Reed Relay Finder

High Density Vertical

Application	
Series Name	New 124-1-A; New 120-1-A; 117-1-A; 117-2-A; 116-1-A; 116-2-A; 115-1-A; 115-2-A; 112-1-A; 110-1-A
Features	Highest Quality Instrumentation Grade Reed Switches; Ultra High Packing Density; High Packing Density
Dimensions mm (inches) Depth	3.9 (0.153); 3.9 (0.153); 3.7 (0.145); 3.7 (0.145); 3.7 (0.145); 3.7 (0.145); 3.7 (0.145)
Width	3.9 (0.153); 3.9 (0.153); 6.6 (0.26); 9.9 (0.39); 6.6 (0.26); 9.9 (0.39); 6.6 (0.26); 9.9 (0.39); 10.0 (0.395); 10 (0.39)
Height	9.5 (0.375); 15.5 (0.61); 9.52 (0.375); 12.45 (0.49); 15.5 (0.61); 11.0 (0.43); 15.2 (0.6)
Footprint (0.1 inch grid)	
Contact Configuration	1A (SPST); 1A (SPST); 1A (SPST); 2A (DPST); 1A (SPST); 2A (DPST); 1A (SPST); 2A (DPST); 1A (SPST); 1A (SPST)
Switch Schematic	
Reed Switch Type	Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; Low Level Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed
Switch Number	2; 1; 2; 2; 2; 1; 2; 1; 2; 2; 1; 2
Diode Available	No; No; Yes; Yes; Yes; Yes; Yes
Switching Voltage/V	170; 200; 170; 200; 200; 200; 200
Switching Current/A	0.5; 1.0; 0.5; 0.5; 0.5; 1.0; 0.5; 1.0; 0.5; 0.5; 1.0; 0.5
Carry Current/A	0.5; 1.2; 0.5; 0.5; 1.2; 0.5; 1.2
Switch Power/W	5; 15(3V), 20; 10; 5; 10; 20; 10; 20; 10; 5; 20; 10
Max Initial Contact Resistance/mΩ	120; 120; 120; 120; 120; 120; 150
Life Expectancy/operations Min Load	2.5 x 10E8; 10E9; 2.5 x 10E8; 2.5 x 10E8; 10E9; 2.5 x 10E8; 10E9
Typical	10E7; 10E8; 10E7; 10E7; 10E8; 10E7; 10E8
Max Load	10E6; 10E7; 10E6; 10E6; 10E7; 10E6; 10E7
Operate Time/ms	0.2; 0.5; 0.3; 0.5; 0.5; 0.5; 0.5
Release Time/ms	0.1; 0.2; 0.15; 0.2; 0.2; 0.2; 0.2
Insulation Resistance/Ω	10E12 Ω; 10E12 Ω; 10E12 Ω; 10E12 Ω; 10E12 Ω; 10E12 Ω; 10E12 Ω
Coil Resistance 3V/Ω	75; 200; 200; 200; –; 250; –; 250; –; 250; –; 250
5V/Ω	200; 300; 500; 400; 250; 500; 375; 500; 250; 350; 500; 500
12V/Ω	–; 800; 800; –; 750; 750; 1000; –; 750; 1000
24V/Ω	–; –; –; –; –; –; –; –

