

# Palletized fixture

Enerpac provides a variety of solutions for use in palletized fixtures:









- Manual and Automated Coupler Systems for connecting/disconnecting to the fixture
- Rotary couplers for use with continuous connection systems
- Pressure intensifiers to provide increased pressure for clamping when used with machine hydraulics
- Safe Link for remote wireless monitoring of fixture pressure or clamp position



## Technical support

- Safety instructions
- Basic hydraulic information
- Advanced hydraulic technology
- FMS (Flexible Machining Systems) technology
- Conversion charts and hydraulic symbols

# components

	▼ series	▼ page	
Accumulators	AC WA	162 - 163	
Coupler Packages	AC, AP MHV	164 - 165	
Manual couplers	MCR MCH	166 - 171	
Activator wand & boosters	B, RA	172 - 173	
Auto-coupler systems	WCA, WPA ACCB	174 - 175	
Rotary couplers	AMP, CR CRV	176 - 177	
Pressure intensifiers	PID	178 - 179	
SafeLink	SL	180 - 185	

Shown: ACL-201A, WA-502, ACL-21A



▶ Enerpac accumulators supply auxiliary pressure to dampen shock loads or to compensate pressure drop in applications where system pressure needs to be maintained.

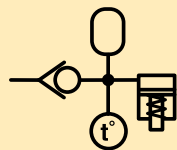
### Accumulator applications:

- Energy storage
- Circuit pulsation dampening
- Thermal expansion compensation

Pulse dampening



Thermal expansion



■ ACBS-202 Accumulator package used to maintain pressure on a machine tool fixture



## Accumulators

...maintain circuit pressure

- Ideal for high frequency and rapid discharge applications
- ACL series are pre-charged to 1450 psi
- Corrosion resistant bodies on ACL series
- Spring actuated accumulator for ACM-1
- High energy storage capacity in a compact package
- WA accumulators are piston type
- ACL accumulators are diaphragm type
- ACM accumulators use internal spring

## Product selection

Operating pressure	Model number	Max. rated oil volume	Gas volume	Pre-charged nitrogen pressure	Usable oil capacity
psi		in <sup>3</sup>	in <sup>3</sup>	psi	in <sup>3</sup> at 5000 psi
<b>▼ Pre-charged accumulators</b>					
0-3000	<b>ACM-1</b>	.10	-	-	-
1500-5000	<b>ACL-21A</b>	.90	1.22	1450	.53
1500-5000	<b>ACL-201A</b>	7.70	10.37	1450	4.51
1500-5000	<b>ACL-502A</b>	20.60	27.46	1450	12.0
<b>▼ Uncharged accumulators</b>					
0-5000 <sup>1)</sup>	<b>WA-502</b>	2.50	2.50	-	2.50
0-5000 <sup>1)</sup>	<b>WA-5010</b>	10.00	10.00	-	7.50

<sup>1)</sup> See pre-charge chart on page 163 for hydraulic operating pressures.

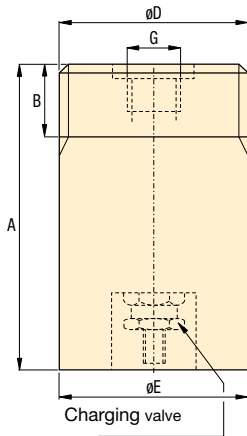
Collet-Lok® product line  
 Swing clamps  
 Work supports  
 Linear Clamps  
 Power sources  
 Valves  
 Pallet Components

**Recommended pre-charge**

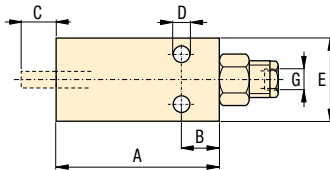
Operating pressure psi	Model number	Nitrogen pressure psi	Usable oil capacity <sup>1)</sup> in <sup>3</sup>
0-1000	<b>WA-502</b>	500	1.50
1000-3000	<b>WA-502</b>	1000	2.00
3000-5000	<b>WA-502</b>	1200	2.50
0-1000	<b>WA-5010</b>	500	5.50
1000-3000	<b>WA-5010</b>	1000	6.50
3000-5000	<b>WA-5010</b>	1200	7.50

<sup>1)</sup> At maximum operating pressure.

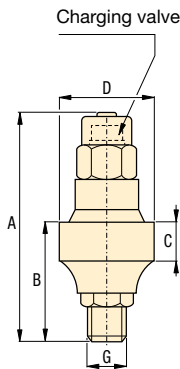
**WA**



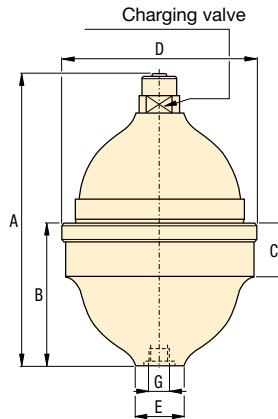
**ACM-1**



**ACL-21A**



**ACL-201A, 502A**



**Product dimensions in inches [  $\pm \frac{\square}{\square}$  ]**

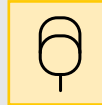
Model number	A	B	C	D	E	F	G	Recommended charging tool	lbs
<b>▼ Pre-charged accumulators</b>									
<b>ACM-1</b>	5.25	.75	.50	.265	1.75	-	.125-27 NPT	-	2.1
<b>ACL-21A</b>	4.14	1.46	.71	1.69	-	-	SAE #4	WAT-2	1.0
<b>ACL-201A</b>	5.39	2.72	1.14	3.33	1.14	-	SAE #6	WAT-2	2.7
<b>ACL-502A</b>	6.73	3.50	1.38	4.49	1.57	-	G3/8"	WAT-2	6.2
<b>▼ Uncharged accumulators</b>									
<b>WA-502</b>	4.69	1.19	-	2.750-16 UN	2.75	-	SAE #8	WAT-1	7.0
<b>WA-5010</b>	7.13	1.19	-	2.750-16 UN	2.75	-	SAE #8	WAT-1	11.5

Pressure: 0-5000 psi

Oil volume: .10-20.60 in<sup>3</sup>

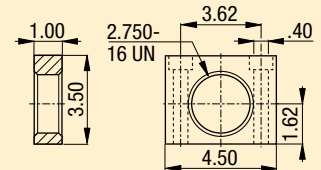
Gas volume: 1.22-27.46 in<sup>3</sup>

- E** Acumuladores
- F** Accumulateurs
- D** Druckspeicher



**Options**

**AW-50 Mounting block**  
For WA series accumulators.



**Hydraulic oil**

193 ▶



**Fittings**

194 ▶



Shown: AP-500, MHV-1, ACBS-22A



**▶ Accumulator packages will help maintain system pressure to your fixture when separated from the hydraulic source. The gauge will display system pressure after the circuit is disconnected.**

## Coupler packages

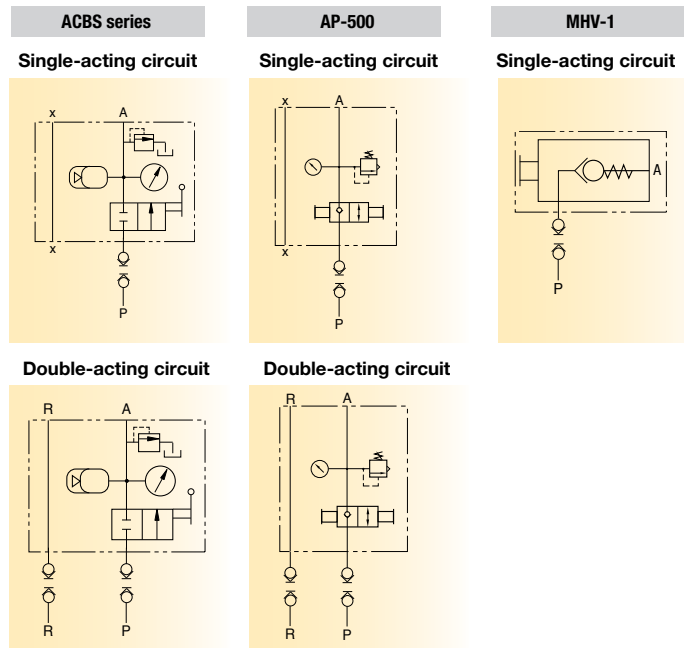
...compact design for easy use of accumulators

- Single design accommodates both single-acting or double-acting circuit
- Relief valve fitted and ball check shut-off
- Glycerin-filled gauge included
- Supplied standard with one male coupler (AH-652)
- Optional manifold mounting. O-ring seals located on bottom of block only for single-acting circuit

### MHV-1 Modular holding valve

- Allows separate operation of clamping fixtures with a single power source
- Ideal for applications when fluid feed lines are impractical. If system pressure is interrupted, the MHV-1 will hold the pressure beyond the valve
- Max. oil flow 305 in<sup>3</sup>/min
- To release system pressure, rotate valve handle in either direction 90° to release and retract system pressure

## **i** Coupler package circuits



■ ACBS-202 Accumulator package used to maintain pressure on a machine tool fixture



## **i** Product selection

Operating pressure	Model number	Max. rated oil volume	Gas volume	Pre-charged nitrogen pressure	Usable oil capacity
psi		in <sup>3</sup>	in <sup>3</sup>	psi	in <sup>3</sup> at 5000 psi

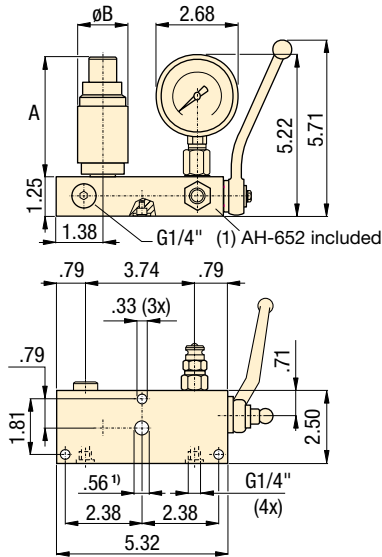
### ▼ Accumulator coupler packages

1500-5000	<b>ACBS-22A</b>	0.90	1.22	1450	.53
1500-5000	<b>ACBS-202A</b>	7.70	10.37	1450	4.51
0-5000	<b>AP-500</b>	<b>AP-500 uses WA-502 or WA-5010<sup>1)</sup></b>			
0-3000	<b>MHV-1</b>	-	-	-	-

<sup>1)</sup> See pre-charge chart on page 163 for hydraulic operating pressures.

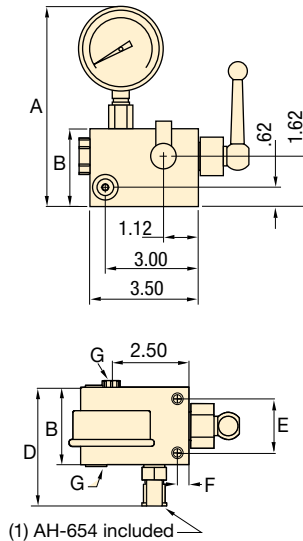
Collet-Lok® product line  
Swing clamps  
Work supports  
Linear Clamps  
Power sources  
Valves  
Pallet Components

**ACBS**

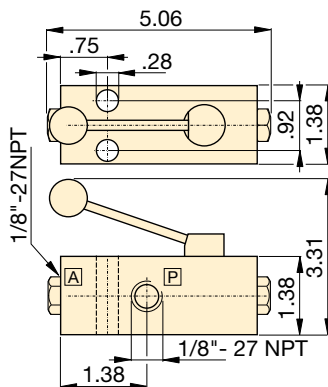


<sup>1)</sup> Manifold hole should not exceed Ø .30 inch when port is utilized.

