

Δ Tandem Controller Required

* Maximum Range is limited by power source rating, module rating, or feeder configuration

Type	Size	Procedure	Waveform	Gas Type	Mode #	Arc Control	Max. Range (*)	
All	All	GMAW CV	STD CV		5	Pinch	10 – 55	V
		GMAW Power	Power Mode®		40	Pinch	0.1 – 40	kW
		GMAW Power	Process HDT™ ¹		635	Pinch	0.1 – 40	kW
Steel	0.030	GMAW CV	CV	CO ₂	93	Pinch	75 – 1200	ipm (1.91 – 30.48 m/min)
			Argon Mix	94	75 – 1200		ipm (1.91 – 30.48 m/min)	
		GMAW Pulse	Pulse	Argon Mix	95	UltimArc®	65 – 1200	ipm (1.65 – 30.48 m/min)
	0.035	GMAW CV	CV	CO ₂	10	Pinch	50 – 1200	ipm (1.27 – 30.48 m/min)
			Argon Mix	11	50 – 1200		ipm (1.27 – 30.48 m/min)	
		GMAW Pulse	Pulse	Argon Mix	12	UltimArc®	60 – 1200	ipm (1.52 – 30.48 m/min)
			RapidArc®	Argon Mix	13		60 – 1200	ipm (1.52 – 30.48 m/min)
			Precision Pulse™	Argon Mix	411		100 – 600	ipm (2.54 – 15.24 m/min)
	0.040	GMAW CV	CV	CO ₂	138	Pinch	50 – 1200	ipm (1.27 – 30.48 m/min)
			Argon Mix	139	50 – 1200		ipm (1.27 – 30.48 m/min)	
		GMAW Pulse	Pulse	Argon Mix	140	UltimArc®	60 – 1200	ipm (1.52 – 30.48 m/min)
			RapidArc®	Argon Mix	141		60 – 1200	ipm (1.52 – 30.48 m/min)
			Precision Pulse™	Argon Mix	412		75 – 600	ipm (1.91 – 15.24 m/min)
	0.045	GMAW CV	CV	CO ₂	20	Pinch	50 – 800	ipm (1.27 – 20.32 m/min)
			Argon Mix	21	50 – 800		ipm (1.27 – 20.32 m/min)	
		GMAW Pulse	Pulse	Argon Mix	22	UltimArc®	50 – 800	ipm (1.27 – 20.32 m/min)
			RapidArc®	Argon Mix	18		75 – 800	ipm (1.91 – 20.32 m/min)
			Precision Pulse™	Argon Mix	413		75 – 600	ipm (1.91 – 15.24 m/min)
	0.052	GMAW CV	CV	CO ₂	24	Pinch	50 – 750	ipm (1.27 – 19.05 m/min)
			Argon Mix	25	50 – 700		ipm (1.27 – 17.78 m/min)	
		GMAW Pulse	Pulse	Argon Mix	26	UltimArc®	50 – 700	ipm (1.27 – 17.78 m/min)
			RapidArc®	Argon Mix	27		60 – 750	ipm (1.52 – 19.05 m/min)
			Precision Pulse™	Argon Mix	414		75 – 500	ipm (1.91 – 12.7 m/min)
	1/16	GMAW CV	CV	Argon Mix	107	Pinch	50 – 700	ipm (1.27 – 17.78 m/min)
