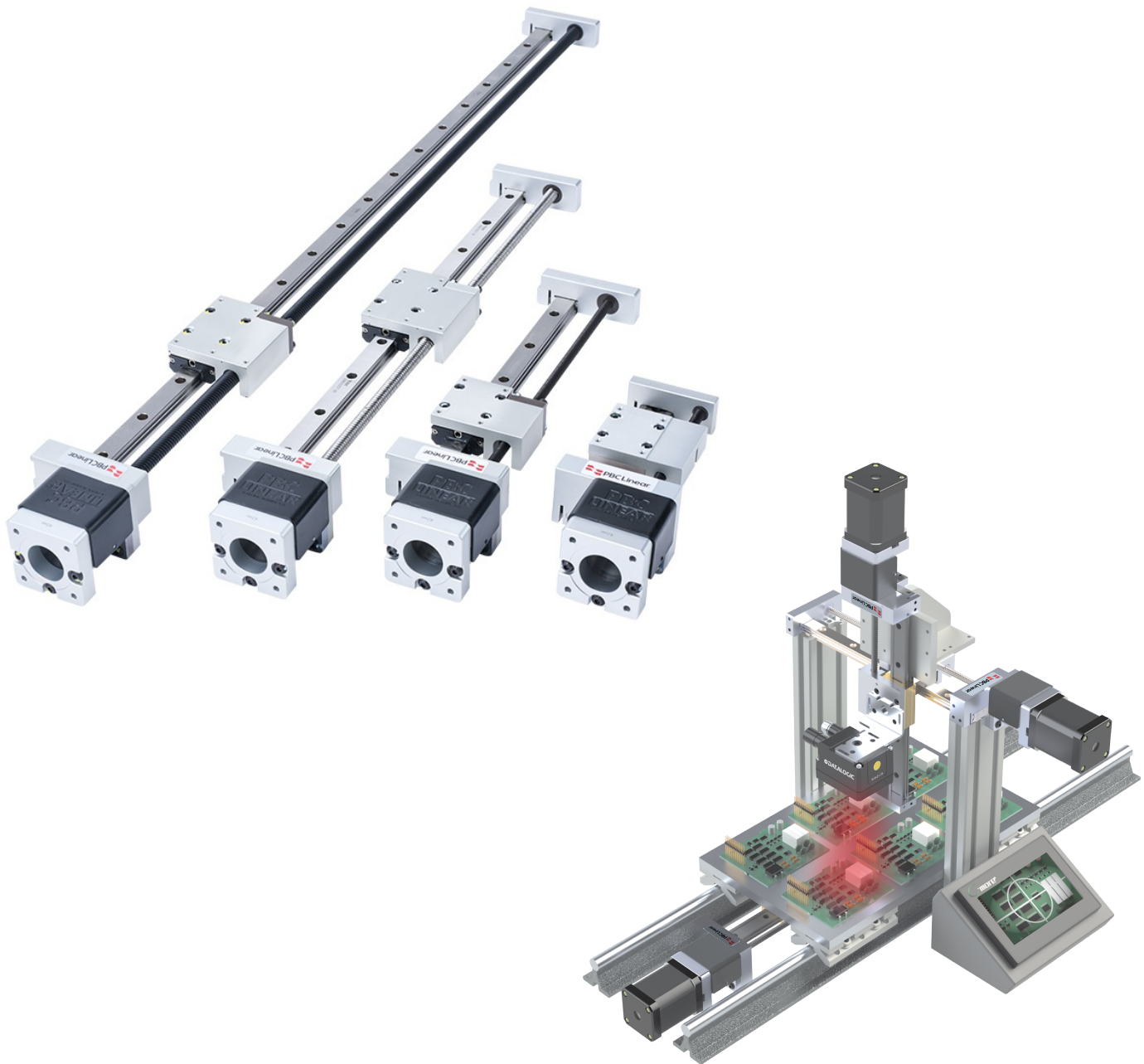


PBC CS SERIES XYZ GANTRY USER MANUAL



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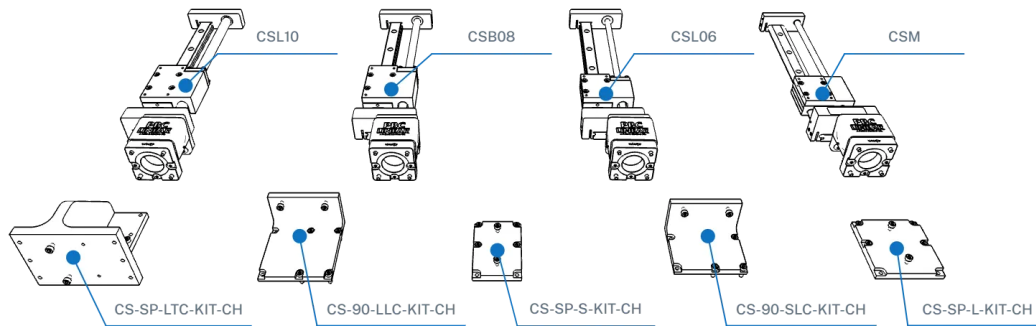
WARNING: Only qualified personnel may transport, assemble, operate, and maintain this equipment. Incorrect handling can result in equipment damage and personal injury.

- Always wear appropriate personal protective equipment, such as safety glasses.
- Turn power OFF and secure the load before any assembly or maintenance.
- Provide a flat, stable mounting surface and enough space for full carriage travel. Do not use the end blocks as hard stops.
- Compact Series actuators are not self-braking. A load can move if the motor or coupling is removed or power is lost, especially on a vertical axis. Fit an electromechanical power-off brake on vertical axes.
- Do not back-drive a lead screw or ball screw actuator by pushing the carriage by hand.
