

FlexGun™

Spot Welding Guns

Ver. 1.0



CenterLine (Windsor) Limited

CENTERED ON SOLUTIONS

FlexGun™ - The Standard for Welding Excellence

Resistance spot welding gun technology has advanced considerably since the introduction of the patented CenterLine VOLTZA™ Transgun. As a pioneer in the development of the Transgun, CenterLine has introduced numerous advancements and continues to play a key role in spot welding gun technology development.

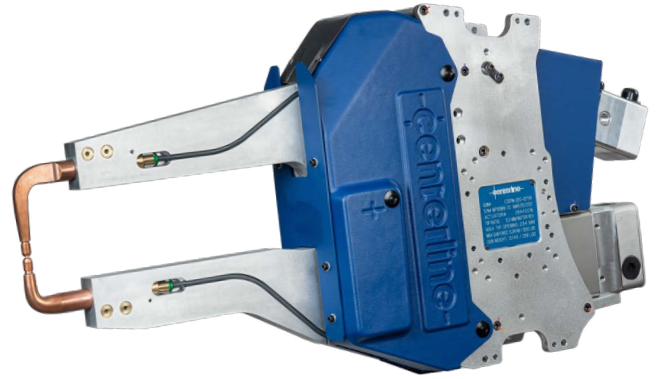
Today, advanced manufacturing systems demand robotic welding guns that are adaptable to a wide range of application conditions while remaining efficient, robust and able to consistently produce high quality welds. CenterLine satisfies those needs with the FlexGun family of welding guns. This collection of weld gun designs reflect CenterLine's years of experience and expertise in resistance welding and provides manufacturers with one of the most practical and reliable collections of welding gun packages available today.

The FlexGun products include the following families:

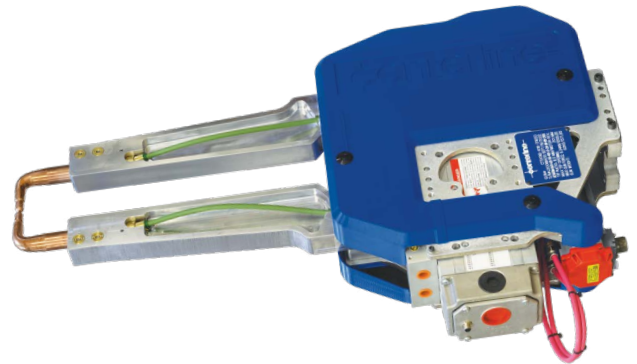
- FlexGun™ 3 (Modular Heavy Duty)
- FlexGun™ Ultra and Ultra HC (High Capacity)

Our FlexGun™ family offers a solution for all your spot welding applications.

Our designers are known for their ability to design weld guns for challenging workpiece geometries. We insource all weld gun manufacturing to control the entire process to ensure quality and durability.