Plastic Package SIL

Application	
Series Name	113-1-A; 113SP-1-A; 113-2-A; 113-1-C; 111P-1-A; 109P-1-A; 106-1-A; 106-1-C; 105-1-A; 105-1-C; 105-1-B; 105-2-A; 103-1-A & 103M-1-A
Features	Highest Quality Instrumentation Grade Reed Switches; High Packing Density; Smallest Form C; High Packing Density; Standard 0.2" Pitch; Wide Range of Configurations; Low Capacitance
Depth	3.7 (0.145); 3.7 (0.145); 3.7 (0.145); 4.8 (0.19); 6.6 (0.26); 4.8 (0.19)
Width	12.5 (0.49); 10 (0.39); 15.1 (0.595); 19.1 (0.75); 19.1 (0.75); 19.1 (0.75)
Height	6.6 (0.26); 8.9 (0.35); 6.6 (0.26); 6.6 (0.26); 6.6 (0.26); 8.1 (0.32); 7.9 (0.31); 10.7 (0.42); 8.1 (0.32)
Contact Configuration	1A (SPST); 1A (SPST); 2A (DPST); 1C (SPDT); 1A (SPST); 1A (SPST); 1A (SPST); 1C (SPDT); 1A (SPST); 1C (SPDT); 1B (SPNC); 2A (DPST); 1A (SPST)
Reed Switch Type	Low Level Dry Reed; Dry Reed; General Dry Reed; General Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; Dry Reed; General Dry Reed; Low Level Dry Reed; High Voltage Switch; Standard Mercury Switch; Position Insensitive Switch; Dry Reed; General Dry Reed; General Dry Reed; Low Level Dry Reed; Standard Mercury Switch; General Dry Reed; Low Level Dry Reed
Switch Number	2; 3; 1; 1; 2; 1; 2; 3; 1; 2; 4; 6; 8; 3; 1; 1; 2; 6; 1; 2
Diode Available	Yes; Yes; Yes; Yes; Yes; Yes
Switching Voltage/V	200; 30; 170; 200; 200; 200; 400; 500; 350; 200; 200; 500; 200
Switching Current/A	0.5; 0.1; 0.5; 1.0; 0.5; 1.0; 0.5; 0.25; 1; 0.5; 0.5; 2; 2; 0.25; 1; 1; 0.5; 2; 1; 0.5
Carry Current/A	0.5; 0.1; 0.5; 1.2; 1.2; 1.2; 3; 2; 1.2; 3; 1.2
Switch Power/W	10; 3; 5; 15/20; 10; 20; 10; 3; 15(5V), 10; 20; 10; 50; 50; 3; 20; 15(5V), 20; 10; 50; 15; 10
Max Initial Contact Resistance/mΩ	120; 250; 150; 150; 120; 150; 120; 200; 150; 120; 150; 75; 100; 200; 150; 170; 150; 100; 150; 120
Life Min Load	2.5 x 10E8; 2.5 x 10E8; 2.5 x 10E8; 10E9; 10E9; 10E8; 10E9; 10E8; 10E9; 10E8; 10E9; 10E9; 10E8; 10E9
Typical	10E7; 10E7; 10E7; 10E8; 10E8; 10E7; 10E8; 10E7; 10E8; 10E7; 10E8; 10E8; 10E7; 10E8
Max Load	10E6; 10E6; 10E6; 10E7; 10E7; 10E6; 10E7; 10E6; 10E7; 10E6; 10E7; 10E7; 10E6; 10E7
Operate Time/ms	0.5; 1; 0.5; 0.5; 0.5; 1; 0.5; 0.75; 1.5; 1.5; 1; 0.5; 1.5; 0.5
Release Time/ms	0.2; 0.5; 0.2; 0.2; 0.2; 0.5; 0.2; 0.5; 1; 1; 0.5; 0.2; 1; 0.2
Insulation Resistance/Ω	10E12 Ω; 10E10 Ω; 10E12 Ω; 10E12 Ω; 10E12 Ω; 10E10 Ω; 10E12 Ω; 10E11 Ω; 10E10 Ω; 10E12 Ω; 10E11 Ω; 10E12 Ω
Coil 3V/Ω	250; –; –; –; 200; –; 200; –; 500; –; 500; –
5V/Ω	500; 150; 150; 400; 500 (1000 for high sensitivity version); 500; 500; 140; 500; 1000; 500; 100; 150
12V/Ω	650; –; –; 1000; 1000; 1000; 500; 1000; 1000; 1000; 375; 1000
24V/Ω	–; –; –; –; –; 3000; 1500; 3000; 3000; 3000; 1000; –

Metal Package SIL

Application	
Series Name	111-1-A; 109-1-A; 109-1-C; 109-1-B; 109-2-A; 108-1-A; 108-1-C; 108-2-A; 107-1-A; 107-1-C; 107-1-B; 107-2-A; 107-2-C
Features	Highest Quality Instrumentation Grade Reed Switches; SoftCenter® Construction in Mu-Metal Can
Depth	3.7 (0.145); 3.7 (0.145); 3.7 (0.145); 4.8 (0.19)
Width	10.0 (0.39); 15.1 (0.595); 20.0 (0.79); 19.1 (0.75); 24.1 (0.95)
Height	6.6 (0.26); 6.6 (0.26); 8.9 (0.35); 6.6 (0.26); 8.9 (0.35); 7.6 (0.3); 10.2 (0.4)
Contact Configuration	1A (SPST); 1A (SPST); 1C (SPDT); 1B (SPNC); 2A (DPST); 1A (SPST); 1C (SPDT); 2A (DPST); 1A (SPST); 1C (SPDT); 1B (SPNC); 2A (DPST); 2C (DPDT)
Reed Switch Type	General Dry Reed; General Dry Reed; Low Level Dry Reed; Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; Dry Reed; General Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; High Voltage Switch; Standard Mercury Switch; Position Insensitive Switch; Dry Reed; General Dry Reed; General Dry Reed; Low Level Dry Reed; Standard Mercury Switch; Dry Reed
Switch Number	1; 1; 2; 3; 4; 2; 1; 2; 3; 1; 2; 1; 2; 4; 6; 8; 3; 1; 1; 2; 6; 3
Diode Available	Yes; Yes; Yes; Yes
Switching Voltage/V	170; 200; 30; 200; 200; 200; 200; 400; 500; 350; 200; 200; 500; 200
Switching Current/A	0.5; 1; 0.5; 0.1; 0.5; 1; 0.5; 0.25; 1; 0.5; 1; 0.5; 2; 2; 0.25; 1; 1; 0.5; 2; 0.25
Carry Current/A	0.5; 1.2; 0.1; 1.2; 1.2; 3; 1.2; 1.2; 3; 2; 1.2; 3; 1.2
Switch Power/W	5; 15(5L), 20; 10; 3; 10; 15(5V), 20; 10; 3; 15(5V), 20; 10; 15(5V), 20; 10; 50; 50; 3; 15(5V), 20; 10; 50; 3
Max Initial Contact Resistance/mΩ	150; 150; 120; 250; 120; 140; 150; 120; 200; 170; 150; 150; 120; 150; 75; 100; 200; 150; 170; 150; 100; 220
Life Min Load	2.5 x 10E8; 10E9; 10E8; 10E9; 10E9; 10E8; 10E9; 10E9; 10E8; 10E9; 10E8; 10E9; 10E8
Typical	10E7; 10E8; 10E7; 10E8; 10E8; 10E7; 10E8; 10E8; 10E7; 10E8; 10E7; 10E8; 10E7
Max Load	10E6; 10E7; 10E6; 10E7; 10E7; 10E6; 10E7; 10E7; 10E6; 10E7; 10E6; 10E7; 10E6
Operate Time/ms	0.5; 0.5; 0.75; 0.5; 0.5; 1; 0.5; 0.5; 0.75; 2; 1; 0.5; 2; 1
Release Time/ms	0.2; 0.2; 0.5; 0.2; 0.2; 0.5; 0.2; 0.2; 0.25; 1.25; 0.5; 0.2; 1.25; 0.5
Insulation Resistance/Ω	10E12 Ω; 10E12 Ω; 10E11 Ω; 10E12 Ω; 10E12 Ω; 10E10 Ω; 10E12 Ω; 10E12 Ω; 10E11 Ω; 10E10 Ω; 10E12 Ω; 10E11 Ω
Coil 3V/Ω	200; –; 330; 100; –; –; 330; –; –; 500; –; 200
5V/Ω	500; 500 (1000 for high sensitivity version); 150; 750; 375; 500; 375; 500; 140; 500; 1000; 500; 500; 100; 375
12V/Ω	–; 1000; –; –; 750; 1000; 1000; 1000; 500; 1000; 3000; 1000; 1000; 375; 1000
24V/Ω	–; –; –; –; –; –; –; 3000; 1500; 3000; 3000; 3000; 3000; 2700

