

**Processes**  
GMAW-STT®

**Product Number**  
K2921-1 STT® Module

See back for complete specs

**Input Power**  
40V DC

**Rated Output Capacity**  
100% Duty Cycle: 450A  
60% Duty Cycle: 500A  
40% Duty Cycle: 550A  
Peak (Max.): 750A

**Weight/Dimensions (H x W x D)**

21.3 kg  
292 x 353 x 645 mm

## ADVANTAGE

- ▶ **Exceptional Arc Control** - Outstanding burnthrough control on thin metal or critical pipe welding.
- ▶ **Ultimarc™** - In synergic STT® modes, it dynamically and simultaneously controls all heat input parameters together, including peak, background and tailout currents. The result is easy procedural setting for the operator.
- ▶ **Modular Design** - The module allows easy connection and fast digital communication with compatible S-Series Power Wave® power sources, Power Feed™ wire feeders, and compatible water coolers. Add STT® capability without having to purchase a second power source.
- ▶ **Compact Footprint** - The module is designed to securely connect directly below Lincoln S-Series Power Wave® models, without taking valuable floor space.
- ▶ **Self-Protecting Circuits** - The module will protect itself from the excessive transient voltages associated with highly inductive weld circuits.



### APPLICATIONS

- ▶ Sheet Metal Fabrication
- ▶ Root Pass pipe welding



K2921-1  
STT® Model

### Power Wave® STT® Module

Add STT® (Surface Tension Transfer®) process capability to any compatible Power Wave® S-Series power source to gain outstanding puddle control for critical sheet metal or pipe root pass welding. The compact STT® module seamlessly integrates with the power source using the high speed Lincoln Electric ArcLink® digital communications protocol.

**INPUT**



**OUTPUT**



IP23S

### WHAT'S INCLUDED

- K2921-1 Includes:
- ▶ Sync Tandem/STT® Receptacle
  - ▶ ArcLink® Receptacle
  - ▶ Sense Lead

# Power Wave® STT® Module

## WHAT IS STT® (SURFACE TENSION TRANSFER®)?

**STT® (Surface Tension Transfer®)** is a controlled GMAW short circuit transfer process that uses current controls to adjust the heat independent of wire feed speed, resulting in superior arc performance, good penetration, low heat input control, and reduced spatter and fumes.

For more information see Nextweld® Document NX-2.20

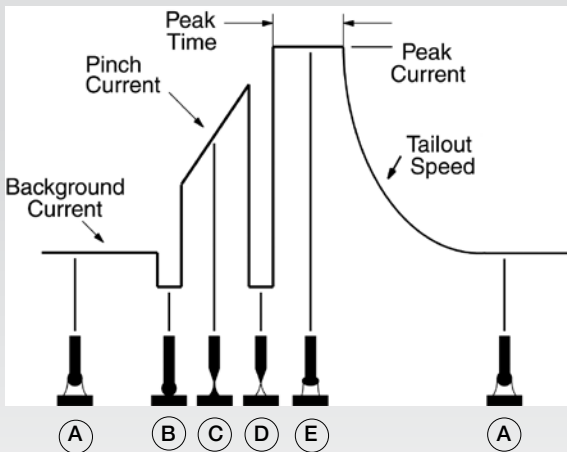


Conventional CV short circuit transfer using CO<sub>2</sub> and .045 in. solid wire.



STT® using CO<sub>2</sub> and .045 in. solid wire. Note reduced spatter and fume.

### The STT® Process



A. STT® produces a uniform molten ball and maintains it until the “ball” shorts to the puddle.



B. When the “ball” shorts to the puddle, the current is reduced to a low level allowing the molten ball to wet into the puddle.



C. Automatically, a precision PINCH CURRENT wave form is applied to the short. During this time, special circuitry determines when the short is about to break and reduces the current to avoid the spatter producing “explosion”.



