### ALARMS | MESSAGE
--- | ---
No Feedback Detected | The PLC did not detect any amplitude feedback.  
Solutions:  
- Increase the feedback delay to 3 seconds.  
- Check your weld force; it could be set too high for the application. For example 4000 lbs of weld force could restrict horizontal displacement, essentially stalling the machine.  
- Check the tool for proper alignment. If misaligned, the weld bead will not have adequate space to move freely causing a stall condition.  
- Check that tool stanchions are in the retract position.  
- Auto-tune the system  
- Verify that all 12mm bolts attaching the tool to the machine are installed and torqued to [100 foot pounds].  
- Check that all bolts on the tool are tightened to the manufacturer’s specification.  
- Check the tool weight and make sure it’s within range for the machine.  
  - VW3300/4300/5300: between 20 - 55 lbs  
  - VW3500/4500/5500: between 35 - 90 lbs  
  - VW3700/4700/5700: between 90 - 150 lbs  
  - VW3900/4900/5900: between 110 - 200 lbs  
  - VW LPT 5700/5900/5960: between 60 - 180 lbs

No Hydraulic Pressure | Hydraulic pump is on but no pressure is detected.  
Solutions:  
- The pump may be rotating backward, check your power.  
- Check if pressure transducer is providing a signal to analog input card. Reference the schematics.

No or Low Air Pressure | Not enough pressure to close pressure switch. Clear all E-STOPs, press E-STOP RESET, press Clear Alarm, and then check air pressure.  
Solutions:  
- Is the air line connected to the machine? Reference pneumatic schematic [#18].  
- Is the main air valve that supplies air to the machine, on?  
- Is the “lockout dump valve” open. Reference [#13] on schematic.  
- Clear all “E-STOP” buttons and press the “E-STOP RESET” button. Any time you E-Stop the machine, power is removed from the “start up dump valve”. Reference [#7] on schematic.  
- Check pressure switch setting. Default set point is 70psi. If pressure drops below the set point, the welder will alarm. Reference [#21] on schematic.

Over Voltage | Drive line voltage greater than 504Vac (480Vac +5%) was detected.  
Solutions:  
- Check incoming voltage to the main disconnect.

---

Table 6-VI  Alarms and Messages (Page 4 of 6)  

Continued
## ALARMS | MESSAGE
--- | ---
**Over Temperature or IGBT** | Drive heatsink temperature greater than 70 Degrees C or fault detected at the driver modules for the IGBT's.  
Solutions:  
- Wait 10 minutes for the machine to cool off.  
- Confirm that the cooling fan is working properly.

**Past Present Sensor** | The Part Present Sensors either could not detect the parts to be welded when the cycle was initiated, or the parts were not detected before the welder started welding. 
Solution:  
- Home the machine, reposition the parts, and try welding again.

**PLC Communication** | Drive PLC communications have failed.  
Solutions:  
- Clear fault on HMI.  
- Cycle machine power.

**Process Limit** | One of the "actual"readings is not within your process limits.

**Remove Welded Part** | Cycle has been aborted because the welded part was not removed.  
Solutions:  
- Remove welded part before cycling.  
- Confirm that part presence sensors are working correctly.

**Run Cycle Lost** | Drive's run cycle was turned off before the end of a cycle  
Solutions:  
- Check for E-Stop conditions.

**Sensor Valve xy Extended** | [Valve xy] has been triggered, but sensor was not acknowledged.  
Solutions:  
- Check that actuated device is not obstructed.  
- Check the air pressure setting on the valve.  
- Check sensor position; make adjustment if necessary.

**Sensor Valve xy Retracted** | [Valve xy] has been triggered, but sensor was not acknowledged.  
Solutions:  
- Check that actuated device is not obstructed.  
- Check the air pressure setting on the valve.  
- Check sensor position; make adjustment if necessary.

**SMR-x** | Potential System Maintenance Required. Go to Setup Mode > Cycle Start to continue and contact Dukane.  
*(x = error number)*

**SMR-F** | Fatal System Fault. Contact Dukane.

**Stanchion Detect** | Stanchions are not retracted.  
Solutions:  
- Home machine.  
- Insure Stanchion pins are lowered.  
- Check stanchion sensors for operation.

---

*Table 6-VI*   Alarms and Messages (Page 5 of 6)  
*Continued*
<table>
<thead>
<tr>
<th>ALARMS</th>
<th>MESSAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigger Time Out</td>
<td>Typically occurs when you trigger by position and the table position is less than the trigger position.</td>
</tr>
<tr>
<td>Under Voltage</td>
<td>Drive line voltage less than 432Vac (480Vac - 10%) for more than 1 second when not welding.</td>
</tr>
<tr>
<td>Vacuum Sensor</td>
<td>The Vacuum Sensor could not detect the parts to be welded.</td>
</tr>
<tr>
<td>Vx Invalid Combination</td>
<td>Valve x: Start and stop method cannot be set to &quot;Start of Weld&quot;.</td>
</tr>
<tr>
<td>Voltage Overload</td>
<td>The load has exceeded the drive's capability.</td>
</tr>
<tr>
<td>Weld Time Limit &quot;has expired&quot;.</td>
<td>Weld time has expired before weld distance could be achieved.</td>
</tr>
</tbody>
</table>
## Touch Screen Banner

The table below shows all the messages that display in the banner position - at the top of the various touch screen menus.

<table>
<thead>
<tr>
<th>Local Message Display</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm Detected</td>
<td>One or more alarms have been detected.</td>
</tr>
<tr>
<td>Door out of Position</td>
<td>Front door is not in the Home position.</td>
</tr>
<tr>
<td>Ejecting Part</td>
<td>One or more ejectors on a tool are ejecting parts.</td>
</tr>
<tr>
<td>Hydraulics Off</td>
<td>The hydraulic unit is off.</td>
</tr>
<tr>
<td>In Cycle</td>
<td>The machine is in RUN MODE and actively in a cycle.</td>
</tr>
<tr>
<td>Invalid Tool ID</td>
<td>Tool ID is enabled, but an invalid ID was detected.</td>
</tr>
<tr>
<td>Light Curtain is Obstructed</td>
<td>An object has been detected in the detection zone, or light curtains are misaligned.</td>
</tr>
<tr>
<td>Machine Ready for Cycle</td>
<td>Everything is OK and ready for a cycle</td>
</tr>
<tr>
<td>Machine Ready for Setup</td>
<td>Machine is ready for manual operations.</td>
</tr>
<tr>
<td>Remove Welded Part</td>
<td>A part has been processed and waiting to be removed.</td>
</tr>
<tr>
<td>Stanchions Not Retracted</td>
<td>Stanchions are extended and waiting to be retracted.</td>
</tr>
<tr>
<td>System Maintenance Required</td>
<td>Call technical support.</td>
</tr>
<tr>
<td>Table Lock Not Detected</td>
<td>Table lock not in the storage location. Movement of table is restricted.</td>
</tr>
<tr>
<td>Table Not in Load Position</td>
<td>Machine will not cycle until table lock is in position or sensing is bypassed.</td>
</tr>
<tr>
<td>TFM Mode On/Off/Reset</td>
<td>TFM mode is on, off, or reset.</td>
</tr>
<tr>
<td>Valve x: &quot;not retracted&quot;</td>
<td>The retract sensor for Valve x is enabled and the device is not in the retract position. Try to Home the machine.</td>
</tr>
<tr>
<td>(x = valve number)</td>
<td></td>
</tr>
<tr>
<td>Waiting for Part and Place Sensors</td>
<td>One or more part presence sensors are enabled but don’t detect the presence of a part. The machine will not cycle until the part is detected.</td>
</tr>
</tbody>
</table>

**Table 6-VII**  Touch Screen Banner Messages
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SECTION 7

Tooling Installation

Initial Machine Startup ............................................. 103
Inspection .............................................................. 103
Apply Power .............................................................. 103
Hydraulic System ........................................................ 103
Initiate HOME Procedure ............................................. 104
Install Tooling Assembly .............................................. 105
Position Upper and Lower Tooling ............................... 105
Torque Mounting Bolts .................................................. 106
Final Tooling Prep ....................................................... 106
Tune Drive to Tooling .................................................... 106
Upper and Lower Tooling Bolt Patterns ......................... 108
Initial Machine Startup

Inspection

Check the hydraulic fluid level to ensure it is at the correct level using the sight glass shown in Figure 7-1. Refer to Section 3 for specifications on the hydraulic fluid, and fluid level. Check for any leaks on the floor or under the cabinet. Make sure both the hydraulic system service doors and the electrical cabinet service doors are closed. The hydraulic system service doors are interlocked to prevent machine operation with the doors open. Figure 2-9 shows a typical door interlock device and the mating receptacle in the cabinet.

Apply Power

AC Power

After supplying electrical power to your welder (See Section 13 - Power Requirements), turn on the AC power switch as shown in Figure 3-7.

Machine Air

The welder requires a supply of clean, dry, compressed air at 75 to 90 psi. The connection is made using 1/2 inch O.D. tubing at the pneumatic lockout device. Turn the valve to the right as shown in Figure 7-2 to open the valve and apply the compressed air. The air is used to raise and lower the front access door and for any optional vacuum part retention or pneumatic clamping and ejection features.

Hydraulic System

Clear Emergency Stop and Reset Welder

Touch the HOME button. The screen will display instructions. A typical sequence consists of: Reset both Emergency Stop Buttons (E-STOP) by turning clockwise and pulling up. These are shown in Figure 7-3. Clear any alarms. Press the E-STOP RESET button. The flashing alarm light will go out. If the light does not go out, check the rear service doors. They should be securely closed, and the door interlocks should be engaged.
Activate Hydraulic Pump

To turn on the hydraulic pump, press the green HYDRAULIC PUMP ON push button. It will light when the pump is activated. The OPERATE screen displays a live readout of lift force - see System Force.

See Figure 7-4 for a view of the Operate screen in both English and metric versions.

Models 5300 and 5500 use a cylinder with a 2-inch bore and a piston area of 3.14 sq. inches. The hydraulic pressure applied to this area produces from 440 lbs to 535 lbs of lift force.

Models 5700, 5700LPT, 5900, and 5900 LPT use a cylinder with a 2.5-inch bore and a piston area of 4.91 sq. inches. The hydraulic pressure applied to this area produces from 685 lbs to 835 lbs of lift force.

Models 5960, 5960LPT have (2) 2 inch bore cylinders less the piston rods whose total piston area is 4.71 sq. inches. The hydraulic pressure applied to this area produces from 690 lbs to 750 lbs of lift force.

Initiate HOME Procedure

Press the HOME MACHINE button on the left column of the display. See Figure 7-5.

The table will move to its home position, the message will change to MACHINE READY FOR SETUP and a message may appear providing status and instructions. Follow the on-screen instructions when those appear.
Install Tooling Assembly

Balanced Tooling
Please see the NOTE to the right regarding the importance of balanced tooling.

Loosely Install Tooling

Install Lower Mounting Bolts
Put the aligned upper and lower tooling assembly on the lift table (the tooling stanchion alignment pins should be extended). Loosely install the lower tooling mounting bolts (M12–1.75 SHCS [grade ISO 12.9] with alloy steel M12 washers) into the table. Use the TABLE UP control to raise the table until the upper tooling is almost in contact (within 2mm or 0.1 inch) with the spring frame, but not touching.

