

SERIES FG FLEXION GRIPPER INFORMATION SHEET

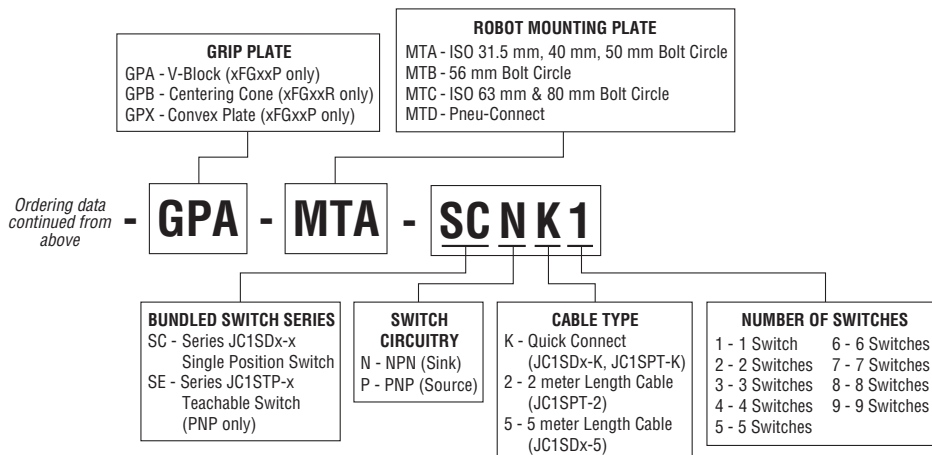
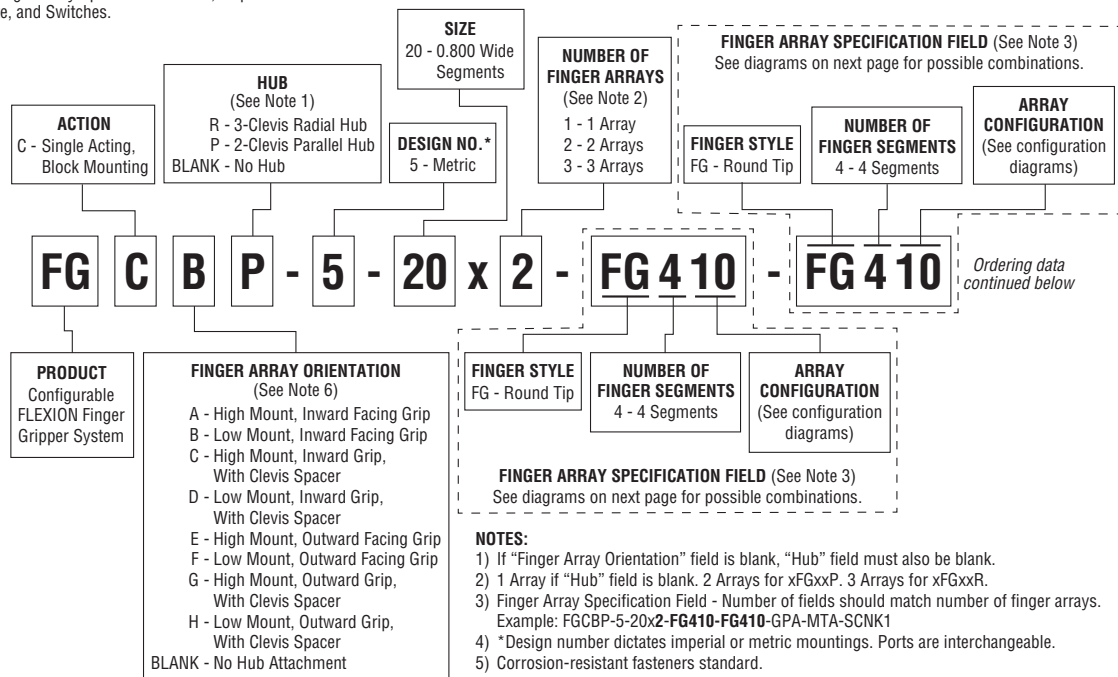
PHD, Inc. makes no warranty as to the fitness of its products or as to the length of service life after being repaired or parts replaced by anyone other than authorized employees of PHD, Inc. In no event shall PHD, Inc. be liable for loss of profits, indirect, consequential, or incidental damages arising out of the use of PHD Products.

IMPORTANT INFORMATION DO NOT DISCARD!

Use this information sheet to assist with gripper installation and setup.
File with maintenance or machine documentation.

