

Operating Instructions

LYNX FREEDOM

FIRMWARE V1.2

Serial Number _____

IWT Stud Welding

*2650 Egg Harbor Road
Lindenwold, NJ 08021*

(856) 435-8004 phone

www.iwtmarketplace.com

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We certify that the contents of this pamphlet correspond to the hard and software described. Deviations, however, cannot be excluded, so that we cannot warrant for absolute compliance. The data in this documentation, however, have been verified regularly and necessary corrections will be incorporated in future impressions. We appreciate any suggestions for improvement.

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1 General

1.1 Introduction to Stud Welding

Your new stud welding equipment is carefully constructed of the finest components and materials available. Used properly, this equipment will give you years of service.

The system incorporates the latest in engineering advances, for completely reliable arc stud welding of mild steel, stainless steel, and other weldable fasteners depending on application requirements.

Carefully reading this manual will enable you to understand how the welder operates to ensure proper performance.

You have purchased a product which:

- Complies to machinery directives 2006/42/EC
- Complies to IEC 60974 for ARC welding equipment
- Complies to IPC-A-610-Class II
- RoHS Compliant 2002/95/EC

Before putting the stud welder into operation, always observe the following:

- Store the operating instructions in a place accessible to every operator.
- Ensure that the respective operator has read and understood the operating instructions prior to installation. Each operator should confirm this by signature.
- Prevent the stud welder from being operated by unauthorized persons.
- Only trained personnel should operate the stud welder.



MORTAL DANGER

Persons with pacemakers must not operate the stud welder and must not stay in the vicinity of the stud welder while it is running. Ensure that the stud welder is not operated near electronically sensitive life-supporting equipment, such as in intensive care units in hospitals.

WARNING

Keep sufficient distance from electronic devices. When stud welding, highly intensive electromagnetic fields are created which may permanently damage these devices (e.g., television sets and laptop computers).

- Observe the safety instructions in Section 3.
- Call 911 or Emergency Response in case of an accident.

1.2 Application

The LYNX Freedom is a microprocessor-controlled battery powered welding system capable of welding fasteners up to 1/2" in diameter without needing to be connected to AC power.

If you need consultation or assistance in solving technical problems, please contact either IWT or one of our field engineers.

1.3 Product Information

Manufacturer:

IWT Stud Welding
2650 Egg Harbor Road
Lindenwold, NJ 08021

Tel: 856-435-80
www.iwtmarketplace.com

Product Designation:

LYNX Freedom Battery Powered Arc Stud Welding System

Country of Origin:

USA

1.4 Serial Plate

The serial plate is located on the rear side of the stud welder. It contains information regarding the manufacturer's name, address, country of origin, product specifications, method of welding, date manufactured, and serial number.

1.5 Documentation

The following operating instructions are supplied with the LYNX Freedom Battery Powered Arc Stud Welder:

- *Operating instructions for the LYNX Freedom Stud Welding System*
- *Freedom Quick Tips, A setup guide*
- *Bill of Materials/parts list*

1.5.1 Operating Instructions

The contents of these operating instructions are neither part of any former or existing arrangement, pledge or legal relationship nor are designed for modifying the latter. All obligations of INTERNATIONAL WELDING TECHNOLOGIES, INC. result from the respective contract of sale (invoice), which also comprises the complete and generally valid warranties. These contractual warranty terms are neither extended nor restricted by the implementation of these operating instructions.



WARNING

Do not carry out any activities on the stud welding system without specifically knowing the operating instructions or the respective part. Ensure that only qualified personnel familiar with the operating instructions and the necessary technical activities (training) operate the system.

1.5.2 In Case of Malfunction

If malfunctions occur, first try to detect, and eliminate the cause according to the list in Section 9 “Troubleshooting”. In if you are unable to determine the cause, power off the welder and contact International Welding Technologies, Inc. (IWT).

Please make sure that you have the following information:

- Customer contact information
- Welder model
- Serial number
- Year of construction
- Options
- Material of stud and work piece
- Method of locating
- Stud dimensions

This information will help save time and unnecessary costs, e.g., caused by delivering the wrong spare parts.

1.6 Contact & Service Address

If you have any questions regarding the operation of the stud welding system, spare parts or if you require service, please contact your distributor, or IWT directly at the following address:

IWT Stud Welding
Attention: Technical Support/Repairs
2650 Egg Harbor Road
Lindenwold, NJ 08021

Tel: 856-435-8004
www.iwtmarketplace.com

2 Description of the Stud Welder

2.1 Arc Stud Welding Technology

The *LYNX Freedom* operates according to the same principles of arc stud welding as defined in the American Welding Society Welding Handbook. However, the Freedom is unique compared to conventional stud welding systems. The Freedom does not need to be plugged into power. Rather than using rectified AC power, the Freedom uses its own self-contained batteries to make a true DC weld.

What happens during an arc stud weld?

In arc stud welding, a fastener is initially set against the part to be welded. When the gun's trigger is pressed, a small amount of current (approximately 30 amps) flows through the fastener to the work surface. At the same time, an electro-mechanical solenoid lifts the fastener away from the surface. This action causes an ionized path between the fastener and the surface. This is called the "pilot arc". After pilot arc, the "main current" is initiated which melts the work surface and the fastener. The solenoid then de-energizes and the fastener is plunged into a molten pool by spring pressure.

Typically, a ceramic shield called a "ferrule" or "arc shield" is placed around the fasteners base and is used to retain the molten pool. The ferrule is vented to allow gases to escape and serves to create a fillet, upon solidification of the molten material. Ferrules are single use, disposable components which are broken away from the welded fastener.

About the LYNX Freedom:

The LYNX Freedom is designed with simplicity in mind for applying weld studs in the field or where power is not accessible. This is possible because the LYNX Freedom is battery powered. It utilizes a straightforward yet intuitive interface. Four predetermined weld settings allow the operator to simply select the welding parameters. A single push button is used to select 1/4", 5/16", 3/8", & 1/2" weld stud diameters. Universal weld settings are possible because the LYNX Freedom is not influenced by fluctuations in incoming power. If a weld setting is not suitable for a particular application, a Wi-Fi connection can be established between a smart device and the welder to adjust weld settings. This feature is only accessible under the guidance of IWT. More information on the Wi-Fi interface can be found in Section 5.

2.2 Dimensions

The *LYNX Freedom Battery Powered Arc Stud Welding System* is a powerful yet portable system that can weld fasteners without being plugged into power. Being truly portable allows the operator to freely move and weld around the shop or in the field without the constraints of heavy 3-phase power or inconvenient worksite generators. At 34lbs, the Freedom can be easily handled by a single person.

The dimensions are:

12" Wide x 14" Long x 8" High



2.3 Technical Data

Description	LYNX Freedom ARC stud welding system
Welding range	Up to 1/2" fully threaded
Material	Steel and stainless steel
Welding Method	Battery powered, arc stud welding
Standard Gun	IWT-A3 clutch lift arc gun
Battery Rating	15.6aH
Charge Time	Approximately 3.5 hours
Output	800amps @ 53 volts
Welding Time	25 – 500 milliseconds
Duty Cycle	Six, 1/2" welds per minute (More on smaller diameters)
Charger Input	110/220VAC single-phase, 5amp (Automatically switching)
Welding Cable*	22 feet of #4 highly flexible weld cable
Ground Cables*	Two, 15 feet of #4 highly flexible weld cables
Weight	34 lbs.
Color	Blue
ALTERING WELDING CABLES MAY DAMAGE THE WELDER AND WILL VOID ITS WARRENTY	
Subject to technical change without notice.	

3 Safety Instructions

This operating manual contains basic instructions that must be complied with during installation and/or operation. It is necessary that the operator and/or welding supervisor reads these operating instructions prior to setup and welding.

Not only the general "safety instructions" listed under this main item, but also the special safety instructions e.g., for high temperatures, voltages, etc. listed under the other main items must be complied with.

3.1 Symbols in the Operating Instructions

The non-observance of safety instructions can cause damage to the operator and observers. The safety instructions of this manual are marked with the general symbol for danger safety symbol in compliance with DIN 4844-W9



Warning of electrical voltage is specifically marked with the safety symbol in compliance with DIN 488-W8.



In addition to these symbols, the words "DANGER TO HEALTH" or "MORTAL DANGER" refer to the degree of a possible danger.

Safety instructions, the non-observance of which, may endanger the machine and its functions are marked with the terms

"CAUTION" or "WARNING".

General instructions are marked with the hand symbol.



3.2 Staff Qualification & Training

The staff responsible for operation, maintenance, inspection, and assembly must have the respective qualification for carrying out these duties. Field of responsibility, competence and the supervision of staff must be exactly regulated by the user. If your personnel do not have the necessary knowledge they must be trained and instructed. If necessary, this can be done with the guidance of the manufacturer or supplier on behalf of the welding equipment user. Furthermore, the user must ensure that the contents of the operating instructions are fully understood by the staff.

As outlined in ISO (International Organization for Standardization) 14732:2013, only qualified personnel can operate the system.

3.3 Non-Compliance with Safety Instructions

Non-compliance with safety instructions may not only endanger persons, but also the welding system and its environment. Any non-compliance with safety instructions may result in a complete loss and irreparable damage to the batteries.

Non-compliance with safety instructions may have the following consequences:

- Failure of important system functions
- Failure of prescribed methods for maintenance
- Danger to persons through electric, mechanic, thermal and acoustic influences

3.4 Safety-Conscious Working

The user must be complied with the safety instructions listed in this manual, existing national accident prevention regulations and possible international working, operating and safety regulations.