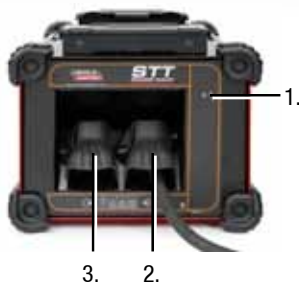
D. STT® circuitry re-establishes the welding arc at a low current level.



E. STT® circuitry senses that the arc is re-established, and automatically applies PEAK CURRENT, which sets the proper arc length. Following PEAK CURRENT, internal circuitry automatically switches to the BACKGROUND CURRENT, which serves as a fine heat control. Additionally, the TAILOUT ramp speed is controlled to provide a coarse heat control, returning the arc to the starting point (A).

### CASE FRONT DESCRIPTIONS

1. Status LED –
2. STT® INPUT – Connects to the Positive output of the power source.
3. STT® OUTPUT – Connects to the wire feeder.



### CASE BACK DESCRIPTIONS

1. Differential I/O Pigtail – Connects to the sync Tandem/STT® Receptacle on the rear of the power source.
2. ArcLink® Pigtail – Connects to the ArcLink® Out receptacle on the rear of the power source.
3. Differential I/O (Sync Tandem) Output – Supports Synchronized Tandem MIG Welding with other compatible power sources. Note: This feature is not compatible with the STT® process, and is therefore disabled when using STT® weld modes.



K2902-1 US/International Model shown.

## APPLICATION DETAILS

### Using STT® for Open Root welding

Open root welding is used for pipe and single-sided plate welding in situations that preclude welding from both sides of the material. This type of welding is common in the petrochemical and process piping industries.



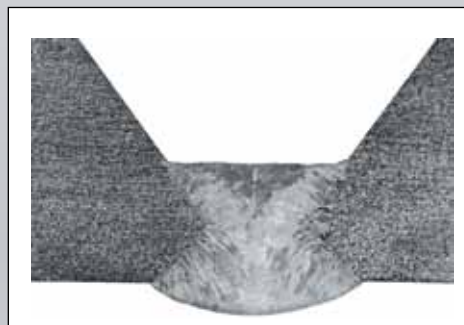
### Advantages of STT® Open Root

- **Penetration Control**
  - Provides reliable root pass and complete back bead.
  - Ensures excellent sidewall fusion.
- **Cost Reduction**
  - Uses 100% CO<sub>2</sub>, the lowest cost gas, when welding carbon steel.
- **Flexibility**
  - Provides the capability of welding stainless steel, nickel alloys, and mild or high strength steels without compromising weld quality.
  - Capable of welding out of position.
- **Low Heat Input**
  - Reduces burnthrough and distortion.
- **Low Hydrogen Weld Metal Deposit**
- **Speed**
  - High quality open root welds at faster travel speeds than GTAW.
- **Current Control Independent of Wire Feed Speed**
  - Allows operator to control the heat input to the weld puddle.
- **Ease of Operator Use**
  - More forgiving process than conventional short arc welding with CV machines.



Open Root Pass with Stick Electrode

Stick welding with cellulose electrodes provides good fusion characteristics, but leaves deep wagon tracks (requiring more labor for grinding), a very convex root weld, and a high hydrogen deposit.



Open Root Pass with STT® provides a weld ligament thickness of approximately 0.22 in.

#### Note these advantages:

- Superior weld profile (no wagon tracks)
- Slight convexity of root weld
- Low hydrogen deposit

### STT® Open Root Application



Inside of an 8 in. x .375 in. wall API 5L-X52 pipe, welded in 5G position.

### Comparing STT® to conventional processes

#### Advantages of STT® replacing short-arc GMAW:

- Significantly reduces lack of fusion
- Good puddle control
- Capable of producing consistent X-ray quality welds
- Reduced training time
- Lower fume generation and spatter
- Can use various compositions of shielding gas
- 100% CO<sub>2</sub> (on mild steel)

#### Advantages of STT® replacing GTAW:

- Four times faster than GTAW
- Vertical down welding
- Reduced training time
- Can use various compositions of shielding gas
- 100% CO<sub>2</sub> (on mild steel)
- Welds stainless, nickel alloys and mild steel
- Consistent x-ray quality welds

### WHEN to use STT®

STT® is the process of choice for low heat input welds.