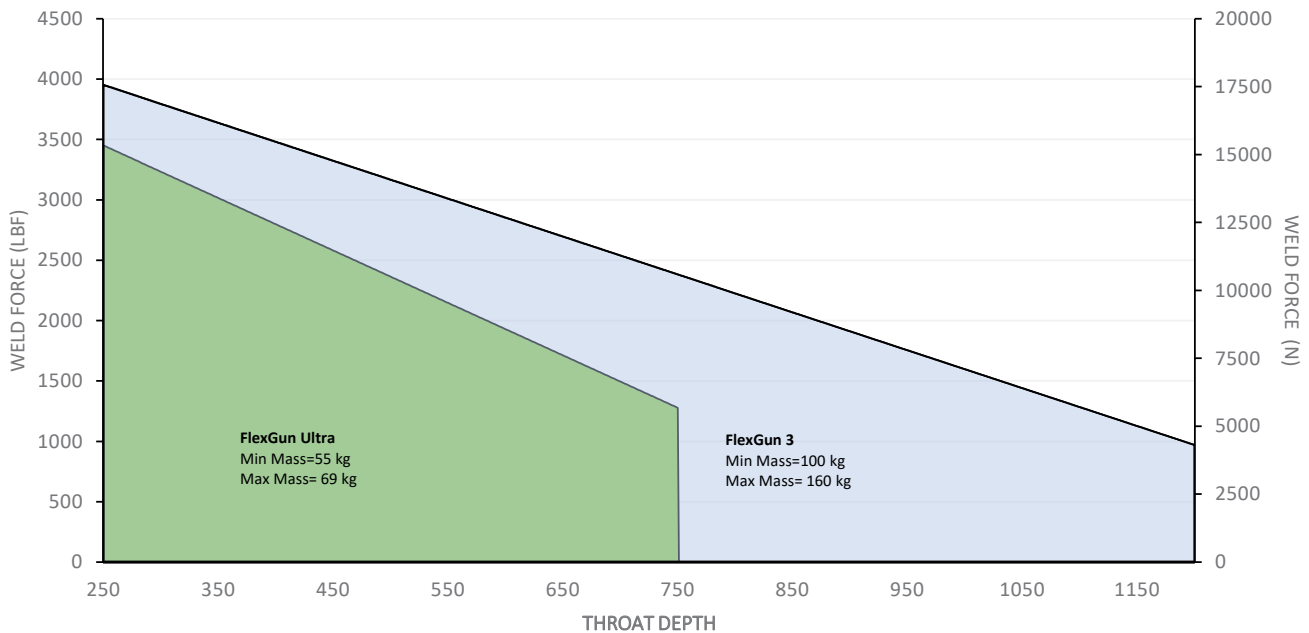
FlexGun™ 3 - Pinch Style



FlexGun™ Ultra - X Style

FlexGun™ Capability Comparison Chart

FlexGun Family Force, Throat Depth & Mass Range

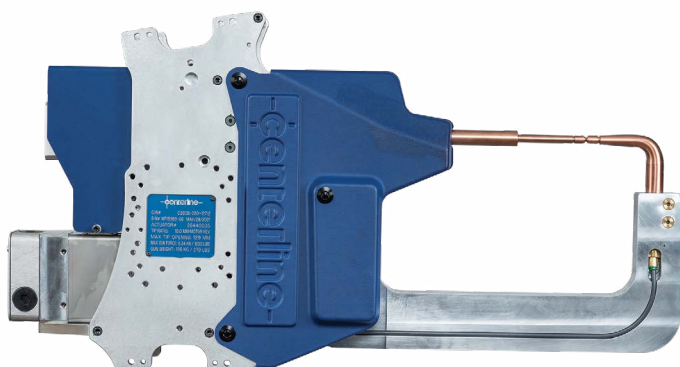
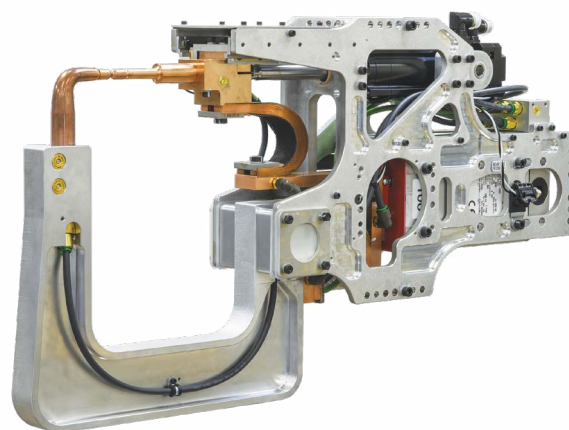
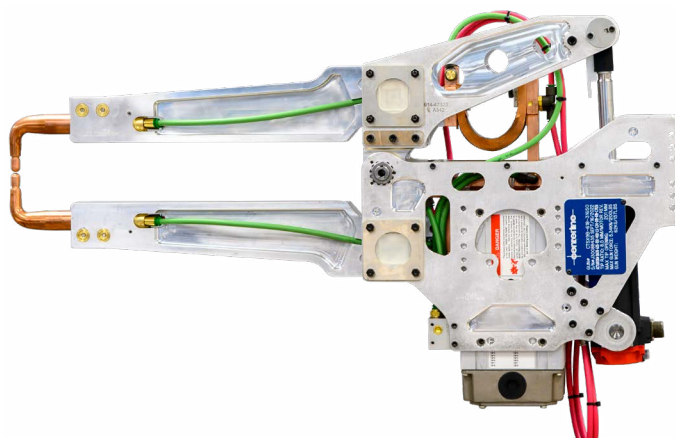


This graph is meant as a guideline only. Consult with CenterLine for your specific welding gun requirements.

FlexGun™ Product Families Common Features

The FlexGun™ Ultra and FlexGun™ 3 designs provide an extensive list of capabilities making them the most versatile and reliable gun designs in the industry.

- **Modular design** for part interchangeability within each weld gun family.
- **Robust construction** with higher gun ratios to provide greater tip force enabling integration onto smaller robots.
- **Practical designs** provide easy access to components for maintenance and service.
- **Optimized cooling** options for maximum electrode life, higher duty cycles, and water savings.
- **Common gun bodies** to minimize spare parts and reduce weld gun delivery time.
- **Protect your investment with durable, modular designs.** Leverage existing welding guns by swapping out arms, adapters, or transformers for re-use in new applications.



FlexGun™ Design Range

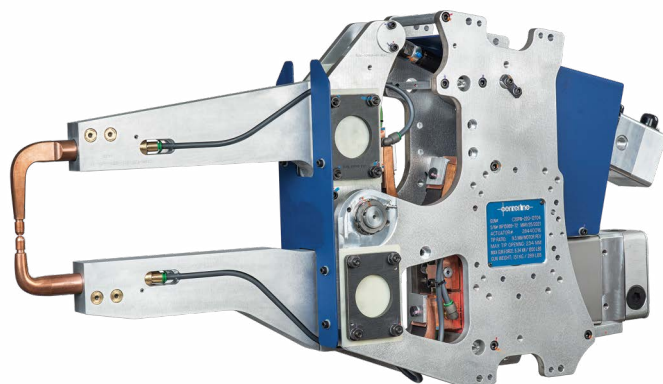
Gun Type	Gun Assembly	X Style	C Style	Pinch Style	Transformer
FlexGun™ 3	Throat Range (mm)		From 50 D x 320 L to 500 D x 500 L	From 50 H x 330 D to 300 H x 830 D	100 kVA to 225 kVA
	Mass Range (kg)		55.1 to 66.0	104 to 150	
	Max. Force, 5mm Pitch Servo (N)		10000	16000	
	Max. Force, 10mm Pitch Servo (N)		10000	NA	
	Robot Mounting		4 way, integrated	4 way, integrated	
Ultra Base	Throat Range (mm)	From 50 H x 300 D to 300 H x 600 D	From 50 D x 320 L to 400 D x 400 L	From 50 H x 250 D to 300 H x 600 D	100 kVA
	Mass Range (kg)	58 to 72	54 to 64	63 to 74	
	Max. Force, 5mm Pitch Servo (N)	8900	8900	8900	
	Max. Force, 10mm Pitch Servo (N)	6900	6700	5100	
	Robot Mounting	3 way, integrated	5 way, integrated	4 way, integrated	
Ultra HC	Throat Range (mm)	From 50 H x 300 D to 300 H x 600 D	From 50 D x 320 L to 400 D x 400 L	From 50 H x 250 D to 300 H x 600 D	135 kVA to 170 kVA
	Mass Range (kg)	67 to 94	67 to 81	69 to 94	
	Max. Force, 5mm Pitch Servo (N)	8900	8900	8900	
	Max. Force, 10mm Pitch Servo (N)	6900	6700	5100	
	Robot Mounting	3 way, integrated	5 way, integrated	4 way, integrated	

FlexGun™ 3

The FlexGun 3 welding guns have industry proven robust construction and offer improved design flexibility to allow for future changes within the tool design or the product. The flexibility of the FlexGun 3 design allows for quick change of gun components and easy access for maintenance needs.

Key Advantages

- Identical modular gun base-body components for C and Pinch style guns.
- Common gun body for aluminum and steel applications.
- Range of 100 kVA to 225 kVA MFDC transformers (AC available on request).
- Heavy duty force capability with large throat geometries.
- Optimized part interchangeability between C and Pinch styles.
- Arm and adapter designs leverage existing standardized libraries to minimize types of arms and adapters. These features contribute to more convenient maintenance and spare part management.
- Total number of components reduced by 30% from the previous FlexGun family.
- Wrought high-strength aluminum used as gun body material to enable high welding forces up to 16 kN.
- Servo and transformer are not structural components of gun body. If these components require service, they can be removed without taking apart the gun, which simplifies maintenance.
- 30 mm dual-guided rod design on C Gun contributes to less deflection under higher loads.
- Cycle tested to over 30 million cycles.
- Add-On Tooling mounted directly to the Gun Body. Consult CenterLine for capacities.



