## Revision History

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<td>- 00</td>
<td>Original release.</td>
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*Dukane Manual Part No. 403-610-00*
SECTION 1

Introduction
Health and Safety

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General User Information

Read the Manual First
Before operating your ultrasonic generator, read this User’s Manual to become familiar with the equipment. This will ensure correct and safe operation. The manual is organized to allow you to learn how to safely operate this generator. 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 here. They have important information that, if ignored, could have increasingly severe outcomes. These statements help you 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 3 while Table 3-II would be the second table in Section 3.
General Considerations

Please observe these health and safety recommendations for safe, efficient, and injury-free operation of your equipment.

Proper Installation - Operate system components only after they are properly installed.

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

Keep the Cover On - Do not remove any equipment cover unless directed to do so by Dukane. The generator produces hazardous electrical voltages which could cause injury.

Grounded Electrical Power - Operate this equipment only with a grounded electrical connection.

See Electrical Safety for grounding instructions, Page 5.

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

Use Eye Protection - Wear ANSI approved safety impact goggles.

Acoustic Stack Hazard - When an acoustic stack (transducer, booster, horn and tip) is energized by the ultrasound signal, it presents a potential hazard. Stay clear of an energized stack.

System E-STOP (abort) Switch - Install a system E-STOP (abort) switch at each operator station when ultrasonic plastic assembly equipment is used with automatic material handling equipment in an automated system.

NOTE

These recommendations apply to the welding system. System in this manual refers to a complete group of components associated with the welding of parts, also known as an ultrasonic assembly system. Typical of the iQ Series AiM™ system consists of the iQ generator, cables, transducer, booster, horn, and fixture.

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 generator with the cover off. This is an unsafe practice and may cause injury.

CAUTION

At some time you may be asked to remove equipment covers by the Dukane Service Dept. personnel. Before doing so, disconnect the unit electrically from the incoming line AC power.

Continued
General Considerations

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

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

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

**Do Not Operate the Equipment** - Your judgement or reflexes could be impaired while taking prescription medications. If so, do not operate the equipment. Be familiar with warning labels and recommended activity restrictions that accompany your prescription medications. If you have any doubt, do not operate the equipment.

Plastics 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 ultrasonic equipment.

Electrical Safety

The **iQ Series** generator provides the operating power and power returns. Make sure the generator is grounded properly.

In addition to the safety considerations, proper grounding is essential for the effective suppression of RFI (Radio Frequency Interference). Every generator contains a RFI filter which blocks noise on the AC power line from entering the generator control circuitry. This filter also prevents ultrasonic RFI from being fed back into the AC power line.

Always connect the included ground wire from the PE ground of the generator to the nearest grounded metal pipe or equivalent earth ground by means of a ground clamp.

CAUTION

Parts being joined ultrasonically will at times vibrate at audible frequencies. Wear ear protectors to reduce annoying or uncomfortable sounds. In addition, ultrasound baffles, sound enclosures, or materials that absorb sound may be located to surround the system. Ultrasound pressure level could exceed 110dB.

WARNING

*Keep head, hands, limbs and body at least six inches (152 mm) away from an operating press/thruster. A vibrating, descending horn can cause burns and/or crushing injuries.*

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.
Electrical Safety

Domestic Power Grounding

For safety, the power cords used on this product have a three-wire, grounding-type power cord. Figure 1-1 illustrates the appropriate electrical outlet to use with the power cord that is included with systems shipped to North America.

![Approved 2 pole, 3 wire grounding receptacle HUBBELL No. 5652 or equivalent to NEMA 6–15R or 6–20R](image)

**Figure 1–1** Example of 220/240 Volt, Grounded, 3-Prong Receptacle

International Power Grounding

The power cable normally provided for international use is compatible with the power outlet used in many Continental European countries (Refer to Figure 1–2). However, if your application requires another type of power cord, check with your equipment supplier, and follow local regulations concerning proper wiring and grounding.

![Grounding Contacts](image)

**Figure 1–2** International 220/240V Grounding

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**CAUTION**

If you have a two-prong electrical receptacle, we strongly recommend that you replace it with a properly grounded three-prong type. Have a qualified electrician replace it following the National Electric Code and any local codes and ordinances that apply. See Figures 1-1 and 1-2.

---

**CAUTION**

If there is any question about the grounding of your receptacle, have it checked by a qualified electrician. Do not cut off the power cord grounding prong, or alter the plug in any way. If an extension cord is needed, use a three-wire cord that is in good condition. The cord should have an adequate power rating to do the job safely. It must be plugged into a grounded receptacle. Do not use a two-wire extension cord with this product.
SECTION 2

Installation

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Connecting Cables
(Quick Start Guide)
Details about the various system connectors and their pin assignments are covered in Section 3.

The connections are the same for both the vertical and horizontal generator configurations. However, the panel location of the connectors differs between the two chassis styles.

AC Power
Detached Cords
The AC line cords supplied with the standard generators are matched to the ultrasonic output power rating and the continent of specified use. See Table 2-I.

<table>
<thead>
<tr>
<th>Continent of Use</th>
<th>Power Cord Part Number</th>
<th>Power</th>
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</thead>
<tbody>
<tr>
<td>North America</td>
<td>200-1109</td>
<td>120V, 15A</td>
</tr>
<tr>
<td></td>
<td>200 - 1110</td>
<td>240V, 15A</td>
</tr>
<tr>
<td>Continental Europe</td>
<td>200 - 1111</td>
<td>240V, 16A</td>
</tr>
</tbody>
</table>

Table 2-I   Standard IEC AC Power Cord Part Numbers

Attached Cords
240 Volt Single Phase Systems - High power generators with power ratings above 2600W use permanently attached power cords.

No Cords
Three-Phase Systems - High power Three-Phase generators do not include an AC Line Cord and must be directly wired.

CAUTION
The power cord is equipped with a three-prong, grounded-type plug for your safety. Whenever a two-slot receptacle is encountered, we strongly recommend that it is replaced with a properly grounded three-lead receptacle.

Have a qualified electrician do the replacement in accordance with the National Electrical Code and local codes and ordinances. DO NOT cut off the power cord grounding prong or alter the plug in any way.

Continued
Automation Controlled Probe System

1. Ground the generator chassis using the supplied 14-Gauge wire, and attach it to the grounding stud: A in Figure 2-1.

2. Recommended – Ground the probe support. This is a user-supplied 14-Gauge wire.

3. Input Cable/Output Cable - Attach the automation control cable from the user-supplied automation equipment to the system input HD-26 connector, J5 on the I/O panel: B in Figure 2-1.