#### STT® is also ideal for:

- Open root – pipe and plate
- Thin gauge material – automotive
- Stainless steel and nickel alloy – petrochemical/utility and food industry
- Silicon bronze - automotive
- Galvanized steel
- Semiautomatic and robotic applications



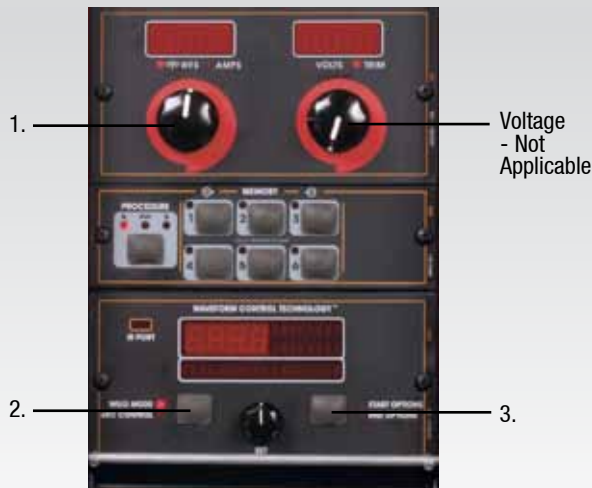
# Power Wave® STT® Module

## SETTING STT® PARAMETERS

### Non-Synergic STT® Control

Power Feed™ 10M Wire Feeder Non-Synergic Interface Control

- Adjust WIRE FEED SPEED to:
  - Control the deposition rate
- Adjust PEAK CURRENT to
  - Control the arc length
 Adjust BACKGROUND CURRENT to:
  - Control heat input (fine)
 Adjust TAILOUT to:
  - Control heat input (coarse)
 Adjust HOT START to:
  - Control the heat input at the start of the weld.
- Adjust START / END OPTIONS to:
  - Modify PREFLOW time, RUN-IN WIRE FEED SPEED and START time as well as CRATER, BURNBACk and POSTFLOW time.



### Synergic STT® Control

Power Feed™ 10M Wire Feeder Synergic Interface Control

- Adjust WIRE FEED SPEED to:
  - Control the deposition rate
- Adjust TRIM to:
  - Change ball size or increase or decrease arc energy.
- Adjust WELD MODE / ARC CONTROL to:
  - ULTIMARC™ dynamically modifies parameters to control heat input, including HOT START, PEAK, BACKGROUND and TAILOUT currents.
- Adjust START / END OPTIONS to:
  - Modify PREFLOW time, RUN-IN WIRE FEED SPEED and START time as well as CRATER, BURNBACk and POSTFLOW time.



## PRODUCT SPECIFICATIONS

| Product Name               | Product Number     | Input Power | Rated Output Capacity <sup>(1)</sup><br>Current/Voltage/Duty Cycle                         | H x W x D<br>(mm) | Net Weight<br>(kg) |
|----------------------------|--------------------|-------------|--|-------------------|--------------------|
| Power Wave®<br>STT® Module | K2921-1 STT® Model | 40 V DC     | 100% Duty Cycle: 450A<br>60% Duty Cycle: 500A<br>40% Duty Cycle: 550A<br>Peak (Max.): 750A | 292 x 353 x 645   | 21.3               |

(1) Dependent on host welding power source output

**The Lincoln Electric Company  
(Australia) PTY LTD**  
**35 Bryant Street Padstow 2211 Australia**  
**1300 728 720 (Aus)**  
**0800 728 720 (NZ)**  
[www.lincolnelectric.com.au](http://www.lincolnelectric.com.au)  
[www.lincolnelectric.co.nz](http://www.lincolnelectric.co.nz)

Your Lincoln Electric Distributor:

#### CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products. Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change - This information is accurate to the best of our knowledge at the time of printing.

**LINCOLN**  
**ELECTRIC**  
 THE WELDING EXPERTS®