FlexGun™ 3 - Pinch Style

Key Features

- Weld force up to 10 kN C Gun, 16 kN Pinch Gun.
- Symmetrical bodies – no LH or RH versions.
- Same shunts are used on C Gun and Pinch Gun styles.
- Base models start at 100 kg.
- Aluminum arms have adaptive feedback connection points as standard.
- Usable throats available up to 1200mm for Pinch Guns and 600 mm for C Guns.
- "S" frame transformers, 100 kVA through 225 kVA MFDC (size 2 through 6).
- Optimized for use with roller screw servo actuator, 4 mm, 5 mm or 10 mm pitch.
- Optional protective hard covers to guard against contamination and for easy serviceability.

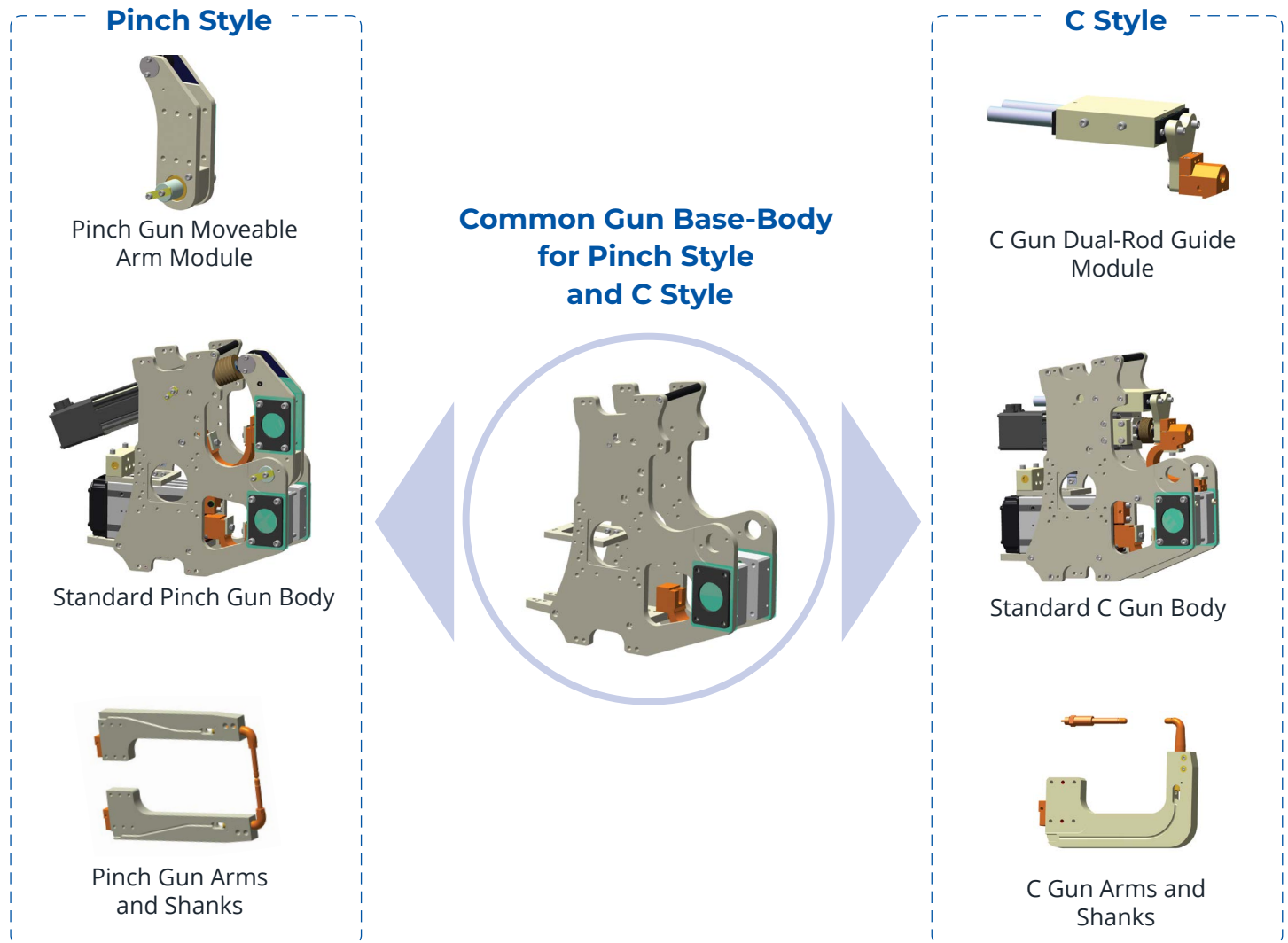


FlexGun™ 3 - C Style with Cover

FlexGun™ 3 Configurations

A wide range of FlexGun™ 3 welding guns are possible based on the two standard bodies.

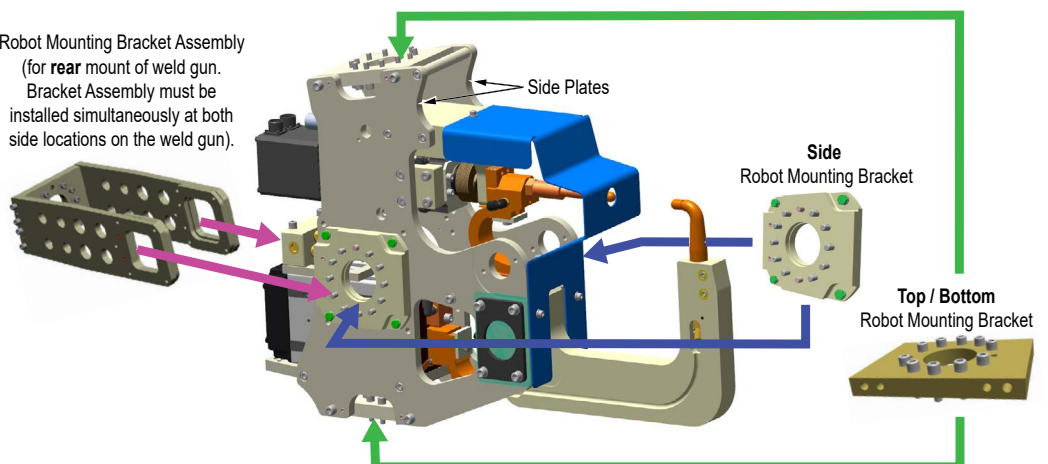
Modular Components



Robot Mounting Locations

An integrated robot bracket is included with each gun to accommodate one of four common mounting locations. Optional brackets are available for other configurations.