**AP-500**



**MHV-1**

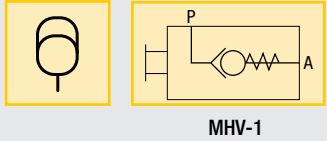


**Product dimensions** in inches [ ]

Model number	A	B	C	D	E	F	G	Recommended charging tool	lbs
<b>▼ Pre-charged accumulator coupler packages</b>									
<b>ACBS-22A</b>	2.69	1.65	-	-	-	-	G1/4"	WAT-2	10.1
<b>ACBS-202A</b>	4.18	3.33	-	-	-	-	G1/4"	WAT-2	11.8
<b>AP-500</b>	6.44	2.50	3.50	3.84	1.75	0.38	SAE #4	-	11.8
<b>MHV-1</b>	-	-	-	-	-	-	1/8" NPT	-	-

- Pressure: 0-5000 psi
- Oil volume: .10-7.70 in<sup>3</sup>
- Gas volume: 1.22-10.37 in<sup>3</sup>

- E** Acopladores manuales
- F** Manuel coupleur
- D** Manuelle kupplung



**Options**

**Couplers** [192](#)

**High pressure filters** [193](#)

**Hydraulic oil** [193](#)

**Fittings** [194](#)

**Important**

**Enerpac high pressure in-line filters are required for use with these control units to prevent damage that can be caused by contaminants that have penetrated your hydraulic fluid system.**

**Order an additional male coupler for use in double-acting hydraulic circuits.**  
**ACBS-Series: AH-652**  
**AP-500: AH-654**

Shown: MCH-31, MCRA-11, MCRC-21, MCH-21, MCR-21



▶ The Enerpac manual coupler is available as a dual connection model or dual connection with optional air circuit for part present sensing. The fixture side receiver is available with or without an internal pilot operated check valve. Filtration provides protection from contamination.

### Manual coupler applications:

- **With P.O. check**
  - Use MCRC-21 for a complete, unitized coupler receiver solution
- **Without P.O. check:**
  - Use MCR-21 when using a remote mounted Pilot Operated Check Valve

■ Enerpac manual couplers simplify the process of connecting and disconnecting to a palletized fixture.

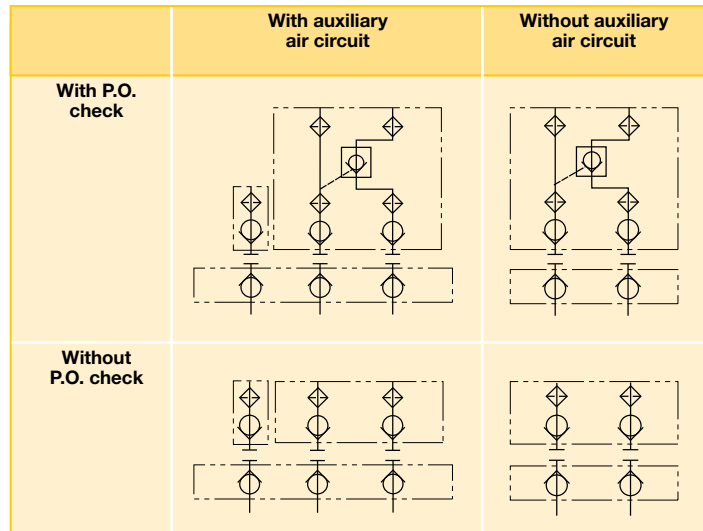


## Manual Couplers

...convenient connection

- Use on palletized fixtures
- Available with or without an internal pilot operated (P.O.) check valve
- Optional coupler block available to add circuit for air part present sensing
- Manifold porting
- Porting for tubing connections
- Filtration to prevent contamination
- Removable front plate provides access to the front filters and check cartridge
- Top port accommodates an accumulator or gauge

## Manual Coupler Circuits



Model number	Basic configurations	Circuits
MCRC-21	Pallet receiver with P.O. check	Two Hydraulic
MCR-21	Pallet receiver without P.O. check	Two Hydraulic
MCRA-11	Auxiliary air circuit receiver block	One Air
MCH-21	Operator handle	Two Hydraulic
MCH-31	Operator handle	Two Hydraulic, One Air
MCSB-21	Storage block	N/A
MCPS-21	Proximity switch kit	N/A

## Select your components

### MCRC-21 Pallet Receiver with P.O. Check

An internal pilot operated check valve and multiple ports to accommodate a gauge or accumulator make the MCRC-21 a great choice of coupler receiver for use in a palletized fixture. Internal filtration protects the check from contamination. Use with the MCH-21 operator handle.



### MCR-21 Pallet Receiver

For applications where the pilot operated check valve is remote mounted in the fixture circuit, use the MCR-1. Internal filtration protects the circuit from outside contamination.



### MCRA-11 Auxiliary air circuit receiver

The MCRA-11 is used to provide an additional connection for use with air part sensing circuits. Use with either the MCRC-21 or the MCR-21. Use with the MCH-31 operator handle.



### MCSB-21 Operator Handle Storage Block

Proper storage of the MCH-21 or MCH-31 handle prevents contamination of the couplers, and makes sure that the handle is disconnected from the fixture. Use the MCPS-21 proximity switch to confirm proper storage as an input to the machine control.



### MCH-21 Two Coupler Operator Handle

Use the MCH-21 with either the MCRC-21 or the MCR-21 pallet receiver.



### MCH-31

Use the MCH-31 when using the MCRA-11 with either the MCRC-21 or MCR-21 receivers.



Max. Flow: 4 GPM

Pressure: 0-5000 psi

- E Acopladores manuales
- F Manuel coupleur
- D Manuelle kupplung

## Options

### FZ Series fittings

 194 ▶



### Hoses and couplers

 192 ▶



### Pilot operated check valves

 153 ▶



### Accumulators

 162 ▶



## Important

Do not couple or uncouple with the hydraulic nozzles under pressure. This can damage the couplers.

Do not exceed maximum flow and pressure.

	Operating pressure psi	Replacement hydraulic nozzle	Replacement filter kit	Voltage	Model number
	100 - 5000	<b>AH654</b>	<b>F12201K</b>	-	<b>MCRC-21</b>
	100 - 5000	<b>AH654</b>	<b>F12201K</b>	-	<b>MCR-21</b>
	10 - 100*	<b>AH654</b>	<b>F12201K</b>	-	<b>MCRA-11</b>
	100 - 5000	<b>AR650</b>	-	-	<b>MCH-21</b>
	100 - 5000	<b>AR650</b>	-	-	<b>MCH-31</b>
	-	<b>AH654</b>	-	-	<b>MCSB-21</b>
	-	-	-	<b>24 VDC</b>	<b>MCPS-21</b>

\* Air pressure



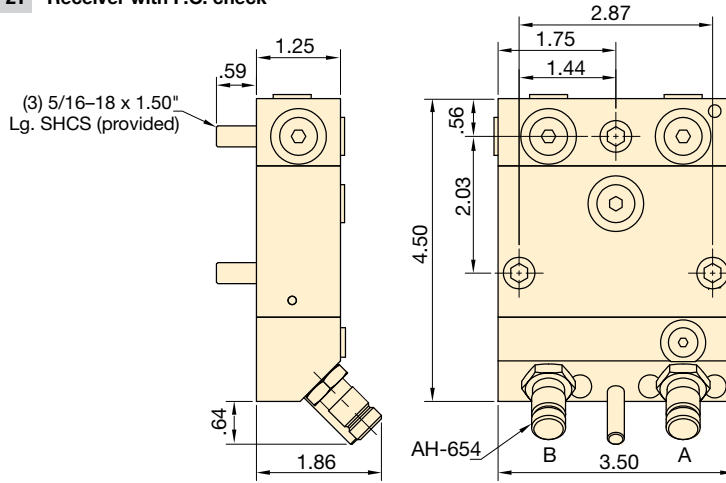
Shown: MCH-21, MCR-21



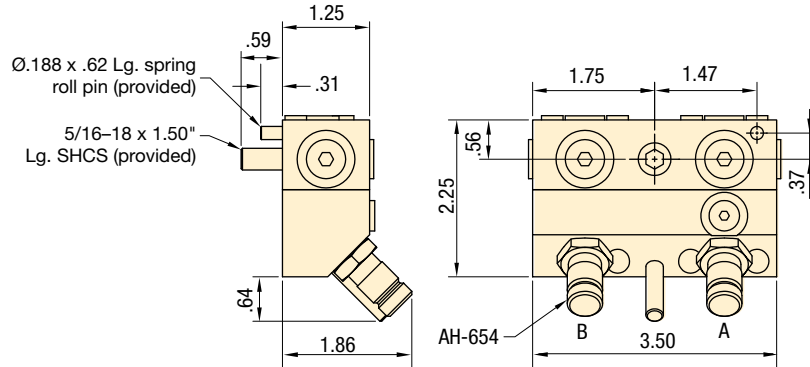
## ► Serie MCR e MCH

The Enerpac MCH-21 two passage operator handle conveniently connects and disconnects to the MCR-21 two passage receiver utilizing a simple push-on, pull-off action.