4. Attach the high voltage coaxial cable from the probe to the ultrasound output connector J1: C in Figure 2-1.

5. Connect the AC power cord to the generator IEC power inlet connector, and plug the other end into an approved AC outlet: D in Figure 2-1.

Figure 2-1 Generator - Bottom View (Vertical Panel Mount Chassis)
RFI Grounding

In addition to the safety considerations previously mentioned, proper grounding at the generator power cord is essential for the effective suppression of electrical noise or RFI (Radio Frequency Interference). Every ultrasonic generator contains a RFI filter which blocks noise on the AC power line from entering the system control circuitry. This filter also prevents ultrasonic frequency noise from being fed back into the AC power line. In order for the RFI filter to operate properly, it is necessary to correctly ground the system. Run a grounding wire from the grounding stud connection to the nearest grounded metal pipe or equivalent earth ground, and secure it with a ground clamp.

See Figure 2-1 on Page 10

Proper Handling of Cable Slack

Coil Extra Slack

When taking up slack in cables, the extra length should be coiled up as shown in Figure 2-2 rather than folded as shown in Figure 2-3.

Avoid Excessive Bending

Avoid excessive tension and bends on cables. Cables should be routed so that there are no abrupt bends in the cables, especially near their connectors.

NOTE

Cables shown in the two figures directly above are representative samples. If cables have slack, coil them rather than fold them.
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SECTION 3

Standard Connections

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Bottom Panel Layout Overview

This section provides an overview of the generator rear panel layout, which includes panel areas dedicated to various standard system functions and options that are available. Figure 3-1 illustrates the panel layout.

**Figure 3-1 Generator Bottom Panel**

- **A** IEC Power Inlet Connector – Attaches to an IEC style power cord.
- **B** Power Switch – Circuit Breaker – Used to switch system power ON and OFF.
- **C** Chassis Grounding Stud – Chassis connection for a protective earth ground.
- **D** System Input/Output Connector – Connections for system control input signals and system status output signals.
- **E** Ultrasound Output Connector – Coaxial high voltage connection to ultrasonic stack.
- **F** Configuration Port Connector – Digital control port to modify system parameters.
- **G** Ethernet/IP Connector – Provides for communication between the *iQ* generator and an automation network.
- **H** Multi-Point Control Connector - Used to connect an MPC module.
- **I** An option module can be installed here.
AC Power Inlet Panel
The standard AC power inlet panel is described in this section.

IEC AC Power Inlet Connector
The IEC AC power inlet connector mounted on the system AC power inlet panel requires a properly configured IEC compliant power cord, which enables worldwide system operation by simply changing the power cord.

This system includes a 16/20 amp rated IEC inlet connector. Single phase 3600W/5000W systems include a non-detachable power cord.

An appropriately rated power cord must be securely attached to the welding system’s IEC inlet connector. If the correct power cord configuration is not included with the system for the local AC power outlet at your location, an appropriate IEC power cord should be available from a local electrical parts supplier.

Power Switch/Circuit Breaker
The power switch/circuit breaker has a rocker type actuator switch that will activate or deactivate the AC power to the system. The power ON position is marked with the internationally recognized \( \Box \) symbol, the power OFF position is marked with the \( \Box \) symbol. This power switch also integrates an appropriately sized over-current protection circuit breaker function in the generator.

If an over-current condition trips the circuit breaker, it will automatically switch to the OFF position. If the overload current that caused the circuit breaker to trip is due to a transient condition, the circuit breaker can be reset by switching the actuator back to the ON position. If when resetting the circuit breaker after it has tripped, it immediately trips again, there is likely an internal system malfunction, and the generator will require service.

Do not repeatedly try to reset the circuit breaker. If it trips, this will only cause more damage to the generator.

Chassis Grounding Stud
The chassis grounding stud is used to attach a protective earth ground to the generator. This will aid in the suppression of electrical interference or radio frequency interference (RFI) that is common in an industrial environment. The chassis ground stud is \( \Box \) in Figure 3-2. Proper system grounding is discussed in Section 2.

System Inputs/Outputs Connector
The SYSTEM INPUTS/OUTPUTS connector mounted on the system I/O panel includes connections for all of the basic system control input and output signals that will typically be associated with an automated control system. The cable attached to this connector includes all of the available system control signals, which will be controlled by an output card or output port on the automation controller.

The user can determine which signals to use for each particular welding application, but there must be at least two connections to this connector or the generator will always be in an E-STOP condition. All of the I/O signals on this connector are electrically isolated (signals are NOT referenced to chassis ground). Inputs are activated when there is a 24VDC difference between the input pin and the Input Common pin. The electrically isolated I/O signals can be activated/monitored from an automation controller with either sinking (NPN) or sourcing (PNP) I/O depending upon how the isolated common connection is terminated. All inputs sink or source 10mA of current from a 24VDC power supply. The total output current cannot exceed 500mA when using the +22VDC generator output (pin 1). If an external supply is used the

Continued
maximum current for each output is 400mA.

Note that a simple switch closure (relay contact) connected to a control input can not activate the input without adding an external power supply to power the input. Adding jumper connections to pins available on the System Inputs connector, can configure switch closure inputs to operate referenced to generator chassis ground (non-isolated), without adding a separate power supply, if desired. Refer to Application Note AN525 found on the Dukane website at:

[https://documents.dukane.com/AppNote/AN525.pdf](https://documents.dukane.com/AppNote/AN525.pdf)

for detailed wiring diagrams of example applications.

The SYSTEM INPUTS/OUTPUTS connector is a HD-26F (high density D-subminiature 26 circuit female) connector. Table 3-1 lists the signal names and descriptions, with detailed descriptions below. The wire color coding for the system input cable is listed in Table 3-1, to assist with custom automation system wiring and assembly.

**System Inputs/Outputs Signal Descriptions**

**Pin 1 (+22V)**
This pin can supply +22VDC at up to 500mA to power the user’s automation controls.

**Pin 2 (Power Gnd)**
Pin 2 is the 22VDC return and is tied to the system chassis ground.

**Pin 3 (E-STOP Output)**
Refer to AN525 for E-STOP wiring.

**Pin 4 (E-STOP Input)**
Refer to AN525 for E-STOP wiring.

**Pin 5 (Remote Setup Selection Bit 0 Input)**
Pin 5 is the Remote Setup Selection Bit 0, which is the least significant bit used to select different welding setups with an automation control system. This input is also used to select different channels when a Multi-Point Controller (MPC) module is connected to J2.

**Pin 6 (Remote Setup Selection Bit 1 Input)**
Pin 6 is the Remote Setup Selection Bit 1, which is the second least significant bit used to select different welding setups with an automation control system. This input is also used to select different channels when a Multi-

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*Continued from Previous Page*

Figure 3-3 System I/O Panel (standard panel shown)
point Controller (MPC) module is connected to J2.