3.5 Safety Instructions for the Operator

When stud welding, danger may result from

- Electric current
- Optical radiation (e.g., arc flash)
- Harmful substances (e.g., smoke)
- Acoustic shock
- Spraying sparks

The operator is obliged to restrict the dangers to an inevitable degree and to point these dangers out to other persons involved.



MORTAL DANGER

People with pacemakers must not operate the stud welder or be within 36 inches of the unit

3.6 Before Starting the System

Pay attention to the following information:

- Do not touch live electrical parts including the batteries in the stud welder.
- Juveniles under the age of 18 years must not operate the stud welding system.
- Read all operating instructions before starting the system.
- Prevent unauthorized use of the system by children or unqualified personnel.
- Wear non-combustible, protective clothes.
- Wear a leather apron to protect your clothes from welding spatters that are generated during the welding process.
- Wear head protection when carrying out welding work above your head
- Wear gauntlet gloves made of leather.
- Never wear rings, watches, or electrically conductive jewelry.
- Wear eye protection to protect against welding splatter and arc flashes that are generated during the process. Safety glasses with 3.0 IR filtered lens are suggested.
- Never look directly at the weld arc.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- **Never cut or alter welding cables. Doing so WILL damage the welder and WILL void the warranty.**
- Welding on closed containers, such as tanks, drums, or pipes can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot work pieces, and hot equipment can cause fires.

3.7 Before Starting to Weld

- Check the state of all cables.
- Immediately replace defective cables and cable connections with genuine **IWT parts**.
- Ensure that the air louvers are not covered. Heat accumulation may damage the stud welder.
- Look around for potential safety or fire hazards prior to welding.

3.8 Safety Precautions at Installation Site

- When placing the stud welder on tables or similar workshop furniture, ensure that the stud welding system stands firmly and that the table can bear its weight.
- Make sure the battery charger is properly grounded when in use.
- According to American National Standards Institute (ANSI) Z49.1, "Safety in Welding, Cutting and Allied Processes," the workpiece or the metal table that the workpiece rests on must be grounded. You must connect the workpiece or worktable to a suitable ground, such as a metal building frame. The ground connection should be independent of or separate from the welding circuit connection.
- Comply with fire prevention regulations and do not weld in hazardous locations.
- Make sure room is well ventilated or extract welding fumes, if necessary.



DANGER TO HEALTH

When welding, fumes and suspended matters may be generated. Beware of fumes detrimental to health, particularly when using surface-treated materials. If possible, only weld in well ventilated rooms that are higher than 10 ft.

Special regulations are applicable for confined spaces, see ANSI Z117.1, OSHA 1926.353, ISO 15011-6:2012 and VBG 15.

3.9 Working with the Stud Welder

Comply with all accident prevention regulations which apply to the operation of your stud welder. If an accident happens, switch off the stud welder or disconnect it from the charger and call 911 or Emergency Response.



Accident prevention regulations applicable for stud welders are ANSI Z49.1:2012, ISO 17846:2004 and VBG15 "Safety in Welding, Cutting and Allied Processes". For more information, contact the Employer's Liability Insurance Association.



DANGER TO HEALTH

When welding, do not wear clothes soiled with easily combustible substances such as oil, grease, and thinners, etc.

3.10 Safety Instructions for Maintenance & Inspection

Since there is always voltage present on the batteries, the Freedom is designed to be serviced by IWT ONLY.

Only carry out maintenance work when the stud welder has been switched off and the batteries have been properly disconnected.

The user must ensure that all maintenance, inspection, and assembly work is carried out by authorized and qualified technical personnel.

Internal work on the system can only be carried out after the batteries have been disconnected and removed. It is necessary to comply with the procedure for stopping the stud welding system described in the operating instructions (section 3.13).

Immediately after having completed your work, re-install and activate all safety and protective devices.

3.11 Unauthorized Retrofit and Spare Parts

This system should never be retrofitted or modified. Only genuine IWT spare parts and accessories authorized by the manufacturer guarantee safety. The use of other parts will result in the cancellation of warranty.

3.12 Proper Operating Methods

Safe operation of the stud welder can only be guaranteed when it is used in accordance with its purpose. The limit values indicated in section 2.3 "Technical Data" must never be exceeded.

3.13 Storing the Stud Welder

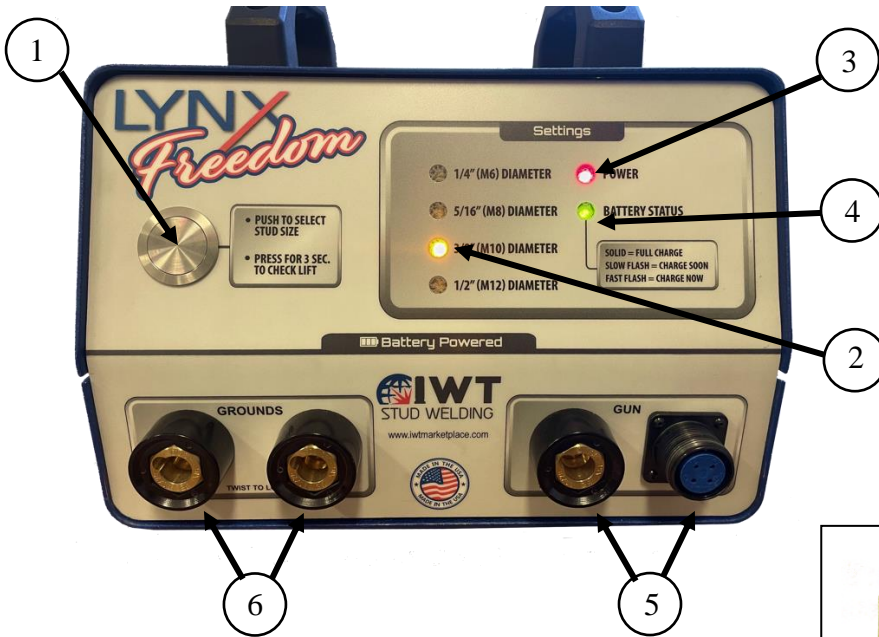
- Switch off the power (section 5.1.1, item 1) with the rocker switch located on the stud welder's rear panel—middle setting.
- Never store with the welder plugged into the charger.
- Never keep the unit on charge for longer than the 3.5-hour charge time.
- Store the Freedom welder with at least a 50% charge on the unit's batteries. (See section 9)
- LIFEPO4 batteries have a low self-discharge rate and can remain ready at charge for several months, however, check units' battery voltage regularly. IWT recommends every 6 to 9 months.
- Disconnect
 - Ground cables (section 5.1.1, item 6)
 - Control cable (section 5.1.1, item 5)
 - Gun cable (section 5.1.1, item 5) from the stud welder.
- Check the welding cable and connections of the stud welder for damage such as arcing, mechanical wear etc. and have damaged parts replaced by IWT or an authorized distributor.
- Roll up the cables without buckling them.
- Make sure stud welder cannot be used by unauthorized persons.

4 Installation of Stud Welder

- Only install the stud welder on an even surface. The five rubber feet located on the bottom of the stud welder guarantees its anti-skid position and serves as vibration dampers.
- Although the stud welder is designed to be resistant to most environmental influences, it should never be sprayed with water or submerged. **Under no circumstances should the unit be placed next to a grinding station.** Metallic particles can be drawn into the enclosure and damage the printed circuit board.
- **The stud welder should not be placed near any high frequency welding equipment, share a common ground and/or common power supply.** Doing so will damage sensitive electronics and will void the stud welder's warranty.
- Please pay particular attention to the strength of the workshop furniture (or welding carts) and ensure its safe and sturdy. The table should be capable of handling at least the machine's weight.
- Make sure there is sufficient free space around the louvers.
- Do NOT use stud welder in temperatures over 115° Fahrenheit
- Do NOT charge batteries in temperatures below 32° Fahrenheit
- Ensure charger is on a grounded outlet and is using the correct voltage.
- Ensure sufficient ventilation of the workroom when operating the system indoors.
- **Never hoist or suspend the machine by the carrying handles.**

5 Exterior Components

5.1.1 Front View

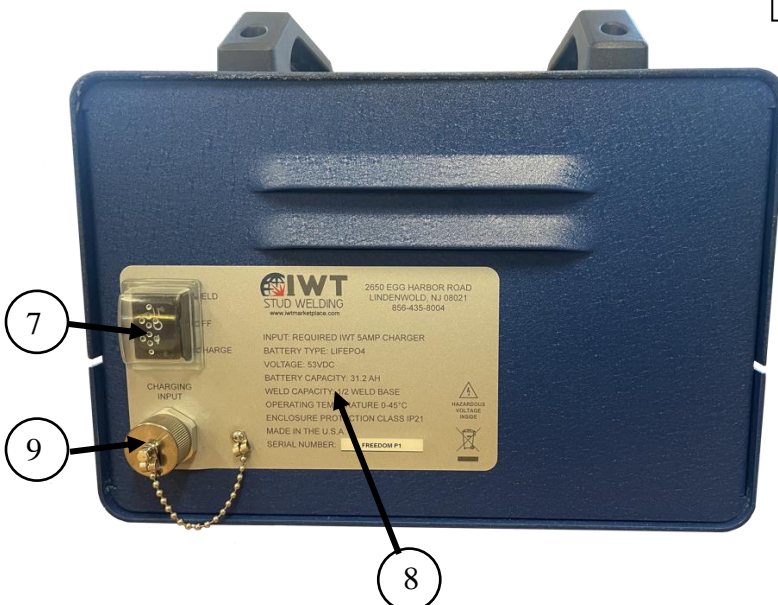


Item	Description
1	Stud Selector Button
2	Weld Setting LED (amber)
3	Power LED (red)
4	Battery LED (green)
5	Gun Connectors
6	Ground Connectors



The housing of the LYNX Freedom corresponds to safety class IP 23, IEC 60974-1. Please observe that this system should not be submerged or sprayed with water.