High Switching Power

Application	
Series Name	114-1-A; 114-2-A; 114-1-B
Features	Highest Quality Instrumentation Grade Reed Switches; High Power
Depth	6.3 (0.245)
Width	24.1 (0.95); 29.0 (1.14)
Height	8.2 (0.32); 12.5 (0.49)
Contact Configuration	1A (SPST); 2A (DPST); 1B (SPNC)
Reed Switch Type	High Voltage Dry Reed
Switch Number	1
Diode Available	Yes
Switching Voltage/V	200Vdc 240Vac (500V max stand off)
Switching Current/A	3
Carry Current/A	2
Switch Power/W	40
Max Initial Contact Resistance/mΩ	150; 200
Life Min Load	10E9
Typical	10E8
Max Load	10E7
Operate Time/ms	1
Release Time/ms	0.5
Insulation Resistance/Ω	10E12 Ω
Coil 3V/Ω	75; –; –
5V/Ω	250; 150; 350
12V/Ω	750; 350; 1000
24V/Ω	2000; 1000; 2200

Custom Reed Relays

Pickering manufacture a very wide range of reed relays. If we do not have exactly what you need, we may be able to adapt an existing relay or design a special part for you. Some examples are below;

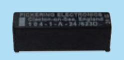
- ✔ Variations or enhancement of specifications
- ✔ Special pin configurations or pin lengths
- ✔ Special print with customers own part number or logo
- ✔ Custom Packaging
- ✔ Equivalents to competitors discontinued parts
- ✔ Non-standard coil voltages and resistance figures
- ✔ Special Life testing under customer's specific load conditions
- ✔ Specific environmental requirements
- ✔ Controlled Thermal EMF
- ✔ Very low capacitance

• Specialized Applications, for example, current operated relays

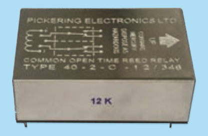
• Standard parts with custom pinouts or pin length

• Copper plated switches for RF/HF applications
• 1 and 2 Form A available

• 2-Pole Mercury Wet relay with custom pinout, an equivalent to a competitor's discontinued part



• Standard Catalog parts tested to a higher specification. For example, the Series 104 has been modified for applications requiring an increased voltage specification



• 2-Pole Mercury Wet Changeover relay where a common open time is required

Help with your Custom Requirements

For help with your custom requirements go to **pickeringrelay.com/products/custom-reed-relays**
If your questions are not answered here please call **+44 (0) 1255 428141** or e-mail:
techsales@pickeringrelay.com

Technical Help

For technical help please go to **pickeringrelay.com/help**
If your questions are not answered here please email **techsales@pickeringrelay.com**

For a free evaluation sample call technical sales on +44 (0) 1255 428141, or e-mail us at sales@pickeringrelay.com

