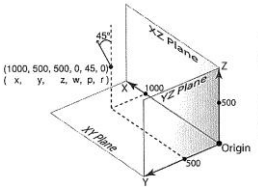
Robot Coordinate Systems and Frames

Fanuc defines frames as:

> Frames are used to describe the location and orientation of a position in three-dimensional space. The location is the X, Y, and Z directions from the origin of the reference frame. The orientation is the rotation about the X, Y, and Z axes of the reference frame. When you record a position, its location and orientation are automatically recorded as X, Y, Z, W, P, and R relative to the origin of the frame it uses as a reference.



The ***orientation*** of a robot position is measured in degrees of rotation about the X, Y, and Z axes.

As shown in the image to the left, 0,45,0 means that the position is rotated +45 degrees about the Y axis and is not rotated about the X or Z axes.

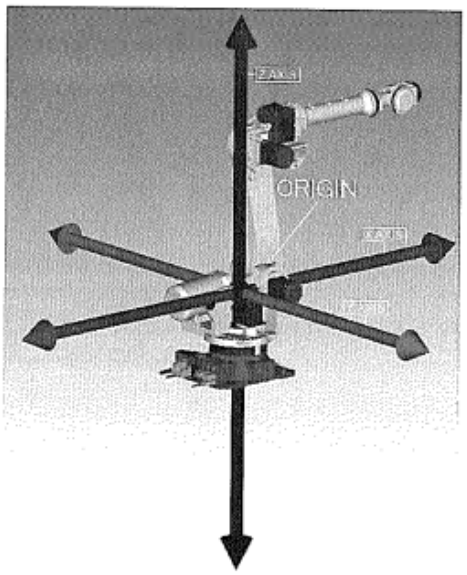
Types of Frames

Frame	Description	Manual Reference
World	The reference frame which all positions are relative to. Origin at intersection of J1 axis with J2 axis.	Section 10.4, page 115 / page 129 (pdf)
Tool	Describes orientation and location of tool. Defined relative to center of faceplate on end of arm.	Section 10.5, page 115 / page 129 (pdf)
User	Frame taught by the programmer for defining robot movement. If not defined, World frame is used.	Section 10.7, page 135 / page 149 (pdf)
Jog	Frame set with any location or orientation. Recommended for defining how the robot should move relative to a part which doesn't align with the world frame.	Section 10.9, page 147 / page 161 (pdf)

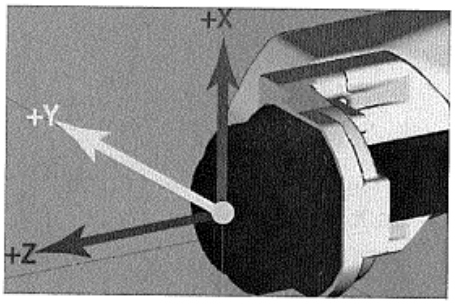
Frame	Description	Manual Reference
Cell	Described as being used for 3D graphics, but not documented outside of Frame overview.	

Frame Illustrations

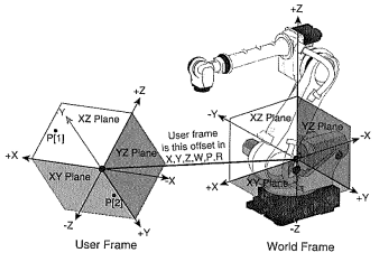
World



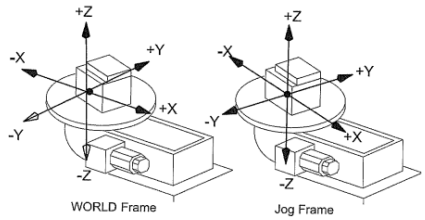
Tool



User



Jog



You can set up jog frame so that the coordinates of jog frame correspond to the coordinates of the part. You can then jog along X, Y, and Z to teach the positions on the part.