

VBX-160 Gripper Sensors

***Applies to all VBX-160 systems with Gripper and Pull Cylinder sensors**

Summary:

Gripper sensors are used during operation to detect part or jaw fumbles (drops/miss-picks), for robot recovery, and general system readiness. There are 3 gripper sensors.

- 1) Gripper Open
- 2) Gripper Closed
- 3) Pull Cylinder Retracted

Two sensors on the “Gripper”, detect fully open and fully closed (when holding soft jaws), and one sensor on a “Pull Cylinder” detecting fully retracted pull studs. The functionality of the sensors is as follows:

- 1) Detecting if Gripper is empty or holding soft jaws
 - a. Pull cylinder sensor detects “fully retracted” cylinder, indicating the gripper is **NOT** holding soft jaws because the Pull Stud is not in an engaged position near the mid-stroke of the cylinder.
- 2) Detecting Empty OD Jaws
 - a. The Gripper Closed sensor should be set to give a signal (light is illuminated) when empty OD Soft Jaws are fully closed without a part.
 - b. When this sensor is hit, the system interprets either empty OD jaws, or part fumble with an OD clamped part
- 3) Detecting Empty ID Jaws
 - a. The Gripper Open sensor should be set to give a signal (light is illuminated) when empty ID Soft Jaws are fully open without a part.
 - b. When this sensor is hit, the system interprets either empty ID jaws, or part fumble with an ID clamped part
- 4) Detecting Clamped Part
 - a. The system should not have any sensor signals when the holding soft jaws and clamping on a part.
 - i. Pull Stud should be engaged with the soft jaws, not fully retracted
 - ii. Gripper position is in-between the Open and Closed position

Parts and Tools required for setting or adjusting sensors:

1) Tools

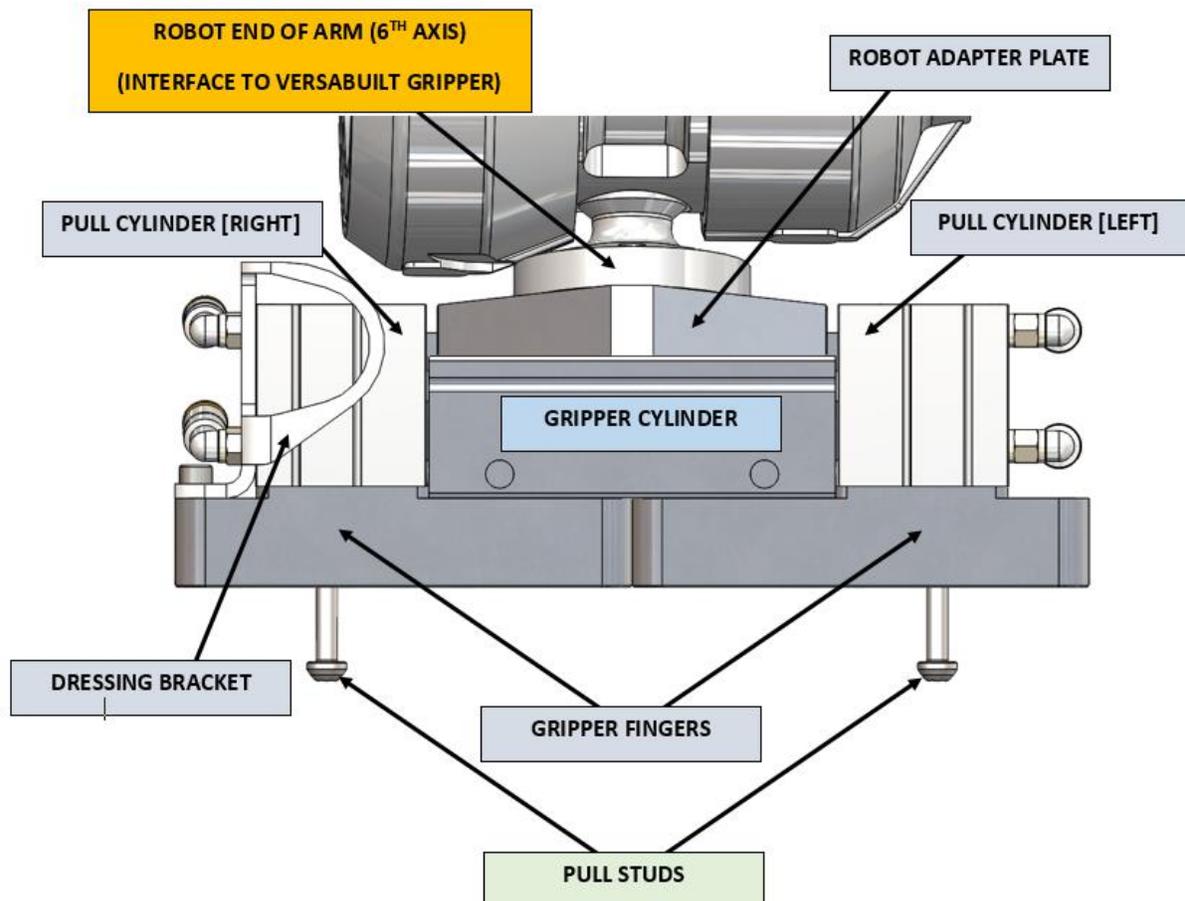
- a. 1.5mm Allen Key to adjust sensors

2) Parts:

- a. SICK Sensor to detect “Gripper Open”
- b. SICK Sensor to detect “Gripper Closed while holding jaws”
- c. SICK Sensor to detect “Pull Stud Retracted”

***QTY: 3 SICK P/N: MZC1-2V2PS-KRD *OR EQUIVALENT**

SENSOR FOR C-SLOT CYLINDERS, MZC1, SMC RAIL CDQ2 OR ECDQ2; 23.7mm HOUSING LENGTH, PNP, 1,000 HZ SWITCHING FREQUENCY, 3-WIRE DC; IP 68; OUTPUT FUNCTION NO



Setting or Adjusting Gripper Sensors:

1) **Put robot in position for sensor adjustment and observation:**

- a. Place OD Soft Jaws on Gripper
 - i. Put robot in "Home" position



- ii. On VBXC Screen, move gripper orientation to tilt-up, for access to bottom of gripper

Wrist



- iii. On VBXC Screen, set Gripper to "Float"



- iv. Manually put pull studs into an extended position (pull out)
- v. Manually place OD Jaws on Gripper
- b. Using VBXC Screen, with OD Jaws on Gripper, set Gripper to Open Position

Gripper



2) Check and/or Set Gripper Open Sensor:

- a. Verify gripper is setup to Open Position
- b. Check lights on SICK Sensors [Gripper Open]



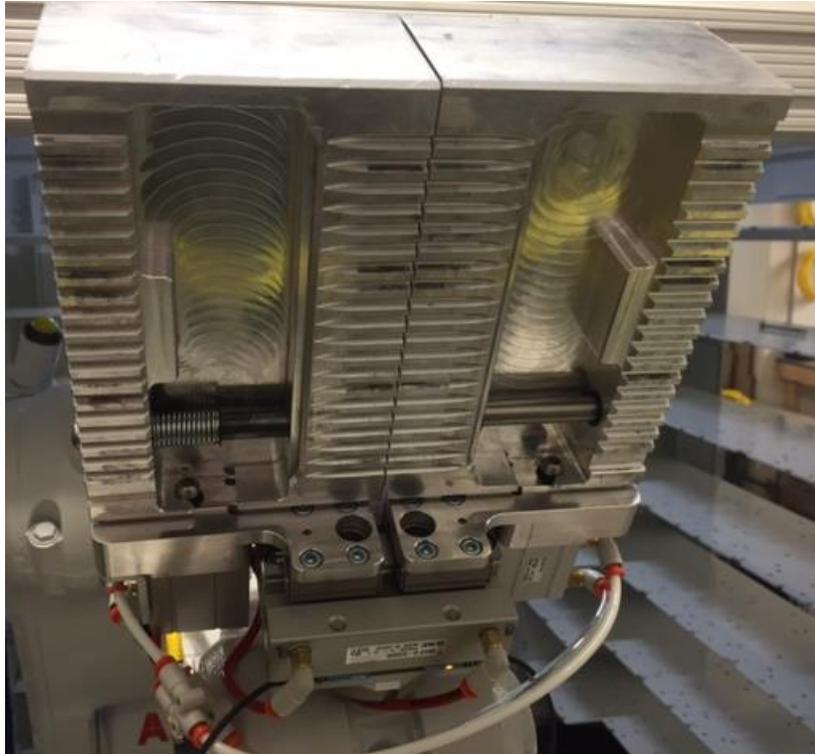
- i. If neither of the sensors are illuminated, the sensor needs to be adjusted.
- ii. With 1.5mm Allen Key, loosen the sensor and adjust until the sensor light is illuminated (as shown in picture above). Secure in place by tightening the set screw with 1.5mm Allen Key
- iii. Verify it is set to "Gripper Open" on the VBXC Screen (a green light should appear next the Gripper Open button)
- iv. If sensor is illuminated, but green light next to "Gripper Closed" is illuminated, the sensors are backwards. Correct this by switching sensors, or moving the sensors in the slot to detect the opposite state.

3) Check and/or Set Gripper Closed Sensor:

- a. Using VBXC Screen, with OD Jaws on Gripper, set Gripper to Closed Position



- b. Check light on 2nd SICK Sensor [Gripper Closed]



- i. If the 2nd sensor is not illuminated, the sensor needs to be adjusted.
- ii. With 1.5mm Allen Key, loosen the sensor and adjust until the sensor light is illuminated (as shown in picture above). Secure in place by tightening the set screw with 1.5mm Allen Key
- iii. Verify it is set to "Gripper Closed" on the VBXC Screen (a green light should appear next the Gripper Closed button)
- iv. If sensor is illuminated, but green light next to "Gripper Closed" is illuminated, the sensors are backwards. Correct this by switching sensors, or moving the sensors in the slot to detect the opposite state.