**Pin 7 (Remote Setup Selection Bit 2 Input)**

Pin 7 is the Remote Setup Selection Bit 2, which is the third least significant bit used to select different welding setups with an automation control system. This input is also used to select different channels when a Multi-Point Controller (MPC) module is connected to J2.

**Pin 8 (Remote Setup Selection Bit 3 Input)**

Pin 8 is the Remote Setup Selection Bit 3, which is the most significant bit used to select different welding setups with an automation control system. This input is also used to select different channels when a Multi-Point Controller (MPC) module is connected to J2.

**Pin 9 (Automation Cycle Stop Input)**

Pin 9 is an input control signal that when enabled, can be used by the automation control system as a redundant signal to shut the ultrasound output off. This signal could also be reconfigured through menu selections to function as an automation end-of-weld control signal input.

**Pin 10 (Front Panel Lockout Input)**

Pin 10 is used to lock the front panel user interface, so an operator cannot change any welding setups or configuration parameters that are stored in memory. This input has no affect on any of the supported industrial buses or iQ Commander. Deactivation of this signal allows normal operation, without any lockout restrictions.

**Pin 11 (Isolated Input Common)**

Pin 11 is electrically isolated from chassis ground. Using isolated sourcing (PNP) output drivers, this common line would be connected to isolated ground potential. Using isolated sinking (NPN) output drivers, this common line would be connected to the isolated positive supply voltage output. For correct operation of the Ultrasound Activation/Cycle Start input it is critical that this pin is connected to either isolated ground or positive supply.

**Pin 12 (Ultrasound Activation/ Cycle Start Input)**

Pin 12 is used to activate the generator ultrasound output. Activation of this control input will switch the ultrasound output ON, and deactivating this signal will switch ultrasound OFF. This input signal will also function as a cycle start input, where the ultrasound activation and timing are completely under the control of the process controller. Depending on the welding process controller setup, this input signal could be activated momentarily to start a welding cycle.

**Pin 13 (Isolated Ultrasound Common)**

Pin 13 is the common connection for Pin 12 (Ultrasound Activation/Cycle Start Input). Pin 13 is electrically isolated from chassis ground. Using isolated sourcing (PNP) output drivers, this common line would be connected to isolated ground potential. Using isolated sinking (NPN) output drivers, this common line would be connected to the isolated positive supply voltage output. For correct operation of the Ultrasound Activation/Cycle Start input it is critical that this pin is connected to either isolated ground or positive supply.

**Pin 14 (Analog Input (0-10VDC))**

**Pin 15 (Analog Input (0-10VDC))**

**Pin 16 (Analog Ground)**

Pin 16 is the signal common (ground) connection for all of the analog signals (on Pins 14, 15, 17, and 18). This signal common pin is connected to system chassis ground and is not isolated from the generator chassis. This is an analog signal ground connection. Do not connect anything to this ground connection, except the wiring to the inputs/outputs of the analog devices.

**Pin 17 (Analog Power Output (0-10VDC))**

Pin 17 is an analog output signal used to monitor the power output from the welding system. The scaling on this output signal is as shown below:

\[1 \text{ Watt} = 0.001 \text{ VDC} \quad (1 \text{mV per Watt})\]

**Example:**

\[20\text{kHz system measures 0.525 VDC on Power Monitor Output = 525 W}\]

**Pin 18 (Analog Amplitude Output (0-10VDC))**

Pin 18 is an analog output signal used to monitor the system amplitude setting. The scaling on this output signal is 100% amplitude = 10.0 VDC, or 0.1 VDC per 1% amplitude. Using this monitor output, the control system can verify that the amplitude is set to the expected programmed amplitude level.

**Pin 19 (Ultrasound Status Output)**

Pin 19 is a digital output that activates when the system...
is delivering ultrasonic power to the load attached to the ultrasound output connector. This output will be an open circuit when the ultrasound output is off.

**Pin 20 (Any Fault Status Output)**

Pin 20 is a digital output that activates whenever any fault condition is detected that terminates/inhibits ultrasound output and normal system operation. This output will be an open circuit when no system fault conditions are detected. Any Fault output remains active until cleared by the System Latch Reset input or by the start of the next weld cycle.

Generator faults that will activate the Any Fault output:
- Overload (Average, Peak, Frequency, Over Voltage)
- Over Temperature Fault
- System Power Fault

**Pin 21 (Overload Status Output)**

Pin 21 is a digital output that activates whenever any overload condition is tripped. Activation of the overload status output signal could be caused by an Average, Peak, Frequency, or Over Voltage overload condition. After the overload status output activates, it will remain active until cleared by the System Latch Reset input or by the start of the next weld cycle. This output will be an open circuit when no overload conditions have been detected.

**Pin 22 (Bad Part Status Output)**

Pin 22 is a digital status output that activates, either momentarily or until the start of the next welding cycle, when the welding parameters recorded during the previous welding cycle are outside of the programmed bad part limits. This output will be an open circuit when a bad part has not been detected.

**Pin 23 (Good Part Status Output)**

Pin 23 is a digital status output that activates, either momentarily or until the start of the next welding cycle, when the welding parameters recorded during the previous welding cycle do not exceed the programmed suspect or bad part limits. This output will be an open circuit after a welding cycle when either a suspect or bad part has been detected.

**Pin 24 (Ready Status Output)**

This status output signal will activate only when the system is ready to activate ultrasound or begin a weld cycle. Pin 24 is a digital status output that activates when a weld processing cycle is completed and the welding process control system is ready to start the next welding cycle. This output will be an open circuit when the welding process controller determines that the next welding cycle cannot be started. This includes system faults or E-STOP active, but not a process fault like Overload.

**Pin 25 (MPC Ready Status Output)**

This status output signal will activate only when an MPC module is connected to the generator. Pin 25 is a digital status output that activates when the MPC controller is ready to start the next MPC welding cycle. This output will be an open circuit when the MPC system is not ready to start an MPC weld cycle.

Any changes to the probe selection control bits will not be acted on until the completion of the current weld cycle. This status output signal will also be open (MPC NOT READY) if a fault condition is detected inside the MPC module. If this status output will not activate, check for a red fault status indication, the SYSTEM STATUS LED, on the front of the MPC module.