5.1.2 Rear View



Item	Description
7	Power Switch
8	Serial Plate
9	Charging port

5.2 Operating Elements

ON/OFF Switch (Section 5.1.2, Item 7)

The power switch is located at the back of the unit. The switch settings are “WELD”, “OFF” or “CHARGE”.

Stud Selector Button (Section 5.1.1, Item 1)

The LYNX Freedom utilizes a flush mounted stainless-steel button to adjust weld settings. This simple interface allows an operator to easily switch between 4 welding parameters.

LEDs (Section 5.1.1 Items 2,3 & 4)

The **amber** LEDs will show the selected stud size to be welded. The weld parameters are factory set for the size and no operator intervention is required. The **red** LED signals that the welder is powered and ready to weld. The **green** LED provides a quick indication of battery charge/condition.

Holding down the stainless-steel button for 3 seconds will enter a “lift check” mode where the gun solenoid lift can be checked without making a weld. While in “Lift Check” mode the **amber** LEDs will also display the percentage of charge left on the batteries.

5.3 Connection Elements

Ground cable connectors (Section 5.1.1., Item 7)

There are two ground cable connectors on the front of the *LYNX Freedom Stud Welding System*. Insert each cable connector into the ground socket and twist in a clockwise direction to tighten. **Ensure these connectors are tight.** These cables provide the path for the welding current. For good grounding, attach each ground cable directly to the work piece. The work piece should be clean and free of paint, scale, or oxidation. Weld between the ground cables to minimize the effects of “arc blow”.

Weld cable connector (Section 5.1.1., Item 6)

The welding gun’s weld cable connector attaches to the front of the unit in the gun connector socket. Insert the connector into the socket and twist in a clockwise direction to tighten.

Ensure this connector is tight.

Control cable connector (Section 5.1.1., Item 6)

The welding gun’s control cable connector attaches to a four-pin connector on the front of the stud welder. This connector provides the gun trigger signal (black and white) and 48VDC (red and green) to energize the gun solenoid. **Note that the gun solenoid is unique to this system. Only use the supplied IWT-A3 gun with this system. Attaching a different gun to the system will damage the batteries.**

Charger connection (Section 5.1.2., Item 10)

The charging port is located on the rear panel of the stud welder. Only use the supplied charger when the machine’s battery voltage is low. Connect the charger by unscrewing the charging ports protective cover. Once connected, press the power switch to the “charge” position. **NOTE: Using a third-party charger will damage the batteries and will void the warranty. More information on charging can be found in Section 7.4**

5.4 Preparing to Weld

Connect the stud welding pistol and the ground cables to the stud welder as indicated in Section 5.3.

5.4.1 Ground Connections

- Connect the ground cables into the indicated ground sockets.
- Turn the connectors clockwise until they stop.
- Connect the clamps to the work piece.

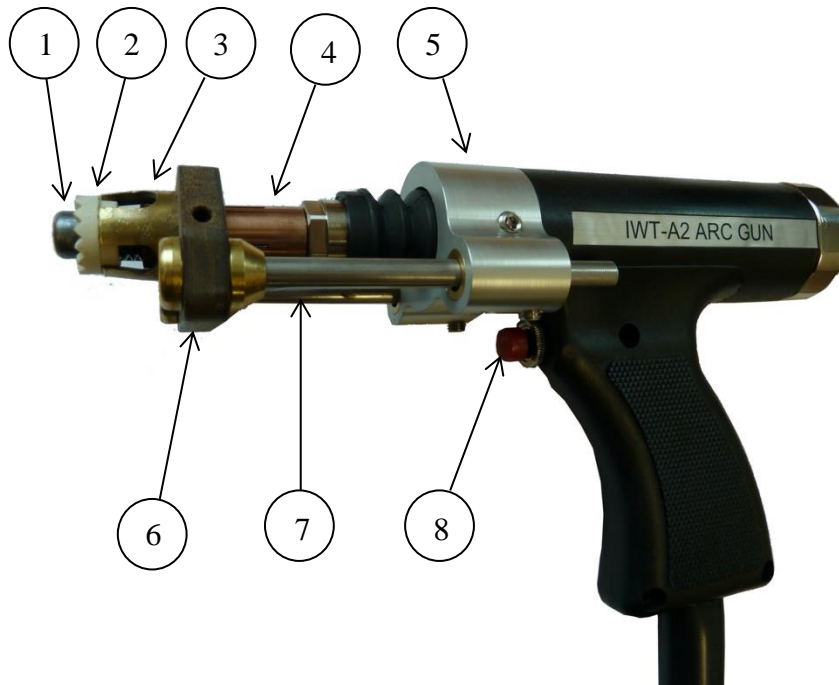


Ensure optimum contact with work piece.

5.4.2 Gun Connections

- Connect welding cable of the stud welding gun into the indicated socket.
- Turn the connector clockwise until it stops.
- Connect the control cable connector into the four-pin socket.
- Turn the screw connector on the outside of the plug to secure the plug to the socket.

5.5 Gun Setup - Ferrules

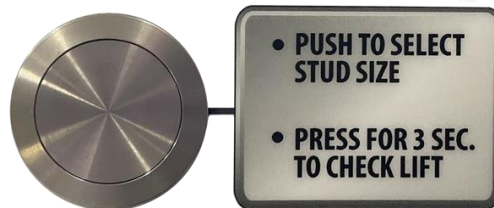


A-3 ARC GUN SET FOR CERAMIC FERRULES

ITEM	DESCRIPTION
1	Arc Fastener – protrusion should be approximately 1/8” beyond the arc shield
2	Arc Shield – selected for the size and type of fastener
3	Arc Shield Grip – selected for the size of the arc shield
4	IWT Arc Chuck – stud holder specific for the size of fastener
5	Face Plate – front of the gun, accepts adjustable leg set, 4 set screws lock legs in place.
6	Arc Shield Foot – holds the arc shield grip. Set screw locks grip in place.
7	Legs – two legs support the foot piece. Loosen the screws at the end of the legs to center the foot and grip allowing the fastener to move freely.
8	Trigger – starts the weld cycle.

5.6 Powering Up

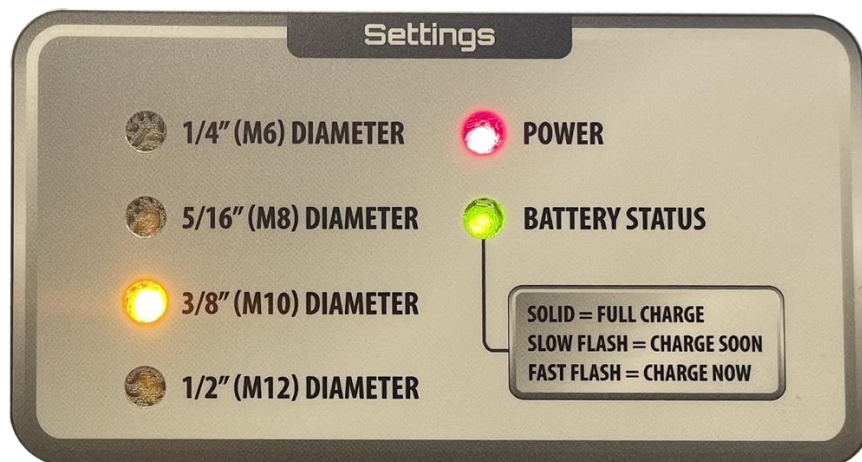
To power up the system press the rocker switch on the rear panel to the “WELD” setting. The unit will power on and run a diagnostic check. Once the diagnostic check is complete, the power LED will illuminate **red**. The **green** battery LED will illuminate indicating the battery status. The last weld setting will be displayed on one of the **amber** LEDs. The machine is now ready to weld. The fastener diameter can be changed by pushing the stainless-steel stud selector button.



The *LYNX Freedom* is equipped with a single button interface to adjust the welding parameters for different stud diameters.

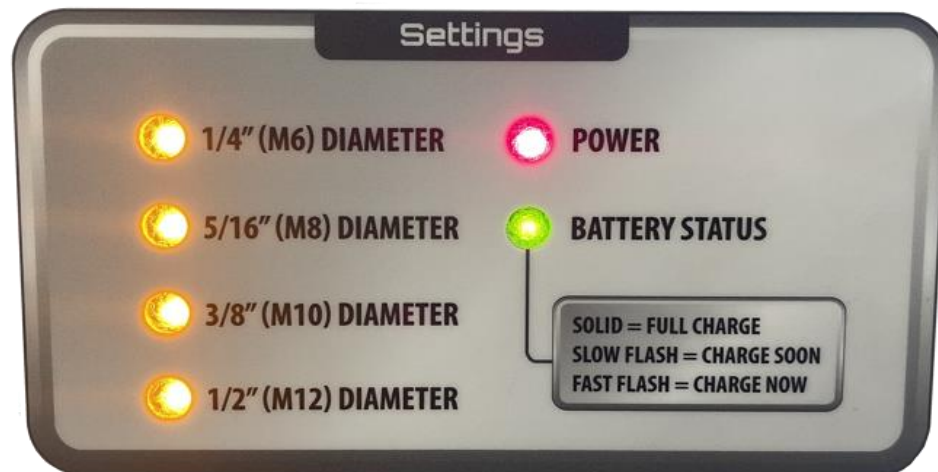
In the picture below:

The **red** LED indicates that the Freedom is powered on.
 The solid **green** LED indicates the batteries have a full charge.
 The **amber** LED indicates the Freedom is set to weld 3/8 diameter weld studs.