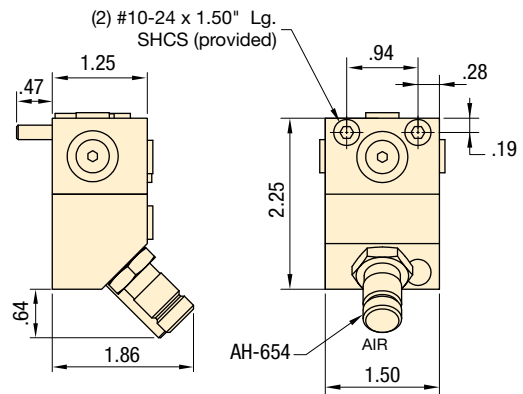
### MCR-21 Receiver with P.O. check



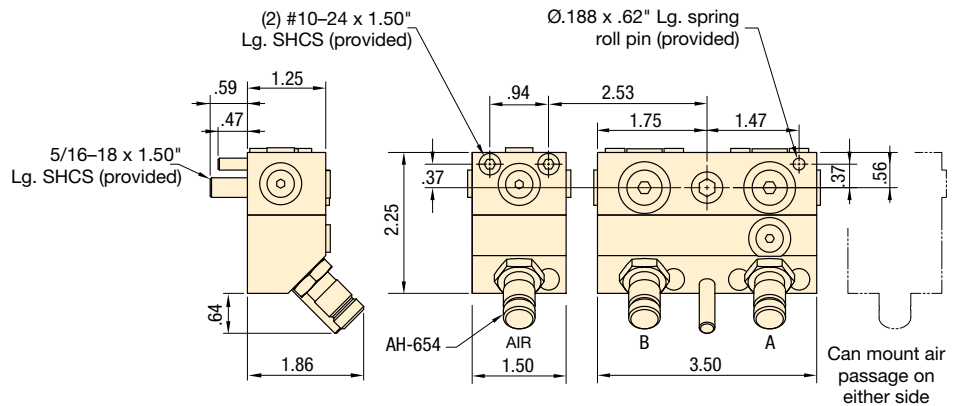
### MCR-21 Receiver without P.O. check



### MCRA-11 Auxiliary air circuit receiver



### MCR-21 with MCRA-11 Receiver with air passage and without P.O. check



Collet-Lok®  
product line

Swing clamps

Work supports

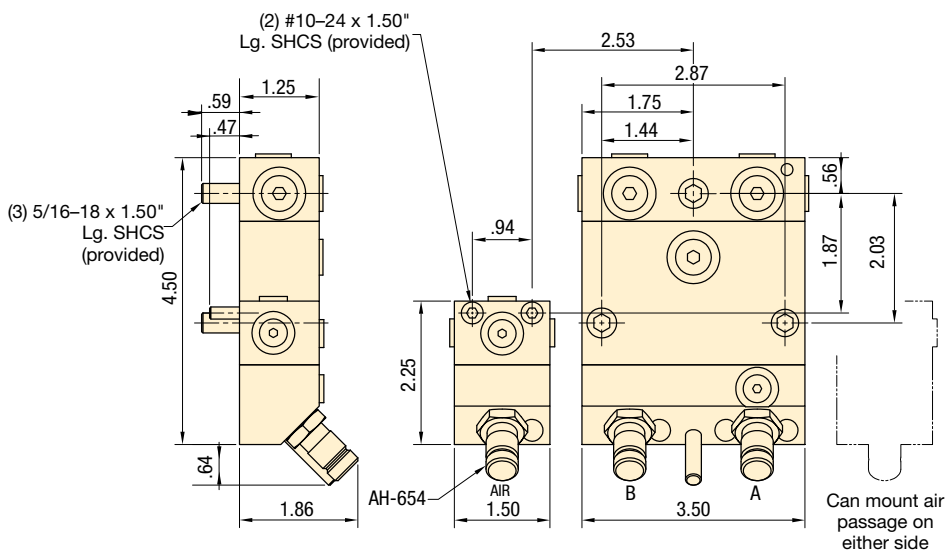
Linear Clamps

Power sources

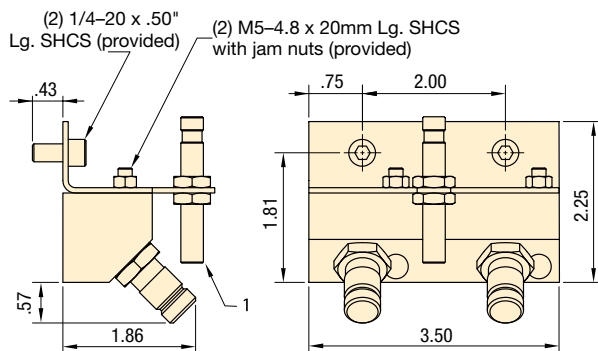
Valves

Pallet Components

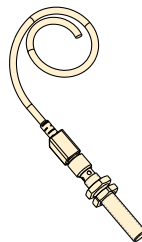
**MCRC-21 with MCRA-11**



**MCSB-21 Storage block**

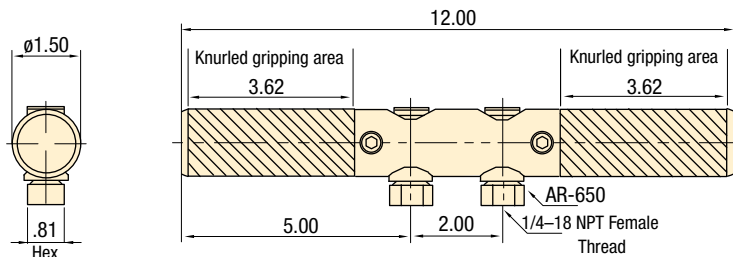


**MCPS-21 Optional proximity switch**

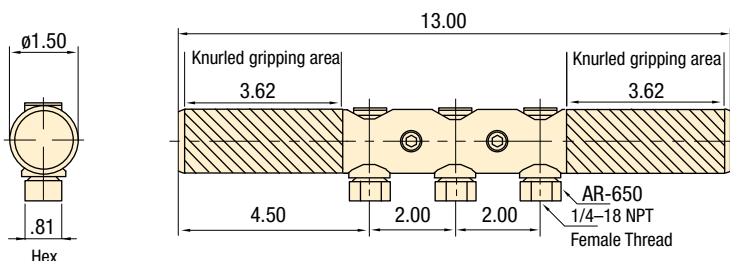


① Optional proximity switch is available. See MCPS-21

**MCH-21 Operator handle**



**MCH-31 Operator handle**



Max. Flow: 4 GPM

Pressure: 0-5000 psi

- E** Acopladores manuales
- F** Manuel coupleur
- D** Manuelle kupplung

**Options**

**FZ Series fittings**

▣ 194 ▶



**Hoses and couplers**

▣ 192 ▶



**Pilot operated check valves**

▣ 153 ▶



**Accumulators**

▣ 162 ▶



**Important**

Do not couple or uncouple with the hydraulic nozzles under pressure. This can damage the couplers.

Do not exceed maximum flow and pressure.

# Manual Couplers *Mounting patterns*

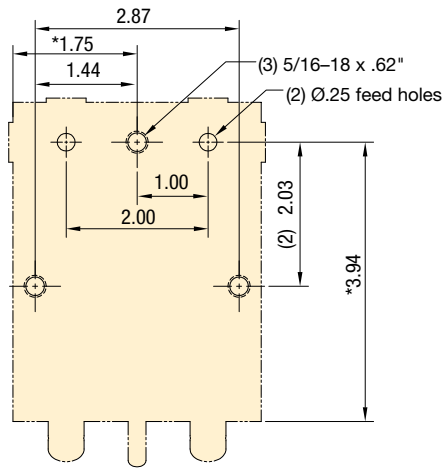
Shown: MCR-21



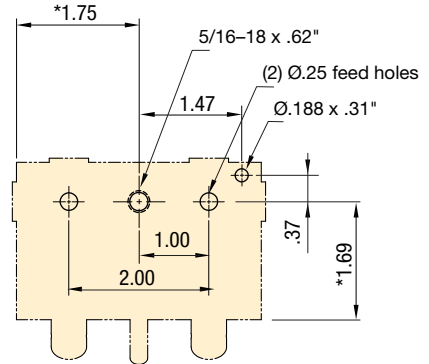
## **MCR series**

The MCR-21 two passage receiver features multiple SAE #4 ports as well as manifold mount ports for easy plumbing to a fixture. Internal filtration in all receiver models protects the circuit from external contamination.

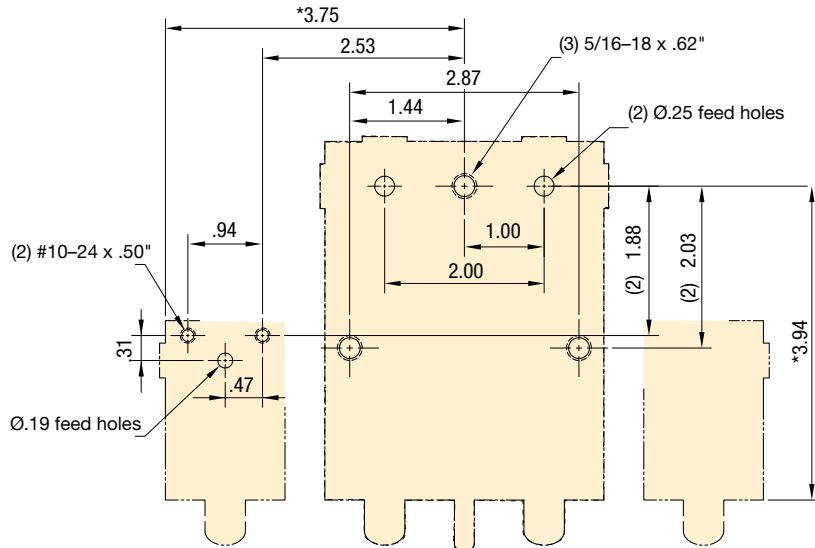
**MCR-21 Receiver with P.O. check – Mtg. hole pattern**



**MCR-21 Receiver without P.O. check – Mtg. hole pattern**

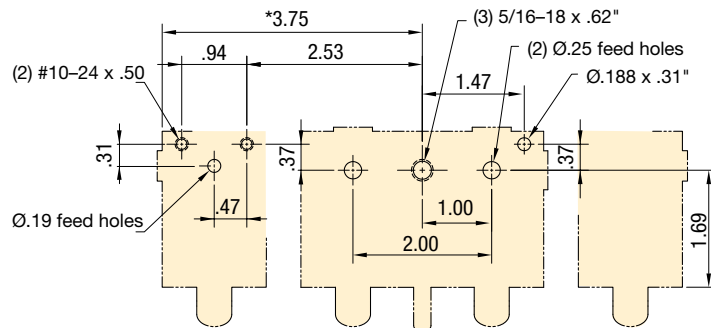


**MCRC-21 with MCRA-11 Receiver with air passage and with P.O. check – Mtg. hole pattern**



Can mount air passage on either side.

**MCR-21 with MCRA-11 Receiver with air passage and without P.O. check – Mtg. hole pattern**

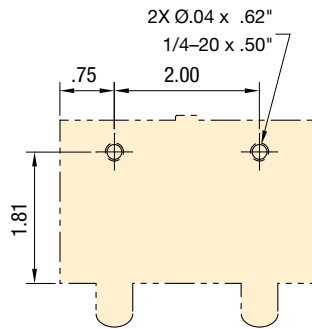


Can mount air passage on either side.

