Robotic Welding

Power Wave® i400 Power Source & AutoDrive™ 4R90 Wire Feeder

- Intelligent Robotic Solution
- Integrated System Design
- Innovative Features
- Industry Leading Design

The Power Wave® i400 & AutoDrive™ 4R90 solution delivers Lincoln's best performance technologies and welding processes all rolled into one highly efficient inverter power source paired with a compact, durable wire feeder designed for high-end robotic welding.

With the increasing demands on welding performance, choose the industry leader in power, performance, and technology, Lincoln Electric's Power Wave® i400 and AutoDrive™ 4R90 system.

AutoDrive™ 4R90

Power Wave® i400

LINCOLN ELECTRIC
THE WELDING EXPERTS®

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www.lincolnelectric.com

Power Wave® i400

ADVANTAGE LINCOLN

- **Flexible Design** - Designed for simple, seamless integration with the FANUC® Robotics R-30iA Controller, or use as a separated configuration to meet your weld cell requirements.
- **Quality and Consistent Welding Results** - Lincoln's Waveform Control Technology® gives you the ability to select the right waveform for each application – that means the arc has been optimized for each wire type and size for exceptionally smooth arc performance.
- **High Performance Digital Communications** - High speed digital communication via ArcLink® protocol, a CAN connection or now the ArcLink® XT™, the ArcLink® protocol can be communicated over an Ethernet cable.
- **Best in Class Power** - 10-420 amps output delivers the power you need for a wide range of processes and materials, with no derating for pulse waveforms.
- **Ready to Perform** - Auxiliary outlet offers flexibility to add fume extraction, water cooler, computer or other accessories quickly and easily.

DESIGN FEATURES

- Industry best 120 kHz inverter:
  - Operates at a high efficiency and (.95) power factor at rated output.
  - Capable of operating from a universal input voltage (208 to 575 volts).
- Fan-As-Needed™ (F.A.N.) - reduces power consumption and the amount of debris that gets drawn into the machine by shutting the fan down when it is not needed.
- Engineered Power Distribution:
  - Single power drop saves time and cost.
  - 3 phase input power supplied to robot controller via dedicated reconnect block.
  - 115VAC, 15 amp capacity auxiliary duplex receptacle to power optional water cooler, fume extraction, grinder, and computer.
- Recessed connection panel for protection against accidental impact.
- External access to controller mounting hardware.

MAINTENANCE AND SERVICE

- Removable left side panel permits easy access to internal components for routine maintenance or repair, even when integrated in a robotic cell.
- Panel mounted status LED indicators allow for quick and easy troubleshooting.
- Lockable on/off power switch on power source for controller/robot for maintenance purposes (power must be disconnected at the wall).
- Mechanical connection to R-30iA Controller accessible from exterior of Power Wave® i400 for easy removal of controller.
- Full support of Lincoln Electric Diagnostic Utility software for easy troubleshooting through the Teach Pendant.

What is Coaxial Transformer Technology™?

Coaxial Transformer Technology™ eliminates inefficiency and power loss. Regardless of the size (power level) a coaxial transformer has superior coupling and efficiency. This is obtained through the coaxial orientation of the primary and secondary windings.

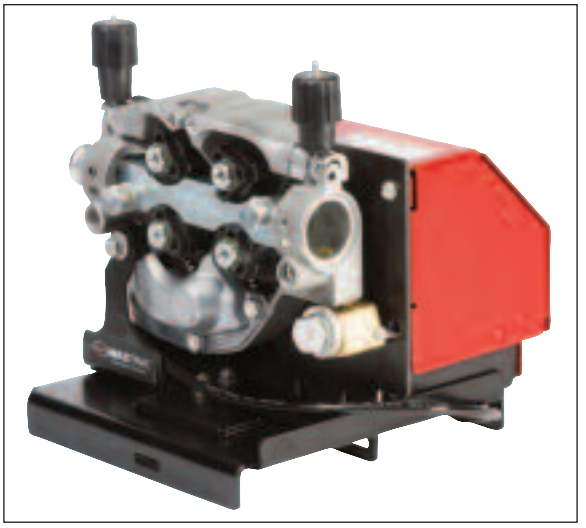
The benefits for the customer include:
- Higher power capabilities with a less complex design.
- Higher efficiency (reduced energy costs).
- Higher reliability (lower stresses on components).
- Proven reliability.