High Voltage

Application	
Series Name	New 119-1-A; 119-2-A; 119-1-B; 104-1-A; 104-1-B; 104-2-A; 62/63-1-A; 62/63-1-B; 60/65-1-A; 60/65-1-B; New 67/68-1-A
Features	Highest Quality Instrumentation Grade Reed Switches; High Voltage; Robust Tungsten Plated Switches
Depth	3.7 (0.145); 3.7 (0.145); 6.3 (0.245); 19.05 (0.75); 16.0 (0.63); 12.6 (0.495)
Width	15.1 (0.595); 20.1 (0.79); 15.1 (0.595); 24.1 (0.95); 29 (1.14); 63.5 (2.5); 57.9 (2.28); 58.4 (2.3)
Height	6.6 (0.26); 8.9 (0.35); 8.9 (0.35); 8.2 (0.32); 12.5 (0.49); 21.3 (0.84); 18.0 (0.71); 14.5 (0.57)
Footprint (0.1 inch grid)	Scaled 50%; Scaled 50%; Scaled 50%
Contact Configuration	1A (SPST); 2A (DPST); 1B (SPNC); 1B (SPNC); 1A (SPST); 1B (SPNC); 2A (DPST); 1A (SPST); 1B (SPNC); 1A (SPST); 1B (SPNC); 1A (SPST)
Reed Switch Type	1kV Stand Off; 2kV Stand Off; 3kV Stand Off; 1kV Stand Off; 1kV Stand Off; 2kV Stand Off; 1kV Stand Off; 1.5kV Stand Off; Standard Mercury Switch; 3kV Stand Off; 1kV Stand Off; 1.5kV Stand Off; 1kV Stand Off; 1.5kV Stand Off; Standard Mercury Switch; 5kV Stand Off; 10kV Stand Off; 15kV Stand Off; 5kV Stand Off; 10kV Stand Off; 5kV Stand Off; 10kV Stand Off; 15kV Stand Off; 5kV Stand Off; 10kV Stand Off; 5kV Stand Off; 10kV Stand Off; 5kV Stand Off; 10kV Stand Off
Switch Number	1; 2; 3; 1; 1; 2; 1 (1kV); 2 (1.5kV); 6 (1.5kV); 3 (3kV); 1 (1kV); 2 (1.5kV); 1 (1kV); 2 (1.5kV); 6 (1.5kV); 1; 2; 3; 1; 2; 1; 2; 3; 1; 2; 1; 2; 1; 2
Diode Available	Yes; Yes; No; No; Yes
Switching Voltage/V	1000; 500; 1000; 500; 1000; 500; 1000; 500; 1000; 500; 3500; 7500; 12500; 3500; 7500; 3500; 7500; 12500; 3500; 7500; 3500; 7500; 3500; 7500
Switching Current/A	0.7; 0.5; 2; 1; 0.5; 2; 3; 3; 3
Carry Current/A	1.25; 1; 3; 1.5; 1; 3; 3; 3; 3
Switch Power/W	10; 10; 50; 25; 10; 50; 50; 50; 50
Max Initial Contact Resistance/mΩ	170; 150; 120; 150; 200; 150; 120; 120; 120
Life Min Load	10E9; 10E9; 10E8; 10E8; 10E8
Typical	10E8; 10E8; 10E7; 10E7; 10E7
Max Load	10E7; 10E7; 10E6; 10E6; 10E6
Operate Time/ms	0.5; 1; 1.5; 1; 1.5; 3; 3; 3
Release Time/ms	0.2; 0.3; 1; 0.3; 1; 2; 2; 2
Insulation Resistance/Ω	10E12 Ω; 10E12 Ω; 10E11 Ω; 10E12 Ω; 10E12 Ω; 10E12 Ω; 10E11 Ω; 10E12 Ω; 10E11 Ω; 10E12 Ω; 10E12 Ω; 10E12 Ω
Coil 3V/Ω	100; 75; 50; 50; –
5V/Ω	250; 200; 125; 100; 375; 100; 220; 750; 250; 50; 50; 25; 50; 35; 20; 35; 40
12V/Ω	750; 500; 400; 400; 1000; 500; 500; 2000; 750; 275; 150; 75; 150; 150; 150; 150
24V/Ω	–; –; –; –; 3000; 1500; 3000; 3000; 2000; 1000; 500; 350; 500; 500; 200; 500; 600

Coaxial/RF/High Speed Digital Reed Relays

Application	
Series Name	111RF-1-A; 109RF50-1-A; 109RF75-1-A; 103G-1-A; 103GM-1-A; 102M-1-A; 102M-1-B
Features	Highest Quality Instrumentation Grade Reed Switches; SoftCenter® Construction in Mu-Metal Can; Low Capacitance; Up to 20W Switching
Depth	3.7 (0.145); 3.7 (0.145); 4.8 (0.19); 4.8 (0.19)
Width	10.0 (0.39); 15.1 (0.595); 19.1 (0.75); 19.1 (0.75)
Height	6.6 (0.26); 6.6 (0.26); 8.1 (0.32); 7.6 (0.3); 10.2 (0.4)
Contact Configuration	1A (SPST); 1A (SPST); 1A (SPST); 1A (SPST); 1A (SPST); 1B (SPNC)
Reed Switch Type	General Dry Reed; General Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; General Dry Reed; Higher Power Dry Reed; General Dry Reed; Higher Power Dry Reed
Switch Number	1; 1; 2; 1; 2; 1; 2; 1; 2; 1; 2; 1; 2
Diode Available	Yes; Yes; Yes
Switching Voltage/V	170; 200; 200; 200; 200
Switching Current/A	0.5; 1; 0.5; 1; 0.5; 1; 0.5; 1; 0.5; 0.5; 1; 0.5; 1
Carry Current/A	0.5; 1.2; 1.2; 1.2; 1.2
Switch Power/W	5; 15(5V), 20; 10; 15(5V), 20; 10; 15; 10; 15; 10; 10; 20; 10; 20
Max Initial Contact Resistance/mΩ	150; 150; 120; 150; 120; 150; 120; 150; 120; 150; 120; 150; 120
Life Min Load	2.5 x 10E8; 10E9; 10E9; 10E9; 10E9
Typical	10E7; 10E8; 10E8; 10E8; 10E8
Max Load	10E6; 10E7; 10E7; 10E7; 10E7
Operate Time/ms	0.5; 0.5; 0.5; 0.5; 0.5
Release Time/ms	0.2; 0.2; 0.2; 0.2; 0.2
Insulation Resistance/Ω	10E12 Ω; 10E12 Ω; 10E12 Ω; 10E12 Ω; 10E12 Ω
Coil 3V/Ω	–; –; –; 300; –; 300; 300; –; –
5V/Ω	180; 375; 500; 500; 500; 500; 500; 375; 1000; 500
12V/Ω	–; 600; 1000; 1000; 1000; 1000; 1000; 1500
24V/Ω	–; –; –; –; –