Engage E-Stop
Press one (or both) of the E-STOP buttons. The hydraulic pump will stop, its illuminated green light (HYDRAULIC PUMP ON) will go out and the ALARM lamp will flash.

Shutdown Power
Turn off and lockout the AC power. Close and lockout the compressed air. Refer to Figures 2-3, 2-4 and 2-5 for photos of correctly locked–out energy sources.

Install Upper Mounting Bolts
Loosely install the upper tooling bolts (M12–1.75 SHCS [grade ISO 12.9] with alloy steel M12 washers) in the upper spring frame. The bolt patterns for each of the lift tables are shown in Figures 7-7 through 7-10.

Check alignment
Restart the system: turn on the AC power, apply the compressed air, clear all the E-STOPs, press the E-STOP RESET switch, and press HYDRAULIC PUMP ON to turn on the hydraulic pump.

Now, use the Table Up/Table Down (on screen) buttons to raise the lift table until the tooling is in direct contact with the spring bridge. Check final alignment of the tooling. Finger tighten all accessible upper and lower mounting bolts.

NOTE
For more information about balance of welding tools, refer to our Application Note 510, Importance of Balanced Vibration Welding Tools, on the Dukane website at: http://www.dukane.com/us/DL_ApplData.asp

TOOLING BOLT LENGTH
The M12 x 1.75 bolts used to secure the tooling must have a minimum of three and one-half (3-1/2) threads engaged in the table or spring threads (one times bolt diameter or 6mm). We strongly recommend that the bolts be long enough to engage at lease five (5) threads (1-1/2 times bolt diameter or 9mm).

INSTALLING UPPER TOOL
When installing upper tooling, ensure that bolts are properly installed in every hole of the upper spring frame.
Torque Mounting Bolts

1. Press E-STOP.
2. Disconnect and lockout the AC power.
3. Close and lockout the machine air.
4. Tighten the upper tooling to the springs with a torque wrench to 90 - 100 ft-lbs. (122 - 135 Nt-m).

NOTE: 100 ft-lbs = 13.83 Kg-m = 135 Nt-m

5. Tighten the lower tooling bolts to the table with a torque wrench set to 100 ft-lbs.
6. Attach and secure any air lines or sensor wiring to the tooling.

Final Tooling Prep

1. Turn on the AC power.
2. Apply the compressed air.
3. Clear any E-STOP.
4. Press the E-STOP RESET button.
5. Press the HYDRAULIC PUMP ON push button.
6. Load the program for the currently installed tooling. Refer to Figure 6-20 and Section 8 - Machine Operation, Selecting a Setup File.
7. Initiate a HOME MACHINE procedure. See Figure 7–5.
8. Retract tooling stanchion alignment pins. See Figure 7–15.
9. Remove any protective parts from tooling.
10. Install any mounting bolts that were inaccessible with the tool closed. Torque them to 100 ft-lbs.

Tune Drive to Tooling

During the Autotune process, the machine seeks the operating frequency that optimizes the drive to the load presented by the upper tooling assembly. If an autotune is not performed, the drive will be fighting the natural resonance of the tooling. The results: wasted energy and possibley inferior welding.

CAUTION

Make sure to retract the stanchion alignment pins before proceeding to tune the drive heads.

Failure to retract the pins may result in damage to the tooling. See Figure 7-14 for a picture of a stanchion with the alignment pin retracted.

CAUTION

It is important to perform an Autotune every time the tooling is changed. Each set of tooling has its own unique resonant frequency. Even tooling sets that are designed to be identical will have a slightly different tuning load due to machining and bolt torquing stresses.
This wasted energy shows up as excessive heating, usually in the magnetic drive coils. Overheated coils will fail prematurely resulting in unnecessary downtime and expense.

Use all the bolts, torqued to the specified value, to attach the upper tooling, unless some part of the tooling obstructs a hole. Failure to install all the mounting bolts may result in the upper tooling becoming acoustically decoupled from the springs, possibly resulting in damage to the tooling or machine.

Acoustic coupling is the tendency for a multipart mass to vibrate as if it were one piece. Insufficient or loose bolts can cause acoustic decoupling where part of a piece vibrates at a different frequency or out of phase relative to the other pieces. A loose lower tool assembly will result in poor welding and can also cause damage to the tooling or the welder.

1. Perform the Autotune procedure. Refer to Figures 6-18 and 6-19.
2. Run Autotune each time tooling is changed. Refer to Section – 10 Troubleshooting if the Autotune procedure fails.
3. After Autotune is complete, go to RUN mode.
5. Press E-STOP RESET.
6. Follow any other on screen instructions.
7. The display should indicate: Machine ready for cycle.
8. The welder is now ready to load parts and begin welding.
Figure 7-6  Model 5300 Upper and Lower Tooling Bolt Patterns
Figure 7-7  Model 5500 Upper and Lower Tooling Bolt Patterns
Figure 7-8  Model 5700 Upper and Lower Tooling Bolt Patterns
Figure 7-9  Model 5700LPT Upper and Lower Tooling Bolt Patterns
Figure 7-10  Model 5900 Upper and Lower Tooling Bolt Patterns
Figure 7-11  Model 5900LPT Upper and Lower Tooling Bolt Patterns
Figure 7-12  Model 5960 Upper and Lower Tooling Bolt Patterns
Figure 7-13  Model 5960LPT Upper and Lower Tooling (Lift Table) Bolt Patterns
SECTION 8

Machine Operation

Machine Startup .................................................. 119
Selecting a Setup File ................................. 120
Load an Existing File ................................. 120
Programming a New File ............................. 120
Set Limits .................................................. 120
Starting a Weld Cycle ..................................... 121
Stopping the Weld Cycle ............................... 122
E-STOP Buttons ....................................... 122
Light Curtain .......................................... 122
Resetting the Machine ................................. 122
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**Machine Startup**

A detailed startup procedure is given at the beginning of *Section 7 – Tooling Installation*. A condensed five step version is given here for your convenience.

1. **AC Power**
   
   Plug in the AC power cord to a 480 Volt AC, 3-Phase, 30 Amp receptacle and turn on the AC power switch. The yellow MAIN POWER light will illuminate.

2. **Compressed Air**
   
   Connect the welder to a supply of clean, dry, compressed air at 75 to 90 psi. Turn the lockout valve to the right to open the valve. The air is used to raise and lower the front access door and for any optional vacuum part–retention or pneumatic clamping and ejection features.

3. **E-STOPS & Reset**
   
   Reset both of the E-STOP buttons by turning clockwise and pulling out (or up). Then press the E-STOP RESET button and the ALARM light will stop flashing and go out. If the alarm light does not go out, make sure the rear service doors are securely closed and the interlocks engaged.

4. **Hydraulic Pump**
   
   Turn on the hydraulic pump - refer to Figure 8-4 - by pressing the HYDRAULIC PUMP ON button. It will illuminate green when the pump is activated.

5. **HOME Procedure**
   
   Press the HOME MACHINE button on the left column of the display. See Figure 8-1.
   
   The table will move to its home position, the message will change to MACHINE READY FOR SETUP and a message may appear providing status and instructions. Follow the on-screen instructions when those appear.

---

**Figure 8-1** HOME Procedure Screen

---

**WARNING**

Never operate the vibration welder with any of the service doors open. This is an unsafe practice and can result in injury or death.

The rear service doors also serve as acoustic shields.
Selecting a Setup File

Load an Existing File

Instructions for loading an existing setup file are given in Section 6 – Touch Screen - USER OPTIONS MODE > Load Setup.

These steps review that information.

1. Press the Setup or Tool Setup button on the top bar.

2. Press the File Control button. The Setup screen, shown in Figure 8-2, appears. From here you can choose the desired setup file.

3. When the pointer is next to the desired setup, press the key to load it.

The name of the loaded setup appears just above the list of setups.

4. To examine the parameter values of a setup file before loading it, press the Setup: button on the top bar.

Programming a New File

Detailed instructions for setting up a new file are given in Section 6 – Touch Screen, SETUP Mode which begins with Figure 6-12.

Set Limits

Instructions for setting limits are given in Section 6, Setup

Refer to Figure 6-24.
Starting A Weld Cycle

1. Load Parts In Tooling
   Once the parts are loaded into the tooling fixtures, and the light curtains are not obstructed, the message banner on the touch screen display should read: Machine ready for cycle.

   **Self–Aligning Parts**
   Upper and lower parts which are self–aligning (e.g. have pins or grooves to keep them aligned) can be loaded together into the bottom tooling fixture.

   **Non Self-Aligning Parts**
   Parts which are not self–aligning will have to be placed into their respective tooling. The lower part is held in place by gravity. The upper part is placed in the fixture. Use the manual VACUUM ON/OFF button to turn the vacuum on and off as needed.

2. Control Panel Lamps
   Check that the green IN CYCLE lamp is lit.

3. Touch Screen Banner
   Check the banner area at the top of the screen for any messages, and follow any instructions displayed.

4. Activate Operate Switch
   Press either of the operate switches to start a cycle. The front access door closes, the parts are welded and the door opens.

5. Remove Parts
   Remove the assembled parts, and repeat the cycle.
Stopping the Weld Cycle

E–STOP Buttons

To stop a weld cycle, press one of the two E-STOP buttons. The welder stops immediately and the hydraulic pump stops. The green HYDRAULIC PUMP ON light and the green IN CYCLE light will both go out, and the red ALARM lamp will flash.

Light Curtain

You can also stop the weld cycle while the front access door is in motion by interrupting the light curtain. This will immediately abort the cycle. The ALARM light will also be flashing.

Resetting Machine

Stopping the welder by interrupting the light curtain or by pressing either of the E–STOP buttons halts all operations and de-energizes the lift table, drive heads, and front access door.

To reset the welder, press the HOME MACHINE button on the touch screen.

The operator should follow any instructions that are displayed in the banner at the top of the touch screen.

The operator will most likely need to follow these steps:
1. Clear all E-STOPs.
2. Press the E-STOP RESET button.
3. Restart the hydraulic pump.
5. Press and hold the HOME MACHINE button.
Welding Parameters ............................................ 127
Weld Time ....................................................... 127
Weld Distance ................................................... 127
Weld Amplitude ................................................ 128
Weld Force ....................................................... 128
Hold Force ....................................................... 128
Hydraulic Flow ................................................ 129
Pneumatic Pressure .......................................... 129
Pneumatic Flow ................................................. 129
**Welding Parameters**

Five key parameters that affect weld quality are:

- Frequency
- Time
- Melt Penetration
- Amplitude
- Force

Frequency is adjusted automatically by the system during the Autotune process. Weld time is a trade-off between fast cycle times and deep melt penetration. A deeper melt penetration increases weld strength.

**Weld Phases** - See the explanation at right. The four phases are depicted graphically in Figure 9-1.

The amplitude and force determine how quickly the weld phases progress. These in turn are determined by the type of plastic and the part geometry. With welding parameters held constant, cycle time increases with wall thickness.

**Weld Time**

The strongest welds are produced using the longest weld time because this allows the melt flow to penetrate deeper into the parts and eliminates any voids.