4) Check with part held by Soft Jaws:

a. OD Jaws:

- i. Using VBXC Screen, with OD Jaws on Gripper, set Gripper to Open Position
- ii. Place matching part in Soft Jaws
- iii. Using VBXC Screen, set Gripper to Closed Position
- iv. Verify part is OD clamped by the Soft Jaws
- v. Verify that neither sensor light is illuminated (we only detect fully open and fully closed, the absence of sensor detect yields a part is in the gripper).
- vi. If one or both of the lights are illuminated, we need to adjust the sensors.
- vii. If neither light is illuminated, remove part and check open and closed one more time, then put robot in position for operation.
****Note:** if available, check multiple OD Jaws with associated parts clamped for proper sensor settings

b. ID Jaws:

- i. Using VBXC Screen, with ID Jaws on Gripper, set Gripper to Closed Position (using VBXC screen float, place jaws, gripper closed)
- ii. Place matching part in Soft Jaws
- iii. Using VBXC Screen, set Gripper to Open Position
- iv. Verify part is ID clamped by the Soft Jaws
- v. Verify that neither sensor light is illuminated (we only detect fully open and fully closed, the absence of sensor detect yields a part is in the gripper).
- vi. If one or both of the lights are illuminated, we need to adjust the sensors.
- vii. If neither light is illuminated, remove part and check open and closed one more time, then put robot in position for operation.
****Note:** if available, check multiple ID Jaws with associated parts clamped for proper sensor settings

5) **Put robot in position for production operation:**

- a. On VBXC Screen, set Gripper to “Float”



- b. Manually remove Jaws from Gripper
c. Place jaws in appropriate slot in VBX-160
d. Put robot in “Home” position



- e. Exit Recovery
f. Cycle Start
g. If there are pneumatic test failures, the sensors may not have been set properly, or are set backwards
h. If the system is not detecting fumbles, check the configuration and select gripper fumble check

Setting or Adjusting Pull Cylinder Sensors:

1) Put robot in position for sensor adjustment and observation:

- a. Place OD or ID Soft Jaws on Gripper
 - i. Put robot in "Home" position



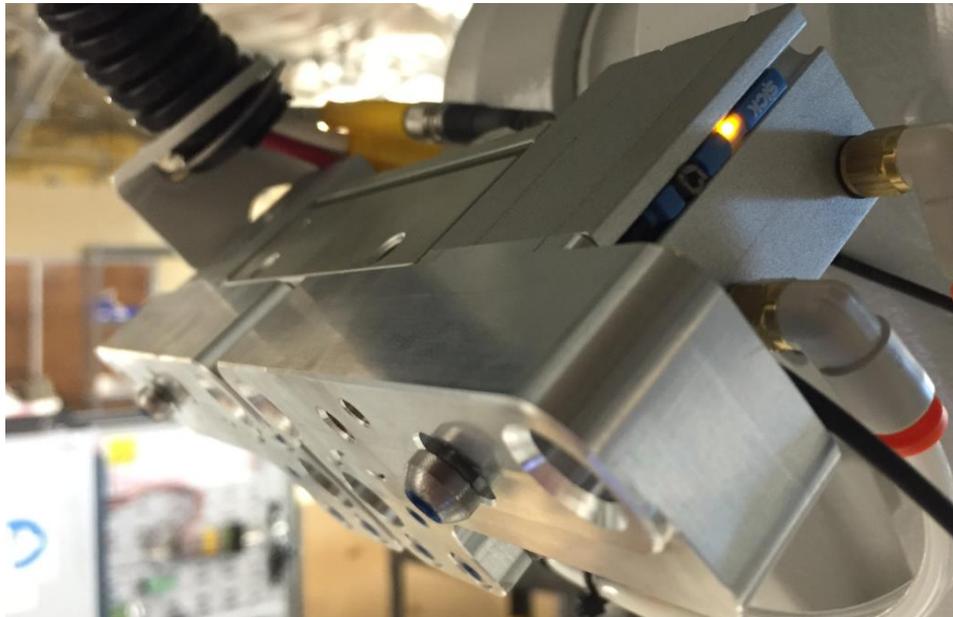
- ii. On VBXC Screen, set Gripper to "Float"



- iii. Manually put pull studs into an retracted position (hold the stud in position)

2) Check and/or Set Pull Cylinder Sensor:

- a. Check lights on SICK Sensors [Pull Stud Retracted]



- b. If the sensor is not illuminated, the sensor needs to be adjusted.
- c. With 1.5mm Allen Key, loosen the sensor and adjust until the sensor light is illuminated (as shown in picture above). Secure in place by tightening the set screw with 1.5mm Allen Key