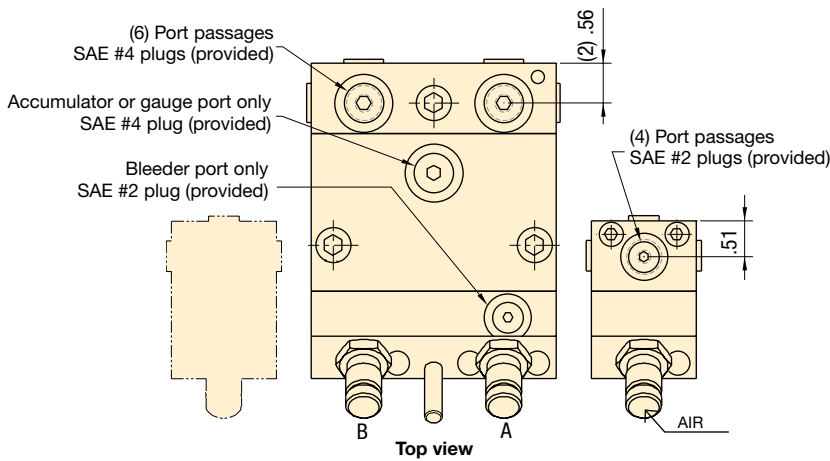
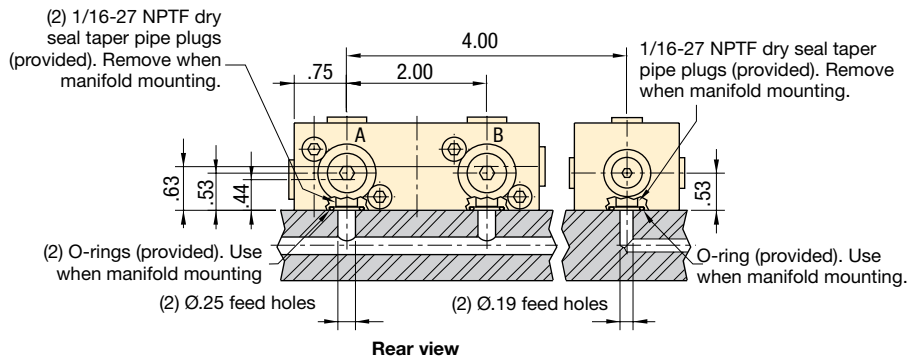
\* Minimum from edge of tool plate

Collet-Lok® product line  
Swing clamps  
Work supports  
Linear Clamps  
Power sources  
Valves  
Pallet Components

**MCSB-21** Storage Block – Mounting Hole Pattern



**Manifold and Port Dimensions**




**Max. Flow: 4 GPM**


**Pressure: 0-5000 psi**

- E** Acopladores manuales
- F** Manuel coupleur
- D** Manuelle kupplung

**Options**

**FZ Series fittings**  
  
 194 ▶

**Hoses and couplers**  
  
 192 ▶

**Pilot operated check valves**  
  
 153 ▶

**Accumulators**  
  
 162 ▶

**Important**

**Do not couple or uncouple with the hydraulic nozzles under pressure. This can damage the couplers.**

**Do not exceed maximum flow and pressure.**

# Activator wand and booster

Shown: RA-1061, B-81



## B and RA series

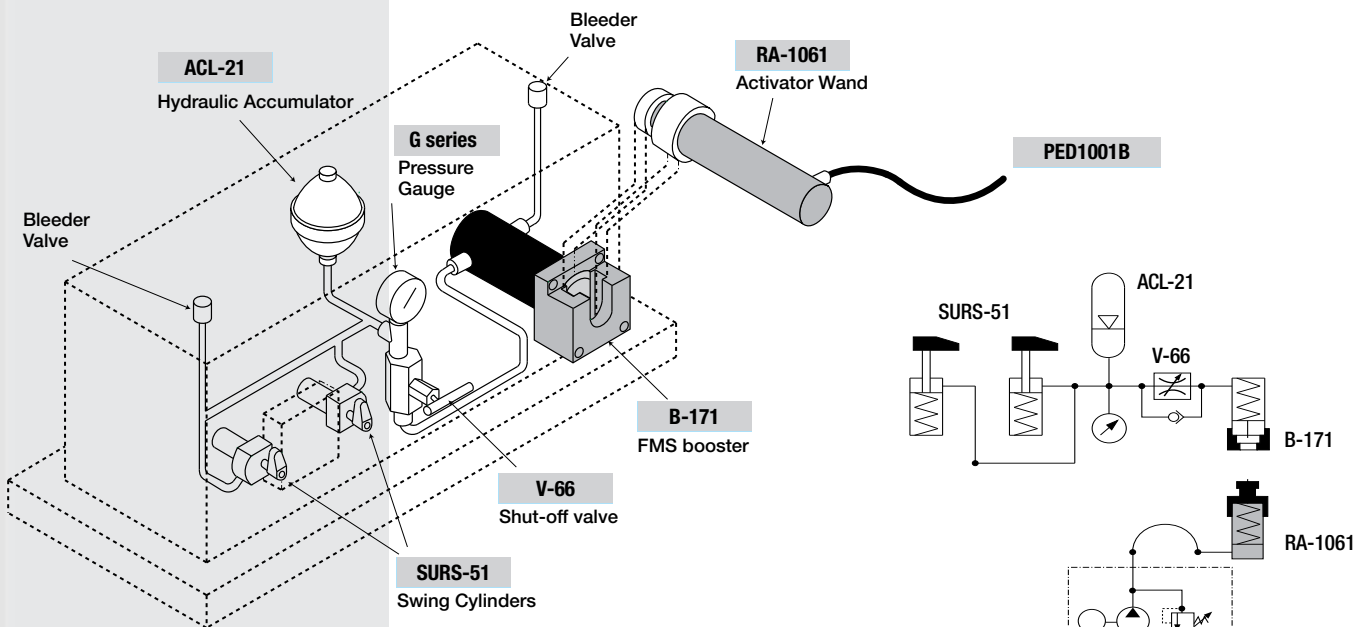
Mechanical energy transfer system uses external cylinder to operate receiver booster.

## Contamination resistant closed hydraulic system

- No-leak palletized system, eliminates oil loss at connection point
- Closed design prevents machining chips and coolant from entering the hydraulic circuit
- Booster can be mounted in either horizontal or vertical position for flexible fixture design

## Hydraulic system schematics

The Activator Wand RA-1061 is placed into the receiver booster B-81 or B-171. The mechanical transfer of force from the activator wand plunger to the booster piston provides oil flow to the system.



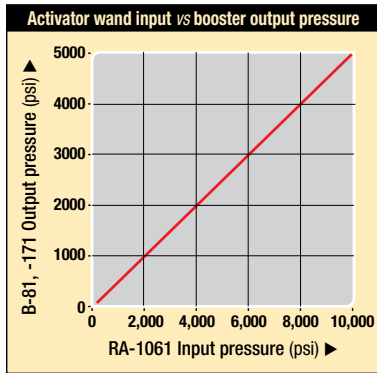
A manually placed Wand and Booster system is used to clamp the castings in this machining fixture.



## Product selection

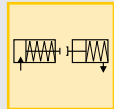
Pressure ratio	Oil flow ratio	Oil volume per stroke	Stroke	Model number	Effective area	Operating pressure	
		in <sup>3</sup>	in		in <sup>2</sup>	psi	lbs
<b>▼ Receiver booster</b>							
2:1	1.75:1	8.10	2.04	<b>B-81</b>	3.98	400-5000	12.7
2:1	1.75:1	17.10	4.30	<b>B-171</b>	3.98	400-5000	15.7
<b>▼ Activator wand</b>							
-	-	9.90	4.44	<b>RA-1061</b>	2.23	800-10,000	11.3

Collet-Lok® product line  
Swing clamps  
Work supports  
99\_078  
Linear Clamps  
Power sources  
Valves  
Pallet Components



- Ratio: 2:1
- Stroke: 2.04-4.44 inch
- Pressure: 400-5000 psi

- E** Multiplicadores
- F** Multiplicateur
- D** Betätigungszyylinder und Druckverstärker



**Options**

**Fittings**

194 ▶



**Hoses and couplers**

192 ▶



For 10,000 psi pumps, refer to the Enerpac Industrial Tools Catalog E327.



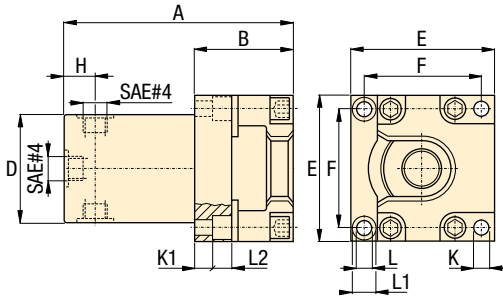
Existing fixtures with manual-connect single-acting circuits can be easily upgraded into the wand and booster.

**Important**

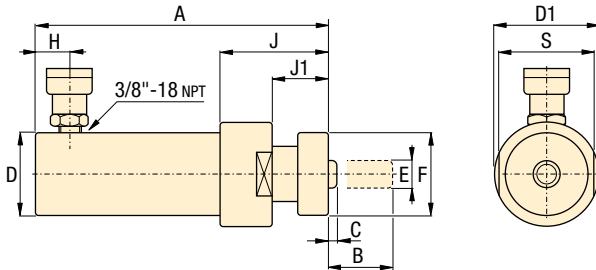
The activator wand has a 2 to 1 ratio of input pressure versus output force.

The booster output flow is 1.75 times the wand input flow.

**B-81, -171**



**RA-1061**



**Product dimensions** in inches [ ]

Model number	A	B	C	D	D1	E	F	H	J	J1	K	K1	L	L1	L2	S
<b>▼ Receiver booster</b>																
<b>B-81</b>	6.86	2.74	1.74	3.00	-	4.00	3.25	1.12	-	-	.41	2.26	.41	.62	.42	-
<b>B-171</b>	9.12	2.74	1.74	3.00	-	4.00	3.25	1.12	-	-	.41	2.26	.41	.62	.42	-
<b>▼ Activator wand</b>																
<b>RA-1061</b>	11.62	4.63	.19	2.25	3.00	.75	2.32	.75	3.02	1.53	-	-	-	-	-	2.75

Shown: WCA-62, WPA-62



▶ The automatic coupler system allows connection and disconnection of palletized hydraulic circuits. This system eliminates the direct intervention of an operator, allowing hands free, safe functioning of the process. Typical systems include one base station located at the load/unload station operating one or more pallet receivers.

■ ACCB-2 Control shown with ZW4020HJ-FHLT12U300 Pump.



■ A 4-way auto coupler is connected to the receiver, mounted on the side of a palletized fixture.



## For automated coupling of hydraulic circuits on palletized systems

- Sensing feedback of coupler position allows for fully automated applications
- Horizontal or vertical mounting for flexible installation on machine tools
- Available as 2 or 4 port model to provide a solution to various hydraulic circuit needs
- Adjustment stroke allows clearance for pallet indexing
- Coupler elements supplied with air blow-off nozzles to prevent damage from contamination
- Automatic coupler control box provides pre-programmed safety features to insure proper sequencing of automatic coupler and fixture operations



### ACCB-2, Automatic coupler control box

175 ▶

- Provides automatic or manual control of your 2 or 4 port auto coupler station.
- Panel view informs when auto coupler is retracted or advanced and whether fixture is unclamped or clamped.
- Includes 2 pressure switches, 3 proximity switches.
- Pressure switches monitor clamping and unclamping system pressure.
- Proximity switches inform PLC when auto coupler is advanced or retracted and when pallet is in position for the auto coupling.
- Integrates with ZW4020HJ-FHLT12U300 and ZW5020HJ-FHLT12U300 pumps.