GMAW Pulse		Pulse	Argon Mix	108	UltimArc®	50 – 500	ipm (1.27 – 12.7 m/min)	
Stainless	0.030	GMAW CV	CV	Argon Mix	61	Pinch	100 – 1200	ipm (2.54 – 30.48 m/min)
			He Ar CO ₂	63	100 – 1200		ipm (2.54 – 30.48 m/min)	
		GMAW Pulse	Pulse	He Ar CO ₂	64	UltimArc®	90 – 1200	ipm (2.29 – 30.48 m/min)
				Argon Mix	66		80 – 1200	ipm (2.03 – 30.48 m/min)
			Precision Pulse™	Argon Mix	420	UltimArc®	100 – 800	ipm (2.54 – 20.32 m/min)
			He Ar CO ₂	430		100 – 800	ipm (2.54 – 20.32 m/min)	
	0.035	GMAW CV	CV	Argon Mix	31	Pinch	75 – 1200	ipm (1.91 – 30.48 m/min)
			He Ar CO ₂	33	75 – 1200		ipm (1.91 – 30.48 m/min)	
		GMAW Pulse	Pulse	He Ar CO ₂	34	UltimArc®	75 – 1200	ipm (1.91 – 30.48 m/min)
				Argon Mix	36		60 – 1200	ipm (1.52 – 30.48 m/min)
			Precision Pulse™	Argon Mix	421	UltimArc®	100 – 600	ipm (2.54 – 15.24 m/min)
			He Ar CO ₂	431		100 – 700	ipm (2.54 – 17.78 m/min)	
	0.045	GMAW CV	CV	Argon Mix	41	Pinch	75 – 800	ipm (1.91 – 20.32 m/min)
			He Ar CO ₂	43	75 – 800		ipm (1.91 – 20.32 m/min)	
		GMAW Pulse	Pulse	He Ar CO ₂	44	UltimArc®	75 – 800	ipm (1.91 – 20.32 m/min)
				Argon Mix	46		50 – 800	ipm (1.27 – 20.32 m/min)
			Precision Pulse™	Argon Mix	423	UltimArc®	50 – 400	ipm (1.27 – 10.16 m/min)
			He Ar CO ₂	433		60 – 400	ipm (1.52 – 10.16 m/min)	
1/16	GMAW CV	CV	Argon Mix	51	Pinch	50 – 600	ipm (1.27 – 15.24 m/min)	
	GMAW Pulse	Pulse	Argon Mix	56	UltimArc®	50 – 700	ipm (1.27 – 17.78 m/min)	
Metal Core	0.045	GMAW CV	CV	Argon Mix	81	Pinch	100 – 700	ipm (2.54 – 17.78 m/min)
			Pulse	Argon Mix	82		UltimArc®	50 – 700
		GMAW Pulse	RapidArc®	Argon Mix	87		75 – 800	ipm (1.91 – 20.32 m/min)
	0.052	GMAW CV	CV	Argon Mix	83	Pinch	50 – 600	ipm (1.27 – 15.24 m/min)
			Pulse	Argon Mix	84		UltimArc®	50 – 600
		GMAW Pulse	RapidArc®	Argon Mix	88		60 – 800	ipm (1.52 – 20.32 m/min)
	1/16	GMAW CV	CV	Argon Mix	85	Pinch	50 – 450	ipm (1.27 – 11.43 m/min)
		GMAW Pulse	Pulse	Argon Mix	86	UltimArc®	50 – 450	ipm (1.27 – 11.43 m/min)
			RapidArc®	Argon Mix	89			60 – 450