TO ORDER SPECIFY:

Product, Action, Finger Array Orientation, Hub, Design No., Size, Number of Finger Arrays, Finger Array Specification Fields, Grip Plate, Robot Mounting Plate, and Switches.



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FINGER ARRAY CONFIGURATIONS

Shaded areas below indicate location of clevis mounting to finger array.

1 Finger Module					
	FG410	1 Half-width Spacer FG411	1 Half-width Spacer FG412	1 Full-width Spacer FG413	1 Full-width Spacer FG414
2 Finger Modules					
	FG420	1 Full-width Spacer FG421	2 Full-width Spacers (Parallel Configuration Only) FG422	3 Full-width Spacers (Parallel Configuration Only) FG423	
3 Finger Modules					
	FG430	1 Full-width Spacer FG431	1 Full-width Spacer (Parallel Configuration Only) FG432	2 Full-width Spacers (Parallel Configuration Only) FG433	2 Full-width Spacers (Parallel Configuration Only) FG434
					2 Full-width Spacers (Parallel Configuration Only) FG435
4 Finger Modules					
	(Parallel Configuration Only) FG440	1 Full-width Spacer (Parallel Configuration Only) FG441	1 Full-width Spacer (Parallel Configuration Only) FG442	1 Full-width Spacer (Parallel Configuration Only) FG443	(Parallel Configuration Only) FG444

RECOMMENDATIONS

Adjust the angular position of the finger modules or finger arrays so that the spacing between opposing fingertips is no wider than necessary to allow the workpiece to pass between the open (extended) fingers.

The maximum load that the gripper can handle will vary based on: size of the part being picked up, shape of the part, texture of the part, speed at which the part is transferred, working pressure, etc. Field testing is recommended to verify acceptable performance of a specified gripping application prior to the gripper being put into service.

START-UP PROCEDURES

The gripper should be securely mounted with external flow control devices attached prior to applying pressure to the unit. Care should be taken to provide adequate clearance for the fingers to open and close. During initial setup, apply pressure slowly to the unit.

SEALS AND FLUIDS

Long life seals are standard on all Series FG Grippers. These seals are compatible with standard paraffin-based lubrications oils used with pneumatic cylinders. For compatibility with other fluids, consult PHD.

DISASSEMBLY AND REPAIR

Series FG Gripper components are not repairable and require specialized fixtures to properly assemble. Consult factory for repair.

SERIES FG STARTUP AND MOUNTING INFORMATION

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ROBOT ADAPTER PLATE ASSEMBLY (Figures 1 and 2)

- 1) Remove ROBOT ADAPTER PLATE (7) from gripper by loosening fastener 15. (**Note:** Head of fastener 15 can be accessed through center hole in CENTERING ACCESSORY (6), if centering accessory is present on gripper. Centering accessory does not have to be removed from gripper to access fastener 15.)
- 2) Insert locating DOWEL PIN (14) into desired dowel pin hole in robot adapter plate. (Tip: Location of dowel pin hole in ROBOT WRIST will determine corresponding dowel pin hole in robot adapter plate.)
- 3) Align DOWEL PIN (14) with dowel pin hole in ROBOT WRIST.
- 4) To mount adapter plate, insert two threaded FASTENERS (13) through appropriate holes in ROBOT ADAPTER PLATE (7) and thread into holes in robot wrist. (**Note:** Fasteners 13 packaged separately from gripper.)
- 5) Torque FASTENERS (13) to value recommended by robot manufacturer. (**Note:** Threadlocker can be applied to fasteners prior to installation to secure the fasteners.)
- 6) Thread desired pneumatic air tube FITTING (11) (NOT INCLUDED) into port on side of ROBOT ADAPTER PLATE (7). (**Note:** Port has a 10-32 [M5] thread.)

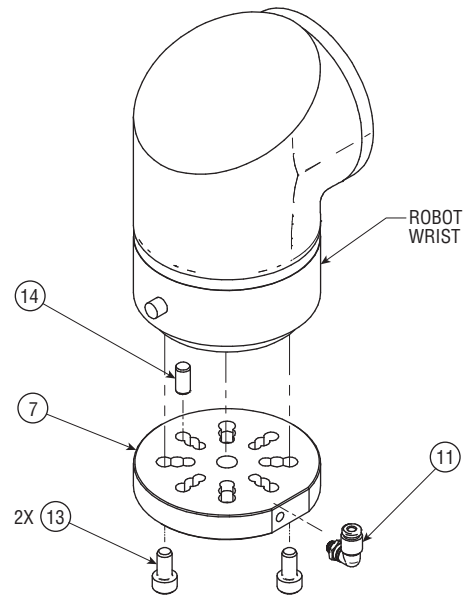


Figure 1

GRIPPER MOUNTING (Figure 2)