A “Lift Check” can be performed by pressing the stud selector button for 3 seconds. The **red** power and **green** battery LEDs flash together giving the operator a visual indication that the machine is in “Lift Check”. In “Lift Check” the gun’s trigger can be pulled without activating a weld. This is useful to confirm that the gun’s solenoid is in good working order.

The correct lift is critical to successful arc stud welding. Too much or too little lift is the number one cause of poor or erratic welds. With the Freedom in lift check mode, hold the gun against the work surface, press the gun trigger and observe that the stud lift away from the work. The ideal lift for this fastener range is approximately 0.080”-0.100” thousands of an inch. The image below shows the Freedom welder in lift check mode. The power and battery status LEDs will flash while in lift check.



As discussed in section 5.2, while in “Lift Check” the weld setting LEDs will display the approximate remaining battery charge. The battery charge level will be displayed by the number of illuminated amber lights. Four illuminated lights indicate full charge, three lights indicated $\frac{3}{4}$ remaining charge, etc. In the photo above the welder is showing a full charge because all four **amber** LEDs are illuminated.

The *LYNX Freedom Stud Welding System* is protected with an advanced battery monitoring system (BMS), software interlocks, fusing and a mechanical contactor. If the Freedom does not power on, please contact IWT Stud Welding or an authorized service center. The unit’s batteries will still have voltage on them even when the machine is in the “OFF” position. As such the machine is not designed to be field serviced.

5.7 Welding Parameters

The Freedom's weld settings have been established through IWT's testing. Since the *LYNX Freedom* does not rely on incoming power, these pre-programmed settings should be accurate for most applications.

The welder's batteries are designed to produce a weld current of 800amps. However, considerations should be made when welding in very cold weather as Lithium batteries (LiFePO₄) are limited in the cold. When the temperature goes down, so does the batteries' output. Generally, this reduction in current does not exceed 10% or 80amps and is insignificant for stud sizes 3/8" or smaller. With each weld, the batteries will self-warm and as the batteries get warmer, their capacity and performance will increase. IWT recommends when operating in temperatures below 50°F the welder should be stored indoors. Additionally, it may be helpful to increase the pre-programmed weld times, please refer to section 5.9. After making changes, IWT suggests making 10-15 test welds in succession, proof testing, and then moving onto production parts. Please read section 7 for more on testing and inspecting welds.

Due to their chemistry, LiFePO₄ cells are unable to accept the same amount of charging current as they do when the temperature is warm. The Freedom's batteries will not charge properly when the temperature is below freezing. Please read section for more information on battery maintenance.

For ease of setup, the Freedom is supplied with a clutch lift gun where the lift is factory set. The gun's lift will remain constant regardless of the amount of plunge. This parameter should not need to be adjusted.

Please consult IWT or your authorized distributor if you believe your application is unique and may require special welding parameters or changes to the gun's lift. For instance, it may be helpful to increase the weld time when operating in cold temperatures. Under IWT's supervision weld parameters can be changed via the machine's Wi-Fi connection and your smart device.

The table below provides the preset values for the four weld settings.

Selection	Stud Diameter	Pilot Arc	Weld Time	Plunge*	Lift*
Stud #1	¼" (M6)	100	75	.100"	.090"
Stud #2	5/16" (M8)	100	125	.100"	.090"
Stud #3	3/8" (M10)	100	200	.125"	.090"
Stud #4	½" (M12)	100	480	.125"	.090"

**Plunge* refers to the amount of fastener extending out past the ferrule, as established by the operator. *Lift* indicates the distance the stud moves during lift check, determined by the gun solenoid. The "lift" is preset at the factory for ideal performance.

5.8 Duty Cycle

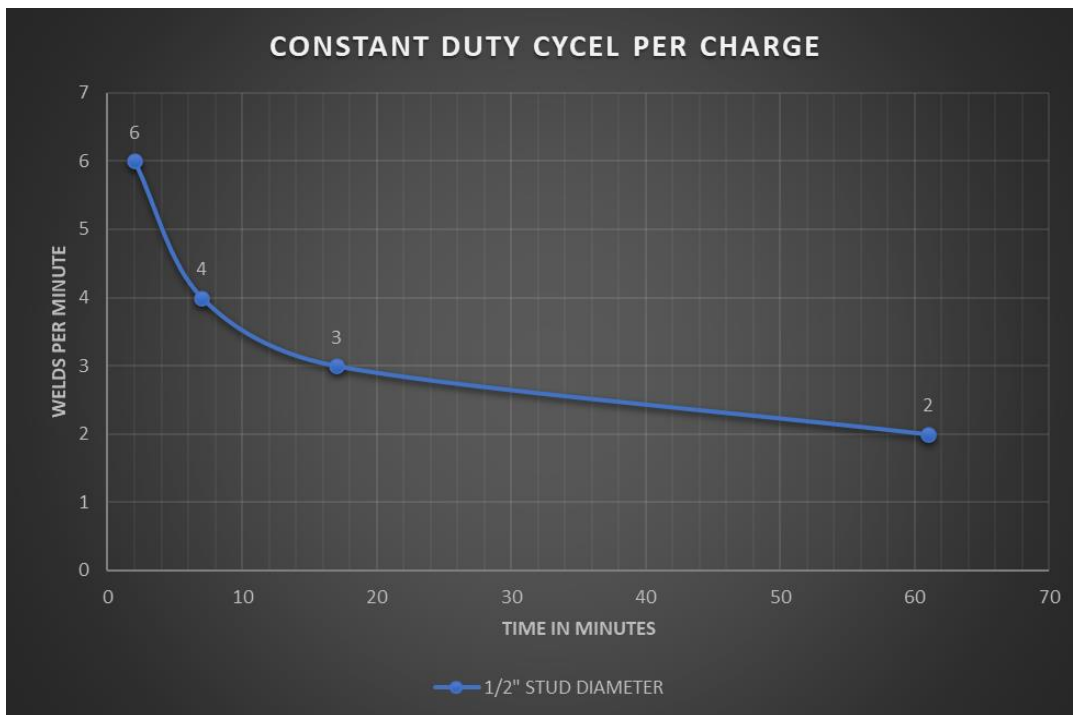
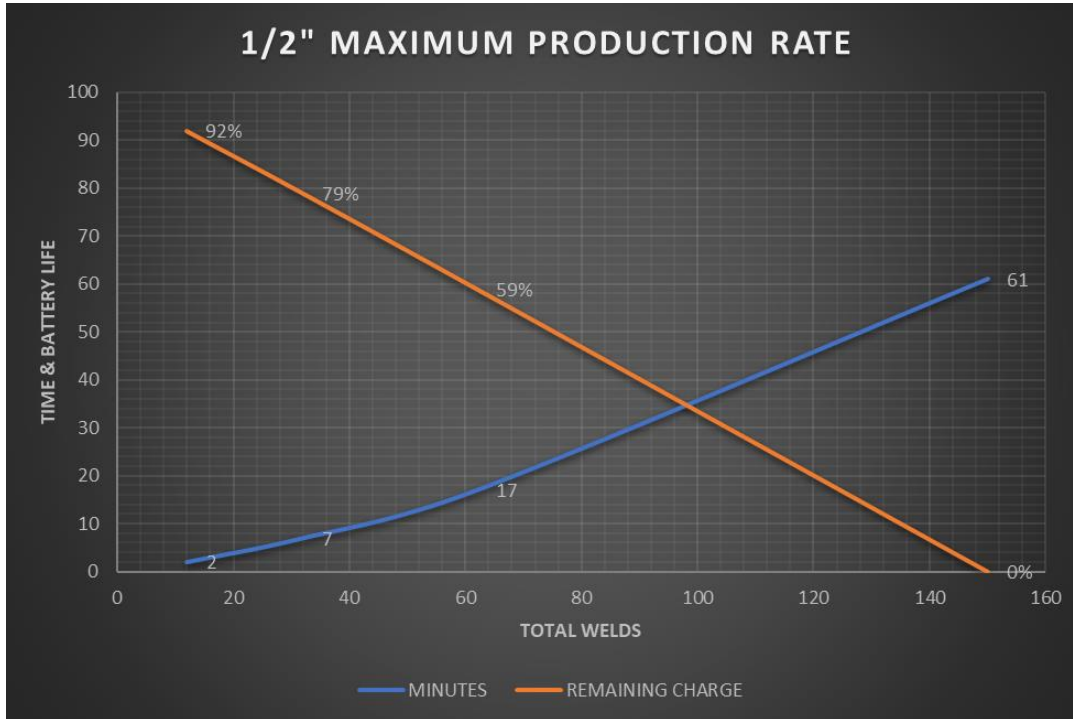
The LYNX Freedom allows the operator to weld at its maximum duty. Prolonged welding at this rate can rapidly increase the internal temperature of the batteries. To protect the batteries from overheating, the Freedom monitors the batteries' internal temperature. If the batteries exceed their safe operating temperature, the system will display an over temperature fault, see section 6.3. It is also important to note that as the batteries' temperature increases so does the machines' weld current. Below is the recommended max production rate which, if followed, should prevent overheating, and keep the Freedom's welding current consistence.