Robot Mounting Bracket Assembly (for rear mount of weld gun. Bracket Assembly must be installed simultaneously at both side locations on the weld gun).



FlexGun™ 3 C Style Robot Mounting Locations

FlexGun™ Ultra and Ultra HC

Ideal for high-density manufacturing, smaller robots save capital and decrease cycle time.

Key Advantages

- Ideal for use on robot models with payloads starting at 80 kg and for applications requiring between 2.5 to 8.9 kN of weld force.
- Integrated robot mounting, superior strength to weight ratio construction, compact size and true symmetrical design.
- Ideal for high-density manufacturing needs.
- Add-On Tooling mounted directly to the Gun Body. Consult CenterLine for capacities.
- Nearly 100 available models including X, C and Pinch configurations, and a vast majority of models with gun mass under 70 kg.

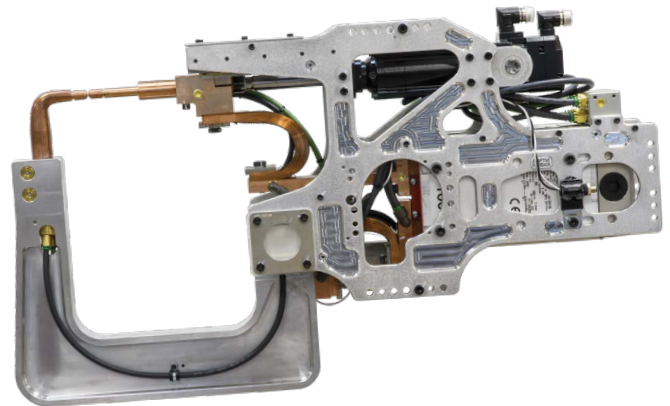
Key Design Features

(Individual model capabilities may vary.)

- Maximum weld force of 13000 N (5mm pitch servo)
- Rapid Tip Speed – up to 834 mm/s (Pinch style), up to 990 mm/s (X style) and 584 mm/s (C style); using library guns with 600 mm throat and ratios of .35 for pinch style and .59 for X style
- ISO and “S” frame transformers, 100 kVA through 170 kVA MFDC (size 2 through 3.5)
- Two Servo Actuator model types for the entire gun family (a 5 mm and a 10 mm pitch)
- Optional protective hard covers to guard against contamination and for easy serviceability



FlexGun™ Ultra - X Style with Cover



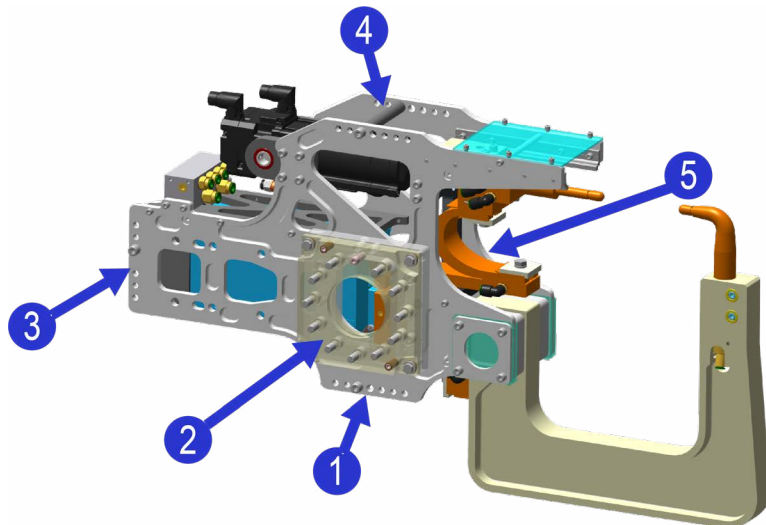
FlexGun™ Ultra - C Style

Robot Mounting Locations

Robot Bracket is included for use in mounting the FlexGun™ Ultra to a robot. Depending on the gun style, up to five (5) mounting locations and/or orientations are possible.

- X Gun - 3 Locations
- C Gun - 5 Locations (as shown)
- Pinch Gun - 4 Locations

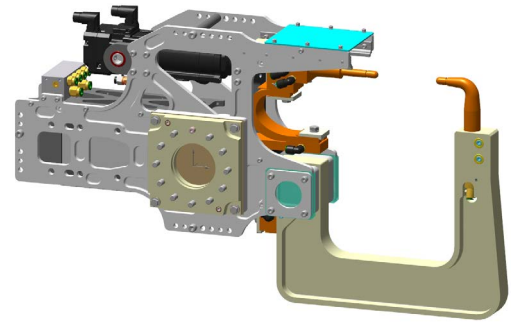
Contact CenterLine for additional robot mounting details and features.



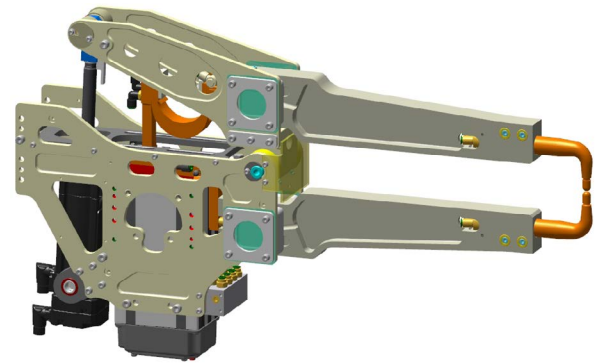
FlexGun™ Ultra C Style - 5 Possible Robot Bracket Locations

Why the FlexGun™ Ultra?