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GMAW	Type	Size	Procedure	Waveform	Gas Type	Mode #	Arc Control	Max. Range (*)			
	Aluminum 4XXX	0.035		GMAW CV	CV	Argon	148	Pinch	150 – 750	ipm (3.81 – 19.05 m/min)	
GMAW Pulse				Pulse	Argon	149	UltimArc®	125 – 800	ipm (3.18 – 20.32 m/min)		
				CC Pulse	Argon	150		125 – 800	ipm (3.18 – 20.32 m/min)		
				Precision Pulse™	Argon	565		125 – 800	ipm (3.18 – 20.32 m/min)		
GMAW Pulse-on-Pulse®		Pulse-on-Pulse®	Argon	98	Frequency		125 – 800	ipm (3.18 – 20.32 m/min)			
3/64				GMAW CV	CV	Argon	71	Pinch	125 – 700	ipm (3.18 – 17.78 m/min)	
				GMAW Pulse	Pulse	Argon	72	UltimArc®	85 – 600	ipm (2.16 – 15.24 m/min)	
					CC Pulse	Argon	69		85 – 600	ipm (2.16 – 15.24 m/min)	
					Precision Pulse™	Argon	567		85 – 600	ipm (2.16 – 15.24 m/min)	
GMAW Pulse-on-Pulse®		Pulse-on-Pulse®	Argon	99	Frequency		85 – 500	ipm (2.16 – 12.7 m/min)			
1/16				GMAW CV	CV	Argon	73	Pinch	75 – 375	ipm (1.91 – 9.53 m/min)	
				GMAW Pulse	Pulse	Argon	74	UltimArc®	75 – 350	ipm (1.91 – 8.89 m/min)	
					CC Pulse	Argon	79		75 – 350	ipm (1.91 – 8.89 m/min)	
					Precision Pulse™	Argon	568		75 – 350	ipm (1.91 – 8.89 m/min)	
GMAW Pulse-on-Pulse®		Pulse-on-Pulse®	Argon	100	Frequency		80 – 400	ipm (2.03 – 10.16 m/min)			
Aluminum 5XXX		0.035		GMAW CV	CV	Argon	151	Pinch	175 – 750	ipm (4.45 – 19.05 m/min)	
				GMAW Pulse	Pulse	Argon	152	UltimArc®	150 – 800	ipm (3.81 – 20.32 m/min)	
					CC Pulse	Argon	153		150 – 800	ipm (3.81 – 20.32 m/min)	
					Precision Pulse™	Argon	570		150 – 800	ipm (3.81 – 20.32 m/min)	
		GMAW Pulse-on-Pulse®	Pulse-on-Pulse®	Argon	101	Frequency		140 – 800	ipm (3.56 – 20.32 m/min)		
		3/64			GMAW CV	CV	Argon	75	Pinch	125 – 750	ipm (3.18 – 19.05 m/min)
					GMAW Pulse	Pulse	Argon	76	UltimArc®	85 – 700	ipm (2.16 – 17.78 m/min)
						CC Pulse	Argon	70		85 – 700	ipm (2.16 – 17.78 m/min)
						Precision Pulse™	Argon	572		85 – 700	ipm (2.16 – 17.78 m/min)
	GMAW Pulse-on-Pulse®	Pulse-on-Pulse®	Argon	102	Frequency		100 – 600	ipm (2.54 – 15.24 m/min)			
	1/16			GMAW CV	CV	Argon	77	Pinch	125 – 500	ipm (3.18 – 12.7 m/min)	
				GMAW Pulse	Pulse	Argon	78	UltimArc®	100 – 500	ipm (2.54 – 12.7 m/min)	
CC Pulse					Argon	80	100 – 450		ipm (2.54 – 11.43 m/min)		
Precision Pulse™					Argon	573	100 – 500		ipm (2.54 – 12.7 m/min)		
GMAW Pulse-on-Pulse®	Pulse-on-Pulse®	Argon	103	Frequency		75 – 350	ipm (1.91 – 8.89 m/min)				
SiBr	0.035		GMAW Pulse	Pulse	Argon	192	UltimArc®	80 – 1200	ipm (2.03 – 30.48 m/min)		
	0.045		GMAW Pulse	Pulse	Argon	191	UltimArc®	50 – 600	ipm (1.27 – 15.24 m/min)		
Cu	0.035		GMAW Pulse	Pulse	Argon Helium	198	UltimArc®	100 – 700	ipm (2.54 – 17.78 m/min)		
	0.045		GMAW Pulse	Pulse	Argon Helium	196	UltimArc®	75 – 500	ipm (1.91 – 12.7 m/min)		
NiCr	0.035		GMAW Pulse	Pulse	Ar/ Ar He	501	UltimArc®	75 – 800	ipm (1.91 – 20.32 m/min)		
	0.045		GMAW Pulse	Pulse	Ar/ Ar He	503	UltimArc®	75 – 600	ipm (1.91 – 15.24 m/min)		
	1/16		GMAW Pulse	Pulse	Ar/ Ar He	505	UltimArc®	75 – 350	ipm (1.91 – 8.89 m/min)		
NiCu	0.035		GMAW Pulse	Pulse	Ar/ Ar He	507	UltimArc®	75 – 800	ipm (1.91 – 20.32 m/min)		
	0.045		GMAW Pulse	Pulse	Ar/ Ar He	509	UltimArc®	75 – 600	ipm (1.91 – 15.24 m/min)		
	1/16		GMAW Pulse	Pulse	Ar/ Ar He	511	UltimArc®	50 – 350	ipm (1.27 – 8.89 m/min)		
NiFe-CI	0.035		GMAW Pulse	Pulse	Ar/ Ar He	513	UltimArc®	75 – 800	ipm (1.91 – 20.32 m/min)		
	0.045		GMAW Pulse	Pulse	Ar/ Ar He	515	UltimArc®	75 – 600	ipm (1.91 – 15.24 m/min)		
Ni-1	0.035		GMAW Pulse	Pulse	Ar/ Ar He	519	UltimArc®	75 – 800	ipm (1.91 – 20.32 m/min)		
	0.045		GMAW Pulse	Pulse	Ar/ Ar He	521	UltimArc®	75 – 600	ipm (1.91 – 15.24 m/min)		
	1/16		GMAW Pulse	Pulse	Ar/ Ar He	523	UltimArc®	50 – 300	ipm (1.27 – 7.62 m/min)		
Ni-CI	0.035		GMAW Pulse	Pulse	Ar/ Ar He	525	UltimArc®	75 – 800	ipm (1.91 – 20.32 m/min)		
	0.045		GMAW Pulse	Pulse	Ar/ Ar He	527	UltimArc®	75 – 500	ipm (1.91 – 12.7 m/min)		