Low Coil Power/Low Thermal EMF

Application	
Series Name	118-1-A; 101-1-A; 101-1-C; 101-1-B; 101-2-A; 100-1-A; 100-1-C; 100-1-B; 100-2-A
Features	Highest Quality Instrumentation Grade Reed Switches; Direct Drive From CMOS; Direct Drive From CMOS - Low Thermal EMF
Depth	5.08 (0.2); 7.4 (0.29); 10.2 (0.40)
Width	8.38 (0.33); 20.1 (0.79); 24.1 (0.95)
Height	15.5 (0.61); 9.4 (0.37); 12.5 (0.49); 12.7 (0.5); 15.2 (0.60)
Contact Configuration	1A (SPST); 1A (SPST); 1C (SPDT); 1B (SPNC); 2A (DPST); 1A (SPST); 1C (SPDT); 1B (SPNC); 2A (DPST)
Reed Switch Type	General Dry Reed; Low Level Dry Reed; General Dry Reed; Low Level Dry Reed; Low Level Dry Reed (Special); High Voltage Switch; Standard Mercury Switch; Position Insensitive Switch; Dry Reed; General Dry Reed; General Dry Reed; Low Level Dry Reed; Standard Mercury Switch; General Dry Reed; Low Level Dry Reed; High Voltage Switch; Standard Mercury Switch; Position Insensitive Switch; Dry Reed; General Dry Reed; General Dry Reed; Low Level Dry Reed; Standard Mercury Switch
Switch Number	1; 2; 1; 2; 17; 4; 6; 8; 3; 1; 1; 2; 6; 1; 2; 4; 6; 8; 3; 1; 1; 2; 6
Diode Available	Yes; Yes; Yes
Switching Voltage/V	200; 200; 400; 500; 500; 200; 500; 200; 500; 500; 200; 500
Switching Current/A	1; 0.5; 1; 0.5; 2; 2; 0.25; 1; 0.5; 2; 1; 0.5; 2; 2; 0.25; 1; 0.5; 2
Carry Current/A	1.2; 1.2; 3; 3; 1.2; 3; 1.2; 3; 3; 1.2; 3
Switch Power/W	15; 10; 15(5V), 20; 10; 50; 50; 3; 15(5V), 20; 10; 50; 10; 50; 50; 3; 10; 50
Max Initial Contact Resistance/mΩ	120; 150; 120; 150; 75; 100; 200; 150; 170; 150; 100; 150; 120; 150; 100; 120; 200; 170; 200; 180; 150
Life Min Load	10E9; 10E9; 10E8; 10E9; 10E9; 10E8; 10E9
Typical	10E8; 10E8; 10E7; 10E8; 10E8; 10E7; 10E8
Max Load	10E7; 10E7; 10E6; 10E7; 10E7; 10E6; 10E7
Operate Time/ms	0.6; 1; 1.75; 1.25; 1; 1.75; 1; 1.75; 2; 1; 1; 1; 2
Release Time/ms	0.35; 0.75; 1.75; 1; 0.75; 1.75; 1; 1.75; 1; 1; 1; 1
Insulation Resistance/Ω	10E12 Ω; 10E12 Ω; 10E11 Ω; 10E10 Ω; 10E12 Ω; 10E11 Ω; 10E12 Ω; 10E11 Ω; 10E10 Ω; 10E12 Ω; 10E11 Ω
Coil 3V/Ω	–; 1000; –; 1600; –; –; –; 2000; –
5V/Ω	1500; 2200; 1600; 3000; 1600; 375; 1600; 3000; 500; 150; 3300; 2200; 500; 370; 3300; 2700; 370
12V/Ω	–; –; 6000; 6000; 1000; 6000; 6000; 3000; 650; 6800; 2000; 1000; 6800; 6800; 1000
24V/Ω	–; –; 6000; 6000; 3000; 6000; 6000; 6000; 2000; 6800; 3300; 6800; 3300