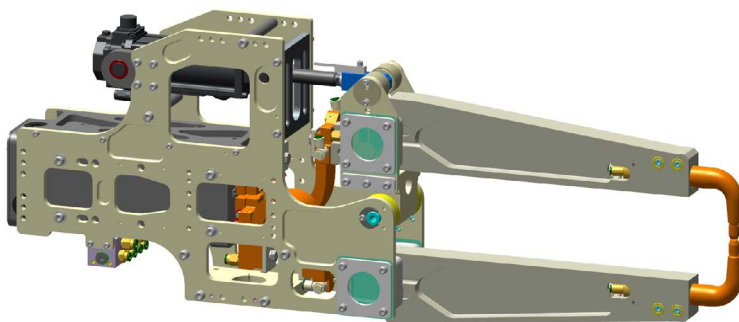
- Superior strength (weld force) to weight ratio – greater capability from a physically lighter gun
- Compact profile - for better access in tight areas.
- True symmetrical design – no RH or LH version or need to add components such as brackets and arms to adapt to changes in mounting conditions.
- Third party transformers and actuators – not limited to single sourced components or expensive replacements.
- Single actuator style is interchangeable across all FlexGun™ Ultra models, reduces inventory needs.
- Actuator life rated to 20 million cycles.
- Standard gun library. Extensive component interchangeability reduces spare parts inventory needs, accommodates potential future changes in gun configurations and enables designers to design a complete project using existing models.
- Cycle tested to over 30 million cycles. Designs based on existing FlexGun™ UL specifications to ensure high reliability, dependable performance, and low maintenance needs.
- Comprehensive thermal testing. Optimal cooling and thermal analysis of all critical weld gun components.
- Fit on 80 kg robots – all standard base models less than 74 kg for 100 kVA transformer.
- Designed to withstand 4G forces of acceleration – able to accelerate and decelerate for rapid spot to spot speed to accommodate high volume production needs.
- No less than 20% duty cycle. Significant improvement over comparatively sized packages, allows for more welds per minute.
- Ideal for high density manufacturing needs – able to mount on smaller robots (less floor space, less capital costs), reduced weight allows for faster spot-to-spot movement, higher duty cycle for better production rate, reliable, robust construction for extended gun life and lower operating costs.