## Product selection

Station position	Model number <sup>1)</sup>	Adjustable stroke	Oil capacity		Maximum oil flow <sup>2)</sup>
			in <sup>3</sup> advance	in <sup>3</sup> retract	
		in	advance	retract	in <sup>3</sup> /min
<b>▼ 2 port auto coupler</b>					
Base	<b>WCA-62</b>	.20 - .59	.66	.66	60
Base	<b>WCA-82*</b>	4.10 - 4.48	.66	.66	60
Pallet	<b>WPA-62</b>	-	-	-	-
<b>▼ 4 port auto coupler</b>					
Base	<b>WCA-64*</b>	.20 - .59	.66	.66	60
Pallet	<b>WPA-64*</b>	-	-	-	-

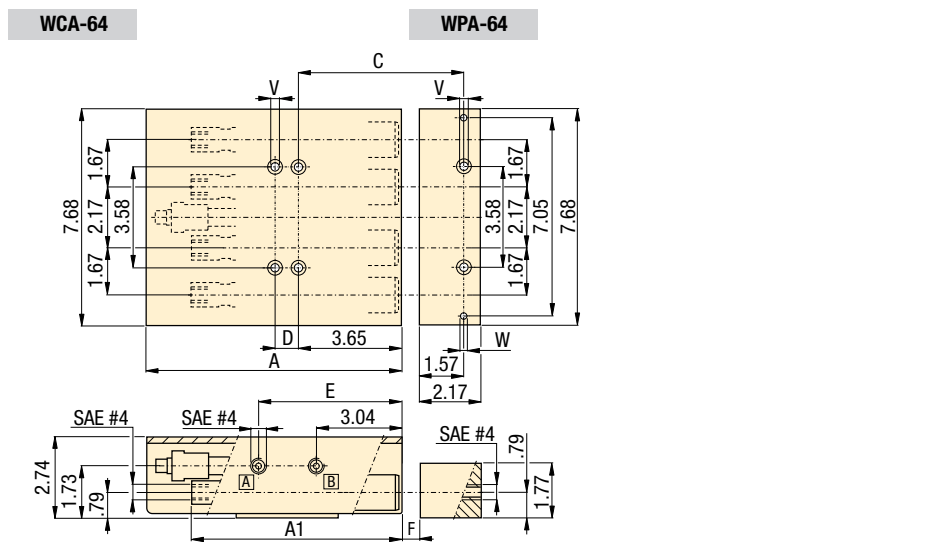
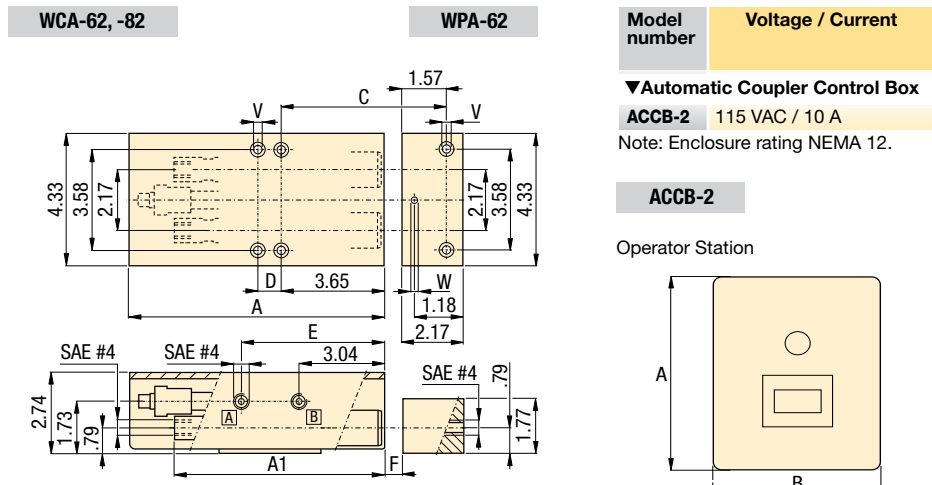
<sup>1)</sup> For additional pallet clearance, WCA-82 long stroke model are available.

<sup>2)</sup> Maximum oil flow of coupler elements is 4.3 GPM.

\* This product is made to order. Please contact Enerpac for delivery information before specifying in your design.

**Product specifications**

Model number	Required radial alignment accuracy in	Operating pressure psi	Hydraulic nozzle model number (included)	Air blow-off fitting model No. (included)	Recommended alignment tool
<b>▼ 2 port auto coupler</b>					
WCA-62	± .02	580 - 5000	CDF-6	FZ-2050	AT-1
WCA-82	± .02	580 - 5000	CDF-6	FZ-2050	AT-2
WPA-62	± .02	580 - 5000	CDM-6	FZ-2050	AT-1
<b>▼ 4 port auto coupler</b>					
WCA-64	± .02	580 - 5000	CDF-6	FZ-2050	AT-1
WPA-64	± .02	580 - 5000	CDM-6	FZ-2050	AT-1



**Product dimensions in inches [ ]**

Model number	A	A1	B	C	D	E	F max.	V <sup>1)</sup> for mounting bolts thread x length	W <sup>2)</sup>	lbs
<b>▼ 2 port auto couplers</b>										
WCA-62	8.86	7.48	-	5.42	.83	5.09	.394-.413	.312-18UN x 3.00	-	16.8
WCA-82*	15.67	14.03	-	9.36	3.94	8.20	3.70	.312-18UN x 3.00	-	28.8
WPA-62	-	-	-	-	-	-	-	.375-16UN x 2.00	.23	4.0
<b>▼ 4 port auto couplers</b>										
WCA-64*	8.86	7.48	-	5.42	.83	5.09	.394-.413	.312-18UN x 3.00	-	29.1
WPA-64*	-	-	-	-	-	-	-	.375-16UN x 2.00	.23	6.6
<b>▼ Automatic coupler control box<sup>3)</sup></b>										
ACCB-2	13.78	-	11.81	-	-	-	-	-	-	30.0

<sup>1)</sup> Mounting bolts are not included. <sup>2)</sup> Drill dowel pin holes after installing WPA.  
 \* This product is made to order. Please contact Enerpac for delivery information before specifying in your design.

- Connection: 2-4 ports
- Stroke: .20-4.48 inch
- Pressure: 580-5000 psi

- Acopladores automáticos
- Coupleurs automatiques
- Automatische Kupplungen

**Options**

**High pressure filters**

193

**AT series alignment tool**

Use the AT series alignment tool to adjust the position of the pallet station in relation to the base station.

**Hoses and couplers**

192

**Important**

Use high pressure filters on pallet station outlet ports, to avoid contamination of pallet mounted valves and cylinders.

To guarantee leakage free connections, accurate positioning of the pallet and base stations is crucial. Carefully read the instruction manual included with the product.

Do not couple or uncouple with the hydraulic nozzles under pressure. This could damage the internal coupler seals.

Do not exceed maximum flow and pressure.

Pallet components System components Yellow pages

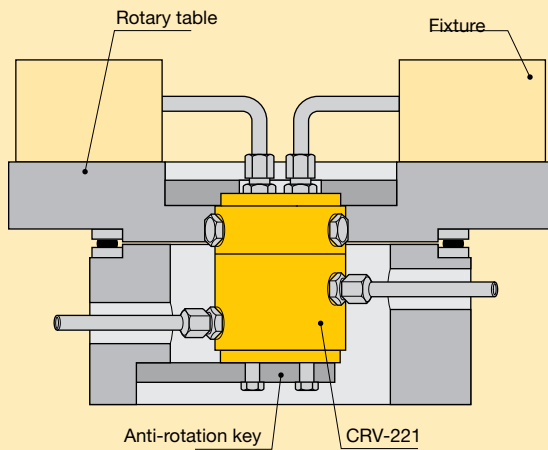


# Rotary couplers *Application & selection*

Shown: CRV-221, CR-111



▶ **Rotary couplers are specially designed unions to transfer pressurized fluid from a stationary supply line to a rotating device. Used for workholding or clamping device such as fixtures installed on rotating index tables.**



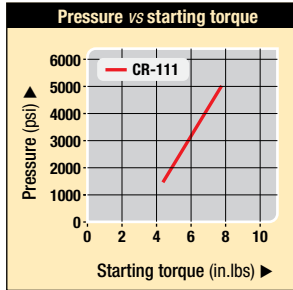
■ *In this application eight CRV-221 rotary couplers are installed to power the individual presses of an eight station rotary press table.*



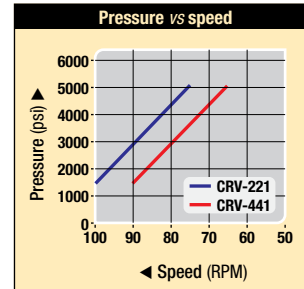
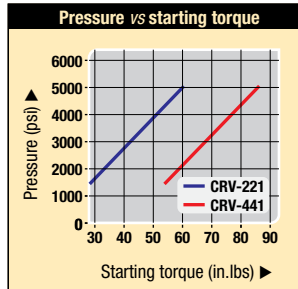
## Permanent hydraulic connection on indexing and rotating work stations

- High rotation per minute
- Low starting torque
- Internal oil bearings for increased lifetime
- Manifold mounting adaptors available to reduce fixture plumbing

### ▶ Starting torque and speed diagrams



Max. operating speed = 30 RPM.



Oil loss CRV-221 = 1.22 in<sup>3</sup>/h, CRV-441 = 2.44 in<sup>3</sup>/h

### ▶ Product selection

No. of radial passages	Model number <sup>1)</sup>	Operating pressure range psi	Maximum speed RPM		Starting torque in.lbs	
			1500 psi	5000 psi	1500 psi	5000 psi
			1	<b>CR-111</b>	1500-5000	30
2	<b>CRV-221</b>	1500-5000	100	75	27	60
4	<b>CRV-441</b>	1500-5000	90	65	53	182

<sup>1)</sup> Before selecting, note the starting torque and speed diagrams above.

### ▶ Manifold mounting adaptor



#### Mounting adaptor AMP-2, AMP-4

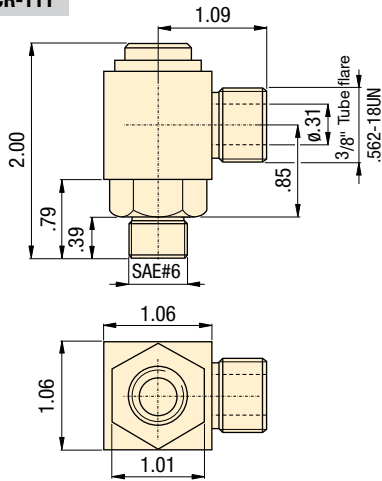
Mounts onto end of two and four passage rotary unions. Allows O-ring mounting directly to fixture.