**Weld Distance**

Depending on the part configuration, the material displaced will generally range from 0.75mm to 1.25mm (0.019 to 0.032 inch). This is only a broad estimate, and your application may require a different value. The amount of displacement required is affected by the flatness of the welding interface.

With greater warping, more material needs to be displaced, and the weld cycle will be longer. The strength of the weld can be a function of the weld distance for some thermoplastics and relatively insignificant for others as shown in Figure 9-3. Do not confuse weld distance which is the collapse distance with weld penetration which is how deep the melt flow penetrates.

**WELDING PHASES**

There are four phases in the vibration welding cycle.

**PHASE 1:** Vibration creates kinetic friction, which generates heat at the joint interface. No penetration takes place in Phase 1.

**PHASE 2:** The glass transition (or crystallization) temperature is reached, and viscous flow occurs. Viscous dissipation in the molten polymer generates heat. Lateral flow in the polymer allows the penetration to occur.

**PHASE 3:** Both melt and flow reach a steady state in which heat loss through the wall due to flash equals heat being generated. The melt flows laterally, and weld penetration increases linearly with time. The penetration required to reach a steady state condition increases with wall thickness, but decreases with welding pressure.

**PHASE 4:** Vibrations are halted, but weld penetration continues because the clamping pressure causes the molten polymer to flow until it solidifies. The parts are held clamped in the final position while they cool enough to be handled.

---

Figure 9-1 Relationship of Melt Penetration to Melt Temperature Through the Four Phases
Weld Amplitude

Amplitude has less effect upon the weld strength than weld time. Figure 9-2 shows the relationship of weld strength for generic POM as a function of weld force for a fixed weld depth and two different amplitudes. Higher weld strength occurs at lower clamping pressures because the weld time is longer and the penetration distance greater. However as clamping pressure increases to shorten the weld time, the weld strength decreases more rapidly for the low amplitude weld joint. Figure 9-3 shows the relationship of weld strength of different thermoplastics as a function of weld depth (collapse distance) for a fixed weld amplitude and weld pressure.

Weld Force

Increasing the weld force increases the collapse but not the weld penetration. The welding force required for different materials is determined by a combination of the polymer’s melt flow index, the glass transition or crystallization temperature and molecular weight. The approximate melt index range for some common thermoplastics and their welding pressure range are given in Table 9-1. Since there is such a wide range of melt flow rates for even common polymers, depending upon their molecular structure, the welding pressure required can initially only be estimated. The optimal values must be determined experimentally.

Pressure is force per unit area, so the weld force setting is the desired welding pressure multiplied by the total effective joint area. Remember to keep the units of measurement consistent (pounds and inch\(^2\), Megapascals or newtons and meter\(^2\)) when calculating the desired weld pressure.

Hold Force

Clamping under pressure while the bond hardens, corrects warping problems by forcing the parts into the proper geometry. Decreasing the welding pressure at the beginning of the hold cycle can reduce the flow of molten material and thus reduce the size of the weld bead or flash. In addition, this can reduce shear thinning to create stronger welds. The hold time must be long enough

![Figure 9-2 Relationship of Weld Strength as a Function of Weld Pressure](image)

![Figure 9-3 Relationship of Weld Strength as a Function of Weld Depth](image)

<table>
<thead>
<tr>
<th>Thermoplastic</th>
<th>Abbrv</th>
<th>Chemical Name</th>
<th>Trade Name</th>
<th>Melt Flow Rate (cm(^3)/10 min)</th>
<th>Welding Pressure (psig)</th>
<th>(MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>Acrylonitrile Butadiene Styrene</td>
<td>Lustran</td>
<td>2–50</td>
<td>145–290</td>
<td>1.0–2.0</td>
<td></td>
</tr>
<tr>
<td>PA6</td>
<td>Polycaprolactam</td>
<td>Nylon 6</td>
<td>18–110</td>
<td>145–290</td>
<td>0.5–3.0</td>
<td></td>
</tr>
<tr>
<td>PA66</td>
<td>Polyhexamethylene– adipamide</td>
<td>Nylon-6/6</td>
<td>10–180</td>
<td>72–435</td>
<td>0.5–3.0</td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>Polycarbonate</td>
<td>Lexan</td>
<td>3–12</td>
<td>145–290</td>
<td>1.0–2.0</td>
<td></td>
</tr>
<tr>
<td>HDPE</td>
<td>High Density Polyethylene</td>
<td>Chevron</td>
<td>0.1–80</td>
<td>72–1160</td>
<td>0.5–8.0</td>
<td></td>
</tr>
<tr>
<td>PMMA</td>
<td>Polymethyl Methacrylate</td>
<td>Lucite</td>
<td>1–25</td>
<td>145–290</td>
<td>1.0–2.0</td>
<td></td>
</tr>
<tr>
<td>POM</td>
<td>Polyoxymethylene</td>
<td>Delrin, Acetal</td>
<td>1–40</td>
<td>145–580</td>
<td>1.0–4.0</td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td>Polypropylene</td>
<td>Herkulon</td>
<td>1–100</td>
<td>72–580</td>
<td>0.5–4.0</td>
<td></td>
</tr>
<tr>
<td>PPE+S</td>
<td>Polyphenylene Ether + Styrene/Butadiene</td>
<td></td>
<td>8–270</td>
<td>145–870</td>
<td>2.0–6.0</td>
<td></td>
</tr>
<tr>
<td>PS</td>
<td>Polystyrene</td>
<td>Styron</td>
<td>3–25</td>
<td>145–580</td>
<td>1.0–4.0</td>
<td></td>
</tr>
<tr>
<td>SAN</td>
<td>Styrene–Acrylonitrile</td>
<td>Lustran</td>
<td>8–25</td>
<td>145–290</td>
<td>1.0–2.0</td>
<td></td>
</tr>
</tbody>
</table>

1 psig = 6.89x10\(^{-3}\) MPa; 1 MPa = 1.45x10\(^2\) psig; 1 MPa = 1x10\(^6\) N/m\(^2\)

Table 9-1 Approximate Welding Pressure for Common Thermoplastics
however, so that the temperature of the weld seam is below the glass transition or crystallization temperature. A holding time of between one and five seconds is usually enough.

**Hydraulic Flow**

There are no mechanical adjustments for the hydraulic system. Hydraulic pressure is controlled by the WELD FORCE and HOLD FORCE settings in the setup file. A pressure transducer provides constant feedback to ensure proper control. Figure 9-4 identifies the transducer and control valves. Do not attempt to perform any mechanical adjustments to the hydraulic system.

**Pneumatic Pressure**

Compressed air is used to raise and lower the front safety door, provide vacuum part retention and actuate any optional pneumatic clamping or ejection features. As long as the air pressure is within the specified range of 75 to 90 psi, the regulator should never require any adjustment. If the pneumatically operated mechanisms are operating too slowly, check that you do not have a restriction upstream and that there is enough air flow into the welder.

**Pneumatic Flow**

The front safety access door uses compressed air to raise and lower the door. The flow rate of the air controls the speed of the door. These are set at the factory for fast enough operation yet slow enough to avoid slamming the door into the stops. Excessive door speed can result in damage. If they ever require adjustment, loosen the locking rings and make small changes to the flow control. Turn the locking rings back down to prevent changes in the settings. The door flow control valves are identified in Figure 9-5.
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Troubleshooting

Electronic Control .................................................. 131
PLC Status LEDs .................................................. 131
PLC Battery Backup .................................................. 131
Electrical Power .................................................... 133
Internal Fuses ....................................................... 133
Circuit Breaker ...................................................... 133
Alarm Messages ....................................................... 133
Hydraulic Overload .................................................. 133
Drive Alarms ......................................................... 134
Hydraulics ............................................................ 135
Lift Table Moves too Slowly ....................................... 135
Lift Table Will Not Move ........................................... 135
Common FAQs ....................................................... 136
Electronic Control

PLC Status LEDs

The location of the LEDs is shown in Figure 10-1. To interpret these LEDs on your PLC, please read the literature from the PLC’s manufacturer that came with your welding system.

PLC Backup Battery
(for optional Allen-Bradley PLC)

The battery status can be observed in the Alarms window. If the battery is low or bad, an alarm is displayed. See Figure 10-3 for locations of major electrical cabinet components. The battery is on the back of the touch screen display.

See Figure 10-2 for backup battery details.

If you do not have a spare battery and want to keep your setup files, you will have to leave the AC power on until the battery is replaced.

The first step in preventing data loss is to always have a written copy of your setup files. The second step is to have a spare battery on hand.

To replace the battery:

1. Turn off the AC power before opening the electrical service cabinet.
2. Figure 10-1 shows where the battery is located.
3. Remove the back cover to the battery.
4. Pull the plastic tab inside and the battery pops out.
5. Put a new battery in so that the plastic tab can still be accessed.
6. Place the black cover back on the battery opening.

Each battery contains some lithium. Do not incinerate or dispose of lithium batteries in general trash collection. Explosion or violent rupture is possible.

The lithium material may be considered toxic, reactive or corrosive. The person disposing of the material is responsible for any hazard created in doing so. State and local regulations may exist regarding the disposal of these materials.
Figure 10-3  Interior of Electrical Cabinet with Major Components Identified
Electrical Power

Internal Fuses
Detail of the electrical cabinet interior is shown in Figure 10-3. Inside the electrical cabinet below the base of the AC disconnect switch is a fuse block containing three 25 Amp fuses. These are wired in series between the AC disconnect switch and the terminal block. To gain access to the fuses, pinch the top and bottom of the clear cover as shown in Figure 10-5, and pull the cover off. There are four locking tabs that must be released which are identified in Figure 10-5. Each fuse has its own red removal tab. Pull the tab to remove the fuse. Note that the fuses are asymmetrical and have a flanged lip on the bottom.

Circuit Breaker
The AC utility outlet on the front panel (K in Figure 4-2, Page 29), is protected by a circuit breaker which is identified in Figure 10-3. The maximum current that can be safely drawn from the utility outlets is 4 Amps total, independent of whether the outlets are wired for 110 Volts AC or 220 Volts AC.

Alarm Messages

Hydraulic Overload
If the circuit breaker for the hydraulic pump motor (Figure 10-6) trips, the touch screen display will show Alarm Detected in the banner position. See Figure 10-7.

Press ALARMS. The alarm will read HYDRAULIC OVERLOAD. The pump motor has overloaded. Try to determine the cause of the overload before resetting the breaker.

1. Check that the hydraulic fluid is clear (not cloudy or dark) with a slight yellow tint. The fluid level sight glass should be at 50%.
2. Verify that the suction gauge (See Figure 3-12, Page 23.) needle is in the safe (green) area when the pump is running.
3. Unscrew the filler cap (Figure 11-3). Pull the basket and filter and check for any blockage or foreign material.

Continued
4. Verify that the heat exchanger is cooling properly, and the hydraulic fluid is below 150°F.

5. Check for any leaking hydraulic fluid from the hose fittings on the floor of the cabinet and underneath the welder.

If the cause of the overload is determined to be one of the five items above, do not operate the machine until the problem has been corrected. Do not increase the trip point on the circuit breaker as this may burn out the pump motor. The motor is designed to draw 4.3 Amps at 480 VAC when delivering its rated 3 HP.