CONSTANT DUTY PER CHARGE								
MINUTES	1/2" STUD DIA. @400MS WELD TIME	WELDS	3/8" STUD DIA. @200MS WELD TIME	WELDS	5/16" STUD DIA. @100MS WELD TIME	WELDS	1/4" STUD DIA. @50MS WELD TIME	WELDS
0-2	6 WELDS PER MINUTE	12	12 WELDS PER MINUTE	24	24 WELDS PER MINUTE	48	48 WELDS PER MINUTE	96
2-7	4 WELDS PER MINUTE	20	8 WELDS PER MINUTE	40	16 WELDS PER MINUTE	80	32 WELDS PER MINUTE	160
7-17	3 WELDS PER MINUTE	30	6 WELDS PER MINUTE	60	12 WELDS PER MINUTE	120	24 WELDS PER MINUTE	240
17-61	2 WELDS PER MINUTE	88	4 WELDS PER MINUTE	176	8 WELDS PER MINUTE	352	16 WELDS PER MINUTE	704
ANTICIPATED WELDS PER CHARGE	2.5 WELDS PER MINUTE	150	4.9 WELDS PER MINUTE	300	9.8 WELDS PER MINUTE	600	19.6 WELDS PER MINUTE	1200

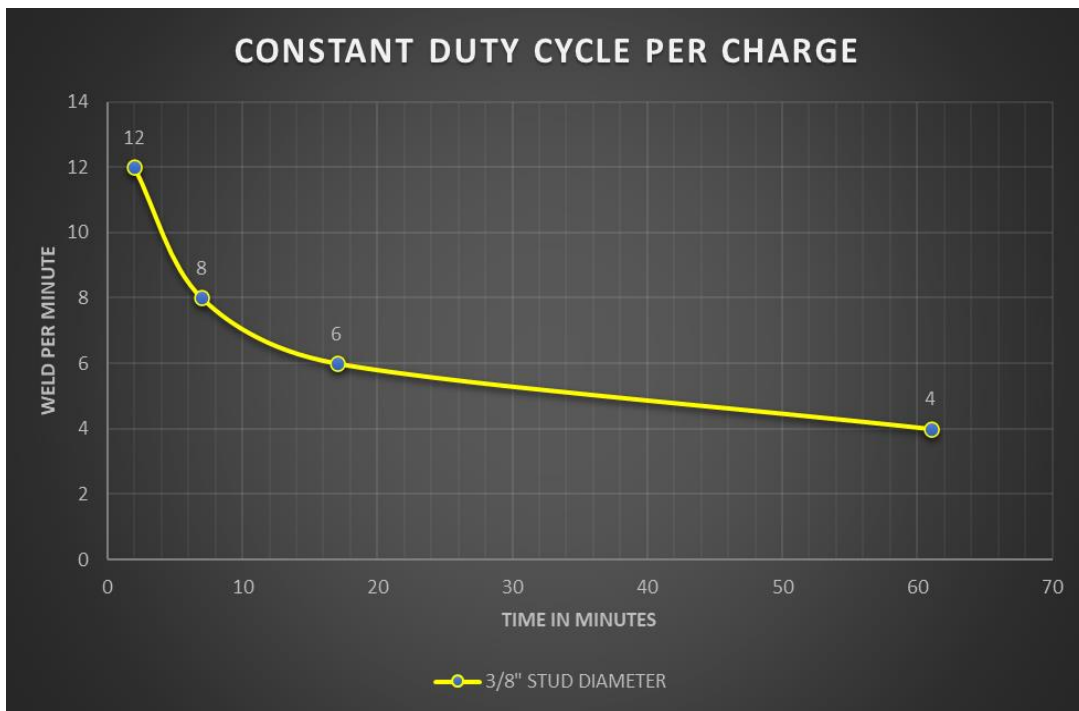
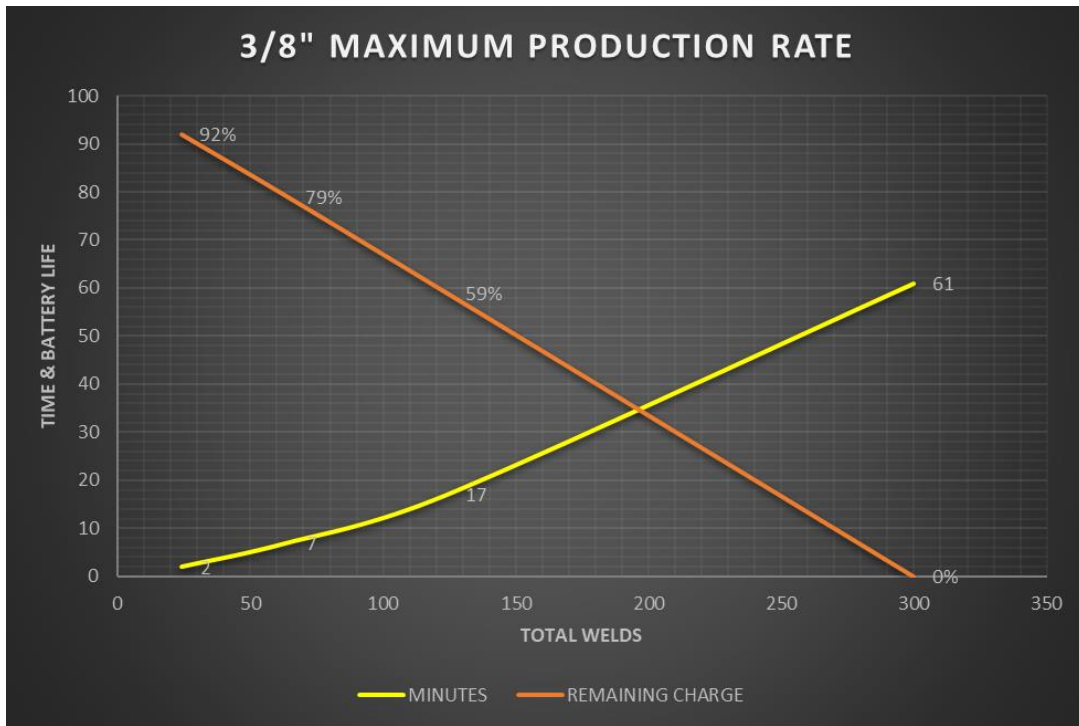
* "Welds per charge" are estimates based on converting weld time to amp hours.