- Inspect the actuator regularly for worn or damaged components and replace them with parts of the same make and model.
- Always test run the actuator after maintenance.

Getting Started

What Is in the Box

A Compact Series (CS) actuator ships with the rail, carriage, drive, end blocks, and an installed motor mount: adapter plate, main frame, NEMA 17 (42mm) motor plate, and plastic cover. The motor, drive coupling, and gantry brackets are ordered separately. A 40mm servo or NEMA 23 motor needs the matching 3PMM motor plate in place of the installed NEMA 17 plate. Handle the actuator by the end blocks to avoid damaging the rail and drive.



COMPACT SERIES ACTUATOR TYPES

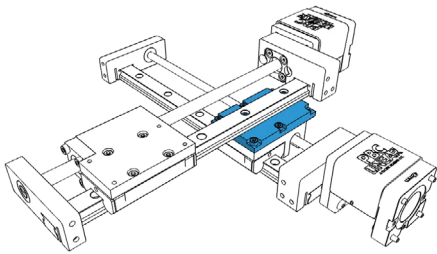
Type	Bearing	Drive	Carriage Length	Carriage Class	Stub Shaft
CSM	Plain bearing (FrelonGOLD)	6mm lead screw	45mm	Short	3.5mm
CSL06	Profile rail (ball bearing)	6mm lead screw	43mm	Short	3.5mm
CSL10	Profile rail (ball bearing)	10mm lead screw	60mm	Long	4mm
CSB08	Profile rail (ball bearing)	8mm ball screw	60mm	Long	4mm