### Drive Alarms

If you get a drive related alarm message, check that the tooling is securely attached to the upper frame using all the bolts and torqued to specifications. Check that the weight of the upper tooling is within the specified range:

- Model 5300  20 – 55 lbs  (9 - 25 kg)
- Model 5500  45 – 90 lbs  (20 - 41 kg)
- Model 5700  90 – 150 lbs  (41 - 68 kg)
- Model 5900  110 – 200 lbs  (50 - 91 kg)
- Model 5960LPT  60 – 180 lbs  (27 - 82 kg)

Refer to Table 6-I ALARMS, Hydraulic Overload. The four possible error messages relating to a drive overload are:

1. CHECK FREQUENCY INVERTER
2. FREQUENCY ERROR
3. CURRENT OVERLOAD
4. VOLTAGE OVERLOAD

If the upper tooling is in the correct weight range and is torqued to the proper values, you may need to increase the voltage, current or feedback delay.

Increase the value that corresponds to the error message. We strongly recommend that you consult Dukane prior to changing these values.

Refer to Overload Settings, and Figure 6-31.
Hydraulics

Lift Table Moves Too Slowly

1. Check that the weld pressure is not set too low. It must be greater than the table weight, lower tooling weight and static table friction load.
2. Check that the hold pressure is not set too low.
3. Check that the table lift force is not set too low.
4. Check that the hydraulic pressure is correct by verifying that the Current Force on the OPERATE screen (Figure 6-3, Page 44) is between approximately 440 and 580 lbs for Models 5300/5500, and between about 680 and 850 pounds for Models 5700/5900.

Lift Table Will Not Move

1. Check that the hydraulic pump is turned on.
   
   The HYDRAULIC PUMP ON light will be lit green and the Current Force on the OPERATE screen should be within the normal unloaded range.
2. If the hydraulic pump will not turn on, check that the hydraulic breaker is not tripped. See Figure 10-6 for the breaker location and Figure 10-8 for the normal operational settings.
3. Is the hydraulic pump motor rotating in the wrong direction? If the OPERATE screen indicates almost zero lift force (Current Force) when the pump is on, check that your 480 Volt AC, 3-Phase line is correctly wired. If any of the phases leads are switched, the pump motor will rotate backwards.

   The welder has built-in diagnostics, and the OPERATE screen will display an error message indicating No Hydraulic Pressure as shown in Figure 10-9. Refer to Table 6-I, Page 90.

   The welders are checked with a phase meter during assembly to ensure the phases are wired correctly and the pump is rotating in the proper direction. The polyphase pump motor is bidirectional and proper rotation can be established by reversing two power leads. To correct the problem, have an electrician swap any two of the high voltage power leads feeding power to the main breaker of the welder.
4. Check that the fluid level in the sight glass is at 50%. The fluid should be clear (not cloudy or dark) with a slight yellow tint.

5. If none of these actions correct the problem, there may be something wrong with your hydraulic unit.

**Common FAQs**

1. Q: Do I need to service the hydraulic unit?
   
   A: Yes. You should replace the filter every one to two years, and change the fluid at every or every other filter replacement, depending on the total operational hours on the hydraulic unit.

2. Q: The pump makes noise and a crackle sound. What is causing this?
   
   A: Pump noise and crackle is most often caused by air entering the pump suction fitting. Tightening the suction fitting (Figure 10-10) will usually eliminate such problems. If the pump fails to prime, vent the pump discharge to atmosphere to reestablish fluid flow.

3. Q: What should I do with the eight grease zerks on the machine?
   
   A: We recommend you grease these locations once or twice a year (in severe environments it may be necessary to do it more often) with a good general-purpose industrial grease.

4. Q: An alarm message says: E-STOP OR SERVICE DOOR OPEN. I’ve checked all the doors and cleared the E-STOPs, it still won’t clear, and I can’t run a cycle. What is the problem?
   
   A: If your machine is equipped with an E-STOP RESET button, you have to push the E-STOP RESET button to reset the safety circuit.

   If that does not solve the problem, attempt to readjust all the door switches. Be sure the back doors are fully closed and the switch tang is fully engaged in the door switch.

   If this does not clear the problem, it is possible that one of the E-STOPs or door interlock switches needs replacement.

---

*Figure 10-10  Hydraulic Suction Fitting*
5. Q: There’s a red box that says SENSOR 1 (or SENSOR 2) on my screen and it won’t go away, and I can’t run a cycle. What do I do now?
   A: If you are using part-in-place detection, the part-in-place sensor is not detecting a part loaded into the tooling. If there are no part-in-place sensors in your tooling, go to the USER OPTIONS > Tool Options > Sensors. Put the sensors in BYPASS mode.

6. Q: What does it mean when I get an Autotune Error?
   A: There is either a serious problem with the machine, there is some decoupling occurring between the machine and tool or within the upper tool or, more likely, the upper tool is outside of the weight range of the machine.

7. Q: There are a lot of tooling bolts. How many do I really HAVE to install?
   A: The best answer to that question is ALL of them. There are some cases where you can use fewer. The only legitimate reason for not using all of the bolts is that some part of the tooling obscures some of the holes. You must also torque the bolts to 100 foot-pounds (136 Nt-m). If you do not, the upper tool can become decoupled from the springs, resulting in possible damage to the tool or machine. Similarly, a loose lower tool will result in poor welding and can damage the tooling or machine.

8. Q: What do you mean by acoustically coupled?
   A: Acoustic coupling is a term we use to describe the tendency of a multipart mass to vibrate as though it were one piece. If the upper vibration tool has some loose bolts in it, the individual pieces can vibrate relative to each other, which causes significant problems. The tooling is then said to be decoupled from the springs. Both the machine and tooling can be damaged if this condition exists for a prolonged period.

9. Q: Why do I have to Autotune the tooling?
   A: 1. During an Autotune the machine seeks the optimal operating frequency for that particular upper tool/spring assembly. If an Autotune procedure is not done, the machine will be fighting the natural resonance of the tooling/frame assembly, which may result in poor and/or inconsistent weld quality.
   A: 2. Fighting the natural resonance of the tooling/frame assembly results in wasted energy. Since you cannot create or destroy energy, only change its form, this wasted energy shows up as heat, especially in the coils. Overheated coils will fail prematurely, resulting in unnecessary downtime and expense.

10. Q: The machine has two cycle activation switches, so why do I only have to activate one to start a cycle?
    A: Machines equipped with light curtains are not required to be equipped with two-hand anti-tie-down cycle actuation, so as a convenience we allow the operator to use either of the switches to start the cycle.

11. Q: This machine is much louder than 80db. What can I do about it?
    A: If the machine is slightly louder than 80db, it is probably running an application with a higher basic sound level than we tested the machine for in our factory. If you buy a Dukane machine with tooling, we always check the total noise of the machine and tooling together. Our standard sound insulation package is designed to deal with the majority of vibration welding applications. Consult Dukane about the possible addition of custom sound insulation. If the machine is significantly louder than 80db, you probably have not installed the fork tube covers that came with the machine (Figures 3-4 and 3-5, Pages 18 and 19). When we ship a machine, the covers are shipped in a corrugated box in the bottom of the electrical cabinet.

Continued
12. Q: When I push the test button on the Autotune screen (Figure 6-18, Page 59), what am I supposed to hear?
A: You should hear a loud, clear, single-note tone similar to that of a boat horn. If you hear any raspy or buzzing sounds, or if you hear anything like a wow or wow-wow-wow-wow sound, check the security of ALL bolts and other fasteners in the upper tool, including the ones securing it to the springs. If the strange sound persists, call Dukane and ask us to listen to it over the telephone.

13. Q: I’ve installed a tool, done the Autotune, the touch screen indicates everything is OK, but when I push the operate switch to start a cycle, the machine just sits there. What is the problem?
A: You have probably not connected the machine to an air line. The only part of the machine itself that needs pressurized air is the sliding door.

14. Q: Why do I have to reset the machine every cycle, or quite often?
A: The most common cause of this is the operator breaking the light curtain just prior to the sliding door becoming completely open. Make sure the door has lowered completely before breaking the light curtain.

15. Q: When I try to Autotune the machine nothing happens and then after a period of time I get an Autotune error. What is the problem?
A: Press the HOME MACHINE button on the touch screen display, and follow instructions on the message banner. Refer to Figure 7-5, Page 98.

16. Q: What happens if I accidentally run a cycle with the stanchion pins extended?
A: Hopefully nothing. The stanchion assemblies might survive a couple of cycles with the pins extended, but they are not necessarily designed to resist damage in this condition. You could damage the tooling or the machine if you do this. Get into the habit of retracting the stanchion pins immediately upon setting down the wrench after tightening the tooling bolts. Also, habitually looking specifically for retracted stanchion pins prior to initiating the Autotune sequence and prior to initiating the first cycle with a freshly installed tool will give you two more chances to discover extended stanchion pins before you risk damage by cycling the machine with the pins extended.

17. Q: What happens if I accidentally cycle the machine with no parts in the tooling?
A: That depends to a large extent on the construction of the tooling. All production-ready Dukane tools have stanchions that act as stops to prevent the tool being damaged if the machine is cycled with no parts in the tool. We cannot always construct the tool such that it would not be damaged if some part of the assembly is in the tool and some part is not. We see many tools built by others that have no form of safety stops at all, and would be destroyed if this were to occur.

18. Q: The lift table surface and/or springs of the machine are starting to rust. What should I do?
A: Do not scrape or abrade the surfaces in an attempt to remove the rust. Spray the springs and lift table surface with a water displacement solvent like WD–40 or a corrosion protector like LPS–2 to prevent further damage. If you are in an environment where caustics are present, or where it is very humid, you should do this as regularly as you would with any bare steel surface. If the problem is severe and/or persistent, try LPS–3 corrosion inhibitor or contact Dukane.

19. Q: It is a problem that the coils are getting hot?
A: Yes. The bottom surface of the coils should not be too hot to touch. It probably indicates that the machine has not been Autotuned, the upper tool is outside of the weight range for the machine, or there is something loose in the upper tool. If you have checked all of these issues and the problem persists, contact Dukane.
SECTION 11

Maintenance

Touch Screen Display ........................................... 141
Pneumatic System .................................................. 141
  Compressed Air Filter ........................................ 141
  Moisture Trap .................................................. 141
Hydraulic System .................................................. 142
  Hydraulic Pressure ............................................ 142
  Hydraulic Fluid Level ....................................... 142
  Hydraulic Fluid Change .................................... 142
  Back Pressure Gauge ....................................... 143
Mechanical System ............................................... 144
  Grease Fittings ............................................... 144
  Table Position Encoder .................................... 144
  Tooling Care .................................................. 144
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Touch Screen Display

Do not use any solvents or abrasive cleaners on the front panel. Do not spray cleaner directly onto the front panel. Apply a small amount of computer display cleaner to a soft towel first. Clean the panel with the moistened towel. Do not allow any liquid to collect around any of the nearby switches.