** Environmental conditions may affect the rate in which an over temperature may occur.

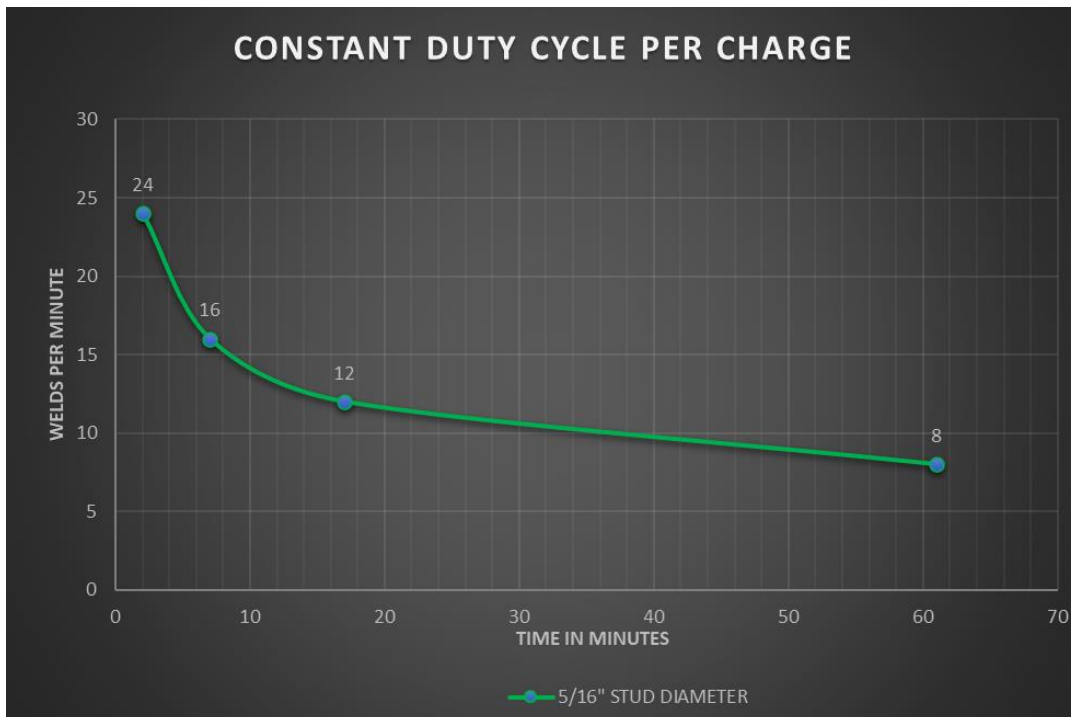
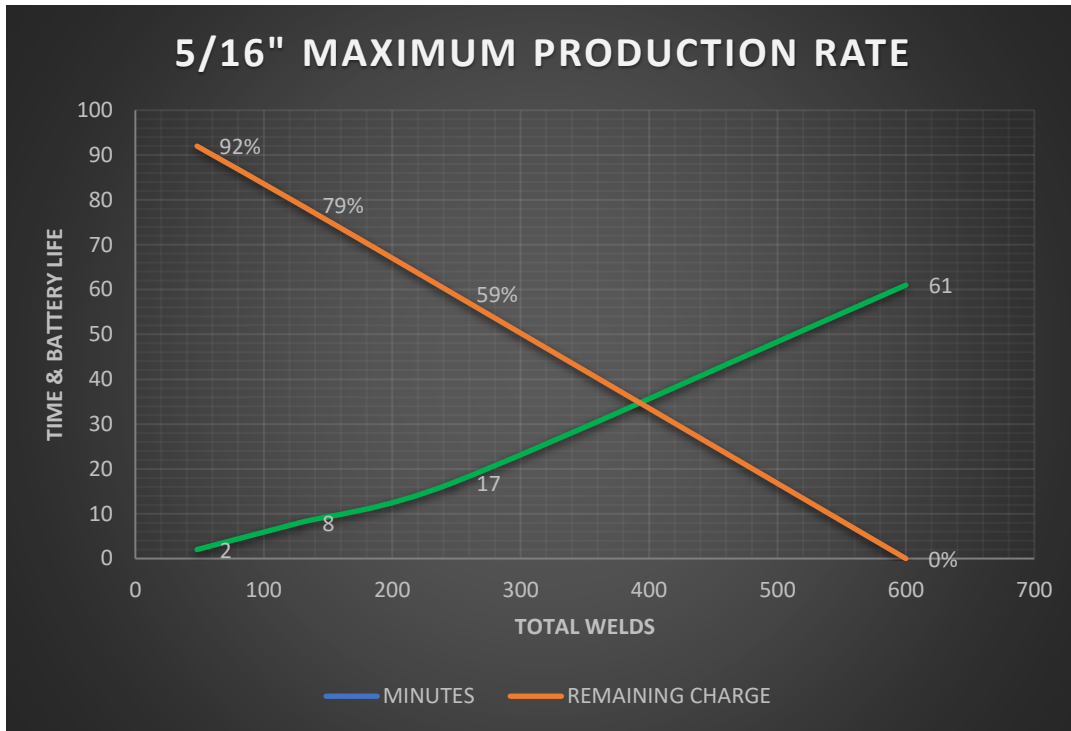
5.8.1 Production Rates & Duty Cycle (1/2" Weld Base)



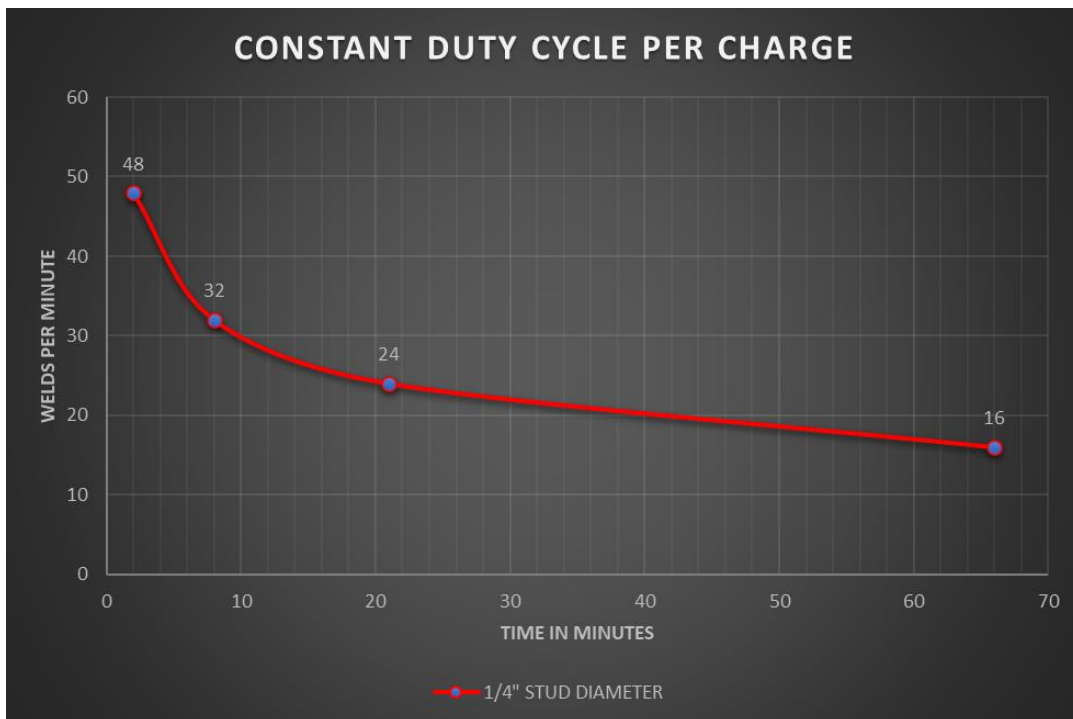
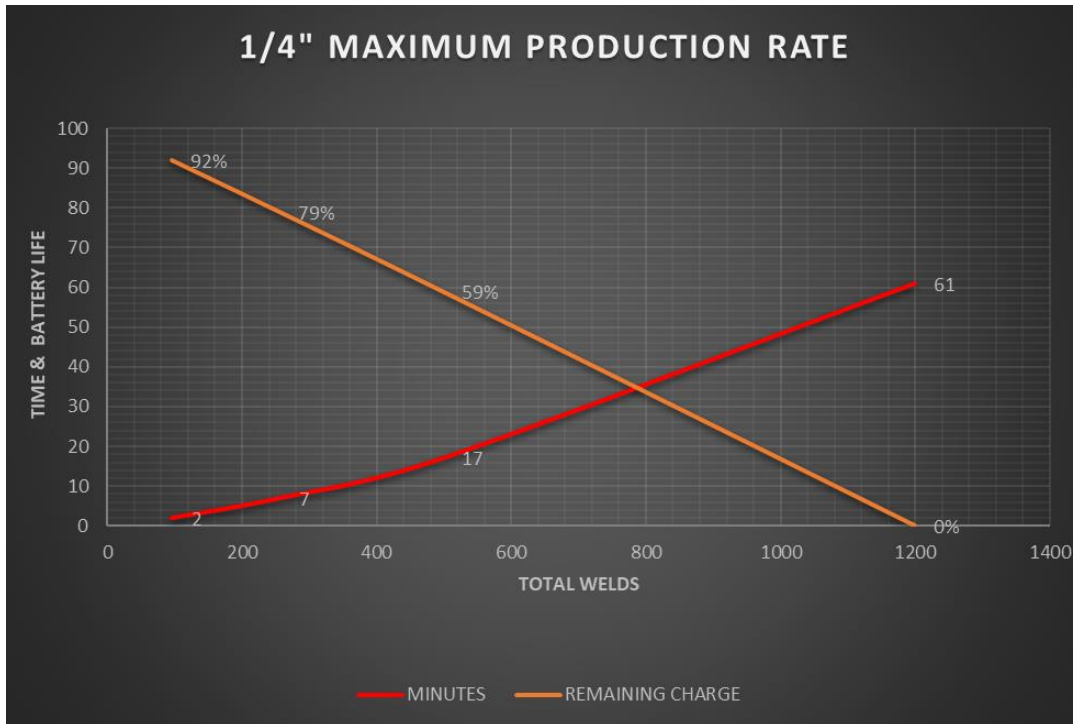
5.8.2 Production Rates & Duty Cycle (3/8" Weld Base)



5.8.3 Production Rates & Duty Cycle (5/16" Weld Base)



5.8.4 Production Rates & Duty Cycle (1/4" Weld Base)



5.9 Wi-Fi Connectivity

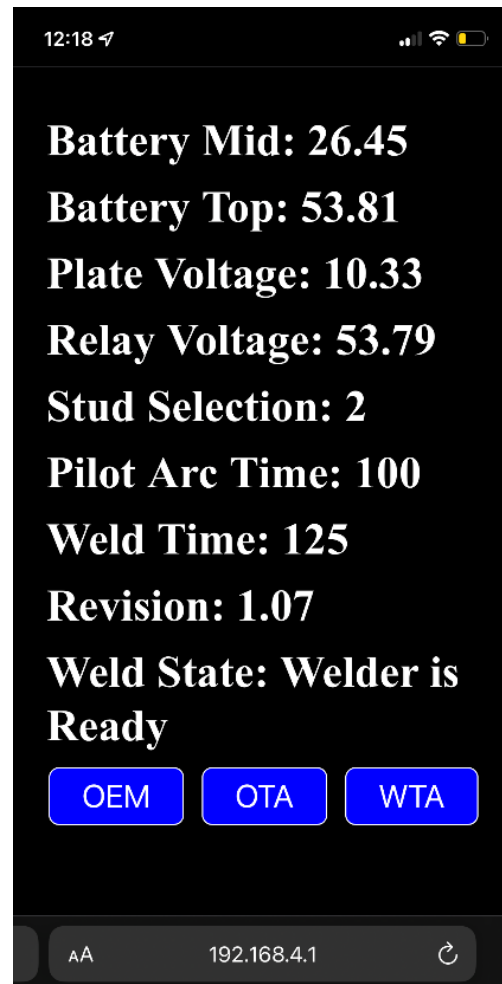
The Freedom can create its own Wi-Fi enabled webpage on a smart device such as a cell phone. This allows for advanced diagnostics and troubleshooting if needed.