Required for Every Driven Axis

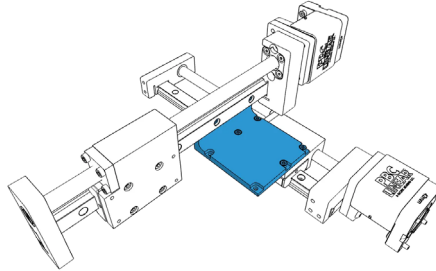
Item	Part Number	Notes
Motor	Customer supplied	NEMA 17 fits the installed plate. 40mm servo: order 3PMM-40A-KIT-CH. NEMA 23: order 3PMM-56A-KIT-CH.
Drive coupling, CSM and CSL06	RW-EKL-2-C-3.5-5 RW-EKL-2-C-3.5-6.35 RW-EKL-2-C-3.5-8	3.5mm actuator bore x 5mm motor shaft (NEMA 17) 3.5mm x 6.35mm [1/4in] motor shaft (NEMA 23) 3.5mm x 8mm motor shaft (40mm servo)
Drive coupling, CSL10 and CSB08	SHR-18C-4-8 SRB-16C-4-5 SRB-19C-4-6.35	4mm actuator bore x 8mm motor shaft (40mm servo) 4mm x 5mm motor shaft (NEMA 17) 4mm x 6.35mm [1/4in] motor shaft (NEMA 23)

Gantry Accessories

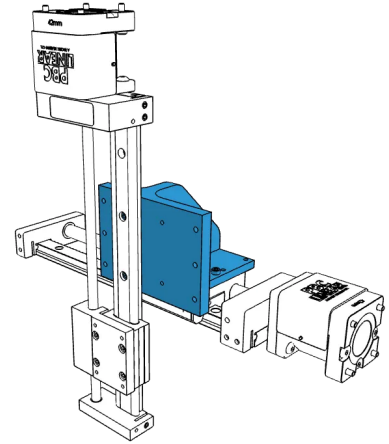
Five bracket kits join Compact Series actuators into XY, XZ, and XYZ configurations. Every Compact bracket is a rail-to-carriage joint. The bracket bolts down onto the lower carriage, and the rail of the upper actuator bolts onto the bracket. The upper carriage stays free to carry the next axis or the tooling. Brackets are sized to the carriage. Short-class brackets fit CSM and CSL06 carriages; long-class brackets fit CSL10 and CSB08 carriages.



Saddle plate, XY ([CS-SP-S-KIT-CH](#),
[CS-SP-L-KIT-CH](#))



90° angle bracket ([CS-90-SLC-KIT-CH](#),
[CS-90-LLC-KIT-CH](#))



90° plate with gusset, vertical Z
([CS-SP-LTC-KIT-CH](#))

Kit Selection

Joint	Lower Carriage	Kit
Saddle plate (XY)	CSM or CSL06 (short)	CS-SP-S-KIT-CH
Saddle plate (XY)	CSL10 or CSB08 (long)	CS-SP-L-KIT-CH
90° angle bracket	CSM or CSL06 (short)	CS-90-SLC-KIT-CH
90° angle bracket	CSL10 or CSB08 (long)	CS-90-LLC-KIT-CH
90° plate with gusset (vertical Z)	CSL10 or CSB08 (long)	CS-SP-LTC-KIT-CH

Kit Contents

Kit	Includes
CS-SP-S-KIT-CH	(1) short saddle plate, 64.5 x 43 x 7mm; (6) SHCS M3-0.5 x 10mm
CS-SP-L-KIT-CH	(1) long saddle plate, 64.5 x 60 x 7mm; (6) SHCS M3-0.5 x 10mm
CS-90-SLC-KIT-CH	(1) short 90° angle bracket, 51 x 61mm base, 64 x 32mm face; (6) SHCS M3-0.5 x 10mm
CS-90-LLC-KIT-CH	(1) long 90° angle bracket, 66 x 61mm base, 64 x 32mm face; (6) SHCS M3-0.5 x 10mm
CS-SP-LTC-KIT-CH	(1) 90° plate with 45° gusset, 87.5 x 78.5mm overall; (6) SHCS M3-0.5 x 10mm
3PMM-40A-KIT-CH	(1) 40mm motor plate; (2) SHCS M4-0.7 x 10mm
3PMM-42A-KIT-CH	(1) NEMA 17 motor plate (spare; one is installed on every actuator); (2) SHCS M3-0.5 x 14mm; (2) SHCS M3-0.5 x 16mm
3PMM-56A-KIT-CH	(1) NEMA 23 motor plate; (4) SHCS M5-0.8 x 12mm



NOTE: Apply low-strength threadlocker to all bracket fasteners. Fasten each bracket to the lower carriage first, then set the upper actuator on the bracket and fasten its rail through the rail counterbores.