Pneumatic System

Compressed Air Filter

Under normal operating conditions, the filter (5 micron element) should only need to be replaced every two years or when the pressure drop exceeds 15psi (0.1MPa) whichever comes first. Replacement filters are available from SMC Corporation of America (Part No. AF30P-060S). Before attempting to replace the filter, turn off the compressed air supply, and then disconnect the air supply from the filter inlet. The metal canister and polycarbonate bowl must be removed to gain access to the filter element. Carefully remove the water drain line from the bottom of the housing before removing the filter canister. The hose fitting can be easily snapped off if bent to far.

To remove the canister, pull and hold the spring-loaded black release tab down as shown in Figure 11-1. Turn the canister 45° either to the left or right, then pull straight down. The filter element is installed under the regulator housing. Twist the filter retainer 90° (Figure 11-2) and pull it down to remove the filter. Install a new filter element and replace the retainer. Reinstall the filter canister by holding the black release tab down and inserting the housing vertically, but rotated 45° off center. Still holding the spring-loaded tab down, push the canister up as far as it will go. Turn the canister 45° until the locking tab is under the alignment mark. Release the tab and it will click into the locked position. Carefully reinstall the water drain hose.

CAUTION

Never use anything sharp on the touch screen. Only use your finger. The screen is intended for industrial use, but can be damaged by scratching or puncturing. Use only a damp (not wet), soft cloth to clean the display. Never spray any liquid directly on the screen. Do not attempt to clean the screen with any solvents.

Moisture Trap

The metal cage below the pressure gauge covers the polycarbonate moisture trap. The trap features a normally closed float and is self-draining of accumulated water. A drain hose is attached to the bottom of the filter housing which exits at the bottom of the machine.

Continued
Keep this in mind as moisture draining to the floor could cause a problem. The total drain line length should be less than 16.5 ft (5 m). The internal float will open under pressure above 22 psi (0.15 MPa) when approximately 25 cm³ = 25 ml (0.85 ounce) of water has accumulated.

**Hydraulic System**

**Hydraulic Pressure**

The pump is set to deliver up to 1500psi at a maximum operating temperature of 150° F. After an extended period of use, the hydraulic reservoir, pump, motor and heat exchanger can become very hot. Use caution to avoid burning yourself. Let the unit cool down to a safe temperature before attempting any maintenance or adjustments.

**Hydraulic Fluid Level**

The reservoir has a capacity of 20 U.S. gallons (75.7 liters). Model VW5300 has a capacity of 10 U.S. gallons (38 liters). Maintain the fluid level to appear at the center of the sight gauge. This corresponds to about 18.5 gallons or 70 liters. If you have to add fluid after use, you obviously have a leak somewhere. Do not operate the machine until the hydraulic leak has been identified and repaired.

**Hydraulic Fluid Change**

Under light to normal operating conditions, the fluid should be changed every four years or 10,000 operational hours, whichever occurs first. If the fluid starts to darken or appear cloudy, it should be changed immediately. Deteriorated hydraulic fluid reduces component life and is a potential danger to operating personnel. Hydraulic fluid is not expensive, and fresh fluid is good insurance against having to replace a costly hydraulic pump.

To drain the hydraulic fluid, unscrew the filler cap shown in Figure 11-3 and remove the filter element and basket. Use a hand pump or electric pump inserted into the filler opening to empty the fluid into a safe storage container. Do not use the drain plug at the bottom of the reservoir. This will create a mess of used hydraulic fluid in the floor of the cabinet because the drain plug does not have a
After draining the reservoir, some fluid will remain in the hydraulic cylinder and lines, so it will take less than 18.5 gallons to refill. Add new fluid until level in the sight glass is at 50% (Figure 11-4). Again it is best to use a pump to fill the reservoir to prevent spillage. We also recommend filtering the fresh fluid to avoid the possibility of any contaminants entering the hydraulic system. You may want to attach a high capacity filter to your pump to speed up the process.

We prefer Mobil DTE® 25 hydraulic fluid because it has a higher temperature breakdown rating. There is very little price difference, and the cost of replacing components in the hydraulic system dictates good maintenance procedures and quality fluid.

When the fluid is changed, install a new filter element. Contact Flodyne/Hydradyne Inc, Hanover Park, IL 60103 USA, (630) 563–5468. The replacement element is Part No. **0075R010BN3HC**. After refilling the reservoir, place the new filter in the basket and reinstall them. Screw the filler cap back on making sure the O–ring seats properly. Tighten the cap securely using a wrench to create a positive seal around the O–ring and prevent any fluid leaks. After the system has been cycled a few times, recheck the fluid level. It may be necessary to add more hydraulic fluid if the sight–glass level has dropped below 50%.

Safely dispose of used hydraulic fluid following all federal, state and local environmental regulations applicable to your area. The person disposing of the material is responsible for any hazard created.

### Back Pressure Gauge

The suction gauge shown in Figure 11 - 4, should always remain in the green safe operating area, which is between 0 and 35 on the dial face. Once the back pressure increases and enters the yellow region of the gauge (35 to 43), it is time to replace the hydraulic filter. Do not operate the welder if the pressure is in the red area (greater than 43 psi). We recommend that you replace the hydraulic fluid whenever you install a new filter. For a replacement filter, contact Flodyne/Hydradyne Inc, Hanover Park, IL 60103 USA, (630) 563–5468. The filter element is Part No. **0075R010BN3HC**. Also check the air vent filter by pushing in the cap and twisting counterclockwise (CCW) . Replace the air filter if needed.

<table>
<thead>
<tr>
<th>Brand</th>
<th>Temperature 25° C Ambient</th>
<th>Ambient Temp. 30° C to 50° C</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGIP/Tutela</td>
<td>OSO 46</td>
<td>OSO 68</td>
</tr>
<tr>
<td>Atlantic</td>
<td>Ideal AW 46</td>
<td>Ideal AW 68</td>
</tr>
<tr>
<td>Castrol</td>
<td>Hyspin AWS 464</td>
<td>Hyspin AWS 68</td>
</tr>
<tr>
<td></td>
<td>Hyspin HDX 46</td>
<td>Hyspin HDX 68</td>
</tr>
<tr>
<td>ESSO</td>
<td>Nuto H 48</td>
<td>Nuto H 68</td>
</tr>
<tr>
<td>Ipiranga</td>
<td>Ipitur AW 46</td>
<td>Ipitur AW 68</td>
</tr>
<tr>
<td>Mobil Oil</td>
<td>Mobil DTE 25</td>
<td>Mobil DTE 26</td>
</tr>
<tr>
<td>Petrobras</td>
<td>Lubrax Industrial HR-46 EP</td>
<td>Lubrax Industrial HR-68 EP</td>
</tr>
<tr>
<td>Renolub (Fuchs)</td>
<td>Renolin B 15</td>
<td>Renolin B 20</td>
</tr>
<tr>
<td></td>
<td>Renolin MR 15</td>
<td>Renolin MR 20</td>
</tr>
<tr>
<td>Shell</td>
<td>Tellus 46</td>
<td>Tellus 68</td>
</tr>
<tr>
<td></td>
<td>Tellus T 46</td>
<td>Tellus T68</td>
</tr>
<tr>
<td>Texaco</td>
<td>Rando Oil HD446</td>
<td>Rando Oil HD68</td>
</tr>
</tbody>
</table>

**Table 11-I** Equivalent Hydraulic Fluids For Normal and Elevated Temperatures
Mechanical System

Grease Fittings

We recommend you grease the zerks once or twice a year with a good general-purpose industrial grease. In severe environments you might want to do it more often. The fittings are located on the top of each of the guide bearings. Figure 11-5 shows the location (looking from the front) of the eight fittings on a partially assembled chassis. Numbers 3, 4, 7 and 8 are accessible from the rear of the chassis. Figure 11-6 shows a detailed view of the front lower right grease fitting (No. 6). Keep the guide rails clean from any dirt or contaminants.

Table Position Encoder

The linear position encoder is shown in Figure 11-7. The device is rated for industrial use, but since it has a resolution of 0.01mm, it is quite sensitive to mechanical impact. Make sure the encoder shaft is kept clean and able to move freely. Do not lubricate the shaft. If the encoder readout is not accurate measuring the table position, check that the encoder is firmly attached to the table and properly calibrated by use of the User Options>Utilities>Calibrate Position Transducer screen (Figure 6-36, Page 79).

Tooling Care

Tooling left unused and open to the air may develop surface corrosion. Spray the surface of the tooling with a rust inhibitor like WD-40 or a corrosion solvent like LPS-2 to protect it. For long term storage, spray the surface of the tooling with LPS-3 corrosion inhibitor and wrap in plastic.

Verify that all bolts are properly installed, and are torqued correctly. For important information on proper bolt torquing, see "TOOLING BOLT LENGTH" on page 105.
Contacting Dukane
Identify Equipment

When contacting Dukane about a service–related problem, be prepared to give the following information:

• Model number, line voltage and serial number.
• Alarm messages from the touch screen display.
• Problem description and steps taken to resolve it.

Many problems can be solved over the telephone, so it is best to call from a telephone located near the equipment.

Intelligent Assembly Solutions

Mailing Address: Dukane IAS, LLC
2900 Dukane Drive
St. Charles, IL 60174 USA

Phone: (630) 797–4900
E-Mail: ussales@dukane.com
Fax:
  Main - (630) 797–4949
  Service & Parts - (630) 584–0796

Website
The website has information about our products, processes, solutions, and technical data. Downloads are available for many kinds of literature. This is our main web address:

www.dukane.com/us/

You can locate your local representative at:

www.dukane.com/us/SA_IntSales.htm
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SECTION 13

Specifications

Tooling Specifications ........................................ 151
Weights, Dimensions ................................................ 152
Operating Environment ............................................ 154
Power Requirements .................................................. 155
    AC Power .......................................................... 155
    Compressed Air .................................................. 155
Space Requirements Drawings ................................. 156
Regulatory Agency Compliance ............................... 161
Tooling Specifications

Tooling Size & Weight

Table 13-I gives the minimum and maximum weight and lateral dimension for the upper tooling for each model. The weight is critical since the drive heads are designed to drive a mass within a specific range. The length of the upper tooling is specified because you should completely cover the longitudinal spread of the spring frame to ensure acoustic coupling. However, you do not want more than about three inches of lateral (in direction of vibration) overhang on each end. More than three inches overhang will allow the unsupported ends to vibrate at their own resonant frequency. The minimum depth (front to back distance) of the upper tooling is dictated by the bolt holes spacing. There is no concern about overhang in the direction orthogonal to vibration.