Surface Mount / Surface Mount RF

Application	
Series Name	200-1-A; 200-2-A; 200-1-C; 200-1-B; 200RF; 102F-1-A
Features	Highest Quality Instrumentation Grade Reed Switches; Only Surface Mount Reed Relay Available with SoftCenter® Construction
Depth	3.9 (0.154); 5.85 (0.23); 4.00 (0.154); 7.6 (0.3)
Width	15.25 (0.6); 20.0 (0.79); 15.25 (0.6); 20.0 (0.79); 15.25 (0.6); 15.25 (0.6); 13.5 (0.53)
Height	6.8 (0.27); 9.0 (0.35); 6.8 (0.27); 9.0 (0.35); 6.8 (0.27); 6.8 (0.27); 4.8 (0.19)
Contact Configuration	1A (SPST); 2A (DPST); 1C (SPDT); 1B (SPNC); 1A (SPST); 1A (SPST)
Reed Switch Type	General Dry Reed; Low Level Dry Reed; High Volt Dry Reed; Standard Mercury Wet Reed; Position Insensitive Mercury Wet Reed; Low Level Dry Reed; Dry Reed; Low Level Dry Reed; Low Level Dry Reed; General Dry Reed; Higher Power Dry Reed
Switch Number	1; 2; 4; 6; 8; 2; 3; 2; 1; 1; 2
Diode Available	Yes
Switching Voltage/V	200; 500; 500; 500; 200; 200; 200; 200; 200
Switching Current/A	1; 0.5; 0.5; 2; 2; 0.5; 0.25; 0.5; 0.5; 1; 1
Carry Current/A	1.2; 1.2; 3; 3; 1.2; 1.2; 1.2; 1.2; 1.2; 1.2
Switch Power/W	15; 10; 10; 50; 50; 10; 3; 10; 10; 10; 20
Max Initial Contact Resistance/mΩ	150; 120; 150; 75; 100; 120; 200; 120; 120; 100
Life Min Load	10E9; 10E8; 10E8; 10E9; 10E9; 10E9
Typical	10E8; 10E7; 10E7; 10E8; 10E8; 10E8
Max Load	10E7; 10E6; 10E6; 10E7; 10E7; 10E7
Operate Time/ms	0.5; 0.5; 2; 0.5; 1; 0.5; 0.5; 0.5
Release Time/ms	0.2; 0.2; 1.25; 0.2; 0.5; 0.2; 0.2; 0.2
Insulation Resistance/Ω	10E12 Ω; 10E12 Ω; 10E10 Ω; 10E12 Ω; 10E11 Ω; 10E12 Ω; 10E12 Ω; 10E12 Ω
Coil 3V/Ω	–; 250; –; –; –; –; –; –; 300; –
5V/Ω	500; 500; 140; 140; 400; 500; 750; 250; 500; 375
12V/Ω	1000; 1000; 500; 500; 1000; 1000; 1000; 1000; 1000; 1000
24V/Ω	–; –; –

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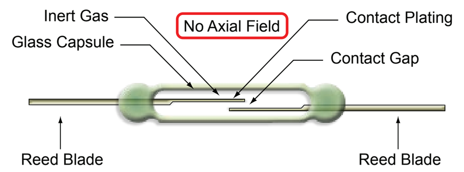
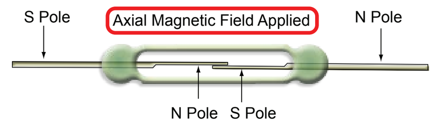
Reed Relay Basics

Reed relays contain a reed switch, a coil for creating a magnetic field, an optional diode for handling back EMF from the coil, a package and a method of connecting to the reed switch and the coil to outside of the package. The reed switch is a simple device and relatively low cost to manufacture.



Reed Switch

The reed switch has two shaped metal blades made of a ferromagnetic material (roughly 50:50 nickel iron) and glass envelope that serves to both hold the metal blades in place and to provide a hermetic seal that prevents any contaminants entering the critical contact areas inside the glass envelope. Most (but not all) reed switches have open contacts in their normal state.



If a magnetic field is applied along the axis of the reed blades the field is intensified in the reed blades because of their ferromagnetic nature, the open contacts of the reed blades are attracted to each other and the blades deflect to close the gap. With enough applied field the blades make contact and electrical contact is made.

The only movable part in the reed switch is the deflection of the blades, there are no pivot points or materials trying to slide past each other. The reed switch is considered to have no moving parts, and that means there are no parts that mechanically wear. The contact area is enclosed in a hermetically sealed envelope with inert gasses, or in the case of high voltage switches a vacuum, so the switch area is sealed against external contamination. This gives the reed switch an exceptionally long mechanical life

Ferromagnetic material is not a good conductor and in particular the material does not make a good switch contact, so the reed blades have to have a precious metal cover in the contact area, the precious metal may not stick to the blade material very well so an underlying metal barrier may be required to ensure good adherence. Some types of reed relay use mercury wetted contacts, consequently reed relays that use plated contacts are often referred to as "dry" reed relays. Where the reed blade passes through the glass envelope any plating (in many cases there may be none) requires controlling to avoid adversely affecting the glass to metal hermetic seal. Outside the glass seal the reed blades have to be suitably finished to allow them to be soldered or welded into the reed relay package, usually requiring a different plating finish to that used inside the glass envelope.