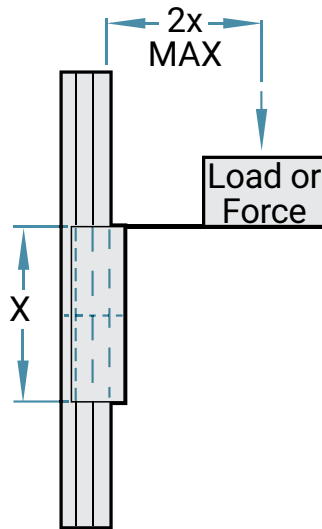
Mounting the Actuator

Compact Series rails mount through the counterbored holes in the rail with M3 SHCS. The number of counterbores depends on the rail length. Use every counterbore when mounting a rail to the base. No base bracket is needed.

1. Provide a flat mounting surface. Profile rail actuators (CSL06, CSL10, CSB08) need flatness within 0.060mm over 200mm.
2. Set the rail on the surface and mark the hole positions through the counterbores.
3. Drill and tap an M3-0.5 hole at each mark.
4. Fasten the rail through every counterbore with M3 SHCS. Apply low-strength threadlocker.
5. Leave clearance at both ends of the rail for the motor mount and for tooling on the carriage.



NOTE: Plain bearing (CSM) carriages must obey the 2:1 rule. A cantilevered load or drive force must act no farther than two times the 45mm carriage length (90mm) from the carriage, or the carriage will bind regardless of how light the load is. Profile rail (CSL06, CSL10, CSB08) carriages are exempt.



Saddle Plate Assembly (XY)

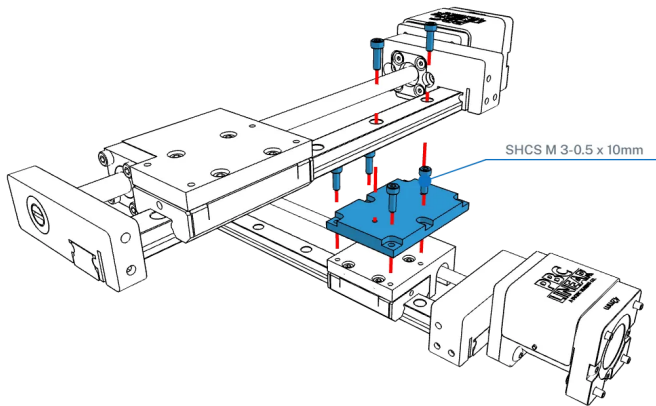
The saddle plate bolts flat onto the lower carriage; the upper actuator lies across the saddle plate at 90° and is fastened through the rail counterbores. The lower carriage moves the upper actuator. The upper carriage stays free for a third axis or for tooling.

CS-SP-S-KIT-CH: Short Carriage (CSM, CSL06)

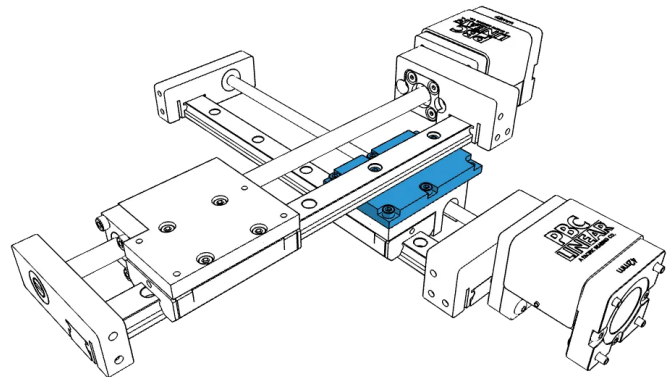
1. Set the short saddle plate on the lower carriage with the counterbores facing up and install (4) SHCS M3-0.5 x 10mm.
2. Set the upper actuator rail across the plate at 90° to the lower rail and fasten the rail to the plate through two rail counterbores with (2) SHCS M3-0.5 x 10mm.