The lower tooling can be as light as you want as long as it has the necessary strength to rigidly hold the lower part in place and covers the lower bolt hole pattern. Conversely, the lower tooling can be as heavy as you want, as long as the combined weight of the table and lower tool allow enough clamping force to be exerted on the part assembly during welding. Table 13-I also gives the lift table size, weight and lift force for each model. The lift table dimensions are effectively the largest rectangular tooling that can normally be accommodated.
### Table 13-1 Upper and Lower Tooling Weight and Dimensions

<table>
<thead>
<tr>
<th></th>
<th>VW5300</th>
<th>VW5500</th>
<th>VW5700</th>
<th>VW5700LP</th>
<th>VW5900</th>
<th>VW5900LP</th>
<th>VW5960</th>
<th>VW5960LP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upper Tooling Weight</strong></td>
<td>Max.</td>
<td>55 lb / 25 Kg</td>
<td>90 lb / 41 Kg</td>
<td>150 lb / 68 Kg</td>
<td>180 lb / 82 Kg</td>
<td>200 lb / 91 Kg</td>
<td>180 lb / 82 Kg</td>
<td>200 lb / 91 Kg</td>
</tr>
<tr>
<td></td>
<td>Min.</td>
<td>20 lb / 9 Kg</td>
<td>35 lb / 16 Kg</td>
<td>90 lb / 41 Kg</td>
<td>60 lb / 27 Kg</td>
<td>110 lb / 50 Kg</td>
<td>60 lb / 27 Kg</td>
<td>110 lb / 50 Kg</td>
</tr>
<tr>
<td><strong>Upper Tooling Length</strong></td>
<td>Max.</td>
<td>20&quot; / 508mm</td>
<td>36&quot; / 914mm</td>
<td>50&quot; / 1270mm</td>
<td>40&quot; / 1016mm</td>
<td>70&quot; / 1778mm</td>
<td>40&quot; / 1016mm</td>
<td>70&quot; / 1778mm</td>
</tr>
<tr>
<td></td>
<td>Min.</td>
<td>16&quot; / 406mm</td>
<td>26.5&quot; / 673mm</td>
<td>30&quot; / 762mm</td>
<td>50&quot; / 1270mm</td>
<td>70&quot; / 1778mm</td>
<td>50&quot; / 1270mm</td>
<td>70&quot; / 1778mm</td>
</tr>
<tr>
<td><strong>Upper Tooling Width</strong></td>
<td>Max.</td>
<td>14&quot; / 355mm</td>
<td>18&quot; / 457mm</td>
<td>24&quot; / 610mm</td>
<td>24&quot; / 610mm</td>
<td>24&quot; / 610mm</td>
<td>24&quot; / 610mm</td>
<td>24&quot; / 610mm</td>
</tr>
<tr>
<td></td>
<td>Min.</td>
<td>13&quot; / 330mm</td>
<td>13&quot; / 330mm</td>
<td>15&quot; / 381mm</td>
<td>15&quot; / 381mm</td>
<td>15&quot; / 381mm</td>
<td>15&quot; / 381mm</td>
<td>15&quot; / 381mm</td>
</tr>
<tr>
<td><strong>Lower Tooling Weight</strong></td>
<td>Max.</td>
<td>1000 lb / 453 Kg</td>
<td>1550 lb / 680 Kg</td>
<td>2000 lb / 9907 Kg</td>
<td>2000 lb / 9907 Kg</td>
<td>2000 lb / 9907 Kg</td>
<td>2000 lb / 9907 Kg</td>
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</tr>
<tr>
<td></td>
<td>Min.</td>
<td>10 lb / 5 Kg</td>
<td>10 lb / 5 Kg</td>
<td>15 lb / 7 Kg</td>
<td>15 lb / 7 Kg</td>
<td>15 lb / 7 Kg</td>
<td>15 lb / 7 Kg</td>
<td>15 lb / 7 Kg</td>
</tr>
<tr>
<td><strong>Lower Tooling Length</strong></td>
<td>Max.</td>
<td>24&quot; / 610mm</td>
<td>38&quot; / 965mm</td>
<td>52&quot; / 1320 mm</td>
<td>72&quot; / 1830mm</td>
<td>72&quot; / 1830mm</td>
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<tr>
<td></td>
<td>Min.</td>
<td>16&quot; / 406mm</td>
<td>26.5&quot; / 673mm</td>
<td>30&quot; / 762mm</td>
<td>50&quot; / 1270mm</td>
<td>70&quot; / 1778mm</td>
<td>50&quot; / 1270mm</td>
<td>70&quot; / 1778mm</td>
</tr>
<tr>
<td><strong>Lift Table Dimensions</strong></td>
<td>Max.</td>
<td>24” L x 18” W</td>
<td>36” L x 18” W</td>
<td>52” L x 24” W</td>
<td>52” L x 24” W</td>
<td>72” L x 24” W</td>
<td>72” L x 24” W</td>
<td>72” L x 24” W</td>
</tr>
<tr>
<td></td>
<td>Min.</td>
<td>610mm x 457mm</td>
<td>965mm x 457mm</td>
<td>1320mm x 610mm</td>
<td>1320mm x 610mm</td>
<td>1830mm x 610mm</td>
<td>1830mm x 610mm</td>
<td>1830mm x 610mm</td>
</tr>
<tr>
<td><strong>Table Weight</strong></td>
<td>300 lb / 136 Kg</td>
<td>435 lb / 197 Kg</td>
<td>630 lb / 286 Kg</td>
<td>630 lb / 286 Kg</td>
<td>750 lb / 340 Kg</td>
<td>750 lb / 340 Kg</td>
<td>7065 lb / 31 KN</td>
<td>7065 lb / 31 KN</td>
</tr>
<tr>
<td><strong>Max. Hydraulic Clamp Force</strong></td>
<td>3140 lb / 14 KN</td>
<td>4710 lb / 21 KN</td>
<td>7360 lb / 33 KN</td>
<td>7360 lb / 33 KN</td>
<td>7360 lb / 33 KN</td>
<td>7360 lb / 33 KN</td>
<td>7360 lb / 33 KN</td>
<td>7360 lb / 33 KN</td>
</tr>
<tr>
<td><strong>Max. Programmable Clamp Force</strong></td>
<td>3000 lb / 13.4 KN</td>
<td>4500 lb / 20 KN</td>
<td>5000 lb / 22.3 KN</td>
<td>5500 lb / 24.5 KN</td>
<td>5500 lb / 24.5 KN</td>
<td>5500 lb / 24.5 KN</td>
<td>5500 lb / 24.5 KN</td>
<td>5500 lb / 24.5 KN</td>
</tr>
</tbody>
</table>

**NOTE**

Minimum table shut height: 6"
(all models except 5960 and 5960LPT which have a shut height of 14")

Maximum daylight frame: 25"
(all models except 5960 and 5960LPT which have a daylight frame of 43")
Approximate Shipping Weights

The vibration welder is designed to be lifted and moved with a heavy-duty forklift. The welder is tied down and shipped on a pallet similar to the one shown in Figure 3 - 1, Page 17. The forklift should have a rated capacity greater than the shipping weight of the welder listed in Table 13 - II. These weights are approximate and do not include tooling or hydraulic fluid.

**Table 13-II**  Approximate Shipping Weights

<table>
<thead>
<tr>
<th>VW Model</th>
<th>Pounds</th>
<th>Kilograms</th>
</tr>
</thead>
<tbody>
<tr>
<td>5300</td>
<td>4,500</td>
<td>2,046</td>
</tr>
<tr>
<td>5500</td>
<td>5,900</td>
<td>2,675</td>
</tr>
<tr>
<td>5700</td>
<td>6,950</td>
<td>3,150</td>
</tr>
<tr>
<td>5700LPT</td>
<td>8,000</td>
<td>3,650</td>
</tr>
<tr>
<td>5900</td>
<td>7,950</td>
<td>3,600</td>
</tr>
<tr>
<td>5900LPT</td>
<td>9,000</td>
<td>4,090</td>
</tr>
<tr>
<td>5960</td>
<td>7,950</td>
<td>3,600</td>
</tr>
<tr>
<td>5960LPT</td>
<td>9,000</td>
<td>4,090</td>
</tr>
</tbody>
</table>

Dimensions

Dimensions are shown in Table 13 - III. For more information, see *Space Requirements Drawings* in this Section beginning on Page 147.

**Table 13-III**  Welder Dimensions - in (mm)

<table>
<thead>
<tr>
<th>VW Model</th>
<th>Height **</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>5300</td>
<td>81 (2057)</td>
<td>48 (1219)</td>
<td>52 (1321)</td>
</tr>
<tr>
<td>5500</td>
<td>80.5 (2045)</td>
<td>84 (2134)</td>
<td>44.5 (1130)</td>
</tr>
<tr>
<td>5700</td>
<td>80.5 (2045)</td>
<td>101 (2565)</td>
<td>51 (1295)</td>
</tr>
<tr>
<td>5700LPT</td>
<td>80.5 (2045)</td>
<td>101 (2565)</td>
<td>51 (1295)</td>
</tr>
<tr>
<td>5900</td>
<td>80.5 (2045)</td>
<td>121 (3073)</td>
<td>51 (1295)</td>
</tr>
<tr>
<td>5900LPT</td>
<td>80.5 (2045)</td>
<td>121 (3073)</td>
<td>51 (1295)</td>
</tr>
<tr>
<td>5960</td>
<td>84 (2134)</td>
<td>122 (3100)</td>
<td>57 (1500)</td>
</tr>
<tr>
<td>5960LPT</td>
<td>84 (2134)</td>
<td>122 (3100)</td>
<td>57 (1500)</td>
</tr>
</tbody>
</table>

**Add for adjustable leveling feet height - between 1 - 3 in (25 - 76 mm)**

NOTE

See *Space Requirements Drawings* starting on Page 147.
Operating Environment

Operate the vibration welder within these guidelines:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>40°F to 95°F (+5°C to +35°C)</td>
</tr>
<tr>
<td>Air Particulates</td>
<td>Keep the equipment dry.</td>
</tr>
<tr>
<td></td>
<td>Minimize exposure to moisture, dust, dirt, smoke and mold.</td>
</tr>
<tr>
<td>Humidity</td>
<td>5% to 95% Non-condensing @ +5°C to +30°C</td>
</tr>
<tr>
<td>Altitude</td>
<td>Sea level to 15,000' (4,570 m)</td>
</tr>
</tbody>
</table>
Power Requirements

AC Power

See Table 13-IV. With the exception of Model 5900, the power cord uses a three–pole, four–blade, grounding type plug designed for 3-Phase 480 VAC at 30 Amps. The 480 VAC 3-Phase plug configuration is shown in Figure 13-1. It is designed to be plugged into a 480 VAC, 3-Phase, 30 Amp, NEMA type L16–30R receptacle as shown in Figure 13-2.

The power cord supplied is approximately 14 feet long. For Model 5300, the user passes the cord through one of the Power Port holes (See Figure 13-3). For Models 5500 and 5700 the cord exits from the top rear of the welder cabinet, so the 480 VAC outlet needs to be close to the machine. Model 5900 is not supplied with a power cord.

Consult your local electrical guidelines to learn if the machine can be operated with a power cord plugged into an outlet, or if it must be hard wired to a 480 Volt circuit. For safety and reliability, the machine should be permanently wired inside electrical conduit to a 480 Volt circuit. A minimum of 10 - Gauge wire is recommended to safely handle the 30-Amp welder current.

Do not alter the plug or receptacle in any way. Do not use an extension cord. If there is any question about the grounding or phasing of your AC power, have it checked by a qualified electrician.