AutoDrive™ 4R90

ADVANTAGE LINCOLN

- **Integrated Design** - Designed to "nest" in the upper arm of the FANUC® Robotics ARC Mate® 100iC arm.
- **Durable and Rugged** - Patented MAXTRAC® wire drive is precision cast aluminum designed to provide reliable feed force.
- **Ease of Use** - Unlike competitive models, no tools are required for drive roll, wire guide or pressure arm adjustment.
- **High Performance** - Brass-to-brass gun connections provide more reliable electrical connectivity and more efficient energy transfer.
- **Best in Class Torque** - Results in faster acceleration and reliably pulls wire through conduit.
- **Precise Control** - Dual spring pressure arms offer clear-cut adjustment for optimizing pressure for different wire types.
- **Welding Results** - High resolution tachometer for accurate wire feed speed control.
- **Optimized Robotic Solution** - Compact, lighter weight packaging maximizes robot acceleration performance and throughput.

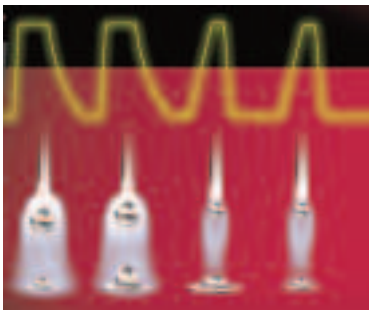
MAXTRAC®
Wire Drive System



A new unique robotic wire feeder package focused on .035-.045 wire applications.
High performance wire drive system featuring:

- **Compact package**
- **Lightweight**
- **Tool-less design**
- **Durable and rugged**

DRIVING SUPERIOR WELDING PERFORMANCE



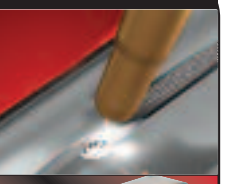
Lincoln's Waveform Control Technology® controls and shapes the output waveforms (or weld modes). It is the modulation of the welding current that achieves a specific desired welding result. High performance, digital welding waveforms are developed based on the application and take into account the process, gas, and wire size combinations.

The desired welding result is efficient, reliable, consistent, high performance welding which is delivered with the Power Wave® i400 solution.

For more information see Nextweld® Document #NX-1.10

LINCOLN NEXTWELD® INNOVATIONS FOR CHALLENGING APPLICATIONS

Waveform Control Technology® makes it possible to take advantage of Lincoln Nextweld® innovations like these patented processes using the Power Wave® i400 and the AutoDrive™ 4R90 wire feeder:

Lincoln Electric Welding	Feature Overview	
Rapid-Arc® - High Speed Welding	• Stable at very short arc lengths • Good at high travel speeds • Very low spatter • Wide range of filler metals • Out of position • Wide range of operating procedures • Low heat input	
Power Mode™ - Consistent stability and penetration	• Join materials thinner than 20 gauge (0.7 mm) • Consistent arc stability & penetration profile • A stable arc despite stickout fluctuation • Wide range of filler metals	
TOTAL s_2f™ TOTAL s_2f™ - Aluminum Welding Solution		
• ***Pulse-on-Pulse™***	• Spatter reduction • Excellent cleaning action • Wide range of frequency modulation (ripple affect) for uniform beads on welds in which appearance is critical • Control of heat input on thinner materials	
• ***Pulse Spray Transfer***	• Spatter reduction • Excellent cleaning action • Synergic - "one knob control"	

The industry's first web resource exclusively for fabricators who rely on Lincoln Electric welding equipment.