NOTE: This kit also contains (2) 1-hole clamps that are not needed for this assembly.



Steps 1 and 2



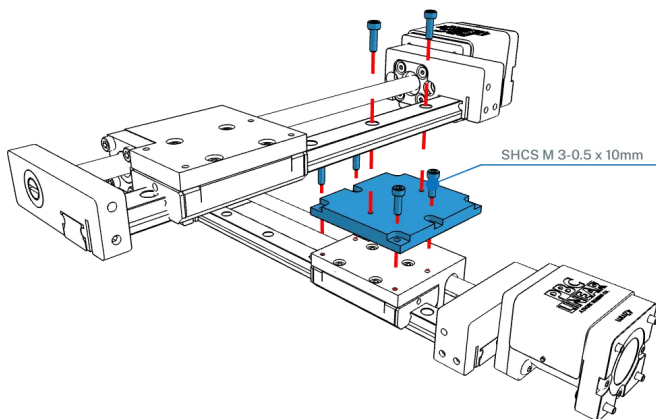
Assembled

CS-SP-L-KIT-CH: Long Carriage (CSL10, CSB08)

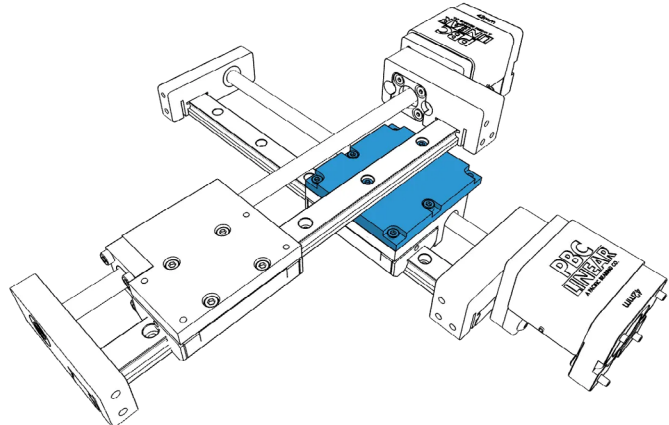
1. Set the long saddle plate on the lower carriage with the counterbores facing up and install (4) SHCS M3-0.5 x 10mm.
2. Set the upper actuator rail across the plate at 90° to the lower rail and fasten the rail to the plate through two rail counterbores with (2) SHCS M3-0.5 x 10mm.



NOTE: This kit also contains (2) 1-hole clamps that are not needed for this assembly.



Steps 1 and 2



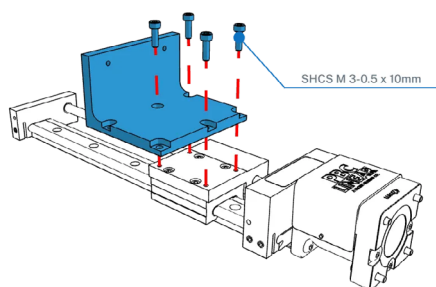
Assembled

90° Bracket Assembly

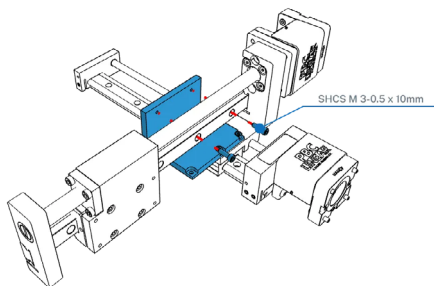
The angle bracket base bolts onto the lower carriage and the upper actuator rail is fastened to the bracket. Use the bracket that matches the lower carriage class.