FCAW	Type	Size	Procedure	Waveform	Gas Type	Mode #	Arc Control	Max. Range (*)	
	Flux Core	All		FCAW-S	Self Shield CV	NA	6	Pinch	10 – 45
FCAW-G				Gas Shield CV		7	Pinch	10 – 45	V
Cored Wire	0.045		FCAW-G	CV	CO ₂	90	Pinch	175 – 600	ipm (4.45 – 15.24 m/min)
					Argon Mix	91		175 – 600	ipm (4.45 – 15.24 m/min)
	0.052		FCAW-G	CV	CO ₂	187	Pinch	150 – 500	ipm (3.81 – 12.7 m/min)
					Argon Mix	188		150 – 500	ipm (3.81 – 12.7 m/min)
1/16			FCAW-G	CV	CO ₂	189	Pinch	125 – 400	ipm (3.18 – 10.16 m/min)
					Argon Mix	190		125 – 400	ipm (3.18 – 10.16 m/min)

SMAW	Type	Size	Procedure	Waveform	Gas Type	Mode #	Arc Control	Max. Range (*)		
	NA	NA	DCEP SMAW	SMAW Soft		NA	1	Arc Force, Hot Start	15 – 900	A
				SMAW Crisp		NA	2	Arc Force, Hot Start	15 – 900	A
				SMAW Pipe		NA	4	Arc Force	50 – 250	A

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GTAW	Type	Size	Procedure	Waveform	Gas Type	Mode #	Arc Control	Max. Range (*)
	NA	NA	DCEN GTAW	Touch Start TIG	Ar / He	3	Hot Start	5 – 900 A
				Touch Start TIG Pulse	Ar / He	8	Frequency, Background, Hot Start	5 – 800 A

CAG	Type	Size	Procedure	Waveform	Gas Type	Mode #	Arc Control	Max. Range (*)
	NA	NA	CAG	Arc Gouge	Compressed Air	9		60 – 900 A