<table>
<thead>
<tr>
<th>Model</th>
<th>Volts</th>
<th>Amps</th>
<th>Power Cord with Plug Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>5300</td>
<td>480</td>
<td>30</td>
<td>Yes, but not connected. See Fig 13-3 for Power Port Holes.</td>
</tr>
<tr>
<td>5500</td>
<td>480</td>
<td>30</td>
<td>Yes, connected.</td>
</tr>
<tr>
<td>5700</td>
<td>480</td>
<td>30</td>
<td>Yes, connected.</td>
</tr>
<tr>
<td>5700LPT</td>
<td>480</td>
<td>40</td>
<td>No power cord supplied.</td>
</tr>
<tr>
<td>5900</td>
<td>480</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5900LPT</td>
<td>480</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5960</td>
<td>480</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5960LPT</td>
<td>480</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 13-IV AC Power Requirements

Compressed Air

The welder requires a supply of clean, dry, compressed air at 75 to 90 psi (0.52 to 0.62 MPascal or 5.1 to 6.1 Bar).

NOTE

If your machine is equipped with a custom input voltage kit, a separate sheet detailing the connections will be provided with System Documentation found in the electrical cabinet (See Figure 3-2, Page 17).
Space Requirements Drawings

Figure 13-3  Model 5300 Floor Space Requirements
Figure 13–4  Model 5500 Floor Space Requirements

Electrical and Air
KEEP CLEAR

Total Minimum Recommended
Clear Area  (125" W  x  105" D)

Clear Area For Front Panel Controls  (21" W x 2" D)

Clear Area For Light Curtain Installation  (46" W x 2" D)

Clear Area For Optional Overhead External Work Light  (61" W x 19" D)

Recommended Minimum Clear Area For Tool Change  (42" W x 36" D)

Dimensions are in inches
Multiply by 25.4 for millimeters
Electrical and Air Drops in This Area
KEEP CLEAR

Total Minimum Recommended Clear Area  (163" W  x  127" D)
Clear Area For Front Panel Controls  (21" W x 2" D)
Clear Area For Light Curtain Installation  (75" W x 2" D)
Clear Area For Optional Overhead External Work Light  (51" W x 19" D)
Recommended Minimum Clear Area For Tool Change  (76" W x 36" D)

VIBRATION WELDER MODEL VWB4900

FLOOR LAYOUT - SUBJECT TO CHANGE WITHOUT NOTICE

Dukane Manual Part No. 403-589-01

Figure 13-6 Model 5900 / 5900LPT Floor Space Requirements
Figure 13-7  Model 5960 / 5960LPT Floor Space Requirements
Regulatory Agency Compliance

FCC
The equipment complies with the following Federal Communications Commission regulations.


CE Marking
This mark on your equipment certifies that it meets the requirements of the EU (European Union) concerning interference causing equipment regulations. CE stands for Conformité Européenne (European Conformity). The equipment complies with the following CE requirements.

- The EMC Directive 2014/30/EC for Heavy Industrial -
  EN 61000-6-4
  EN 55011
  EN 61000-6-2
  EN61000-4–2
  EN61000-4–3
  EN61000-4–4
  EN61000-4–5
  EN61000-4–6
  EN61000-4–8
  EN61000-4–11
- The Low Voltage Directive 2014/35/EU.
- The Machinery Directive 2006/42/EC.
- EN ISO 12100: Safety of Machinery - General principles of design, risk assessment, and risk reduction.

IP Rating
The vibration welder has an IP (International Protection) rating from the IEC (International Electrotechnical Commission).

The rating is IP2X, in compliance with finger-safe industry standards.

UL & CSA
The equipment complies with these standards:

**Underwriters Laboratories (UL):**
UL61010-1

**National Standards of Canada (CSA):**
CAN/CSA C22.2 No. 61010-1

as verified by TÜV Rheinland.

**CAUTION**

DO NOT make any modifications to the PLC, its program, or to the vibration welder as delivered by Dukane. Unauthorized changes made to the system may result in violating one or more regulations under which this equipment is manufactured. In addition, any warranties applying to the system expressed or implied may be void.
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Appendix A, Parts List ........................................ 163
VW5300 ................................................. 165
VW5500 ................................................. 166
VW5700 ................................................. 168
VW5900 ................................................. 170
VW5960 ................................................. 171
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## Appendix A - Parts List

### VW5300 Parts List

<table>
<thead>
<tr>
<th>Dukane part number</th>
<th>Manufacturer part number</th>
<th>Manufacturer</th>
<th>Item</th>
<th>Quantity</th>
<th>Keep in stock?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Door Components</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JT-2200-246</td>
<td>BES R03KC-PSC30F-BV00.2-GS49</td>
<td>Balluff</td>
<td>Inductive Proximity Sensor, Flat (Front Door Open)</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2000-293</td>
<td>440N-S32023</td>
<td>Allen Bradley</td>
<td>Non Contact Interlock Switch, 1NC 1NO, (Front Door Closed)</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-15</td>
<td>440K-C21062</td>
<td>Allen Bradley</td>
<td>Safety Interlock (Back Doors)</td>
<td>2</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Hydraulic System</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JT-1900-23</td>
<td>1263493</td>
<td>Hydac</td>
<td>Oil Filter Element</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-1900-07</td>
<td>CWCA-LIN-MBA</td>
<td>Rexroth</td>
<td>Counter Balance</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-1900-08</td>
<td>4WRAEB6W25-11 / G24N9DK26/MR</td>
<td>Rexroth</td>
<td>Directional Valve</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-1900-09</td>
<td>#DBETE6X/200G24K31A1M</td>
<td>Rexroth</td>
<td>Proportional Valve</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Bridge Components</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JT-1127-00</td>
<td>N/A</td>
<td>Dukane</td>
<td>Lamination Carrier Cast (X500 Series)</td>
<td>2</td>
<td>no</td>
</tr>
<tr>
<td>JT-2100-09</td>
<td>N/A</td>
<td>Dukane</td>
<td>Two Wire Coil 80 Turn</td>
<td>2</td>
<td>no</td>
</tr>
<tr>
<td>JT-2100-03</td>
<td>N/A</td>
<td>Dukane</td>
<td>Amplitude Pick-up Coil Assembly</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-1019-66</td>
<td>N/A</td>
<td>Dukane</td>
<td>Capsule Pick-up Magnet</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-1022-11</td>
<td>N/A</td>
<td>Dukane</td>
<td>Linear Positioning Transducer</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Main Drive and Controls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-5100</td>
<td>N/A</td>
<td>Dukane</td>
<td>Vibration Drive 50A</td>
<td>1</td>
<td>no</td>
</tr>
<tr>
<td>JT-2200-560</td>
<td>BR-5FCFCD.2048-06</td>
<td>B &amp; R</td>
<td>2GB Compact Flash</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-513</td>
<td>BR-X20BB80</td>
<td>B &amp; R</td>
<td>Bus Controller Base</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-514</td>
<td>BR-X20BC0083</td>
<td>B &amp; R</td>
<td>Bus Controller Powerlink</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-515</td>
<td>BR-X20PS9400</td>
<td>B &amp; R</td>
<td>BC Power Feed, 24VDC</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-516</td>
<td>BR-X20DI9371</td>
<td>B &amp; R</td>
<td>12 Input, 24VDC, Sink 1 Wire</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-517</td>
<td>BR-X20DO9322</td>
<td>B &amp; R</td>
<td>12 Output, 24VDC, .5A, Source</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-551</td>
<td>BR-X20BM11</td>
<td>B &amp; R</td>
<td>Bus Module with Power Bus Connector</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>Dukane part number</td>
<td>Manufacturer part number</td>
<td>Manufacturer</td>
<td>Item</td>
<td>Quantity</td>
<td>Keep in stock?</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------</td>
<td>--------------</td>
<td>------</td>
<td>----------</td>
<td>----------------</td>
</tr>
<tr>
<td>JT-2200-552</td>
<td>BR-X20BM01</td>
<td>B &amp; R</td>
<td>Bus Module with Power Bus Separation</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-553</td>
<td>BR-X20TB12</td>
<td>B &amp; R</td>
<td>Standard Terminal Block (12pt)</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-554</td>
<td>BR-X20AC0SL1</td>
<td>B &amp; R</td>
<td>Locking Plate (Left)</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-555</td>
<td>BR-X20AC0SR1</td>
<td>B &amp; R</td>
<td>Locking Plate (Right)</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-557</td>
<td>BR-X20CA0E61. 00200</td>
<td>B &amp; R</td>
<td>EPL Connection Cable (2 ft)</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-559</td>
<td>BR-5PP5: 436590.001-00</td>
<td>B &amp; R</td>
<td>15” PP500 No Windows</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-707</td>
<td>WLB322C285P BQMB</td>
<td>Banner</td>
<td>LED Lamp</td>
<td>1</td>
<td>no</td>
</tr>
<tr>
<td>JT-1023-82</td>
<td>SHW35 CAN1SSC1GK</td>
<td>THK</td>
<td>Bearing Block</td>
<td>4</td>
<td>no</td>
</tr>
<tr>
<td>JT-1023-83</td>
<td>SHW35 1000LGK</td>
<td>THK</td>
<td>Bearing Rail</td>
<td>2</td>
<td>no</td>
</tr>
<tr>
<td>JT-2300-503</td>
<td>VQ4401-5</td>
<td>SMC</td>
<td>Air Valve Dbl Sol 24V Open Center (Tooling)</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>JT-2300-504</td>
<td>ARBQ4000-N-P-1</td>
<td>SMC</td>
<td>Air Regulator VQ Interface</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>JT-2300-502</td>
<td>VQ4301-5</td>
<td>SMC</td>
<td>Air Valve Dbl Sol 24V Closed Center (For Doors and Tooling)</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>JT-2300-24</td>
<td>NZM103HT-K5LZ-E55CL</td>
<td>SMC</td>
<td>Vacuum Ejector</td>
<td>2</td>
<td>yes</td>
</tr>
<tr>
<td>JT-1023-09</td>
<td>NCMC125-2600C</td>
<td>SMC</td>
<td>Air Cylinder 1 1/4” x 26”, Rear Pivot, Magnetic piston</td>
<td>2</td>
<td>yes</td>
</tr>
</tbody>
</table>

**Table 13-5: VW5300 Parts List**

## VW5500 Parts List

<table>
<thead>
<tr>
<th>Dukane part number</th>
<th>Manufacturer part number</th>
<th>Manufacturer</th>
<th>Item</th>
<th>Quantity</th>
<th>Keep in stock?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Door Components</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JT-2200-490</td>
<td>DW-AS-633-M8-001</td>
<td>Contrinex</td>
<td>Proximity, 8mm, PNP, 4mm Range, NO</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2000-218</td>
<td>440N-S32016</td>
<td>Allen Bradley</td>
<td>Non Contact Interlock Switch, 1NC 1NO, (Front Door Closed)</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-2200-15</td>
<td>440K-C21062</td>
<td>Allen Bradley</td>
<td>Safety Interlock (Back Doors)</td>
<td>2</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Hydraulic System</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dukane part number</td>
<td>Manufacturer part number</td>
<td>Manufacturer</td>
<td>Item</td>
<td>Quantity</td>
<td>Keep in stock?</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------</td>
<td>--------------</td>
<td>------</td>
<td>----------</td>
<td>---------------</td>
</tr>
<tr>
<td>JT-1900-23</td>
<td>1263493</td>
<td>Rexroth</td>
<td>Oil Filter Element</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>JT-1900-07</td>
<td>CWCA-LIN-MBA</td>
<td>Rexroth</td>
<td>Counter Balance</td>
<td>1</td>
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<td>Amplitude Pick-up Coil Assembly</td>
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<td>BR-5CFCRD.2048-06</td>
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<td>2GB Compact Flash</td>
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<td>BR-X20CA0E61.00200</td>
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<td>JT-2300-503</td>
<td>VQ4401-5</td>
<td>SMC</td>
<td>Air Valve DbI Sol 24V Open Center (Tooling)</td>
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Dukane Manual Part No. 403-589-01
### VW5500 Parts List