To access the LYNX Freedom's advance diagnostics, do the following:

- Hold "Stud Selector Button" during power up to activate Wi-Fi antenna
- In your smart device's settings, select "Wi-Fi"
- Look for **Freedom (plus the unit's unique serial number "s/n")** in available networks, select "**Freedom s/n**"
- Type in the password, "**password**"
- Open a web browser and type in the Freedom's IP address "**192.168.4.1**" in the address bar

The Freedom stud welder will create its own webpage displaying the following useful information, (see image below):

- battery voltage,
- plate voltage,
- safety relay voltage,
- selected weld parameters,
- firmware revision, and
- welder states (see section 5.9)



5.10 Welder States

While logged into Wi-Fi the operator or technician can view the welder's status. This tool is used for diagnostic and troubleshooting purposes.

Welder State #	Description	Explanation
0	WELDER_INIT	Freedom welder is powering on
1	WELDER_WAIT	Freedom is waiting between welds, see "Welds Per Minute" in section 5.7
2	WELDER_READY	Freedom is ready to weld
3	GUN_ON_WORK	The gun is on the grounded work surface
4	CHECK_FOR_STUD_LIFT	Check to see gun has lifted
5	ARC_TIME_HOLD	Pilot arc is activated
6	WELD_TIME_HOLD	Weld time is activated
7	CHECK_FOR_SOW	Weld ended, confirm stud has returned to work
8	WAIT_FOR_GUN_REMOVED	Waiting for gun to be removed for work after weld
9	WELD_FAULT	Weld error, see section 6.1
10	WELD_FAULT_RESET	Gun trigger is being activated to reset weld fault
11	SYSTEM_FAULT	System fault, see section 6.2
12	TEMPERATURE_FAULT	Over temperature fault, see section 6.3

6 Faults

There are three fault conditions designed to protect the Freedom.

- A weld fault will stop a weld from occurring because of a poor setup.
- A system fault will protect against catastrophic equipment failure.
- The over temperature fault occurs when the battery temperature exceeds 175°F.

These faults will be displayed in “**welder state**” when connected to the Freedom’s Wi-Fi enabled webpage (see section 5.1).

6.1 Weld Fault

A weld fault indicates that an error has occurred during the weld. When a weld fault occurs, the power LED will flash **red** and the ¼” **stud selection** will illuminate **amber**. Weld faults typically occur when the “set-up” is incorrect.

A weld fault can occur under the following conditions:

- The gun failed to lift or the gun did not lift enough. These conditions will create a short circuit.
- The plate is painted, scaly, or oxidized and pilot arc was lost or never created.
- The work surface is poorly grounded.
- The welding cables have been modified.
- The studs being used are poor quality.

The operator will be prevented from welding again until the weld fault is acknowledged. The weld fault is acknowledged by holding down the gun’s trigger button for 3 seconds. Once the fault has been cleared the operator can continue welding. While weld faults may seem like a nuisance for the operator, they serve an important function in preventing a poor setup from producing bad welds or damaging the system. In the event of repeated weld faults, it is recommended to stop using the system and call either IWT or an authorized service center for technical support. Correcting the fault may be as simple as checking and adjusting the gun’s lift, cleaning heavily scaled plate, or using quality weld studs.

6.2 System Fault

A system fault is an internal equipment malfunction. A system fault is indicated on the machine by the power LED flashing **red** and the 1/2” **stud selection** LED turning **amber**. Unlike the weld fault, the only way to clear a system fault is to power down the machine for 30 seconds and then power it back up. **If the system fault does not automatically clear, the system will need to be sent to either IWT or an authorized service center for repair.**

6.3 Over Temperature Fault

An over temperature fault occurs when the batteries safe operating temperature is exceeded. When an over temperature fault occurs, all stud LEDs will sequentially flash. This condition will prevent the operator from welding until the batteries have sufficiently cooled. **Do not charge the batteries when an over temperature fault has been activated.**

7 Quality Control

7.1 General

The American Welding Handbook and the 0905 DVS Guideline, contain specifications regards to quality assurance of stud weld joints. The tests described in this section are chosen from these publications. These tests should be carried out prior to and during welding.

7.2 Demands on the Company

The company is encouraged to employ a technical supervisor / engineer responsible for welding matters as well as qualified operating personnel for stud welding (see *AWS Welding Handbook* or *DVS Guideline 0905, part 2, section 4*).

In the case of components for which documentation must be provided (or stud welding as per DIN 4100, DIN 4113), the company must submit a certificate of competence or a proof of qualification (see DVS Guideline 0905, part 2, sections 4.1 and 4.2).

The proof of qualification applies to safety regulations for the fastening of structural components. When being used in the building industry, only approved base and stud materials may be used (for example, see AWS **D1. 1/D1. 1M** Structural Welding Code or DIN 4100. section 2.1, certificate of approval for stainless steel BT; DIN 4113, part 2).

7.3 Weld Qualification

Provided that the IWT stud welding system is used properly, and the materials are appropriately selected, the strength of the welding joint (welding zone) will typically be stronger than that of the stud or base material. The best method of quality control for stud welding is to destructively test samples that have been welded to the same base material as used in actual production.

7.4 Type and Scope of Test

Standard work tests **MUST** be carried out and supervised by the user before welding on a structure. The number of welds after which a standard work test is required is agreed upon with the customer or engineer.

7.5 Standard Test

The standard work test is constrained by the stud diameter, base material and type of equipment used. It comprises the following tests:

- Visual inspection (all samples)
- Tensile test
- Torque test
- Bend test

In case of doubt, the test scope should follow *AWS Welding Handbook* or DVS Guideline 0905, part 2, section 5.1.1.

7.6 Simplified Test

Simplified work tests serve to check the correct setting and function of the equipment. They are carried out at the beginning of every working shift and after several hours of inactivity.

- Simplified work tests include:
- Visual inspection (all samples)

7.7 Production Samples

The studs for the work test should be welded on the same metal using the same welding positions and edge distances as on the component to be welded later. If it is possible and sensible from an economical point of view, use parts that are identical to those used in production. The uniformity of a weld should always be visually assessed to check for major defects. When in doubt, tensile and bend tests should be carried out.

8 Maintenance

8.1 Stud Welder

The stud welder is constructed in such a way that only a minimum amount of maintenance is required. Lithium batteries (LIFEPO4) have a 2-3x longer life than lead acid batteries while being 80% lighter. The batteries can be stored at full charge for several months. However even though these LIFEPO4 batteries have an extremely low self-discharge rate, the battery status should be periodically checked. Just like other electronics that uses LIFEPO4 batteries, the welder should be used and charged regularly. Ideally the welder should be used until the batteries are completely discharge and then fully re-charged. Never store the Freedom with batteries that are fully discharged. See additional information on the batteries and charging in Section 9.

8.2 Replacement of Components

Defective components may only be replaced by trained IWT technicians. A perfectly functioning stud welder can only be warrantied when genuine IWT spare parts are used.

8.3 Fuses

The LYNX Freedom is protected by the following fuses:

Main System fuse: JLLN-350 POWR-GARD: 350A, 300V
Printed Circuit Board Lifting fuse: M5 X 20 Ceramic Fuse: 4A, 250VAC (F1)



MORTAL DANGER

Always replace fuses with the correct replacement value. Do not use oversized fuses that may damage the unit.

Always disconnect the stud welder when replacing fuses or servicing the stud welder.

8.4 Electronic Waste (WEEE), Directive 2002/96/EC:

Minimize the effects we have on the environment by not disposing electronic waste (e-waste) with household trash. Please follow your local instructions for disposal and/or recycling of electronic equipment and batteries.



9 Battery Management

9.1 General

IWT'S lithium batteries (LIFEPO4) and proprietary Battery Management System (BMS) are combined to create one of the safest battery powered stud welders on the market.

The features of the Freedom LIFEPO4 batteries:

- Longer storage life – batteries can be stored for several months
- Environmentally friendly – no hazardous chemicals which can be recycled
- Fast charge – can be fully charged in less than 3.5 hours
- Virtually maintenance free
- No special mounting direction (batteries could even be mounted up-side-down)
- Will not freeze or boil over – Lithium batteries are dry cell technology
- Ultra-safe – IWT uses multiple redundant battery monitoring systems (BMS)

9.2 Battery Monitoring Systems (BMS)

The battery's on-board micro-controller monitors failure modes and reports them to the Freedom's control board. Utilizing both hardware and software monitoring, the LYNX Freedom has the most advance BMS in the welding market. The Freedom stud welder is protected against over-discharge, over charge, short circuit, and thermal overload.

9.3 Battery Maintenance

The Freedom batteries will remain at charge for several months, ready to weld, while the system is not being used. The Freedom's batteries have a self-discharge rate of less than 2% per month. However, the Freedom batteries should never be allowed to be drained to zero. IWT recommends checking the batteries every 6 to 9 months.

The Freedom should be used regularly. Doing so will provide the batteries with an optimal life span. Properly maintained batteries can be charged between 2000-4000 times and can last up to 8 years.