PowerWaveSoftware.com offers users access to new product software releases, system upgrades, welding improvements, and Power Wave® Utilities.

Go to PowerWaveSoftware.com today!

The Lincoln Electric Company led the industry with the introduction of ArcLink®, the first digital communications protocol for the arc welding industry introduced in 2002. ArcLink® is a protocol, or means of communicating and sharing information between intelligent components for seamless, time-critical data transfer in an arc welding system.

Continuing this leading position, Lincoln Electric has now introduced another industry first with ArcLink® XT, which takes all of the same features and benefits of traditional ArcLink communication, but eXtends this communication protocol on an Ethernet connection directly to the FANUC® Robotics R30iA controller.

For more information see Nextweld® Document #NX-1.30

LINCOLN ELECTRIC AND FANUC® ROBOTICS ADVANTAGES:

ArcLink® XT Features:

New Standard Features - Ethernet is a standard feature on the Power Wave® i400 with no additional hardware cost and also offers Lincoln Electric's Production Monitoring™ utility as a part of the robotic solution.

Performance Based Design - 100 MHz, full duplex Ethernet interface offers a reliable and consistent hardware platform for industrial environments, and facilitates future feature expansion.

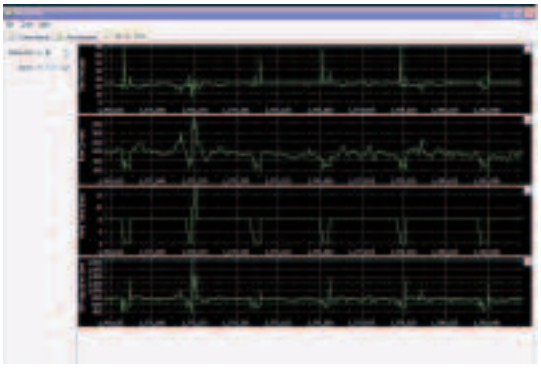
Lower Cost System - Lower cost system for multi-equipment (multi-arm) through addition of a network Ethernet switch. No additional cards or hardware required.

ArcLink® Features:

Common User Interface - The Teach Pendant can display actual volts, wire feed speed, etc, in process specific units.

Reduced Set-up Time - As an ArcLink® device, all communication with the robot controller, power source, wire feeder are automatically recognized.

Full Access to Welding Database - Search by process, material, and procedure right from the Teach Pendant and access all set-up variables.



HIGH SPEED DIGITAL CONTROL TECHNOLOGY & FEATURES:

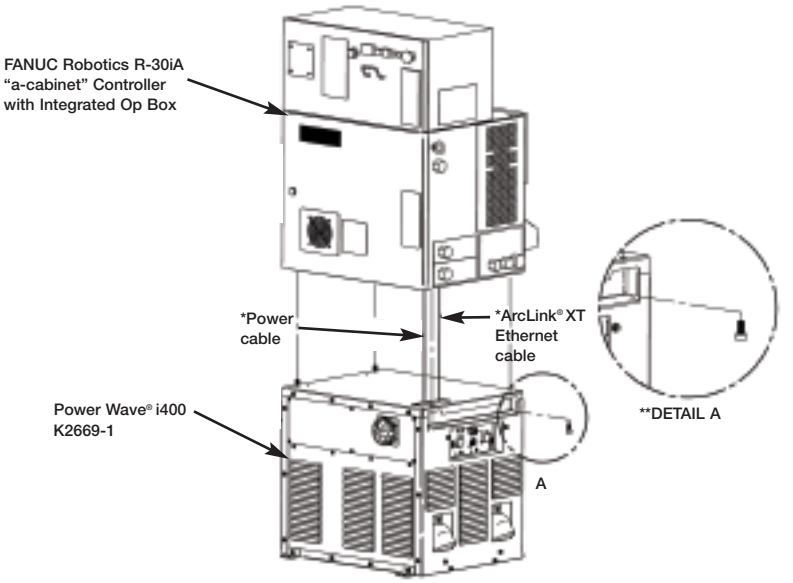
Lincoln Electric emerges as an industry leader with a distributed control architecture design in the Power Wave® i400 system created with a flexible design that ensures future expansion capabilities and features.

