

Proximity Sensor Operation



Proximity Sensor Application Notes

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A proximity sensor is activated by a magnetic field or ferrous material component. There are numerous possibilities for sensor orientation within a given magnetic field. The following information outlines several key factors to consider when determining proximity sensor operation.

Operate and Release

Operate distance (D) is the dimension between the proximity sensor and the actuator where the sensor must operate. Release distance is the dimension between the proximity sensor and the actuator where the sensor must release. See Figure 1 for illustrations of proper proximity sensor and actuator alignment.

Magnetic Overdrive

Magnetic overdrive is a critical parameter in the operation of proximity sensors providing low and stable contact resistance as well as outstanding performance. This is achieved by employing the sensor at the recommended must-operate distance or closer.

Milli-Tesla and Gauss

Surface-mounted sensors and small proximity sensors can be conveniently tested for magnetic sensitivity using a Helmholtz Coil. This device is a relatively large assembly consisting of two sets of windings. The windings are arranged to produce a “zone” or volume of space with uniform magnetic field strength. The field strength in the “zone” is directly related to the current in the windings. The field strength is measured in milli-Tesla (mT) or Gauss (G).

$$1\text{mT} = 10\text{G}$$

Placing a proximity sensor in the test “zone” of a Helmholtz Coil is an excellent way to test magnetic sensitivity. The sensor under test can be subjected to various predetermined fields to verify response or non-response to each field. The test system can also determine the exact field strength required to operate the sensor. This scheme of testing complies with international standards for implantable medical devices, which requires that the devices not respond to certain ambient stray fields.

Contact Resistance

The electrical resistance of the proximity sensor—measured in Ohms—is the combined resistance of the entire assembly, including the reed switch contacts and wire or cable. Contact resistance is measured the following ways in these proximity sensor types:

- Form A contact resistance is measured when an actuator is located at the must-operate distance
- Form B is measured when an actuator is not present
- Form C contact resistance is measured in the following ways:
 - normally open contact resistance is measured when the actuator is located at the must-operate distance
 - normally closed contact resistance is measured when the actuator is located at the must-release distance or greater

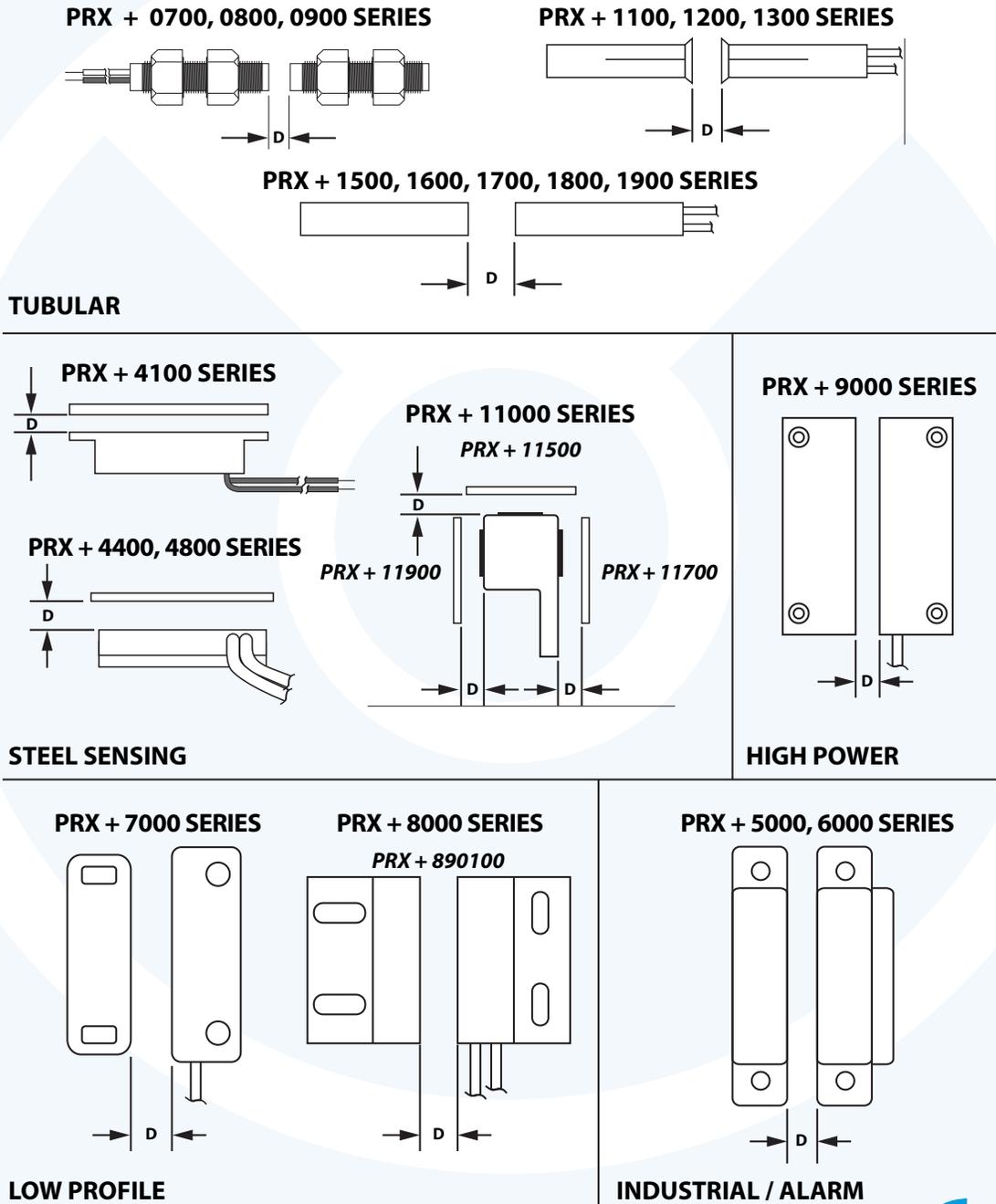


Figure 1