9.4 Charging

IWT's 5amp battery charger is equipped with a microcontroller and utilizes PWM technology for charging. The charger has a three-section charging mode, controlling both the charging current and voltage automatically. The charger is designed to ensure that the battery is charged fully, but never overcharged. The optimum temperature range for charging is 50°F to 100°F. **Never charge the battery when the temperature is lower than 32°F.**

9.4.1 Charger Model & Parameters

Model Series	300LP
Rated Input Voltage	100VAC / 240 VAC, 50/60HZ
Constant Voltage	54VDC
Constant Current	0.1 ~ 5.0A

9.4.2 Operating Instructions

To charge the unit:

1. Unscrew the charging port's protective cap
2. Connect the charger to the charging port on the back of the Freedom Stud Welder
3. Plug the charger into AC power (110VAC or 220VAC, single phase)
4. Select rocker switch on the back of the Freedom to "CHARGE",
5. The charger's LED will illuminate **red**
6. After charging is complete the LED will illuminate **green**

At the completion of charging:

7. Set rocker switch to "OFF",
8. Unplug the AC power,
9. Unplug the charger from the welder
10. Secure protective cap on charging port

For a complete description for all the LED statuses, see table below:

Status LED	Charger Status
Green On (1 second)	Standby
Green On	Charged
Red On	Charging
Green & Red Flash	Battery Disconnect Detected
Red Flash	Reverse Polarity
Red Flashes Three Times, Then Off & Repeat	Output Over Voltage Protection
Red Flashes Five Times, Then Off & Repeat	Over-Temperature Protection
Red Flashed Seven Times, Then Off & Repeat	Short Circuit Protection

9.4.3 Warnings

- Keep the charger out of reach of children
- The charger will become hot to the touch
- DO NOT cover the charger while charging
- DO NOT charge in a hot/humid area
- DO NOT charge near flammable products/explosive gases
- DO NOT open or disassemble the charger
- IWT is not responsible for any damage caused by the operator or improper use
- If the charger becomes damaged, replace the charger immediately with only a genuine IWT's approved charger
- Do not submerge the charger in liquids
- ALWAYS disconnect the charger from the Freedom stud welder when not in use

9.4.4 Common Issues & Solutions

Problem	Possible Causes	Solution
Charger is connected to the battery, but does not work; LED shows Red	The charger was connected backwards Short circuit of the charger's output	Reconnect the charger and battery correctly
LED flashes between green and red .	The charger has disconnected from the battery	Reconnect charger and battery
Red flashes 5 times, then off & repeat	The charger is overheating and reverting to standby mode to provide thermal protection	Allow the charger time to cool, it will auto-resume charging once it has cooled down
The charger is connected to AC power, but no LED lights are coming on	The plug is loose, not connected to AC power The charger is damaged	Reconnect to AC power Return charger to IWT for evaluation. DO NOT open the charger

10 Trouble Shooting

10.1 Troubleshooting the *LYNX*Freedom

There are a few basic rules to follow when trouble shooting any stud welding system. They are as follows:

If the studs are not being securely welded, stand back and look at the entire situation. Often the problem will be something simple, such as incorrect polarity, poor grounding, dirty plate, bad studs, or improper lift.

After you have determined that the setup is correct examine the cables. This is the part of the welder that receives the most wear and is subjected to failure.

In trouble shooting a welding system, it is a common misconception that whenever the welds are inconsistent, it is the fault of a defective control unit. This is rarely the case. If the welder is defective, it will most likely NOT power on at all.

Usually when inconsistency occurs, it means that the set-up is poor. There may be a problem with the parent metal, or the weld studs are of poor quality. This would account for the differences in the welds. See section 10.2 below.

If a problem cannot be identified, look at the gun. Is there enough engagement of the stud within the collet or chuck, and is it tight? If nothing is apparent on the outside of the gun, check it internally. Is the gun shaft able to move back and forth freely?

If, after observing all the preliminary pointers and it is obvious there is a defect within the system (for example the Freedom is displaying a system fault), **power down the welder and contact an authorized IWT service center for information on servicing your system.**

10.2 Causes of Poor or Erratic Welds

- Loose collet. The collet does not grip the stud tightly.
Solution: *Change or adjust collet*
- Faulty or poor ground connection
Solution: *Clean worksurface or tighten ground connectors*
- Poor surface condition
Solution: *Grind the surface to be welded. Grind through paint, heavy oxidation, or anodizing.*
- Broken or loose cables
Solution: *Replace cables*
- Dirt in gun/gun binding
Solution: *Clean gun with compressed air, soft cloth, and WD-40™*
- Incorrect Polarity
- **Solution:** *Change cable hookup as described in Section 5.9.*
- Cables coiled
Solution: *Uncoil cables*
- Arc Blow (incomplete fillet around the base of the welded fastener)
Solution: *The principal cause of arc blow is a magnetic field induced by current flow during the weld. It occurs most often in long, narrow strips of metal or near edges of sheets or plates. In some cases, a change in grounding position will correct the problem. Always try to weld between the two ground cables provided.*
- Incorrect fastener plunge
Solution: *Adjust the backstop and/or foot piece so that approximately 1/8" of the fastener sticks beyond the ferrule. Incorrect Lift/No Lift*
Solution: *Perform a lift check and adjust lift for the type of stud being welded.*
- The stud is not centered in the foot piece and is rubbing against the ferrule creating a hang up.
Solution: *Adjust the gun foot piece so the stud is centered in the ferrule.*
- Poor stud quality
Solution: *Use only IWT's fasteners to assure quality.*

10.3 Trouble Shooting Poor Welds

1. **Weld too hot**
 - Decrease “Weld” time
 - Set plunge/protrusion as indicated in Section 5.7
 - Increase gun lift
2. **Weld too cold**
 - Increase “Weld” time
 - Set plunge/protrusion as indicated in Section 5.7
 - Decrease gun lift
 - Clean worksurface
 - Worksurface or battery temperature is too cold
 - Poor stud quality
3. **Arc blow**
 - Use double ground cables
 - Change ground cable position
 - Dirty studs
4. **No Weld or hang up (See Section 6.5)**
 - Check foot piece for stud rubbing against ferrule
 - Check gun shaft and bearing are not binding
 - Check that face plate set screws are not too tight
 - Perform lift check to ensure stud is lifting and returning to work surface
5. **Frequent weld faults (See section 6.1)**
 - Malfunctioning gun or incorrect set up
 - Poor stud quality (blunt weld end or incorrect flux ball)
 - Oxidized surface conditions

11 WARRANTY

IWT's mechanical components are warranted against manufacturer's defects in material and workmanship for a period of one (1) year from the time of shipment from IWT's facility. IWT's electrical components are similarly warranted for a period of one (1) year from the time of shipment from IWT's facility. IWT's sole obligation under this warranty is limited to repairing the product or, at its option, replacing the product without additional charge, provided the item is properly returned to IWT for repair as described below. The provisions of this warranty shall not apply to any product that has been subjected to tampering, abuse, improper setup or operating conditions, misuse, lack of proper maintenance, or unauthorized user adjustment. IWT makes no warranty that its products are fit for any use or purpose to which they may be put by the customer, whether or not such use or purpose has been disclosed to IWT in specifications or drawings previously or subsequently provided, and whether or not IWT's products are specifically designed and/or manufactured for such a purpose.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED. ALL OTHER WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHETHER EXPRESSED, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING, ARE HEREBY DISCLAIMED. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

LIMITATION OF REMEDY

In no event shall IWT be liable for any incidental, consequential, or special damages of any kind or nature whatsoever. IWT is in no way liable for any lost profits arising from or connected to this agreement or items sold under this agreement, whether alleged to arise from breach of contract, expressed or implied warranty, or in tort, including, without limitation, negligence, failure to warn, or strict liability.

RETURN PROCEDURE

Before returning any equipment in or out of warranty, the customer must first obtain a return authorization number and packing instructions from IWT. No claim will be allowed nor credit given for products returned without such authorization. Proper packaging and insurance for transportation is solely the customer's responsibility. After approval from IWT, the product should be returned with a statement of the problem and transportation prepaid. If, upon examination, warranted defects exist, the product will be repaired or replaced at no charge, and shipped prepaid back to the customer. Return shipment will be by common carrier (i.e., UPS). If rapid delivery is requested by customer, then such transport is at the customer's expense. If an out-of-warranty situation exists, the customer will be notified of the repair costs immediately. At such time, the customer must issue a purchase order to cover the cost of the repair or authorize the product to be shipped back as is, at the customer's expense. In any case, a restocking charge of 20% will be charged on all items returned to stock.

FIELD SERVICE

Repairs are ordinarily done at IWT's, Lindenwold, New Jersey facility where all necessary tools are available. Field service is only supplied at IWT's discretion. If field service is required and is performed at IWT's sole discretion, all relevant expenses, including transportation, travel time, subsistence costs, and the prevailing cost per hour (eight hour minimum) are the responsibility of the customer.

UNFORESEEN CIRCUMSTANCES

IWT is not liable for delay or failure to perform any obligations hereunder by reason of circumstances beyond its reasonable control. These circumstances include, but are not limited to, accidents, acts of God, strikes or labor disputes, laws, rules, or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials, and any other event beyond IWT's control.

ENTIRE AGREEMENT/GOVERNING LAW

The terms and conditions contained herein shall constitute the entire agreement concerning the terms and conditions for the limited warranty described hereunder. No oral or other representations are in effect. This Agreement shall be governed in all respects by the laws of State of New Jersey. No legal action may be taken by any party more than one (1) year after the date of purchase.