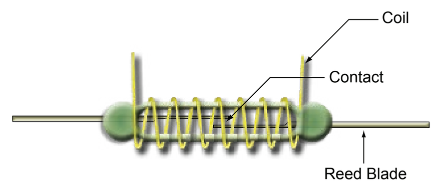
The materials used for the precious metal contact areas inside the glass envelope have a significant impact on the reed switch (and therefore the relay) characteristics. Some materials have excellent contact resistance stability; others resist the mechanical erosion that occurs during hot switch events. Commonly used materials are ruthenium, rhodium and iridium– all of which are in the relatively rare platinum precious metal group. Tungsten is often used for high power or high voltage reed switches due to its high melting point. The material for the contact is chosen to best suit the target performance.

Another design variable on the reed switch is its size. Longer switches do not have to deflect the blades as far (measured by angle of deflection) as short switches to close a given gap size between the blades. Short reeds are often made of thinner materials so they deflect more easily but this impacts on their rating and contact area. Smaller reed switches allow smaller relays to be constructed – an important consideration where space is critical. The larger switches may be more mechanically robust and have greater contact area, improving their signal carrying capability.

It is these compromises in reed switch design that gives rise to the vast range of reed relays that are available with both subtle and not so subtle differences in performance.

Generating the magnetic field

To create a relay a magnetic field needs to be created that is capable of closing the reed switch contacts. Reed switches can be used with permanent magnets (for example to detect doors closing) but for reed relays the field is generated by a coil which can have a current passed through in response to a control signal. The coil surrounds the reed switch and generates the axial magnetic field needed to close the reed contacts.



Different reed switches require different levels of magnetic field to close the contact, and this is usually quoted in terms of the ampere turns (AT) – simply the product of the current flowing in the coil multiplied by the number of turns. Again this creates a great deal of variation in the reed relay characteristics. Stiffer reed switches for higher power levels or high voltage switches with larger contact gaps, usually require higher AT numbers to operate, so the coils require more power.

Use of different wire gauges for the coil and number of turns creates relays with different drive voltage requirements and different coil powers. The resistance of the wire coil controls the amount of steady state current flowing through the coil and therefore the power the coil consumes when the contacts are closed. Whenever fine wires are used in Pickering relays, the termination leads from the coils are skeined with several strands of wire twisted together to increase their physical strength.

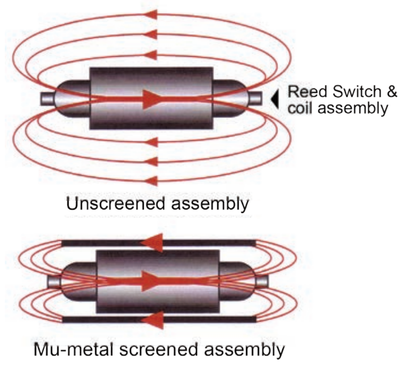
Larger coils can be used to reduce power consumption, but that increases the size of the relay.

A significant factor in some designs is the ability to drive reed relays with standard CMOS logic, requiring that the coil is operated from 5V or 3.3V and that the current (power) requirements in the coil are minimized.

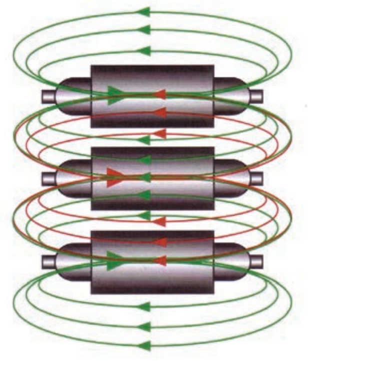
Protection against Magnetic Interaction

Because reed relays are magnetically operated causes a potential problem for users when they are assembled in dense patterns on PCBs

The magnetic field required to close the reed blades flows through the nickel iron reed blades and returns by field lines which are outside the reed relay body. If several relays are placed close together the external field lines can be drawn by the neighboring reed blades and either reinforce of partially cancel the field in the reed, changing the current needed to close or open the contact. This can in some circumstances cause enough effect that the relay may either fail to close or open depending on the magnetic polarity. Some manufacturers suggest arranging the relays in different polarity patterns to mitigate the worst effect of the interaction, but this can become a complex compromise in dense arrays of relays where there are many near neighbors.



Simplified illustration of magnetic fields around screened and unscreened reed switch and coil assemblies

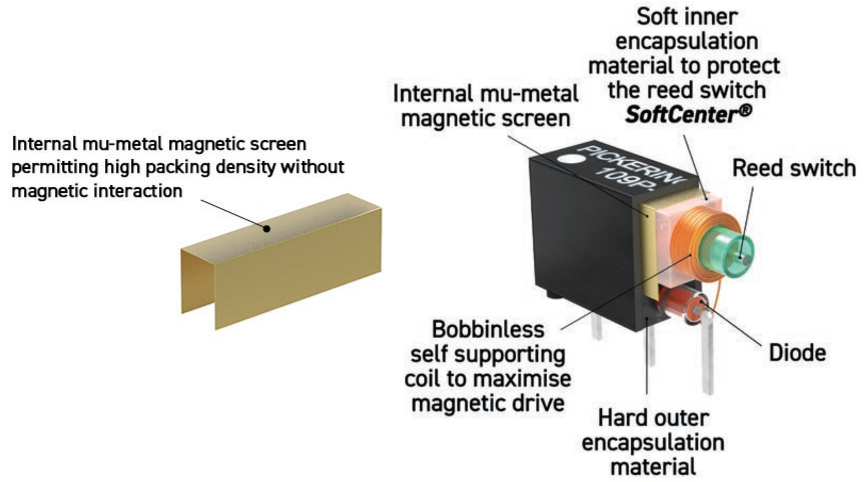


Simplified illustration showing cancellation of magnetic fields due to adjacent unscreened reed relays

