PFDD6, PFDD4 COLLABORATIVE ROBOTS

The Next Generation of Collaborative Robots

The growth of collaborative robots that can safely work side-by-side with people makes automation accessible to a new generation of applications. However, this accessibility has often come at the cost of higher prices for special sensors, reduced repeatability, and dramatically reduced cycle time.

Precise Automation's line of direct-drive collaborative robots provides the features, price and repeatability offered by traditional robots with the ease of use of popular collaborative robots.

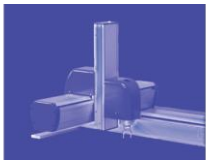
These new robots feature direct-drive motors in the base and elbow and a low-ratio belt drive for the Z axis, allowing low-friction teaching and eliminating the large collision forces resulting from harmonic-drive robots. This patented design approach allows the robots to move at speeds similar to people, even when people are present in the workcell, while still limiting forces to the ISO collaborative robot standard. Thus, operators can move freely around the robot without concerns for their safety or reducing productivity.

Compared to vertically-articulated robots, the cylindrical working volume of these robots requires a much smaller footprint in the factory. The outer link moves under the inner link, allowing the robot to move from side to side without swinging the tool through a large radius and allowing higher tool speed motions with lower kinetic energy, since the arm is "tucked in". This further minimizes collision forces. Soft foam covers protect operators.

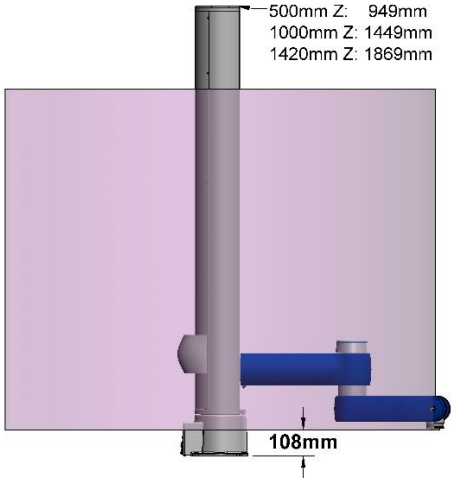
These robots have the controls and power supplies located inside the robot. This feature, in addition to the cylindrical working volume, make these robots ideal for mobile applications, as the overhanging moment is much less than a vertically articulated robot, and there is no need to house a large robot controller on the mobile platform.

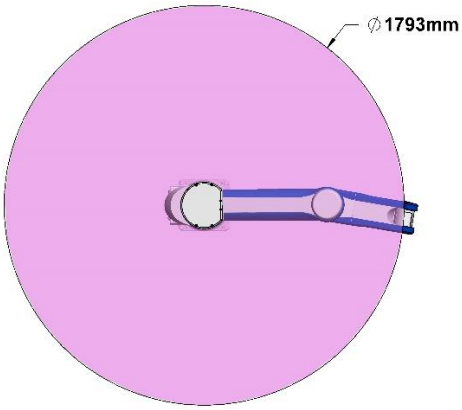
PFDD6 **PFDD4**

PRECISE AUTOMATION



General Specifications	PFDD6	PFDD4
Range of Motion & Resolution		
J1 (Base) Axis	+/- 168 degrees	+/- 168 degrees
J2 (Z) Axis	500, 1000, 1420mm	500, 1000, 1420mm
J3 (Elbow) Axis	+12 to +348 degrees	+12 to +348 degrees
J4 Axis	+100, -220 degrees	+/- 240 degrees
J5 Axis	+/- 110 degrees	
J6 Axis	+/- 295 degrees	
Repeatability	20 microns at center of tool flange	20 microns at center of tool flange
Performance and Payload		
Maximum Acceleration	5000 mm/sec^2 with 6kg payload	5000 mm/sec^2 with 6kg payload
Cycle Time	1.25 sec for 25 mm x 300 mm x 25 mm cycle with 5kg	1.25 sec for 25 mm x 300 mm x 25 mm cycle with 5kg
Maximum Payload	6kg	8kg
Collaborative Forces	Precise collaborative robots have been tested for collision forces and the user manual contains a table of collision forces in free space and against rigid surfaces, using a spring plate that simulates the compliance of the human hand. Maximum speed collisions in free space are under the ISO force limits for operator safety. However, in order to use a robot in an application without safety shields, the application as a whole (including end effectors, operation methods, objects being handled and obstacles in the workcell) must be evaluated for safety. For more information on the evaluation of applications and workcells without safety shields, please contact Precise Automation.	
Interfaces		
General Communications	RS-232 channel, 100 Mbps Ethernet port	
Digital I/O Channels	12 optically isolated inputs and 8 optically isolated outputs, 24 volts 100ma, available on facilities panel at base. Remote I/O also available.	12 optically isolated inputs and 8 optically isolated outputs, 24 volts 100ma, available on front panel of controller. Remote I/O also available.
Pneumatic Lines	Two air lines, 71 PSI maximum, provided at outer link and routed internally to fittings on the Facilities Panel.	Two air lines, 71 PSI maximum, provided at outer link and routed internally to fittings on the Facilities Panel.
Operator Interface	Web based operator interface supports local or remote control via browser connected to embedded web server	
Programming Interface	Three methods available: Guidance Motion (simple GUI for non-programmers using teach and repeat methods), embedded Guidance Programming Language (standalone, modeled after Visual Basic.Net), PC control using open-source TCP/IP Command Server operated via Ethernet connection (TCP).	
Required Power	Dual range: 90 to 132 VAC and 180 to 264 VAC, auto selecting, 50-60 Hz, 600 watts maximum, 250 watts typical operation, 80 watts stationary 6kg, 20 watts Z brake on	Dual range: 90 to 132 VAC and 180 to 264 VAC, auto selecting, 50-60 Hz, 600 watts maximum, 250 watts typical operation, 80 watts stationary 6kg, 20 watts Z brake on
Weight	46, 55, 65kg	44, 53, 63kg





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