GMAW-Tandem	Type	Size	Procedure	Waveform	Gas Type	Mode #	Arc Control	Max. Range (*)
	Steel	0.035	GMAW Tandem (Δ)	Sync Pulse Lead	Argon Mix	400	UltimArc®, Phase Angle	100 – 1000 ipm
Sync Pulse Trail				Argon Mix	401	UltimArc®	100 – 800 ipm	(2.54 – 20.32 m/min)
HotWire Pulse Trail				Argon Mix	460		80 – 900 ipm	(2.03 – 22.86 m/min)
Sync Pulse Lead				Argon Mix	402	UltimArc®, Phase Angle	150 – 800 ipm	(3.81 – 20.32 m/min)
Sync Pulse Trail				Argon Mix	403	UltimArc®	150 – 800 ipm	(3.81 – 20.32 m/min)
HotWire Pulse Trail				Argon Mix	461		80 – 800 ipm	(2.03 – 20.32 m/min)
0.040		GMAW Tandem (Δ)	Sync Pulse Lead	Argon Mix	404	UltimArc®, Phase Angle	100 – 700 ipm	(2.54 – 17.78 m/min)
			Sync Pulse Trail	Argon Mix	405	UltimArc®	100 – 700 ipm	(2.54 – 17.78 m/min)
			HotWire Pulse Trail	Argon Mix	462		75 – 800 ipm	(1.91 – 20.32 m/min)
0.045		GMAW Tandem (Δ)	Sync Pulse Lead	Argon Mix	406	UltimArc®, Phase Angle	100 – 800 ipm	(2.54 – 20.32 m/min)
			Sync Pulse Trail	Argon Mix	407	UltimArc®	100 – 800 ipm	(2.54 – 20.32 m/min)
			HotWire Pulse Trail	Argon Mix	463		50 – 800 ipm	(1.27 – 20.32 m/min)
1/16		GMAW Tandem (Δ)	Sync Pulse Lead	Argon Mix	408	UltimArc®, Phase Angle	100 – 500 ipm	(2.54 – 12.7 m/min)
			Sync Pulse Trail	Argon Mix	409	UltimArc®	100 – 500 ipm	(2.54 – 12.7 m/min)
			HotWire Pulse Trail	Argon Mix	464		50 – 500 ipm	(1.27 – 12.7 m/min)

HyperFill ¹	Type	Size	Procedure	Waveform	Gas Type	Mode #	Arc Control	Max. Range (*)	
	Steel	0.035	GMAW	HyperFill®	Argon Mix	601	UltimArc®	150 – 800 ipm	(3.81 – 20.32 m/min)
		0.040	GMAW	HyperFill®	Argon Mix	602	UltimArc®	100 – 600 ipm	(2.54 – 15.24 m/min)
		0.045	GMAW	HyperFill®	Argon Mix	603	UltimArc®	100 – 465 ipm	(2.54 – 11.81 m/min)
	Metal Core	0.045	GMAW	HyperFill®	Argon Mix	608	UltimArc®	150 – 515 ipm	(3.81 – 13.08 m/min)
Cored Wire	0.045	FCAW-G	HyperFill®	Argon Mix	618	Pinch	100 – 630 ipm	(2.54 – 16 m/min)	

GTAW - APEX ²	Type	Size	Procedure	Waveform	Gas Type	Mode #	Arc Control	Max. Range (*)
	NA	NA	DCEN GTAW	Touch Start TIG	NA	490	Transition Speed	5 – 500 A

¹HyperFill® & Process HDT™ Waveform Activation Capability with Power Wave® and PIPEFAB™ Systems

Your purchase of a Lincoln Power Wave or PIPEFAB Welding System comes with (i) a license to use Lincoln Electric standard Power Wave / PIPEFAB waveforms, and (ii) HyperFill & Process HDT waveform capability, which requires a separate license. Without the separate license, the HyperFill and Process HDT waveforms are not available for use on these machines, and only the standard Power Wave / PIPEFAB waveforms are usable.

²APEX® System Required