CS-90-SLC-KIT-CH: Short Carriage (CSM, CSL06)

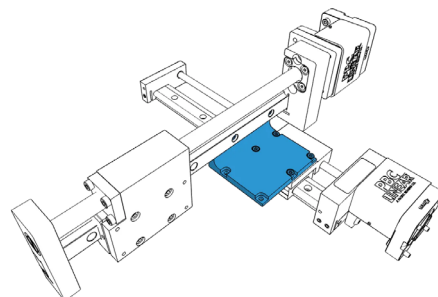
1. Fasten the bracket base to the lower carriage with (4) SHCS M3-0.5 x 10mm.
2. Set the upper actuator on the bracket and fasten its rail to the bracket through the rail counterbores with (2) SHCS M3-0.5 x 10mm.



Step 1



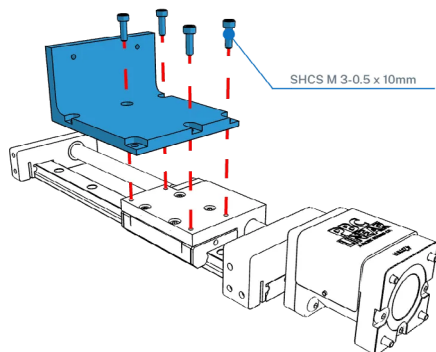
Step 2



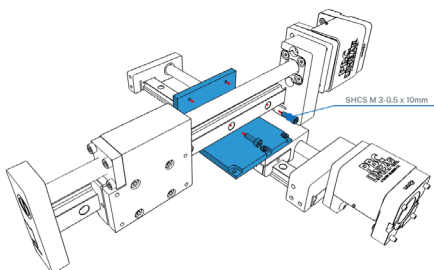
Assembled

CS-90-LLC-KIT-CH: Long Carriage (CSL10, CSB08)

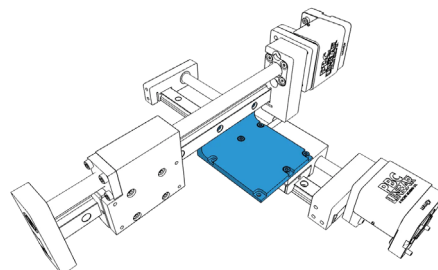
1. Fasten the bracket base to the lower carriage with (4) SHCS M3-0.5 x 10mm.
2. Set the upper actuator on the bracket and fasten its rail to the bracket through the rail counterbores with (2) SHCS M3-0.5 x 10mm.



Step 1



Step 2



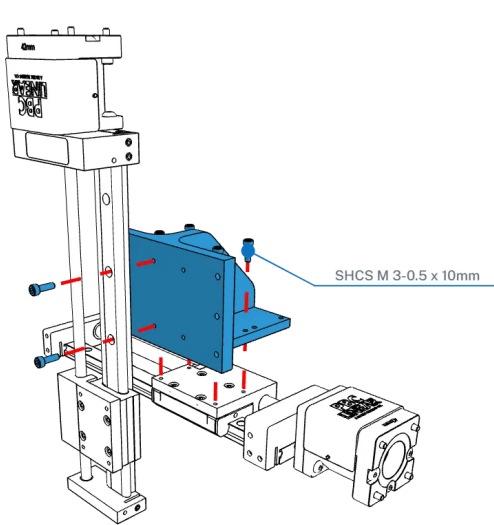
Assembled

CS-SP-LTC-KIT-CH: Vertical Z on a Long Carriage (CSL10, CSB08)