The state-of-the-art technology used in this system is designed with the highest performance digital controls in the robotic power source marketplace:

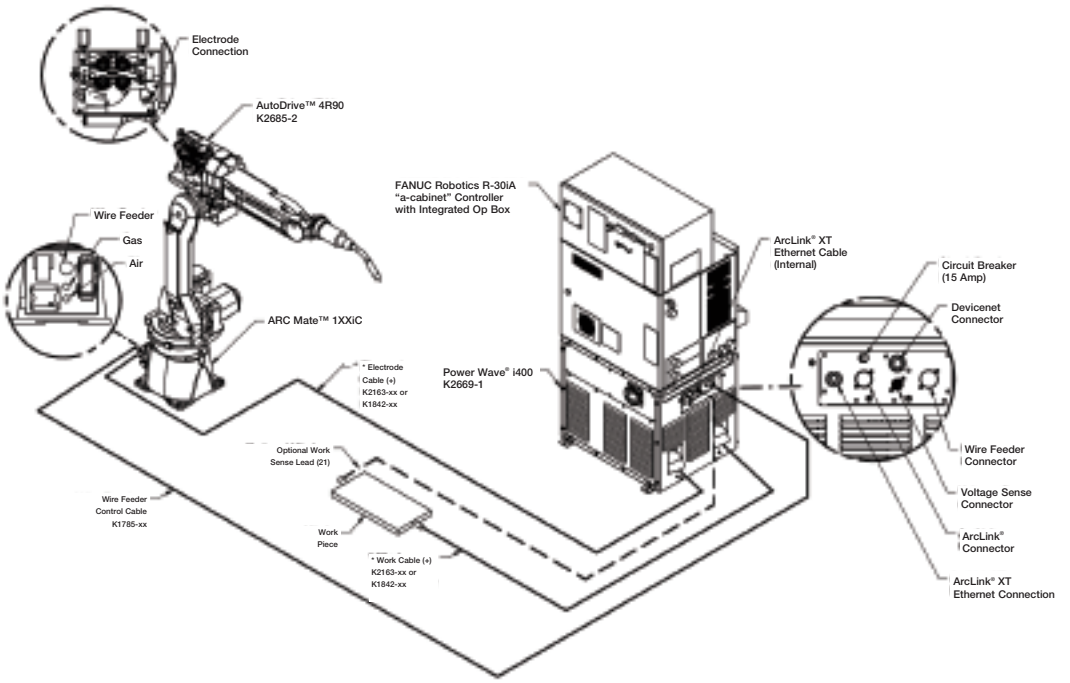
- Over 5000 MIPS processing power
- 100 Mbps full duplex data transfer rate
- 32 Mbytes SDRAM memory
- More than 16 Mbytes FLASH Memory

SYSTEM DIAGRAMS

Easy connection and installation provides for a stress-free commissioning stage. The ease of use and servicing ensures users are efficient and productive with their time.