### ▶ Product selection

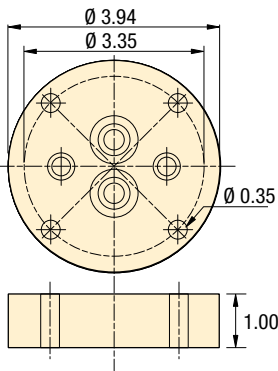
Number of radial passages	Model number	Operating pressure range	Used with
		psi	
2	<b>AMP-2</b>	1500-5000	CRV-221
4	<b>AMP-4</b>	1500-5000	CRV-441

**Product dimensions** in inches [  ]

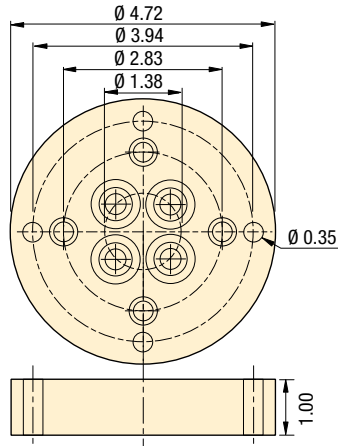
**CR-111**



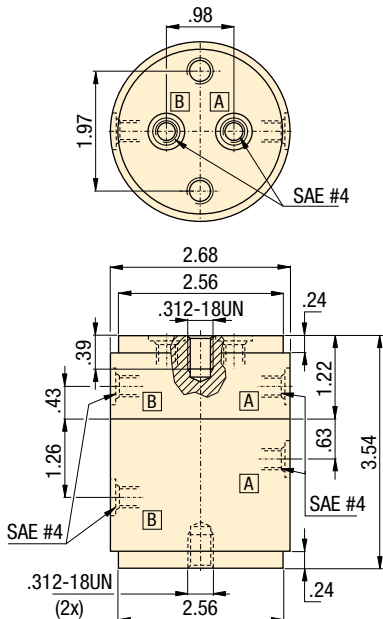
**AMP-2**



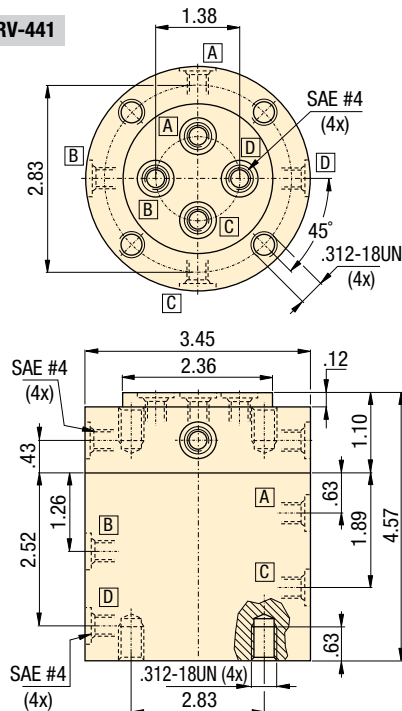
**AMP-4**



**CRV-221**



**CRV-441**



Passages: 1-4 lines

Speed: 30-100 RPM max.

Pressure: 1500-5000 psi

- E** Acoplamiento giratorio
- F** Joints tournants
- D** Drehdurchführungen



**Options**

Fittings

 194



Couplers

 192



Hoses and couplers

 192



**Important**

Before selecting, note the pressure versus starting torque diagrams.

Rotary couplers must be mounted in the center of rotation of the installation.

Anti-rotation keys should be utilized.

For proper application, clamp force, pressures and timing, consult Enerpac for support.

Shown: PID-401



## PID series

When hydraulic pressure from an existing power source is limited, Enerpac oil-to-oil intensifiers serve to increase output pressure to satisfy the required application.

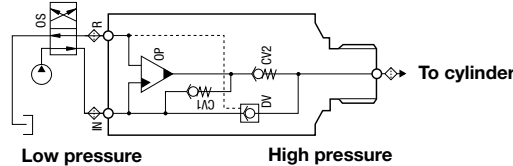
## High flow units intensify low inlet oil pressure to high outlet pressure

- Internal bypass valving enables high output flow rates
- Wide range of intensification ratios allows for adapting to various operating pressure requirements
- Compact and self-contained design allows for ease of installation
- Includes dump valve eliminating the need for an external pilot check valve
- Select fit of all internal components provides long operating life

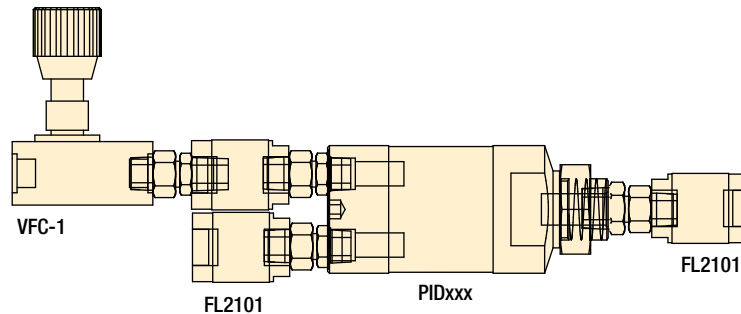
## Intensifier principle

- When oil is supplied to the inlet (IN) port it flows freely past the check valves (CV) and the dump valve to the cylinder and advances it.
- As the inlet pressure increases the oscillating pump (OP) automatically increases the outlet pressure by the chosen intensification.
- Once the maximum pressure is reached, the pump frequency lowers and balances at the maximum pressure.
- Free flow from the cylinder to tank occurs when the directional control valve is switched to supply the R-port.
- 10 micron filtration is required on all ports in the circuit to ensure trouble free operation. Filters and flow control included.

### PID Series



### PID-xxxF intensifier



■ PID-Series intensifier utilizes low pressure machine hydraulics to power clamping cylinders.



## Product selection

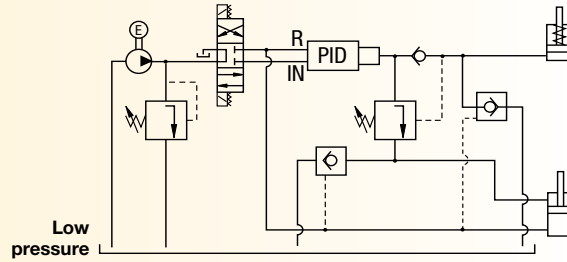
Maximum pressure	Pressure intensification ratio	Maximum input flow	Maximum output flow	Model number	Inlet pressure range	lbs
psi		in <sup>3</sup> /min	in <sup>3</sup> /min	with dump valve	psi	
10,000	1 : 3.2	610	150	PID-321F	300 - 1560	2.6
10,000	1 : 4.0	580	120	PID-401F	300 - 1250	2.6
10,000	1 : 5.0	550	95	PID-501F	300 - 1000	2.6
10,000	1 : 6.6	530	75	PID-661F	300 - 750	2.6

\* Operating pressures above 5000 psi require high pressure fittings or intensifier models with BSPP ports. Contact Enerpac for details.

**i System set-up information:**

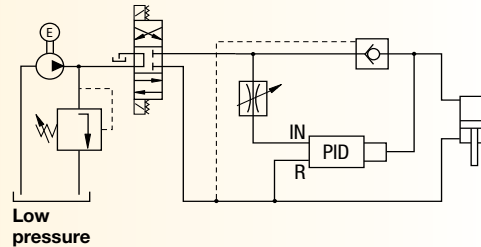
**With dump valve (PID models)**

The intensifier with the dump valve is used to achieve high pressure on the advance side of a double-acting cylinder.

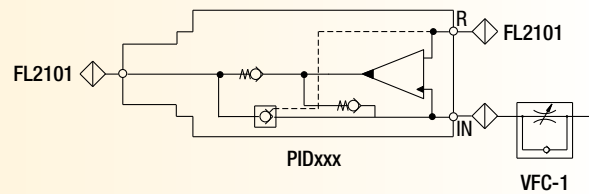


**With external dump valve**

In a system where the pump's oil flow is higher than the maximum inlet oil flow of the intensifier, an external check valve and flow control valve reduces the pump's oil flow.



This application can be set up when machines are equipped with low pressure hydraulics but the pressure to clamp the workpiece must be higher.



Ratio: 1:3.2-1:6.6

Flow: 75-150 in<sup>3</sup>/min

Pressure: 960-10,000 psi

- E** Multiplicadores
- F** Multiplicateur
- D** Öl-Öl Druckübersetzer



**Options**

**FL-series, high-pressure filters**

193 ▶



**Directional valves**

135 ▶



**FZ-series fittings**

194 ▶



**! Important**

Do not exceed maximum allowable inlet pressure.

10 micron filtration is included to ensure trouble-free operation.

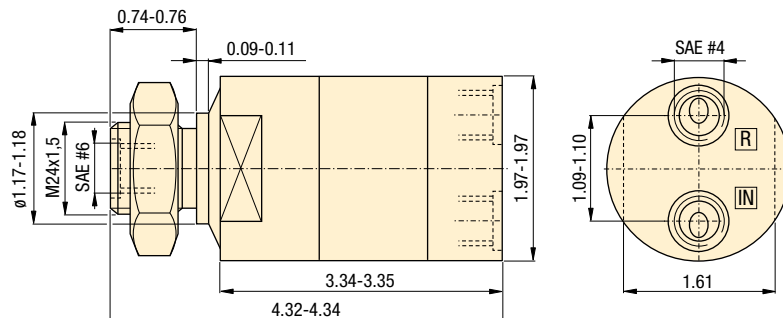
Applications above 5000 psi require high pressure fittings or intensifier models with BSPP ports. Contact Enerpac for details.

PID models with dump valve provide an economical means of relieving pressure from the system.

Can be panel mounted into machine (M24x1,5 thread).

**A Product dimensions in inches [ ]**

**PID series**



Shown: SLS-2



▶ SafeLink provides wireless communication between the fixture mounted SEND unit and the machine control interfaced RECEIVE unit.

A pressure switch is used on the fixture to monitor the circuit pressure. If the pressure switch on the fixture goes open, the RECEIVE unit communicates the changed status to the machine control through either 24 VDC, Modbus RTU RS485 or Ethernet IP protocol or Modbus TCP/IP.

The machine control would interrupt the machining process. The SEND unit can also be used with limit switch based position sensing clamps to verify clamped or unclamped status for robotically loaded systems.