**Pin 26 (Isolated Output Common)**

Pin 26 is electrically isolated from chassis ground. For isolated sourcing (PNP) inputs, this common line would be connected to isolated ground potential. Using isolated sinking (NPN) output drivers, this common line would be connected to the isolated positive supply voltage output.
<table>
<thead>
<tr>
<th>Pin</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J5-1</td>
<td>BLK/RED</td>
<td>+22V CURRENT LIMITED POWER SUPPLY (500mA MAX)</td>
</tr>
<tr>
<td>J5-2</td>
<td>RED/BLK</td>
<td>+22V RETURN (iQ CHASSIS GROUND)</td>
</tr>
<tr>
<td>J5-3</td>
<td>BLK/WHT</td>
<td>E-STOP OUTPUT</td>
</tr>
<tr>
<td>J5-4</td>
<td>WHT/BLK</td>
<td>E-STOP INPUT</td>
</tr>
<tr>
<td>J5-5</td>
<td>BLK/GRN</td>
<td>REMOTE SETUP SELECTION BIT 0 INPUT</td>
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<tr>
<td>J5-6</td>
<td>GRN/BLK</td>
<td>REMOTE SETUP SELECTION BIT 1 INPUT</td>
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<td>REMOTE SETUP SELECTION BIT 2 INPUT</td>
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<td>BLK/YEL</td>
<td>AUTOMATION CYCLE STOP INPUT</td>
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<td>J5-9</td>
<td>YEL/BLK</td>
<td>FRONT PANEL LOCKOUT INPUT</td>
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<td>BLK/BRN</td>
<td>ISOLATED INPUT COMMON</td>
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<td>BRN/BLK</td>
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<td>ANALOG GROUND</td>
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<td>RED/BLU</td>
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<td>ANY FAULT STATUS OUTPUT</td>
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<td>RED/YEL</td>
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<td>RED/BRN</td>
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<td>READY STATUS OUTPUT</td>
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<td>RED/ORN</td>
<td>MPC READY STATUS OUTPUT</td>
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<tr>
<td>J5-25</td>
<td>ORN/RED</td>
<td>ISOLATED OUTPUT COMMON</td>
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</table>

**Table 3-I**  System Input/Output Connector Signals (J5)

**Note:** The descriptions shown are for the default I/O settings. Almost all inputs are programmable to other input functions and all outputs to other output functions. The exception is the ULTRASOUND ACTIVATION / CYCLE START INPUT which cannot be programmed to another function.
Ultrasound Output Connector

The ultrasound output connector used with all standard generators is a high voltage (5000V) coaxial style SHV-BNC connector. This connector provides superior shielding of electrical noise, compared to other types of connectors. The ultrasound output connector mates with fully shielded coaxial ultrasound cables that are secured with a simple and reliable quarter-turn bayonet style attachment mechanism.

Figure 3-4 Ultrasound Output Connector

CAUTION

The ultrasonic output from this connector (that drives the attached ultrasonic load) is a very high AC voltage. At high power levels this can exceed 2 amperes of current and must be securely terminated via the ultrasound cable for safe operation. Use original equipment ultrasound cables for safe and reliable system operation. Improperly assembled ultrasound cables can result in high voltage arcing and will destroy the ultrasound connectors.

Do not use your generator if there is any evidence of arcing (black carbon deposits) on either the ultrasound output connector or the ultrasound cable connectors.
EtherNet/IP Port Connector

The EtherNet/IP or Modbus TCP/IP connector allows the iQ generator to connect to an EtherNet/IP or Modbus TCP/IP network.

NOTE
Refer to Section 4, Pg. 33, for more information.

Figure 3-5 J9 Ethernet/IP or Modbus TCP/IP Port Connector
**USB PORT CONNECTOR**

Connect a Windows PC to this port using the included USB cable in order to use Dukane’s PC interface tool, *iQ Commander™*. This tool works with all *iQ AiM™* power supplies and allows the user to easily perform field firmware updates, product setup, parameter configuration and system diagnostics along with other functions.

**To install *iQ Commander™***

1. Download the installation file from (http://update.dukane.com/) and save to the desired location on the PC.
2. Double-click on the installation file.
3. Once prompted, click on “Next >” on the “Welcome to the InstallShield Wizard for iQ Commander” page. The executable will start the installation process.
4. When the progress bar is nearly full, a new window will appear asking to install the FTDI CDM Drivers. This window may appear behind the *iQ Commander™* installation window. If the FTDI CDM Driver window is not visible, move the *iQ Commander™* installation window to the side to see the FTDI CDM Drivers installation window.
5. On the FTDI CDM Drivers installation window, click on “Extract”, “Next >”, accept the agreement, “Next >”, and then “Finish” to install the first set of FTDI Drivers.
6. Another window will pop up asking to install another set of FTDI CDM Drivers. Repeat step 5 to install the second set of drivers.
7. Once the drivers are installed, Click on “Finish” to complete the process. The user can connect a USB cable from the PC to the AIM generator and start the program.

**Operations that can be done via *iQ Commander™***

1. Update the *iQ AiM* generator firmware.
2. Test the ultrasonic stack.
3. Scan an ultrasonic stack to determine the optimal Free Run Frequency.
4. Weld a part.
5. Select a probe when an MPC module is connected.

**Control parameters available via iQ Commander™**

1. Set weld method to Time, Energy, Peak Power, Distance, or Position and the associated value in seconds, joules, watts, or millimeters.
2. Configure custom I/O.
4. Enable and set Trigger by Power parameters.
5. Enable and set Hold Time.
6. Enable and set Afterburst delay and duration.
7. Enable checking for Suspect Parts. Set maximum and minimum values for Time, Power, Energy, Distance, and/or Position.
8. Enable checking for Bad Parts. Set maximum and minimum values for Time, Power, Energy, Distance, and/or Position.
9. Configure advanced hardware settings including, Free Run Frequency, Frequency Tracking, Frequency Lock and Hold, and Frequency Limits.

**Parameters that can be obtained via iQ Commander™.**

1. All parameters that are configured via iQ Commander™.
2. Real time data which includes welder state (ultrasound active or not), frequency, power, position, and amplitude.
3. Weld cycle data from previous weld which includes: Cycle Count; Good, Bad, and Suspect Part information; Process Limit setting exceeded or not reached if Bad or Suspect Part checking is enabled; Weld Time; Weld Energy; Peak Power; Weld Distance; Weld Position.
SECTION 4
Standard System Status
and Controls

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Front Panel Controls

This section introduces the *iQ* Series ultrasonic generator AiM control panel and LCD display with this information:

- Functions of the panel components shown in Figure 4-1 below are discussed.
- These screen basics are introduced:
  - Making selections,
  - Interpreting on-screen arrows,
  - Taking a look at setup identification.

*NOTE*

Do not touch the display. Touch only the keys that are on the front panel.