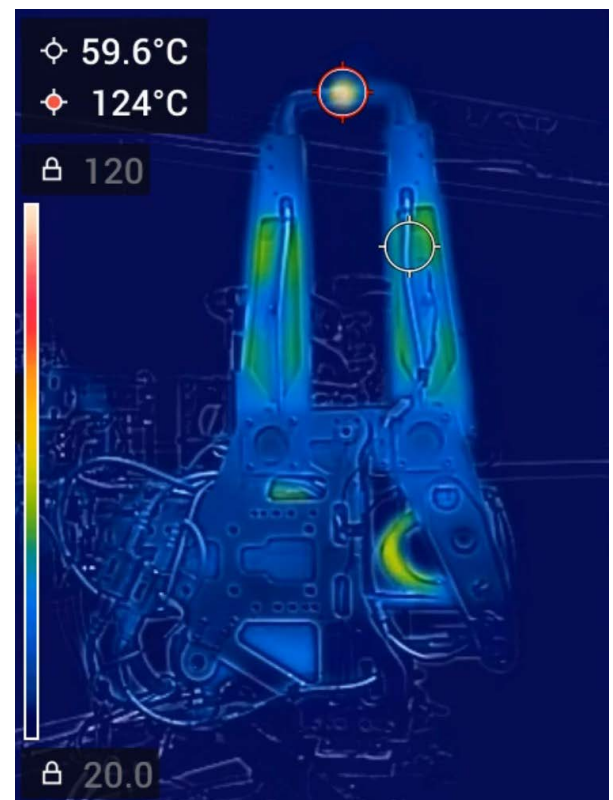
FlexGun™ Ultra - C Style



FlexGun™ Ultra - X Style



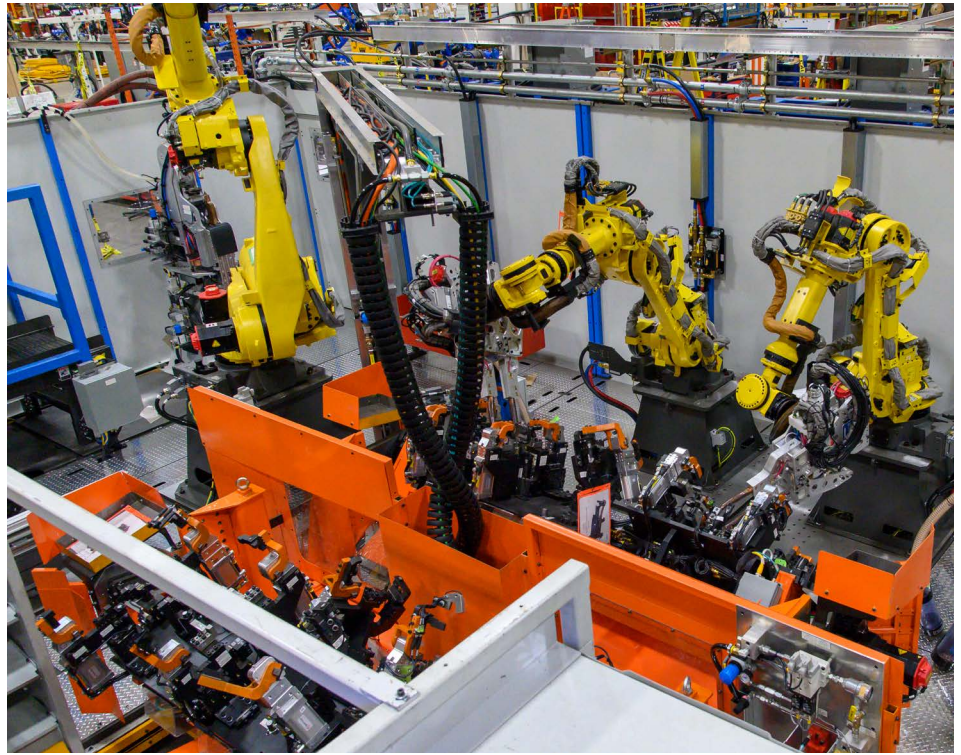
FlexGun™ Ultra HC - Pinch Style



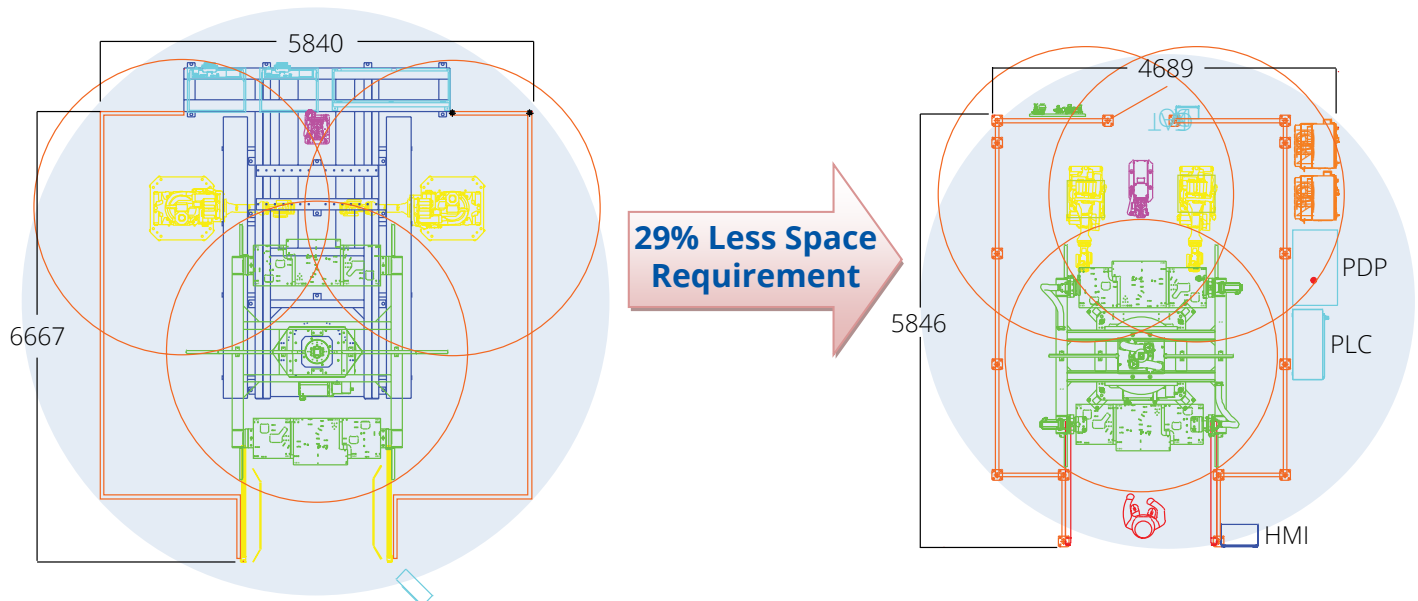
High Density Welding Cell

The FlexGun™ Ultra family guns are ideal for high density welding cells. These cell designs rely on smaller robots with reduced payload capacity that consume less floor space. Smaller robots reduce initial capital costs, are less expensive to operate, and reduce the overall manufacturing footprint.

High density cells require lightweight and slim profile gun packages that can be quickly repositioned in confined spaces to perform spot welds on medium gauge assemblies. Applications requiring less than 8.9 kN in weld force and fast spot-to-spot gun movement benefit the most from this approach. Simulations performed with the FlexGun™ Ultra have shown a 5-10% improvement in robot speed over standard gun payloads.



Standard vs. High Density Cell Design Comparison

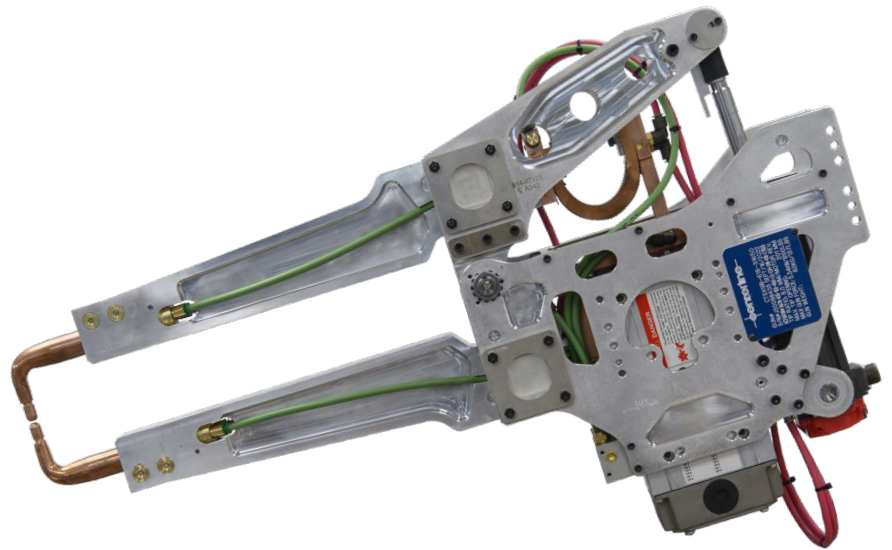


- 2 Station Rotary Table
- 2 Fanuc 2000iB/165kg robots
- 38.9 m2 Total Space Required

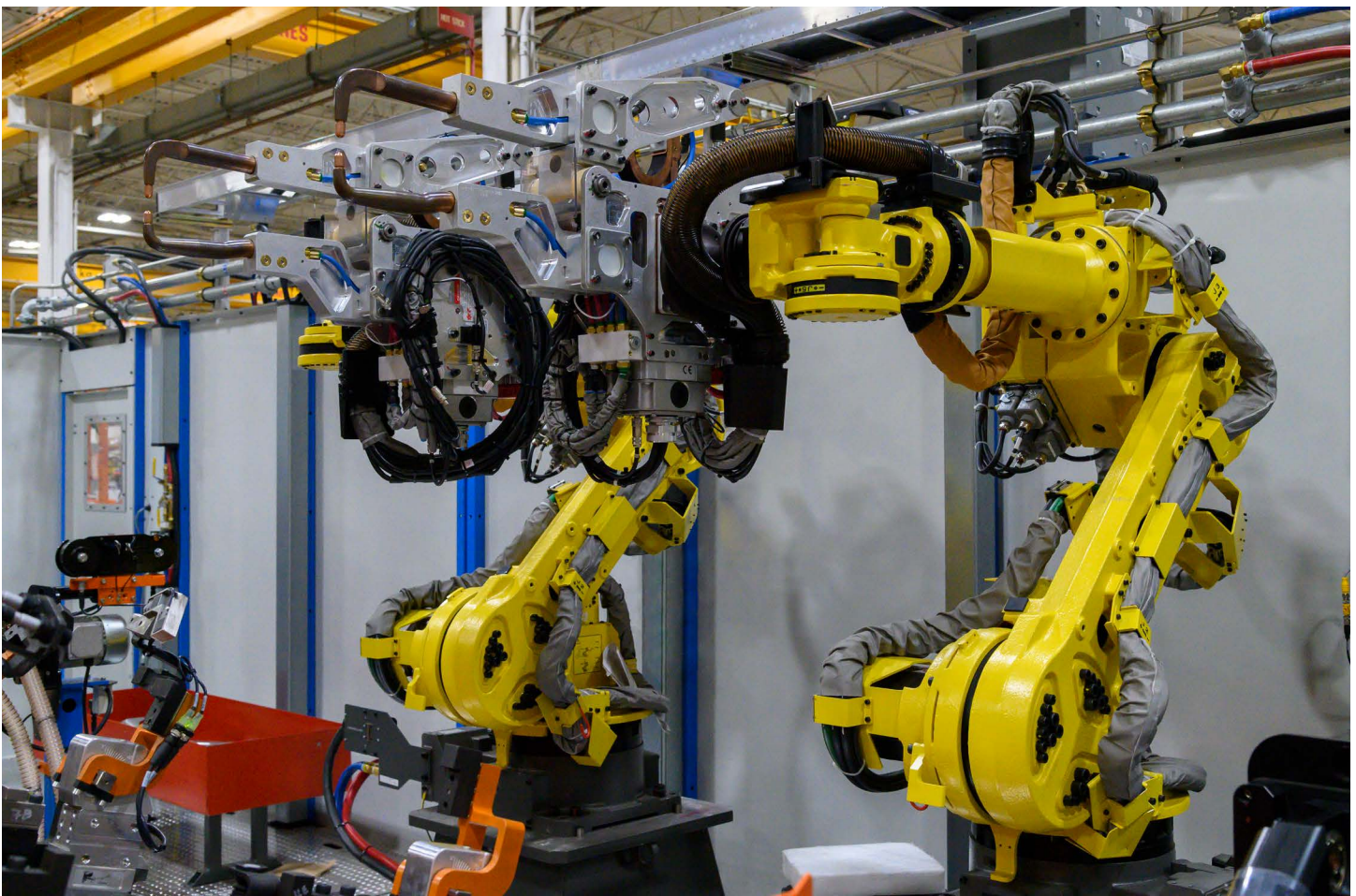
- 2 Station Rotary Table
- 2 Fanuc 1000iB/100kg robots
- 27.4 m2 Total Space Required