## WIRELESS communication between a fixture circuit and the machine control

- Fixture mounted “SEND” unit uses radio communication to monitor pressure and/or clamp position
- 2.4 GHz Frequency Band for global acceptance
- “Frequency Hopping” used to for signal stability, even in busy production environments
- “SEND” units are easily reassigned to a different “RECEIVE” unit so fixtures can be moved between machines
- No limit to the number of systems used in a production area
- “SEND” units are internally powered by a replaceable 3.6 VDC Lithium battery – provides up to 3-year battery life
- “SEND” units are sealed to IP-67 for protection from contamination and coolant
- LED lights for visual status indication
- LCD Display window for set-up and status display

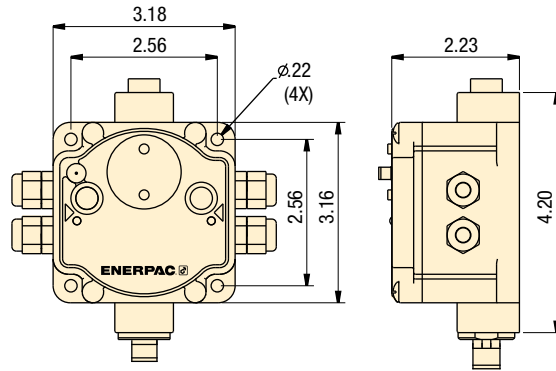
Model Number	Description
SLS-1	“SEND” Unit with Internal Antenna
SLS-2	“SEND” Unit with External Antenna
SLS-3	“SEND” Unit with External Antenna, 3 Inputs
SLR-1	“RECEIVE” Unit with External Antenna
SLR-2	“RECEIVE” Unit with External Antenna, 3 Inputs
SLS-2AC	.2m Antenna Cable
SLEM-1	Expansion Module for SLR
SLEB-1	Ethernet Bridge for SLR-1
SLSC-1	Power and Communication Splitter Cable for SLEB-1
SLDB-1	DIN Rail Mounting Bracket

## Product specifications

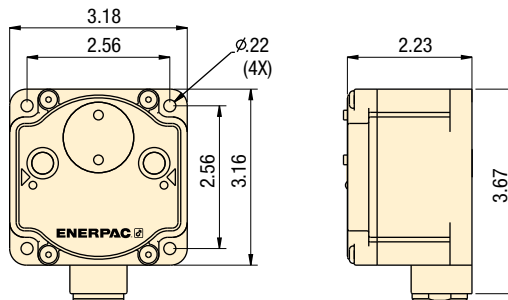
IP Rating	Radio Frequency	Transmit Power	Input Power for RECEIVE Unit	Outputs	FCC Rating	Receiver Communication Protocols	Additional Outputs available from Receiver
IP 67	2.4 GHz	21 dBm	+10 VDC	+24 VDC	FCC	Modbus	24 VDC
		conducted	to		Part 15,	RTU RS485	
			+30 VDC		Subpart C,		
					15.247	Ethernet IP	
Dust tight,	Global		Supplied	NMOS			Max
immersion	Standard		by machine	Sinking		Modbus	from
up to 1			control			TCP/IP	Receiver:
meter							6

Collet-Lok® product line  
Swing clamps  
Work supports  
Linear Clamps  
Power sources  
Valves  
Pallet Components

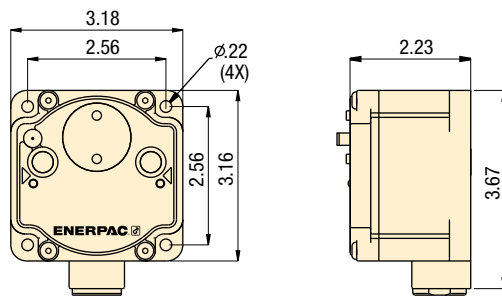
**SLR-1 / SLR-2 RECEIVE UNIT**



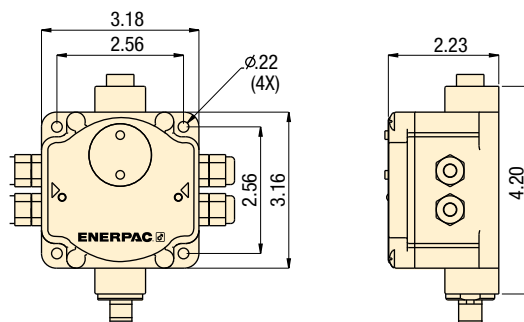
**SLS-1 SEND UNIT**



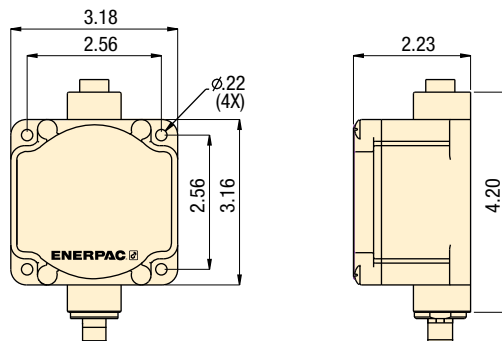
**SLS-2 / SLS-3 SEND UNIT**



**SLEM-1 EXPANSION MODULE**



**SLEB-1 ETHERNET BRIDGE**



**Radio Frequency: 2.4 GHz**

**IP Rating: 67**

**Communication protocols:  
Modbus RTU RS485  
Ethernet TCP IP**

- E** Monitoreo Inalámbrico
- F** Contrôle sans fil
- D** Drahtlose Überwachung

**! Important**

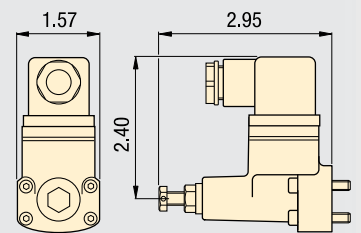
**A Pressure Switch is required to monitor the pressure in the fixture circuit. For a convenient manifold mount model, use the PSCK-8 or PSCK-9 from Enerpac.**

**Manifold Mount Pressure Switch**

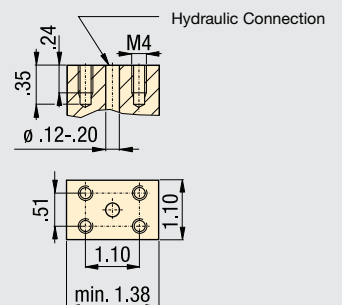
IP Rating: 65 (Dust and Water Jet)

PSCK-8: Range 1450-5000 psi (100-345 bar)

PSCK-9: Range 290-3045 psi (20-210 bar)



**Mounting Dimensions**

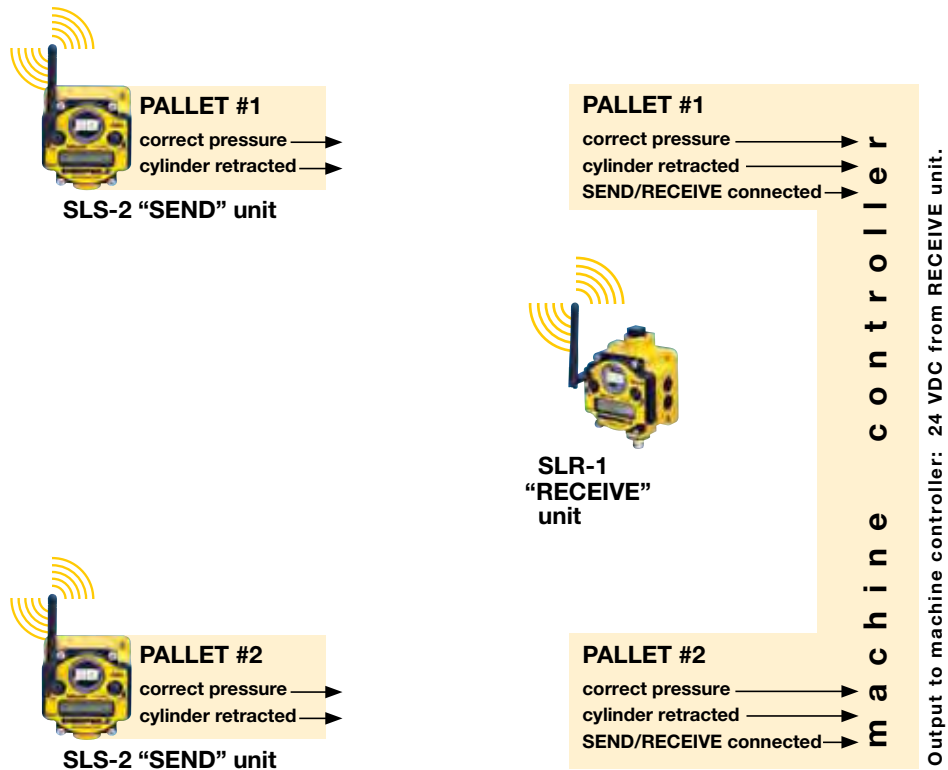


Shown: SLS-1

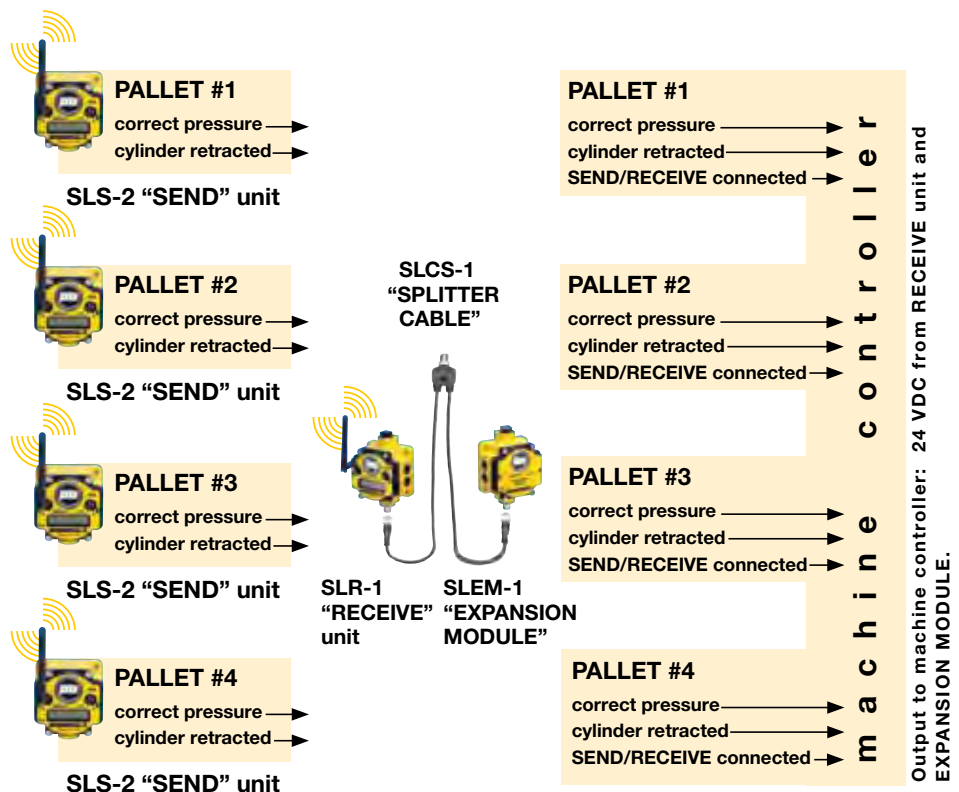


SafeLink can provide a discrete 24VDC output signal for systems of up to 4 fixtures. Each SEND unit can provide up to three outputs to the RECEIVE unit. The RECEIVE unit has 6 terminal stations, which are assigned to SEND units in groups of 3. So each RECEIVE unit can be paired with 2 SEND units when using the 24VDC output. For extra capacity, an EXPANSION MODULE provides an additional terminal strip, adding 2 more sets of three terminal stations.