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<th>Dukane part number</th>
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<td>JT-2300-24</td>
<td>NZM103HT-KSLZ-E55CL</td>
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<td>Vacuum Ejector</td>
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<td>JT-1023-09</td>
<td>NCDMC125-2600C</td>
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<td>Air Cylinder 1 1/4&quot; x 26&quot;, Rear Pivot, Mag</td>
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Table 13-6: VW5500 Parts List

### VW5700 Parts List

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<th>Manufacturer</th>
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**Table 13-7: VW5700 Parts List**

### VW5900 Parts List

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<th>Manufacturer part number</th>
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**Page 169**

*Dukane Manual Part No. 403-589-01*
<table>
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<th>Manufacturer part number</th>
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<td>Proportional Valve</td>
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<td>Dukane</td>
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### VW5960 Parts List

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Table 13-9: VW5960 Parts List
# Index

## A

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<thead>
<tr>
<th>Topic</th>
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<tbody>
<tr>
<td>Alarms</td>
<td>94</td>
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<td>Alarm History</td>
<td>93</td>
</tr>
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<td>94</td>
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<td>Auto-Tune Error</td>
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<td>Check Frequency Inverter</td>
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<td>Autotune</td>
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## C

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<tr>
<td>Contacting Dukane</td>
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</tr>
<tr>
<td>E-Mail</td>
<td>147</td>
</tr>
<tr>
<td>Phone</td>
<td>147</td>
</tr>
<tr>
<td>Website</td>
<td>147</td>
</tr>
<tr>
<td>Controls and Display</td>
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<tr>
<td>In Cycle</td>
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<tr>
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## D

<table>
<thead>
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<th>Page</th>
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<tbody>
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<td>79</td>
</tr>
<tr>
<td>Display and Controls</td>
<td>25</td>
</tr>
<tr>
<td>Alarm</td>
<td>27</td>
</tr>
<tr>
<td>Color Touch–Screen Display</td>
<td>27</td>
</tr>
<tr>
<td>E-Stop</td>
<td>28</td>
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<tr>
<td>E-Stop Reset</td>
<td>28</td>
</tr>
<tr>
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<td>28</td>
</tr>
<tr>
<td>In Cycle</td>
<td>27</td>
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<tr>
<td>Main Power</td>
<td>27</td>
</tr>
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<td>Operational Switches</td>
<td>29</td>
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<td>31</td>
</tr>
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<td>30</td>
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<tr>
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<td>29</td>
</tr>
<tr>
<td>Vacuum On/Off Button</td>
<td>31</td>
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<tr>
<td>Door and Table Control</td>
<td>47</td>
</tr>
<tr>
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<td>47</td>
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<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Cabinet</td>
<td></td>
</tr>
<tr>
<td>Interior</td>
<td>132</td>
</tr>
<tr>
<td>E–STOP Buttons</td>
<td>29</td>
</tr>
</tbody>
</table>

## F

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter housing</td>
<td>21</td>
</tr>
<tr>
<td>Forklift Channels</td>
<td>18</td>
</tr>
<tr>
<td>Cover plates</td>
<td>19</td>
</tr>
</tbody>
</table>
G
General User Information  3

H
Health and Safety  7, 9
Electrical Safety  11
   AC Power Disconnect  11
   AC Power Receptacle  11
   Electrical Cabinet Door  11
General Considerations  9
   Cable connections  10
   Grounded Electrical Power  9
   Special Health Notice-Plastic  11
   Wear ear protectors  10
Hydraulic Safety  14
Operational Safety  13
   Light Curtains, Electrical Cabinet Service Door and Disconnect  13
Pneumatic Safety  12
   Filter housing  13
   Lockout device  12
Hold Time  65
Home Machine  104
   HOME Procedure  104
Hydraulic Drive  22
   Adding Hydraulic Fluid  23
   Lift/Clamp Force by Model  22
Hydraulic System  103
   Clear Emergency Stop & Reset Welder  122

I
Installation  15
   AC Power  19
      AC Disconnect Switch  20
      AC Requirements  155
         Disengaging Switch Coupling  20
Compressed Air  21
Hydraulic Drive  22
Unpacking  17
Welder Placement  17
   Energy Sources  17
   Floor Area  18
   Forklift Channels  18
   Leveling  19

L
Light Curtain  30
Limit Indicators  57
Load an Existing File  120
Location of Part Data  59

M
Machine Operation  117
Machine Startup  119
Resetting Machine  122
Selecting a Setup File  120
   Load an Existing File  120
      Programming a New File  120
Startup  119
Stopping the Weld Cycle  122
Maintenance  139
Hydraulic System
   Back Pressure Gauge  142
   Hydraulic Fluid Change  142
   Hydraulic Fluid Level  142
   Hydraulic Pressure  142
Mechanical System  144
   Grease Fittings  144
      Table Position Encoder  144
   Tooling Care  144
Pneumatic System  141
   Compressed Air Filter  141
      Moisture Trap  141
   Touch Screen Display  141

N
Notes, Cautions and Warnings  3

O
Optimizing Performance  123

P
Part Clamp Speed  66
Part Data
   Part Data Viewer
Index

Suspect Part  59
Part Locators  73
Part Presence Indicators  74
Part Data Viewer  59
Password Configuration  49
Password Required  49
Performance
  Hold Force  128
  Hydraulic Flow  128
  Pneumatic Flow  129
  Pneumatic Pressure  129
  Weld Amplitude  128
  Weld Distance  127
  Weld Force  128
  Welding Parameters  127
  Weld Time  127
PLC Backup Battery  131
Programming a New File  120

R

Read This Manual First  3
Regulatory Agency Compliance  161
  CE Marking  161
  FCC  161
Resetting Machine  122
Run Mode
  I/O Table  89
  Operate  55
  Sensor Status  73
  Valve Status  73

S

Sensors  73
  Sensor Status  73
  Set to Bypass  73
  Test V1A and Test V1B  76
Set Limits  120
Setup File
  Programming a New File  120
  Selecting  120
  Set Limits  120
Setup Mode  54
  Autotune  68
  Hold  65
  Trigger Method  63

Weld  64
Specifications  149
  Dimensions  152
  Operating Environment  154
  Power Requirements  155
  Shipping Weights  152
  Space Requirements Drawings  156
  Tooling Size & Weight  151
Stanchion Alignment Pin  106
Starting A Weld Cycle  121
Stopping the Weld Cycle  122
System documentation  17

T

Table Down speed  63
Table Lift Force  62
Table Speed Options  66
Table Up Speed  66
Thermal Press  66
Tool Cart Position  66
Tooling
  Capacity  4
  Tooling Assembly  105
  5300 Bolt Patterns  108
  5500 Bolt Patterns  109
  5700 Bolt Patterns  110
  5700LPT Bolt Patterns  111
  5900 Bolt Patterns  112
  5900LPT Bolt Patterns  113
  5960 Bolt Patterns  114
  5960LPT Bolt Patterns  115
  Final Tooling Prep  106
  Position Upper  105
  Stanchion Alignment Pin  106
  Tighten Upper  105
  Torque Mounting Bolts  106
  Tune Drive  106
Tooling Installation  105
  Bolt Patterns  108
  Final Tooling Prep  106
  Install Tooling Assembly  105
  Machine Startup  103
  Position Upper Tooling  105
  Tighten Upper Tooling  105
  Torque Mounting Bolts  106
  Tune Drive to Tooling  106
Tool Weight Compensation 69
Touch Screen Banner 99
List
Alarm Detected 99
Door out of Position 99
Ejecting Part 99
Hydraulics Off 99
In Cycle 99
Invalid Tool ID 99
Light Curtain is Obstructed 99
Machine Ready for Cycle 99
Machine Ready for Setup 99
Remove Welded Part 99
Stanchions Not Retracted 99
System Maintenance Required 99
Table Lock Not Detected 99
Table Not in Load Position 99
Valve 1: "not retracted" 99
Valve 2: "not retracted" 99
Valve 3: "not retracted" 99
Valve 4: "not retracted" 99
Waiting for Part and Place Sensors 99
Touch Screen Menus 44
Introduction 44
Primary Menu Buttons 46
Run Mode 53
Counter Reset Buttons 56
I/O Table 89
Operate 55
Part Presence Indicators 74
Reset Suspect Part Counter - 56
Sensor Status 73
Setup Summary 120
Valve Status 73
Weld Parameters 55
Select a Language 48
Setup Mode 54
Autotune 68
Hold 64
Load Position 62
Trigger Method 62
Position 63
Zero Motion 63
Weld 64
Weld by Distance 64
Weld by Time 64
Trigger Position 63

Troubleshooting 129
Common FAQs 136
Drive Alarms 134
Electrical Power 133
Circuit Breaker 133
Internal Fuses 133
Electronics Control 131
Low PLC Battery LED 131
PLC Status LEDs 131
Hydraulic Overload 133
Hydraulic System 135
Lift Table Moves Too Slowly 135
Lift Table Will Not Move 135

Utilities 78
Calibrate Position Transducer 80
Edit Date and Time 79
Overload Settings 81
Password Configuration 88
Save Location of Part Data 88

Valves 73

Weld Amplitude 64
Weld by Distance 64
Weld by Time 64
Weld Cycle 33
Access Door Closes 35
Clamping Phase 36
Hold Phase 36
Initiate Weld Cycle 35
Parts Loaded 35
Parts Removed 37
Release Phase 37
Welding Phase 36
Welder Overview 4
Key Features 5
Welding Problems and Solutions 129
Weld Parameters 62
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ISO CERTIFICATION

Dukane chose to become ISO 9001 certified in order to demonstrate to our customers our continuing commitment to being a quality vendor. By passing its audit, Dukane can assure you that we have in place a well-defined and systematic approach to quality design, manufacturing, delivery and service. This certificate reinforces Dukane's status as a quality vendor of technology and products.

To achieve ISO 9001 certification, you must prove to one of the quality system registrar groups that you meet three requirements:

1. Leadership
2. Involvement

The ISO 9001 standard establishes a minimum requirement for these requirements and starts transitioning the company from a traditional inspection-oriented quality system to one based on partnership for continuous improvement. This concept is key in that Dukane no longer focuses on inspection, but on individual processes.

Dukane’s quality management system is based on the following three objectives:

1. Customer oriented quality. The aim is to improve customer satisfaction.
2. Quality is determined by people. The aim is to improve the internal organization and cooperation between staff members.
3. Quality is a continuous improvement. The aim is to continuously improve the internal organization and the competitive position.

Dukane products are manufactured in ISO registered facilities.

Please refer to our website at:

www.dukane.com/us/SA_IntSales.htm
to locate your local representative.