FlexGun™ Ultra X-Style Advantages

- Compact design, center-of-gravity is closer to the robot wrist
- Higher gun ratios that generate greater tip force for a given actuator.
- Robot rear mounting axis aligned with welding plane permits highly efficient robot moves.
- Compact design requires less motion for side plates and less stiffening.



FlexGun™ Ultra - X Style



FlexGun™ Ultra X-style shown on Fanuc R1000iA/100F Robot

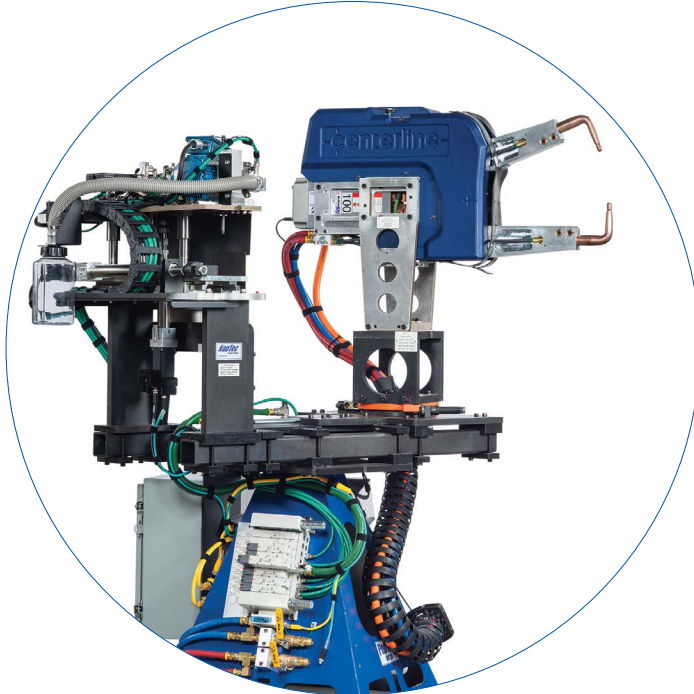
PedTec™ Integrated Solutions

Pedestal Mounted Weld Guns with Integrated KapTec™ Maintenance Solutions

PedTec™ Solutions are pre-engineered, supplied complete, tested with 3D models and documentation for easy integration. These configured products save design, build, and commissioning time, as well as floor space.

CenterLine is the only manufacturer of a patented self-contained, fully automated cap dresser and cap changer unit for single ped or dual ped guns.

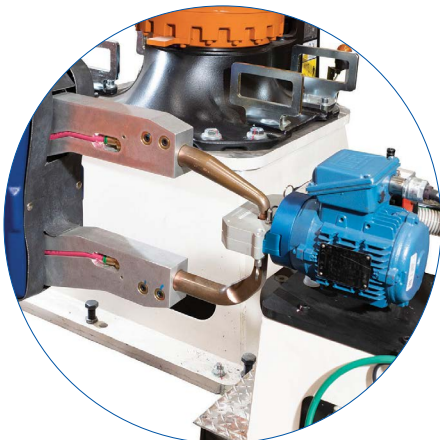
From robot carried weld guns to dual ped weld gun applications, the KapTec™ system is a solution for all cap servicing needs.



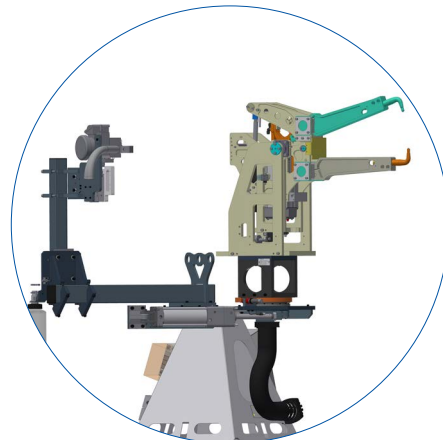
PedTec™ Pedestal Mounted Weld Gun with Integrated KapTec™ Dresser & Changer

KapTec™ Patented Automated Maintenance Station for Pedestal Mounted Weld Guns

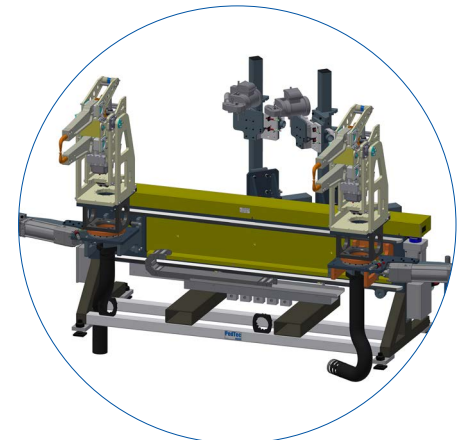
- Weld gun pivots to the maintenance station.
- Full position control of vertical and horizontal axis to perform cap maintenance.
- Configurable for different gun geometries.
- Weld caps are serviced when the material handling robot is moving workpieces.
- Gun pivot is safer than a swing in dresser and requires less floor space.
- The maintenance station is behind the weld gun allowing easy access for servicing magazines and dresser.
- Integrated SMC water retract system.