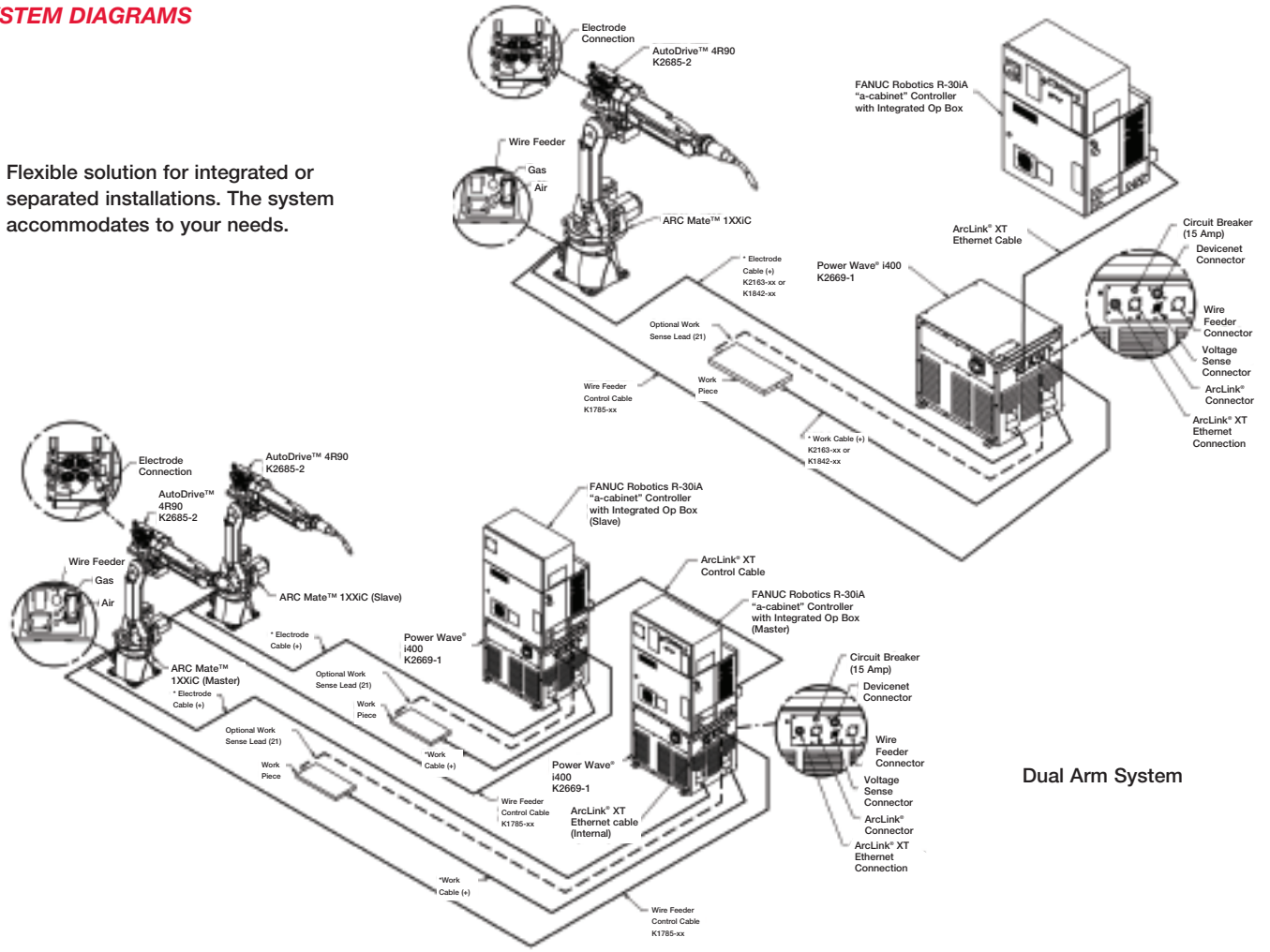
New FANUC®Robotics/Lincoln Electric solution providing the latest technology and features together - the best of robotics and robotic welding combined.



* Refer to Output Cable Guidlines for recommended cable size in Power Wave® i400 Instruction Manual.