Cleaning - If the display is dirty, clean it by first putting a mild cleaning solution on a clean, soft cloth. Then, gently wipe the cloth over the screen.
System Operating Mode Keys

ON LINE - After AC power has been activated and the generator is operating normally, ONLINE is the normal operating mode. The generator can produce ultrasound signals in this mode. The word, Online appears in a green outlined box in the upper right of the display. See Figure 4-2.

TEST - After AC power has been activated and the generator is operating normally, in the ONLINE mode and not in E-STOP mode the TEST key can be pushed. This activates the ultrasound output allowing the operator to test system function. The display will show the real time settings for Amplitude, Power, and Operating Frequency. This information is useful in troubleshooting.

While pushing the TEST key, look at the System Power Output. See Figure 4-3. The power displayed is highly dependent on the ultrasonic stack and amplitude setting. The power should always be greater than 0 watts.

IMPORTANT - Benchmark each stack (an assembly of probe, booster, and horn) for frequency and power while operating in free air. This provides reference information throughout the life cycle of each stack. This information can be used for comparison when troubleshooting wear and mating surface fatigue. The Test History feature has the option of saving the test results for future reference. If the displayed power is significantly higher than normal make sure the stack is properly assembled and not damaged.

OFFLINE - After AC power has been activated and the generator is operating normally, the OFFLINE key may be pressed to put the generator into the offline mode. In this mode the generator can not generate an ultrasound signal.

The word, Offline appears in the display’s upper right corner and the display background is yellow.
Navigation Keys (4)

Moving the Cursor - Press the left and right navigation keys to move the display’s cursor left or right to select the desired digit. The + or - keys are used to change the value of the selected digit. Press the up and down navigation keys (+ or -) to scroll through menu lists. Also, use the keys to move to different levels of the list.

ENTER Key
Press ENTER to confirm and store a selection in memory. Example: After entering a time value, press ENTER.

CANCEL Key
Press the CANCEL key to stop editing a value without saving changes to the value or to leave secondary menu screens.

INFO Key
Press the INFO key, and the menu shown to the right in Figure 4-5 appears.
Screen Basics
Making Selections

Figure 4-6 below shows there are several ways to show that an item has been selected:

• An area of green highlights a selected item.
• The cursor shows what digit is selected.

Interpreting
On-Screen Arrows

Arrows pointing up and down, give visual cues that more text is available in the direction the arrow points. An example is shown below in Figure 4-7. For this screen, the + and - (up or down) navigation keys are used to move in the direction of the on-screen arrow.
System Power Output Level (Bar Graph)
A bar graph displays the percentage of ultrasonic power being drawn by the load. See Figure 4-8 to the right.

Bar Graph Power Scaling
Power scaling is related to amplitude. At 100% amplitude the whole graph is lit, and the generator is operating at 100% power. At 50% amplitude the entire graph is lit, and the generator is operating at 50% power.
If the amplitude setting is lowered, the graph rescales automatically according to the revised amplitude.
Example: With a 1200W generator, at 50% amplitude, if the whole graph is lit, that represents 600W.

CAUTION
If an alarm indicates there is an overload fault, verify that the ultrasonic stack is not damaged.
Setup Identification

Setup identification can be seen at the top of the screen as shown in the figure below.

The example shown in Figure 4-9 illustrates that setup control is by the front panel interface or an industrial network such as Ethernet/IP.

If 01 is displayed, this indicates that the setup selection is controlled by generator. If A01 is displayed, setup selection is controlled by automation.

This is the name of the setup being edited if in Automation mode. Otherwise, the setup shown is the one in use.

![Figure 4-9 Main Menu Detail - Setup Identification](image)

The Status Bar

U/S STATUS: U/S Indicates Ultrasound status. If it is a gray ultrasound is off. Orange means ultrasound is on and blinking red that the ultrasound output is greater than 90% of the rated power of generator based on the current amplitude setting.

PART STATUS: G shows the part status of the last weld cycle. Gray means a weld cycle hasn’t run since the generator was powered up. Green indicates a good part, yellow a suspect part, and blue a bad part.

PLC CONNECTION: PLC indicates if a PLC is connected. Green means a PLC is connected to the generator. Otherwise PLC is gray.

AMPLITUDE CONTROL: R indicates how the amplitude is controlled. If it is gray the generator controls the amplitude, green means amplitude is controlled by the analog input and if “OTF” is displayed a PLC controls amplitude.

NETWORK STATUS: When NET is green a network is connected at 100mbps. When orange, a network is connected at 10mbps. When gray, no network connected is detected.

SETUP CONTROL: If the # symbol is the leading character, the setup selection is controlled by the generator (#01 for example). If the leading character is A the setup selection is controlled automation.

GENERATOR STATUS: When Online is displayed, the generator is capable of outputting ultrasound. If Offline is shown, the offline key has been pressed to disable ultrasound. E-STOP indicated ultrasound output is disabled due to the E-STOP signals on the I/O connector.

MPC CONTROL: If an MPC is connected the selected probe is displayed here. For example, P08 indicates that MPC Probe 8 is selected by the generator. This is useful for checking the generator to MPC wiring if the cable that connects them together has been modified.

Continued
Ethernet/IP or Modbus TCP/IP Networks
Enable or Disable DHCP, and monitor other aspects of the network.

Network Settings
The Network Settings screen as seen in Figure 4-10 has Five elements:

1. DHCP: These initials stand for Dynamic Host Configuration Protocol. The protocol was established for assigning dynamic IP addresses to devices on a network. DHCP is enabled by default, this ensures no network address contention will happen in the event that the generator is plugged into a network before the user assigns a static address. Most commonly, the DHCP is disabled and a statically assigned IP addresses is used in an industrial network.

When DHCP is enabled, the static IP address/network mask setting is ignored. You may need to contact your network administrator if you do not know whether to enable or disable DHCP.

2. IP ADDRESS: This Internet Protocol address is a number unique to a piece of equipment acting as an identifier when the equipment is connected to a network. This field is editable when DHCP is disabled.

You may need to contact your network administrator if you do not know what address to use.

3. NETWORK MASK: defines the subset of the network address which applies to the locally defined subnetwork. Generally, this setting must match other entities on the network. This field is editable when DHCP is disabled.

You may need to contact your network administrator if you do not know what mask to use.

4. GATEWAY ADDRESS: This would normally be left at 0.0.0.0 and is only to be used if a router is part of the network. This field is editable when DHCP is disabled.

5. NETWORK LINK: Indicates the state of the Ethernet link. Down is not plugged in, 10Mbps (Half), 10Mbps (Full), 100Mbps (Half), 100Mbps (Half/Full Duplex).
Restore Factory Defaults
Restore Factory Defaults Deletes all setups and restores all parameters to factory defaults.

An intermediate display allows for confirmation.

When confirmed, factory defaults are restored.