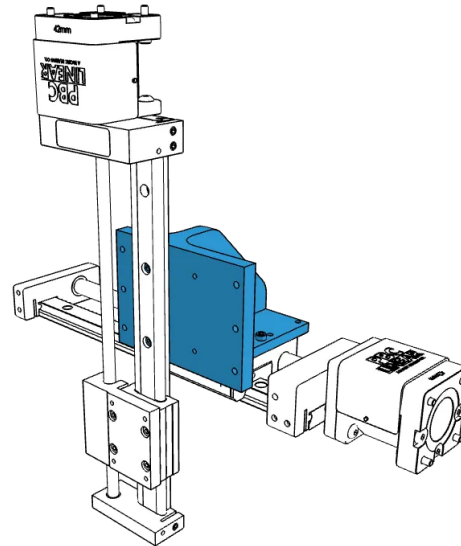
1. Fasten the plate base to the lower carriage with (4) SHCS M3-0.5 x 10mm. Orient the plate face as shown.
2. Hold the Z actuator vertical against the plate face, motor end up, and fasten its rail to the plate through the rail counterbores with (2) SHCS M3-0.5 x 10mm. Fit a power-off brake on the Z motor (see Safety).



NOTE: This kit also contains (2) 3-hole clamps and (6) M4 screws that are not needed for this assembly.



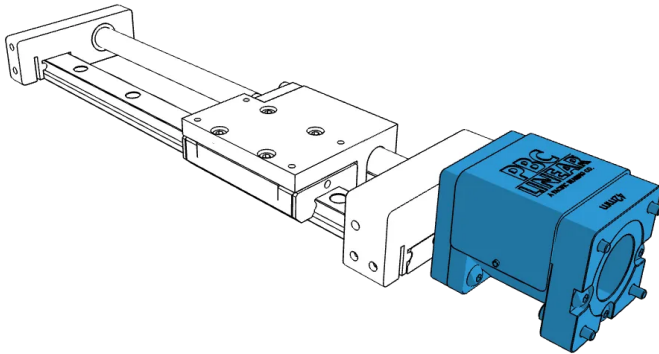
Steps 1 and 2



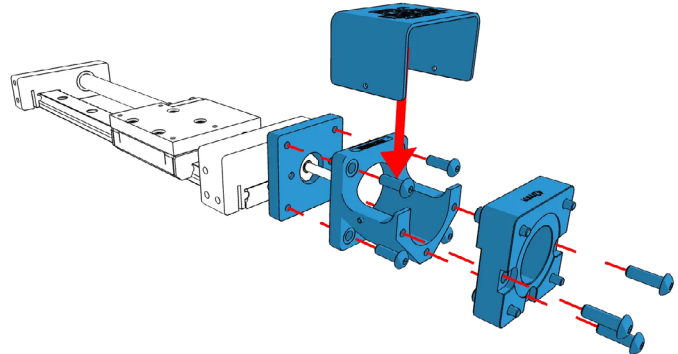
Assembled

Motor Mount

Every Compact Series actuator ships with the motor mount installed: adapter plate, main frame, NEMA 17 motor plate, and plastic cover. The motor is customer supplied. Couplings are listed under Stub Shaft and Coupling Selection.



Motor mount as shipped



Adapter plate, main frame, motor plate, and cover

Changing the Motor Plate

1. Pull the plastic cover off the main frame.
2. Remove the (3) BHCS M4-0.7 x 12mm and the NEMA 17 motor plate.
3. Attach the [3PMM-40A-KIT-CH](#) (40mm servo) or [3PMM-56A-KIT-CH](#) (NEMA 23) plate to the main frame with the same (3) BHCS M4-0.7 x 12mm.

Drive Coupling and Motor

1. Slide the coupling onto the actuator stub shaft and tighten the actuator-side clamp screw.
2. Attach the motor to the motor plate with the plate fasteners and engage the motor shaft in the coupling.
3. Check shaft engagement on both sides, then tighten the motor-side clamp screw.
4. Snap the plastic cover onto the main frame.