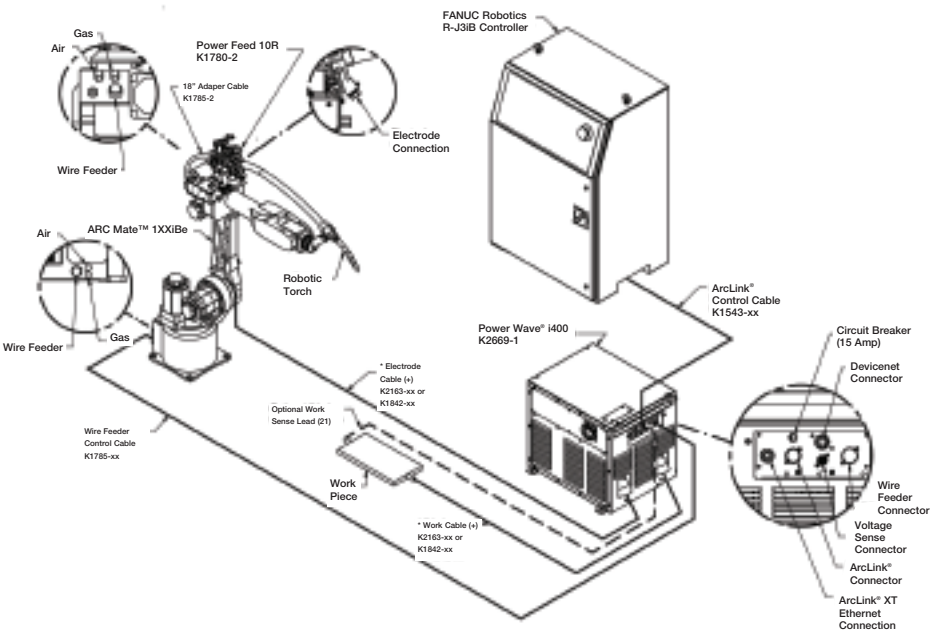
SYSTEM DIAGRAMS

Flexible solution for integrated or separated installations. The system accommodates to your needs.



Dual Arm System

Backward compatibility is supported to ensure existing robotic cells can be integrated with Power Wave® i400 (shown here is a Power Wave® F355i replacement).



TECHNICAL SPECIFICATIONS

POWER WAVE® i400	
Input Power	200/230/380-415/460/575 3 Phase Input 50/60 Hz * Single product number - CE compliance is provided with a CE Filter Kit. Input voltage is limited to 380-415/3/50/60 with kit installed.
Duty Cycle	350A/34V/100% 400A/36V/60% 420A/37V/40% * No derating for CV versus Pulse modes.
Output Current Range	5-420 ADC * Best in class rated machine for power.
Output Voltage Range	10-37 VDC
Cooling Method	Fan As Needed™ (F.A.N.) * Cooling fan runs when the output is energized, and for 5 minutes after the output has been turned off.
Power Factor at Rated Output	.95
IP Rating	IP21S
Welding Output	CV/DC
Welding Processes	CV-MIG, Pulsed-MIG, Flux-cored, Metal-cored, Stainless, Aluminum
Dimensions - H x W x D in (mm)	21 x 18.5 x 23.6 in (533 x 470 x 600 mm)
Net Weight - lbs (kg)	209 lbs. (95 kg)
Volume	0.150 m^3
Universal Certifications	CE, $CSA_{C/UL}$, C-Tick

AUTODRIVE™ 4R90	
Wire Drive	4 Driven Rolls * 4 Gear powered rolls versus competitive 2 gear driven rolls & 2 idle rolls
Motor Type	Permanent Magnet DC Motor
Tachometer Type	Magnetic High Resolution Dual Channel
Wire Feed Speed Range in/min (m/min)	AutoDrive™ 4R90 - 50 to 800 in/min (0.8 to 20.3 m/min)
Max Wire Size Range	AutoDrive™ 4R90 Solid: .023 - .045" (0.6 – 1.2 mm) Cored: .035 - .045 (0.9 - 1.2 mm)
Dimensions – L x W x H inches (mm)	9.1 x 7.5 x 8.4 inches (231 x 141 x 213 mm)
Net Weight - lbs (kg)	14.5 lbs. (6.5 kg)
Universal Certifications	CE, $CSA_{C/UL}$, C-Tick

LINCOLN ELECTRIC
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