PedTec™ Pedestal Mounted KapTec™ Dresser



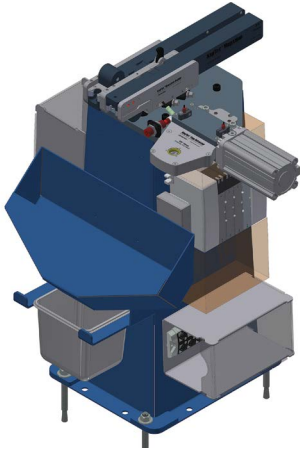

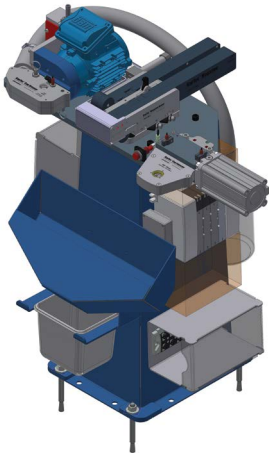
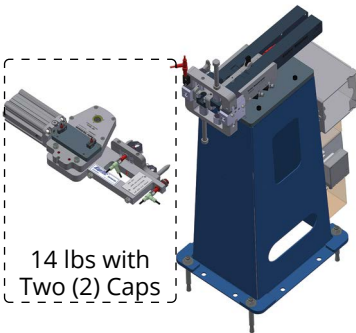
PedTec™ Pedestal Mounted Weld Gun with Integrated KapTec™ Dresser

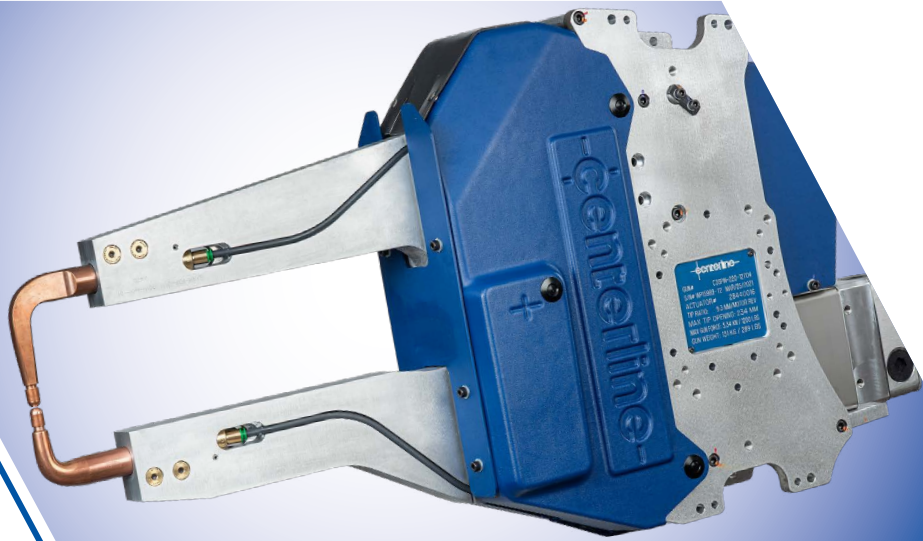


PedTec™ Pedestal Mounted Dual Weld Gun with Integrated KapTec™ Dressers

KapTec™ Integrated Solutions

Pedestal Mounted KapTec™ Maintenance Solutions

			 <p>14 lbs with Two (2) Caps</p>
<p>KapTec™ Weld Tip Changer Assembly, including:</p> <ul style="list-style-type: none"> • Cap Extractor • Weld Cap Magazine Holder • Two (2) Weld Cap Magazine styles • 5/8 cap capacity – 21 caps • 3/4 cap capacity – 18 caps • Cap collection tray & bin 	<p>KapTec™ Weld Tip Dresser Assembly, including:</p> <ul style="list-style-type: none"> • Tip dresser motor, including Cutter and Holder • Chip collection assembly, including shroud & vacuum system complete with chip container • Safety disconnect 	<p>KapTec™ Integrated Dresser & Changer, including:</p> <ul style="list-style-type: none"> • Tip dresser motor, including cutter and holder • Chip collection assembly including shroud & vacuum system complete with chip container • Cap Extractor • Weld Cap Magazine Holder • Two (2) Weld Cap Magazine styles • 5/8 cap capacity – 21 caps • 3/4 cap capacity – 18 caps • Cap collection tray & bin • Safety disconnect 	<p>KapTec™ Robot Carried Lite, including:</p> <ul style="list-style-type: none"> • Weld Cap Magazine Holder • With Carried Lite cap loader add-on • Two (2) Weld Cap Magazine styles • 5/8 cap capacity – 21 caps • 3/4 cap capacity – 18 caps • Carried Lite robot end-of-arm mounting plate • Cap Extractor • Weld Cap Grippers
<p>All solutions above include:</p> <ul style="list-style-type: none"> • KapTec™ integrated solutions are supplied complete, fully tested and integration ready. • Pneumatics termination on PedTec™ base, including: <ul style="list-style-type: none"> • (1) Main air aluminum manifold to be connected to the main line • (1) SMC manual regulator • (1) SMC valve base (valve base series TBD) • (1) Lot SMC valves (valve series TBD) • Not included – Air lockout, main supply regulator, air filter • Controls termination on PedTec™ base, including: <ul style="list-style-type: none"> • I/O block(s) – for connection to main line I/O network • Not included – 24VDC power cables, communication cables to main line 			
<p align="center">Not included/Customer to provide:</p>			
	<ul style="list-style-type: none"> • Tip dress motor starter CenterLine assumes the motor starter will be the responsibility of the customer and/or will be generally provided with the weld control. 	<ul style="list-style-type: none"> • Robot integration, including end-of-arm I/O and pneumatics 	
<ul style="list-style-type: none"> • Installation or integration at customer facility <ul style="list-style-type: none"> • End User build specifications 			



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