Figure 4-11  Miscellaneous Sub-menu Items
ALARMS

Terminology: Alarm refers to any fault, or error the generator might produce.

An alarm condition may occur. Figure 4-12 shows the format for a typical alarm display.

The list below gives general reference information for each alarm condition.

<table>
<thead>
<tr>
<th>Faults</th>
</tr>
</thead>
<tbody>
<tr>
<td>U100  Configuration Fault (The default setup may be corrupted, the model number does not match the generators installed assemblies, the Serial Number is incorrect or missing.)</td>
</tr>
<tr>
<td>U104  Frequency Overload Fault 1 (The generator was unable to find the stacks frequency by twice the time of the Ramp Up setting.)</td>
</tr>
<tr>
<td>U106  Peak Overload Fault (The generator's output current has exceeded its safe operating level and has terminated the ultrasound output.)</td>
</tr>
<tr>
<td>U108  Average Overload Fault (The output power has exceeded the rated power of the generator model.)</td>
</tr>
<tr>
<td>U110  Power not OK Fault (There is a problem with the AC line voltage.)</td>
</tr>
<tr>
<td>U111  Over Temperature Fault (Generator has exceeded its safe operating temperature limit.)</td>
</tr>
<tr>
<td>U112  Frequency Overload Fault 3 (There was excessive operating frequency drift due to heating of the stack. The operating frequency is “far” away from the Free Running Frequency.)</td>
</tr>
<tr>
<td>U116  Ultrasound Voltage Overload (The actual transducer voltage exceeded the maximum expected value at 100% amplitude.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Initiate Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>U302  Ultrasound Activation Input Activated at End of Cycle</td>
</tr>
<tr>
<td>U308  Generator Not Ready (The generator initialization process is not complete. The generator is not ready to activate the Ultrasound output. The Automation Cycle Stop input is activated while activating the Ultrasound Activation input.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>U401  Weld Time Set to Zero</td>
</tr>
<tr>
<td>U402  Weld Power Set to Zero</td>
</tr>
<tr>
<td>U403  Weld Energy Set to Zero</td>
</tr>
<tr>
<td>U404  Weld Distance Set to Zero</td>
</tr>
<tr>
<td>U405  Weld Position Set to Zero</td>
</tr>
<tr>
<td>U406  Max Trigger Time Set to Zero</td>
</tr>
<tr>
<td>U413  Max Trigger Time Exceeded (The trigger did not occur within the specified time limit.)</td>
</tr>
</tbody>
</table>

Table 4-I   Alarm Messages

NOTE
Go to this web address: http://www.dukane.com/easyalarm for more information about the alarm’s cause and remedy.
Multi-Point Control (MPC) Interface

The MPC Interface connector powers and controls an external MPC module. This external module, (that can be ordered with a minimum of two probe controls up to a maximum of 16 probe controls), must be purchased in addition to a basic generator for a fully functional MPC system.

Connections required for the external MPC module are described below.

MPC Interface Connections

Complete the steps for the basic connections as described on Pages 10-11. These involve:

- Grounding
- Ultrasound Output
- System Control Status Inputs/Outputs
- AC Line Input

In addition to completing these first four steps, complete the two steps below to wire the MPC Control Inputs/Status Outputs as described. Details about the various system connectors and their pin assignments are covered below.

- MPC I/O - MPC control/input signals and status output signals are carried in the I/O cable that should already be connected - See Table 4-II (Page 37)
- MPC INTERFACE - Attach one end of the MPC Interface cable (Dukane # 200-1408-XX) to the MPC connector on the iQ generator panel in Figure 4-13. Connect the other end of the cable to the MPC INTERFACE connector on the right rear of the MPC module.

NOTE

The MPC Interface cable is a separate line item on the iQ generator system order. The -XX at the end of the cable number specifies cable length. This will vary depending on your MPC installation.

Figure 4-13 Bottom View (Vertical Panel Mount Chassis)
MPC I/O Connections
Signal names and Pin numbers and the connectors related to the MPC option are shown in the table below. See the pages referred to in the table for more information about the signals.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Setup Bit 0 Input</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Setup Bit 1 Input</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Setup Bit 2 Input</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Setup Bit 3 Input</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>MPC Ready Out</td>
<td>J5 (Page 17 - 19)</td>
</tr>
</tbody>
</table>

Table 4-II  MPC Signals

MPC Probe Control
When the optional MPC Module and MPC I/O are used, the generator has the capability of controlling as many as sixteen compatible probes. One probe can be turned on at a time while the sequence of probe activation is determined by the user’s automation. The table below shows how the setup bit inputs correspond to the probes.

<table>
<thead>
<tr>
<th>MPC I/O</th>
<th>Probe Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>0</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 4-III  MPC Setup Bit Inputs

NOTE
Ultrasound Output Connector
The ultrasound output connector used with all standard generators is a high voltage (5000V) coaxial style SHV-BNC connector. This connector provides superior shielding of electrical noise, compared to other types of connectors. The ultrasound output connector mates with fully shielded coaxial ultrasound cables that are secured with a simple and reliable quarter-turn bayonet style attachment mechanism.

The ultrasonic output from this connector (that drives the attached ultrasonic load) is a very high AC voltage. At high power levels this can exceed 2 amps of current and must be securely terminated via the ultrasound cable for safe operation. Use original equipment ultrasound cables for safe and reliable system operation. Improperly assembled ultrasound cables can result in high voltage arcing and will destroy the ultrasound connectors.
**iQ LinQ™**

*iQ LinQ™* communication options allow automated systems to monitor and change settings in *iQ* generators. These options provide machine builders the ability to integrate the generator into an electrical cabinet and to use the machine’s HMI to program or monitor weld settings.

All Dukane *iQ Aim™* generators include *iQ LinQ™* EtherNet/IP and Modbus TCP/IP communication protocol support. Using one of these protocols avoids adding expensive analog cards into PLC racks. *iQ LinQ™* is available for Profinbus, PowerLink, Profinet, EtherCat, and CC-Link with the optional ANYBUS module.

*iQ LinQ™* demos are available to provide complete ladder logic and HMI screens that can be dropped into Allen Bradley (RSLogix 5000; Studio 5000 Logix Designer; Factory View Studio ME) Siemens (TIA Portal) and B&R (Automation Studio) PLC projects. Contact your local Dukane representative for more information about the *iQ LinQ™* options.

**iQ LinQ™**

The *iQ LinQ™* option allows the *iQ* generator to connect to an industrial network.