## Basic System with I/O Machine Interface



## Larger System with I/O Machine Interface



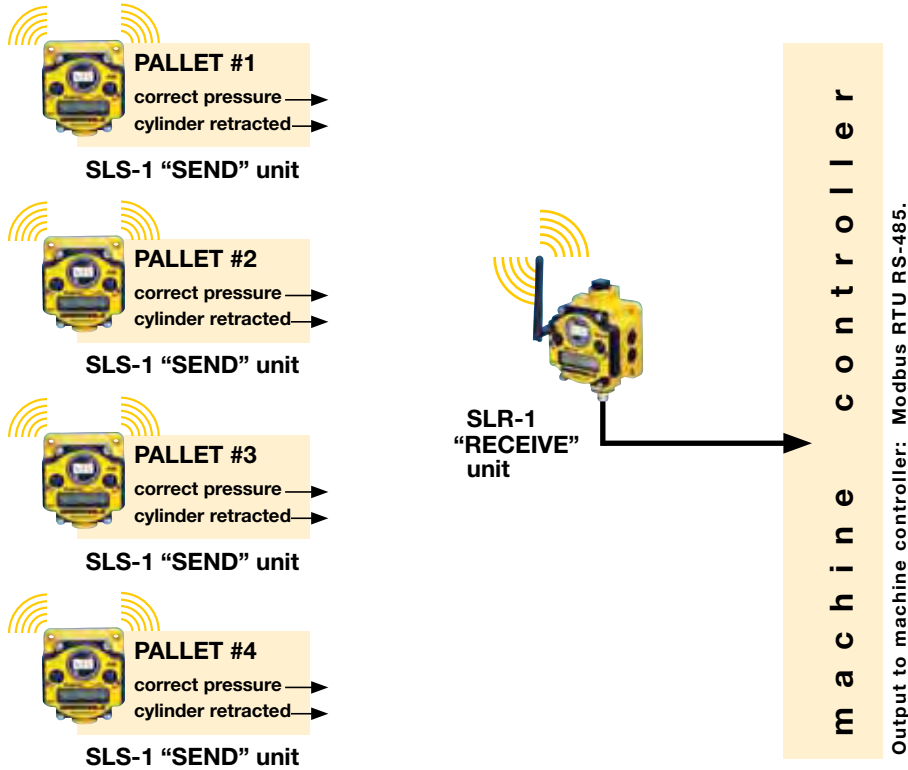
### SLCS-1 Splitter Cable

The SLCS-1 Splitter Cable is used with the SLEM-1 Expansion Module and the SLEB-1 Ethernet Bridge to connect to the SLR-1 RECEIVE unit and the machine control circuit.



Collet-Lok® product line  
Swing clamps  
Work supports  
Linear Clamps  
Power sources  
Valves  
Pallet Components

**Larger System with Modbus RTU Machine Interface**

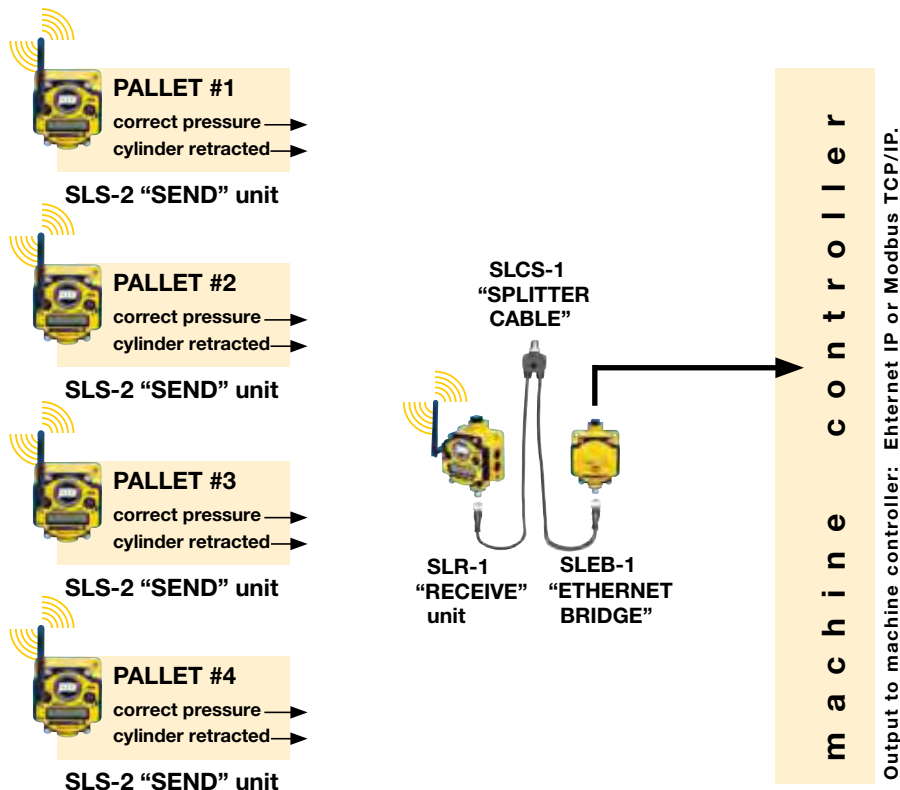


Shown: SLR-1



▶ SafeLink RECEIVE units can supply the outputs by using the standard Modbus RTU RS-485 protocol. This output uses the 5 pin connector on the RECEIVE unit. If Ethernet protocol is preferred, an ETHERNET BRIDGE is available to convert the Modbus RTU R-485 to ETHERNET IP or Modbus TCP/IP.

**Larger System with Ethernet IP Machine Interface**



Shown: SLEB-1



▶ The SLEB-1 Ethernet Bridge is used with the SLR-1 Receiver when Ethernet connection is available in the machine control. Use of the SLEB-1 will allow the monitoring of more fixtures in a large pallet pool system.



Shown: SLR-1



▶ SafeLink provides wireless communication between the fixture mounted SEND unit and the machine control interfaced RECEIVE unit. If the pressure switch on the fixture goes open, the RECEIVE unit communicates the changed status to the machine control through either 24 VDC Modbus RTU RS485 or Ethernet TCP IP protocol. The machine control would interrupt the machining process. The SEND unit can also be used with limit switch based position sensing clamps to verify clamped or unclamped status for robotically loaded systems.

## ▶ WHAT IS SAFE LINK?

SafeLink is a wireless way to communicate between a palletized fixture and a machine control.

## ▶ WHY USE SAFE LINK?

SafeLink can monitor the fixture pressure and clamp position in real time- even when parts are being machined. The system can also be used to verify that the operator has properly pressurized the fixture before it is sent in to be machined. If there is a pressure deficiency, the signal between the Send and Receive units is interrupted, and the machine control can respond before expensive damage occurs.

## ▶ HOW DOES SAFE LINK WORK?

SafeLink uses 2.4 GHz radios to allow the SEND unit on the fixture to communicate with the RECEIVE unit that is interfaced with the machine control. The RECEIVE unit provides both 24 VDC outputs and a standard Modbus RTU RS485 communication protocol. An optional Ethernet Bridge will convert this to an Ethernet TCP IP protocol. The machine control must be set up to respond to this protocol to initiate a Feed Hold command, turn on a warning light, or even activate a Machine Stop command.

A pressure switch for pressure monitoring or a limit switch for position sensing is used with the SEND unit. If the pressure or position is lost, the switch goes open and the signal to the RECEIVE unit is interrupted.

## ▶ WHAT POWERS THE SEND UNIT?

The SEND unit uses a 3.6 VDC size D Lithium battery that is supplied with the unit.

Projected battery life is 3 years.

## ▶ WHAT POWERS THE RECEIVE UNIT?

The receive unit requires 24 VDC power, usually from the power supply in the machine control.

## ▶ WILL THE MACHINE FAULT IF THE PALLET IS IN THE LOADING STATION AND THE CLAMPS ARE UNCLAMPED?

The Receive unit is just an input source for the machine control. The machine control must be able to identify which fixture is in the machine being run and which one is in the loading station. When in the loading station, the machine control must be able to ignore the signal loss when the clamps are unclamped to remove the completed parts.

## ▶ HOW MANY FIXTURES CAN BE MONITORED BY ONE RECEIVE UNIT?

By using either Modbus RTU RS485 or Ethernet TCP IP, up to 56 SLS-1 or SLS-2 Send Units on fixtures can be monitored by a single SLR-1 Receive Unit.

## ▶ IS INSTALLATION AVAILABLE FROM ENERPAC?

Enerpac has partnered with a CNC control specialist that can quote custom installation services. Contact your Enerpac Territory Manager for details.

# SafeLink Monitoring System Worksheet

## SAFE LINK PALLET MONITORING SYSTEM

FOR CUSTOMERS WHO REQUIRE CUSTOM INSTALLATION OF THE ENERPAC SAFE LINK PALLET MONITORING SYSTEM, PLEASE PROVIDE THE FOLLOWING INFORMATION FOR EACH MACHINE TOOL TO BE EVALUATED:

COMPANY: \_\_\_\_\_ CITY, STATE, ZIP: \_\_\_\_\_  
 CONTACT: \_\_\_\_\_ CONTACT PHONE (EXT): \_\_\_\_\_  
 ADDRESS: \_\_\_\_\_ CONTACT EMAIL: \_\_\_\_\_

### BUDGET

BUDGET FOR CUSTOM INSTALLATION OF SAFE LINK SYSTEM ON THIS MACHINE TOOL:

\$500	\$1000	\$2500	\$5000+
-------	--------	--------	---------

### MACHINE INFORMATION

MACHINE MAKE	
MACHINE MODEL	
MACHINE SERIAL NUMBER	
MACHINE TYPE	
SINGLE BED HORIZONTAL MACHINING CENTER	
PALLET POOL CELL WITH HORIZONTAL MACHINING CENTERS	
NUMBER OF MACHINES IN CELL	
SINGLE BED VERTICAL MACHINING CENTER	
TWO PALLET VERTICAL MACHINING CENTER	
SLIDE BY	
VERTICAL TURRET LATHE (VTL)	
OTHER/DESCRIBE	
NUMBER OF FIXTURES ASSOCIATED WITH THIS MACHINE	
TOTAL NUMBER OF CIRCUITS IN FIXTURE GROUP	

### MACHINE CONTROL INFORMATION

MACHINE CONTROL/MAKE									
MACHINE CONTROL/MODEL NUMBER									
MACHINE CONTROL/SERIAL NUMBER									
MACHINE CONTROL INTERFACE AVAILABLE	<table border="1"> <tr> <td>MODBUS</td> <td>ETHERNET</td> <td>DEVICENET</td> <td>RELAY</td> </tr> <tr> <td>SERIAL RS-232</td> <td colspan="3">OTHER/DESCRIBE</td> </tr> </table>	MODBUS	ETHERNET	DEVICENET	RELAY	SERIAL RS-232	OTHER/DESCRIBE		
MODBUS	ETHERNET	DEVICENET	RELAY						
SERIAL RS-232	OTHER/DESCRIBE								
MACHINE CONTROL IP ADDRESS									
ACTION IF FAULT IS DETECTED	<table border="1"> <tr> <td>FEEDHOLD</td> <td>ACTIVATE A LIGHT</td> </tr> <tr> <td>MACHINE STOP</td> <td>OTHER/DESCRIBE</td> </tr> </table>	FEEDHOLD	ACTIVATE A LIGHT	MACHINE STOP	OTHER/DESCRIBE				
FEEDHOLD	ACTIVATE A LIGHT								
MACHINE STOP	OTHER/DESCRIBE								

CONTACT ENERPAC: INFO@ENERPAC.COM • PHONE 414-747-8315 • FAX 414-769-9247