Stub Shaft and Coupling Selection

STUB SHAFT DIMENSIONS			
Actuator	Stub Shaft Diameter	Stub Shaft Length	Coupling Engagement
CSM, CSL06 (6mm screw)	3.5mm	20mm	6mm
CSL10, CSB08 (10mm and 8mm screws)	4mm	20mm	6mm

RECOMMENDED AUTOMATIONDIRECT MOTOR PLATES AND DRIVE COUPLINGS			
	40mm frame (8mm motor shaft)	42mm frame, NEMA 17 (5mm motor shaft)	56mm frame, NEMA 23 (6.35mm motor shaft)
Motor plate	3PMM-40A-KIT-CH	3PMM-42A-KIT-CH (installed)	3PMM-56A-KIT-CH
Motor fasteners (included in the plate kit)	(2) SHCS M4-0.7 x 10mm	(2) SHCS M3-0.5 x 14mm & (2) SHCS M3-0.5 x 16mm	(4) SHCS M5-0.8 x 12mm
Drive coupling CSM, CSL06 (3.5mm stub shaft)	RW-EKL-2-C-3.5-8	RW-EKL-2-C-3.5-5	RW-EKL-2-C-3.5-6.35
Drive coupling CSL10, CSB08 (4mm stub shaft)	SHR-18C-4-8	SRB-16C-4-5	SRB-19C-4-6.35

Any coupling used must fit inside the main frame: 25mm maximum outside diameter and 26mm maximum length. Check that the coupling bores and bore depths accept both the actuator stub shaft and the motor shaft.

Maintenance

Lubrication

Plain bearing (CSM) carriages use self-lubricating FrelonGOLD liners and need no lubrication. The PTFE-coated lead screw and polymer anti-backlash nut also need no lubrication. Profile rail (CSL06, CSL10, CSB08) carriages are recirculating ball bearing blocks and must be relubricated.

- Relubricate profile rail raceways every 1,000km, 50,000 cycles, or six months, whichever comes first. Under light, clean, room-temperature duty the interval can extend to 2,500km, 100,000 cycles, or one year.
- Use a synthetic lithium-soap grease or a synthetic oil (DIN 51517 CLP, CGLP, or HLP class) with ISO VG 32–100 viscosity. Brush a thin layer along the raceways and stroke the carriage at least four times.
- Some actuators ship with a preservative on the raceways. Apply lubricant during installation.
- Wipe the actuator down occasionally. Use fluids sparingly and keep them out of the drive.



NOTE: Do not use WD-40, motor oil, oils with additives, moly or other filled greases, PTFE sprays, or products containing fluorocarbons or silicone on any Compact Series actuator.

Troubleshooting

Symptom	Possible Cause	Corrective Action
Carriage binds or stalls (CSM)	Load or drive force applied beyond the 2:1 cantilever limit	Move the load closer to the carriage or use a profile rail actuator
Carriage binds or stalls (all types)	Rail twisted or bowed by an uneven mounting surface or a missed counterbore	Loosen the rail screws, check mounting surface flatness (0.060mm over 200mm), fasten every counterbore evenly
Motor runs but carriage does not move, or moves erratically	Coupling clamp loose, coupling misaligned, or insufficient shaft engagement	Check both coupling clamps and the 6mm coupling engagement; verify the coupling bore matches the stub shaft (3.5mm or 4mm)
Load drifts when power is removed	Actuator is not self-braking	Add a power-off brake on the motor; secure the load before service
Rough or noisy travel (profile rail)	Raceways dry, contamination on the rail, or a prohibited lubricant was used	Clean the rail and relubricate with an approved lubricant (see Lubrication)
Excessive backlash or poor repeatability	Worn nut or loose coupling	Check the coupling; contact PBC Linear for nut replacement
Motor will not mount	Motor plate does not match the motor frame	Fit the 3PMM plate for the motor frame (see Changing the Motor Plate)