**Control Parameters Available via *iQ LinQ™***

1. Set weld method to Time, Energy, Peak Power, Distance, and/or Position. Set associated values in seconds, joules, watts, or millimeters/inches.
2. Set Amplitude, Ramp Up Time, and Ramp Down Time.
3. Enable and set Trigger by Power or Trigger By Position parameters.
4. Enable and set Hold time.
5. Enable and set Afterburst delay and duration.
6. Enable checking for Suspect Parts. Set maximum and minimum values for Time, Power, Energy, Distance, and/or position.
7. Enable checking for Bad Parts. Set maximum and minimum values for Time, Power, Energy, Distance, and/or position.
8. Configure advanced hardware settings including Frequency tracking, Free Run Frequency, Frequency Lock and Hold, and Frequency limits.

**Parameters that can be obtained via *iQ LinQ™***

1. All parameters that are configured via *iQ LinQ™*.
2. Real time data which includes welder state (ultrasound active or not), frequency, power, amplitude, and position.
3. Weld cycle data from previous weld which includes:
   - Cycle Count
   - Good, Bad, and Suspect Part information
   - Process Limit setting exceeded or not reached if Bad or Suspect Part checking is enabled
   - Weld Time
   - Weld Energy
   - Peak Power
   - Weld Distance
   - Weld End Position

For information on how to control and/or monitor specific parameters, *iQ Generator iQ LinQ™* Communication and Control documentation is available.

Signing a non-disclosure agreement is required to obtain this documentation.
System Verification Tests

Preliminary Setup
1. Plug in the AC line cord to the correct AC power outlet. See Table 6-II (Page 52) for the model power requirements.
2. Attach a compatible ultrasonic probe to the ultrasound output connector - J1.
3. Activate the AC Breaker/Switch A to the ON position.

Testing the Generator
(Complete steps 1-3 above, and then continue with steps 4, 5, and 6 below).

4. The start up sequence begins. Then the display shows the splash screen. The start up sequence ends when the display shows the menu screen.
5. System Operating Mode Key Tests (See Figure 4-16)
   a. Press the OFFLINE mode key B.
      The display shows OFFLINE in the upper right hand corner and the screen background will change to yellow.
   b. Press the TEST key C.
      The ultrasound should not activate, and the Alarm ID #308 will be displayed.
   c. Press the ONLINE key D.
      The display shows ONLINE in the upper right hand corner and the screen background will change back to white.
   d. Press the TEST key C. Ultrasound should activate and the Test screen will be displayed showing Amplitude, Power, and Frequency values. Release the TEST key.
6. Optionally, system status outputs can be monitored during this test.
   The ultrasound status output activates only when ultrasound is active.
   The power monitor output signal indicates the ultrasonic power level.

Figure 4-15 Rear Panel AC Breaker/Switch

Figure 4-16 Operating Mode Key Tests

Figure 4-17 Testing the Generator
System Test

To test the system’s ultrasound operation, perform the following steps.

1. For this test, the generator must be ONLINE. Make sure ONLINE appears in the upper right corner of the display.

2. Connect a probe to the generator ultrasonic output.

3. Place the probe so that the tip of horn is not in contact with anything. If you are using a hand probe, you may feel a slight vibration or sensation in your hand. This is normal. There should not be any loud or unusual noise.

4. Navigate to the Real Time Data screen.

5. Press and hold the TEST key (A in Figure 4-18).

6. The first segment LED of the SYSTEM POWER OUTPUT LEVEL bar graph (B in Figure 4-19) turns red. The probe will operate as long as the TEST key is pressed.

7. When the TEST key is released, the SYSTEM POWER OUTPUT LEVEL bar graph turns off (no red in the bar graph area). This test cannot be performed with the generator OFFLINE.

CAUTION

Any unusually loud noise from the probe stack indicates that it has been improperly assembled. Check the probe stack for correct assembly and proper torque.
Probe Operation

1. If the generator is not online, press the ONLINE mode key (C in Figure 4-20). ONLINE will appear in the upper right hand corner of the display (D in Figure 4-20).

2. Hand Probe – Apply the probe tip to the components to be ultrasonically joined, and press the hand probe’s activation switch.
   Automation System – Activate the automation system program to trigger the generator. Move the probe tip in contact with the components to be ultrasonically joined, and run a welding cycle.

3. Hand Probe – The programmed welding time or energy will be processed, and then the ultrasound will be shut off.
   Automation System – The programmed weld time, energy, peak power, or distance will be processed, and then the ultrasound will shut off.

   NOTE
   Neither a hand probe or an automation system can trigger the generator to produce an ultrasound output if the generator is OFFLINE.

Stopping the Ultrasound Output

Press the OFFLINE key (E in Figure 4-20).
Ultrasound will deactivate.

Press the emergency (E-STOP) switch, and the ultrasound signal will deactivate. - This customer supplied switch is wired to J5 pins 3 and 4 (see System Inputs/Outputs Signal Descriptions pg. 17) and opens the connection between those pins when pressed.
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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/Fault indicators from the display
• Software version (Press INFO. With selection indicators at System Information, press ENTER to get this data.)
• 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
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

You can locate your local representative at:

   www.dukane.com/contact-us/
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Interpreting the Model Number .... 53

Regulatory Agency Compliance .... 54
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Figure 6-1  Horizontal 2600 watt and below Generator Drawing
Figure 6-2  Vertical 2600 watt and below Generator Drawing
# Operating Environment

Operate the generator within these guidelines:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td>40°F to 100°F (+4°C to +38°C)</td>
</tr>
<tr>
<td><strong>Air Particulates</strong></td>
<td>Keep the equipment dry  \  Minimize exposure to moisture, dust, dirt, smoke and mold</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>5% to 95% Non–condensing @ +5°C to +30°C</td>
</tr>
</tbody>
</table>

Storage guidelines (generator is not operating):

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td>-4°F to 158°F (-20°C to +70°C)</td>
</tr>
<tr>
<td><strong>Air Particulates</strong></td>
<td>Keep the equipment dry  \  Minimize exposure to moisture, dust, smoke and mold</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>5% to 95% Non–condensing @ 0°C to +30°C</td>
</tr>
</tbody>
</table>
## Generator AC Power Requirements