- 1) If not already present, install \varnothing 4 mm x 12 mm long alignment DOWEL PINS (14) into holes in HUB (2).
- 2) Apply small amount of O-ring compatible grease to MANIFOLD O-RING (12) and install O-ring into shallow counterbore in underside of ROBOT ADAPTOR PLATE (7).
- 3) Thread MOUNTING BOLT (15) into threaded hole in ROBOT ADAPTOR PLATE (7) and torque to 20 in-lb [2.3 Nm]. (**Note:** Threadlocker can be applied to bolt prior to installation to secure bolt.)

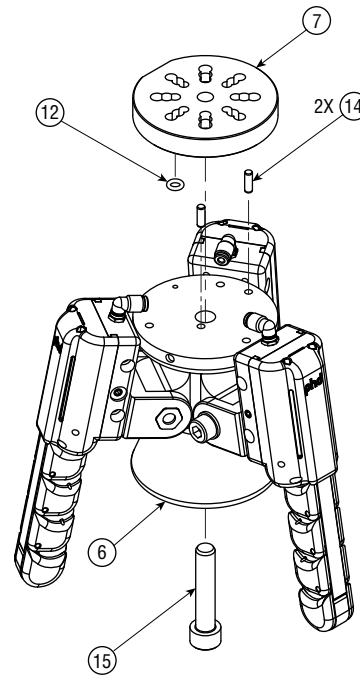


Figure 2

SERIES FG STARTUP AND MOUNTING INFORMATION

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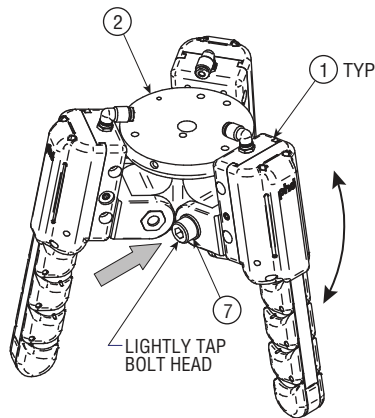


Figure 3

ARRAY ANGLE ADJUSTMENT (Figure 3)

- 1) To adjust angle of FINGER MODULE or ARRAY (1), loosen BOLT (7).
- 2) Lightly tap head of BOLT (7) in toward HUB (2), in direction of shaded arrow. Array will now be free to rotate.
- 3) Rotate array to desired position.
- 4) Torque BOLT (7) to 60 in-lb [6.8 Nm] to retain new position of module or array on hub.

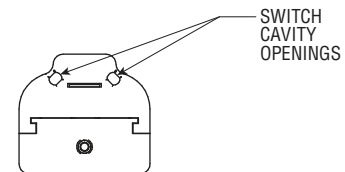


Figure 4

SWITCH INSTALLATION AND ADJUSTMENT (Figure 4)

- 1) Each FINGER MODULE (1) can accept two single position or dual position teachable SWITCHES (8) to sense desired degree of finger articulation.
- 2) Locate two oval shaped switch cavities on end of finger module.
- 3) Insert switch into switch cavity with “PHD” logo facing outward, so logo is visible through slot in base of finger module.
- 4) To sense un-articulated finger position (“ready to grip” condition), first use cable exiting switch to push switch toward finger end of finger module, until switch reaches end of cavity.
- 5) With power applied to switch, slowly pull switch cable to move position of switch away from finger end of finger module, until indicator in switch lights.
- 6) Tighten setscrew in end of switch using supplied Allen wrench to secure switch position.
- 7) To sense intermediate articulated finger position (“gripped” condition), first actuate gripper to grip workpiece in desired location and orientation.
- 8) With powered applied to switch and gripper gripping, insert switch into finger module switch cavity and using cable exiting switch, slowly push switch toward finger end of finger module until switch indicator lights.
- 9) Tighten setscrew in end of switch using supplied Allen wrench to secure switch position.
- 10) To sense fully-articulated finger position (“workpiece not present” condition), follow Steps 7 - 9, without workpiece present.

