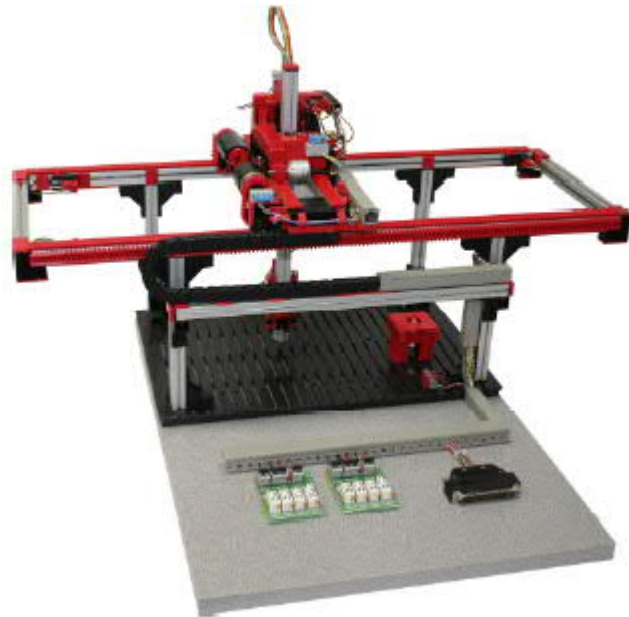# 3-Achs-Portal

The model 3-axis-portal simulates a stationary used handling robot with an orthogonal work space used for passing on work pieces to processing or sorting unit, as used e. g. in factories being automated in a large degree. The model consists of the portal robot that is able to move in three linear directions and an electromagnetic gripper, fit to be moved in Z-direction, a piece store and a discharge station. The end positions of the several moving parts are each recognized by software end position switches. The simulated process shows metal work pieces being withdrawn from the store by the electromagnetic gripper, being moved to the discharge station and there getting put down: At the beginning of the sequence the moving parts of the robot execute a reference tour, in order to equalize the incremental distance measuring systems of the X- and Y-axes with their real positions. The reference tour is done with the gripper being in its upper end position. After this, the gripper is moved in X- and Y-direction until it has reached its demanded position above the piece store. The gripper moves in –Z-direction until it touches the work piece. The magnet gets switched on and the part is attached to the gripper. The gripper moves in +Z-direction until it has again reached its upper end position. Following this, it executes a movement in X- and Y-direction until it has reached a positionabove the discharge station. Having reached this state, the gripper again moves in –Z-direction until the attached piece is put on the discharge station, where it gets recognized by an inductive proximity switch. The work piece is withdrawn by deactivating the electromagnetic gripper. In order to save the whole unit from being damaged by moving out of the allowed work space, caused by a mistake in programming the control unit, the linear directions are supplementary equipped with hardware end position switches, which cause an immediately stop of the corresponding axis in case of being actuated. The electronic concept of the model only enables a restarting of the robot by executing a movement towards the work space.

Inputs / Sensors		
Variable	Name	Direction
x0	x_axis_at_position_x_minus	Input
x1	x_axis_at_position_x_plus	Input
x2	x_axis_reference_position	Input
x3	y_axis_at_position_y_minus	Input
x4	y_axis_at_position_y_plus	Input
x5	y_axis_reference_position	Input
x6	z_axis_at_position_z_plus	Input
x7	z_axis_at_position_z_minus	Input
x8	proximity_switch	Input
x9	start_button	UserInput
x10	abs_position_x_15	Input
x11	abs_position_x_14	Input
x12	abs_position_x_13	Input
x13	abs_position_x_12	Input
x14	abs_position_x_11	Input
x15	abs_position_x_10	Input
x16	abs_position_x_09	Input
x17	abs_position_x_08	Input
x18	abs_position_x_07	Input
x19	abs_position_x_06	Input
x20	abs_position_x_05	Input
x21	abs_position_x_04	Input
x22	abs_position_x_03	Input
x23	abs_position_x_02	Input
x24	abs_position_x_01	Input
x25	abs_position_x_00	Input
x26	abs_position_y_15	Input
x27	abs_position_y_14	Input
x28	abs_position_y_13	Input
x29	abs_position_y_12	Input
x30	abs_position_y_11	Input
x31	abs_position_y_10	Input
x32	abs_position_y_09	Input
x33	abs_position_y_08	Input
x34	abs_position_y_07	Input
x35	abs_position_y_06	Input
x36	abs_position_y_05	Input
x37	abs_position_y_04	Input
x38	abs_position_y_03	Input
x39	abs_position_y_02	Input
x40	abs_position_y_01	Input
x41	abs_position_y_00	Input

Outputs / Actuators		
Variable	Name	Direction
y0	x_axis_to_x_minus	Output
y1	x_axis_to_x_plus	Output
y2	y_axis_to_y_minus	Output
y3	y_axis_to_y_plus	Output
y4	z_axis_to_z_plus	Output
y5	z_axis_to_z_minus	Output
y6	magnet	Output