<table>
<thead>
<tr>
<th>Operating Frequency</th>
<th>Generator Model Number</th>
<th>Overload Power Ratings (Watts)</th>
<th>Input AC Power Requirements</th>
<th>Nominal AC Volt</th>
<th>@ Maximum RMS Current</th>
<th>Nominal AC Volt</th>
<th>@ Maximum RMS Current</th>
<th>Nominal AC Volt</th>
<th>@ Maximum RMS Current</th>
<th>Nominal AC Volt</th>
<th>@ Maximum RMS Current</th>
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</thead>
<tbody>
<tr>
<td>15kHz</td>
<td>15HB360-4 R-XX</td>
<td>3600</td>
<td>380-480V 50/60 Hz @ 10 Amps</td>
<td>1200</td>
<td>5 A</td>
<td>0.75 - 2.5A</td>
<td>700 - 1300 VAC</td>
<td>15HB360-4 R-XX</td>
<td>3600</td>
<td>380-480V 50/60 Hz</td>
<td>10 Amps</td>
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<tr>
<td>20kHz</td>
<td>20HB120-UR-XX</td>
<td>1200</td>
<td>100-240V 50/60 Hz @ 15 Amps</td>
<td>2000</td>
<td>7 A</td>
<td>5 A</td>
<td>1.5 - 3 A</td>
<td>100-240V 50/60 Hz</td>
<td>15 Amps</td>
<td>100-240V 50/60 Hz</td>
<td>15 Amps</td>
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<tr>
<td>25kHz</td>
<td>25HB120-UR-XX</td>
<td>1200</td>
<td>100-240V 50/60 Hz @ 15 Amps</td>
<td>2000</td>
<td>7 A</td>
<td>5 A</td>
<td>1.5 - 3 A</td>
<td>100-240V 50/60 Hz</td>
<td>15 Amps</td>
<td>100-240V 50/60 Hz</td>
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<tr>
<td>30kHz</td>
<td>30HB090-U R-XX</td>
<td>900</td>
<td>100-240V 50/60 Hz @ 15 Amps</td>
<td>1800</td>
<td>6 A</td>
<td>5 A</td>
<td>1.5 - 3 A</td>
<td>100-240V 50/60 Hz</td>
<td>15 Amps</td>
<td>100-240V 50/60 Hz</td>
<td>15 Amps</td>
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<tr>
<td>35kHz</td>
<td>35HB120-U R-XX</td>
<td>1200</td>
<td>100-240V 50/60 Hz @ 15 Amps</td>
<td>1200</td>
<td>6 A</td>
<td>5 A</td>
<td>1.5 - 3 A</td>
<td>100-240V 50/60 Hz</td>
<td>15 Amps</td>
<td>100-240V 50/60 Hz</td>
<td>15 Amps</td>
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<tr>
<td>40kHz</td>
<td>40HB060-U R-XX</td>
<td>600</td>
<td>100-240V 50/60 Hz @ 15 Amps</td>
<td>600</td>
<td>3 A</td>
<td>5 A</td>
<td>1.5 - 3 A</td>
<td>100-240V 50/60 Hz</td>
<td>15 Amps</td>
<td>100-240V 50/60 Hz</td>
<td>15 Amps</td>
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</tbody>
</table>

### Notes:
- An X used above in the Model Numbers is a "wildcard" character, meaning any valid character code combination.
- AC line voltage and current need depend on whichever generator has been chosen for your system. See the table above.
- For 480 VAC generators, the 24V power supply that connects to the power source (24V) shall be listed or labeled with the party North America marking (UL, CSA, TUV, etc.).
- Maximum current requirements are specified at the minimum nominal AC line voltage and the rated power level.
- If the input line voltage is lower than 100V, the output current will exceed 15 Amps.
- Do not operate machine at voltages lower than 100V. Current will exceed rating causing a shock hazard.
Figure 6-3
Interpreting the Model Number

The example model number shown here is 20HB120-UR-C3.
This means:
A 20kHz generator, rated for 1,200 watts, horizontal bench, operating on a 100-240 VAC line, with an ANYBUS PROFINET module in the options slot.

Power Level

<table>
<thead>
<tr>
<th>Power Level</th>
<th>Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>500</td>
</tr>
<tr>
<td>090</td>
<td>900</td>
</tr>
<tr>
<td>120</td>
<td>1,200</td>
</tr>
<tr>
<td>180</td>
<td>1,800</td>
</tr>
<tr>
<td>200</td>
<td>2,000</td>
</tr>
<tr>
<td>260</td>
<td>2,600</td>
</tr>
<tr>
<td>360</td>
<td>3,600</td>
</tr>
<tr>
<td>500</td>
<td>5,000</td>
</tr>
</tbody>
</table>

Nominal U/S Frequency

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15kHz</td>
</tr>
<tr>
<td>20</td>
<td>20kHz</td>
</tr>
<tr>
<td>25</td>
<td>25kHz</td>
</tr>
<tr>
<td>30</td>
<td>30kHz</td>
</tr>
<tr>
<td>35</td>
<td>35kHz</td>
</tr>
<tr>
<td>40</td>
<td>40kHz</td>
</tr>
</tbody>
</table>

System Process Control

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>AiM™ Color LCD w/iQLinQ™</td>
</tr>
<tr>
<td>C3</td>
<td>iQLinQ™ PROFIBUS INTERFACE Module</td>
</tr>
<tr>
<td>C4</td>
<td>iQLinQ™ CC-LINK INTERFACE Module</td>
</tr>
<tr>
<td>C5</td>
<td>iQLinQ™ POWERLINK INTERFACE Module</td>
</tr>
<tr>
<td>C6</td>
<td>iQLinQ™ EtherCAT INTERFACE Module</td>
</tr>
</tbody>
</table>

AC Line Input

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Voltage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>100-240V Universal</td>
</tr>
<tr>
<td>2</td>
<td>200-240V for 1800, 2000, 2600</td>
</tr>
<tr>
<td>4</td>
<td>480V Three-Phase</td>
</tr>
</tbody>
</table>

Chassis Style

<table>
<thead>
<tr>
<th>Chassis Style</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB</td>
<td>Horizontal Bench Chassis</td>
</tr>
<tr>
<td>VB</td>
<td>Vertical Panel Mount Chassis</td>
</tr>
<tr>
<td>Blank</td>
<td>Ethernet/IP or Modbus TCP/IP</td>
</tr>
</tbody>
</table>
Regulatory Agency Compliance

FCC
The generator 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 2004/108/EC for Heavy Industrial
  - EN 61000-6-4: 2001
  - EN 55011: 2003
  - EN 61000-6-2: 2005
  - 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 2006/95/EC.
- The Machinery Directive 2006/42/EC.
  - EN 60204: 2006

UL
The iQ generator complies with these standards:

Underwriters Laboratories:
UL 61010-1, and

National Standards of Canada:
CAN/CSA C22.2 No. 61010-1-12

as verified by TÜV Rheinland.

CAUTION
DO NOT make any modifications to the generator or associated cables as the changes may result in violating one or more regulations under which this equipment is manufactured.

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

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

ISO CERTIFICATION

Dukane chose to become ISO 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 certification, you must prove to one of the quality system registrar groups that you meet three requirements:
1. Leadership
2. Involvement

The ISO standards establish 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/contact-us/

to locate your local representative.