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**TABLE 1 - ROBOT ADAPTOR PLATE MOUNTING FASTENERS
AND ALIGNMENT PLATE**

DESCRIPTION	MOUNTING FASTENERS	ALIGNMENT DOWEL PLATE
ISO 9401-1 Adaptor, 31.5, 40, & 50 PCDs	M5 x 10 mm	Ø 5 mm x 12 mm
	M6 x 12 mm	Ø 6 mm x 12 mm
Adaptor, 56 mm PCD	M4 x 14 mm	Ø 4 mm x 10 mm
ISO 9401-1 Adaptor, 63 & 80 PCDs	M6 x 16 mm	Ø 6 mm x 12 mm
	M8 x 16 mm	Ø 8 mm x 12 mm

OPTIONAL KITS

PART NUMBER	DESCRIPTION	CONTENTS
91374	Manifold Seal Kit	Mainfold Seals (Qty 4)
91375-01-4	Finger Module Kit	Round Tip, 4-Segment Finger Module (Qty 1)
91375-02-4	Finger Module Kit	Flat Faced, 4 Segment Tip Finger Module (Qty 1)
91390-01	Hub Kit	2-Clevis Parallel Hub (Qty 1), Tubing And Fittings (Qty 2)
91390-02	Hub Kit	3-Clevis Radial Hub (Qty 1), Tubing And Fittings (Qty 3)
91392	Clevis Spacer Kit	Clevis Spacer, Mounting Bolt, Washer, And Nut (Qty 1 Each)
91393-15	Single Length Tierod Kit	1 1/2-Array Position Tierods (Qty 2), Tierod Nuts (Qty 4)
91393-20	Single Length Tierod Kit	2-Array Position Tierods (Qty 2), Tierod Nuts (Qty 4)
91393-30	Single Length Tierod Kit	3-Array Position Tierods (Qty 2), Tierod Nuts (Qty 4)
91393-40	Single Length Tierod Kit	4-Array Position Tierods (Qty 2), Tierod Nuts (Qty 4)
91393-50	Single Length Tierod Kit	5-Array Position Tierods (Qty 2), Tierod Nuts (Qty 4)
91499	Assorted Length Tierod Kit	1 1/2, 2, 3, 4, And 5-Array Position Tierods (Qty 2 Each), Tierod Nuts (Qty 4)
91398	Pneu-Connect Adaptor Plate Kit	Adaptor Plate (Qty 1), Mtg Fasteners, Manifold Seals, Dowel Pins (1 Set Each)
91399	ISO 9401-1 Adaptor Plate Kit, 63 & 80 PCDs	Adaptor Plate (Qty 1), Mtg Fasteners, Manifold Seals, Dowel Pins (1 Set Each)
91400	ISO 9401-1 Adaptor Plate Kit, 31.5, 40, & 50 PCDs	Adaptor Plate (Qty 1), Mtg Fasteners, Manifold Seals, Dowel Pins (1 Set Each)
91401	Adaptor Plate Kit, 56 mm PCD	Adaptor Plate (Qty 1), Mtg Fasteners, Manifold Seals, Dowel Pins (1 Set Each)
91407	V-Block Kit (for Parallel Hub)	Fixed V-Block (Qty 1), Mounting Fasteners (Qty 2)
91409	Centering Cone Kit (for Radial Hub)	Fixed Centering Cone (Qty 1), Mounting Fasteners (Qty 3)
91411	Convex Grip Plate Kit (for Parallel Hub)	Convex Cylinder Fixed Grip Plate, Mounting Fasteners (Qty 2)
91443	Port Plug Kit	Port Plugs (Qty 3)
91498-01	Finger Module Spacer Kit	1/2-Width Module Width Spacer
91498-02	Finger Module Spacer Kit	Full-Width Module Width Spacer
91500	Finger Module Grip Pad Kit	Fingertip Pad (Qty 1), Finger Segment Pads (Qty 3), Contact Adhesive (1 Roll)
91681	Valve Kit	Valve (Qty 1), Fittings (Qty 2), Muffler (Qty 1), and Tubing (10 ft [3 m])
81278-2-05	NPN Single-Position Switch with Bare Leads	Switch (Qty 1)
81279-2-05	PNP Single-Position Switch with Bare Leads	Switch (Qty 1)
81280-2	NPN Single-Position Switch with M8 Connector	Switch (Qty 1)
81281-2	PNP Single-Position Switch with M8 Connector	Switch (Qty 1)
81281-1-02	PNP Two-Position Switch with Bare Leads	Switch (Qty 1)
81283-1	PNP Two-Position Switch M8 Connector	Switch (Qty 1)
63549-02	Extension cable for M8 Connector Switches	2 Meter Long Cable (Qty 1)
63549-05	Extension cable for M8 Connector Switches	5 Meter Long Cable (Qty 1)