A much more sensible approach is to include a magnetic shield in the reed relay package, an approach used by Pickering Electronics for many years. The user is then free to use a layout pattern that best suits the application. The approach has the added benefit of improving the coil efficiency since it concentrates the magnetic field lines closer to the reed switch body, shortening the magnetic field length outside the reed blades and creating a larger field for a given number of ampere turns in the coil. Lower coil operating currents make coil driving simpler and improves other parameters like thermoelectric emf generation.

Pickering relays use either an internal mu-metal screen inside the plastic package or an external mu-metal can. Mu-metal is used because it has a high permeability at low frequencies and DC. It deflects any external magnetic field around the relay body and the material has a low ability to retain a magnetic field when the coil current is interrupted. Magnetic shields using other materials are generally to be avoided since remanent magnetism can alter the operating point of the relay and create contact variability.

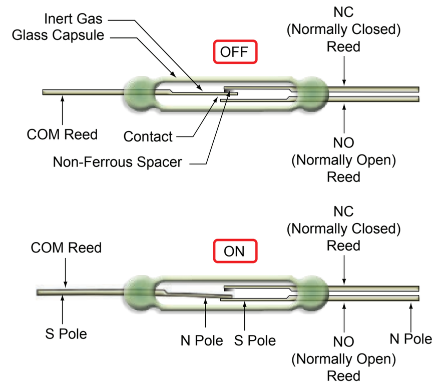
If relays are to be closely packed together then a relay should be chosen with an integrated magnetic shield.



Reed Relay Types

Changeover Reeds

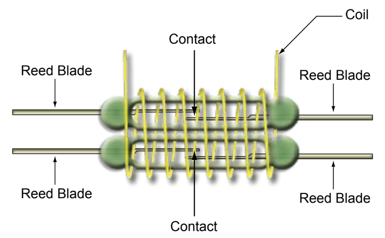
Reed relays can be supplied with changeover switches – the reed switch has a normally closed contact (when no magnetic field is applied) and a normally open contact (which closes when the field is applied). The reed switch closed contact uses the blade as a spring bias with a non ferrous spacer to avoid completing a magnetic circuit. The coil field moves the blade to the normally open contact blade which does not have this spacer. As the reed relay switch blades transition between the two states for a brief period neither contact is closed – and important consideration in some applications.



The normally closed position relies on contact pressure being created by the spring bias of the blade. As well as being much harder to manufacture than normally open reed relays the two contacts, normally closed and normally open, can have quite different characteristics and stability. Experience is generally that they have a slightly less stable contact resistance than their simpler normally open counterparts. Even so, they perform a useful function for many applications because unlike the use of two normally open reed relays used to create a changeover function they only need one coil drive and it is mechanically not possible to have both contacts closed at the same time.

Two Pole Relays

Reed relays can also be supplied as 2 pole relays where two reed switches are contained in the same package and operated by a common coil drive.



It is important to remember that these relays do not have an interlock mechanism between the two, it is unsafe to assume that that the two poles operate at exactly the same time and the two reed switches are essentially independent. There could be an operate time difference of between 50 - 250 microSeconds between them. Failure in one (say a contact weld) will not stop the other contact from moving.

Mercury Reed Relays

There is a class of reed relays that has been historically very popular where the reed contacts include mercury that provides the electrical contact between the blades. The mercury is provided by a small reservoir which blade actuation tends to pump up a grooved surface on the reed blade to the contact area using mercury's high surface tension to retain the material.

Selective chrome plating is often used in the construction since mercury and chrome do not stick together and this is used to help control the mercury.

The glass envelope of mercury relays is also highly pressurised (typically 12 to 14 bar) which helps to manage the switch materials and operation and to improve electrical parameters.

These relays are strongly preferred in some industries because they have a long contact life and bounce free contact closure – a feature that is particularly helpful under hot switch conditions. Stability of low contact resistance during their operational life is considered to be better than that of dry reed relays.

Most types of mercury reed relays are position sensitive – they can only be used in a vertical orientation. Some non position sensitive versions are also available which can be used in any orientation. Mercury wetted relays however are not RoHS compliant and national regulations may limit their use to certain critical applications where exceptions on RoHS have been granted.

High Voltage Reed Relays

High voltage reed relays in addition to having to ensure high clearance distance (including the distance between the contacts in the reed switch) have to have a carefully match operating environment and different contact materials to resist the contact erosion that occur when switching the signals. High voltage reed switches commonly use tungsten or rhodium contacts.

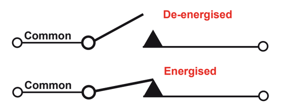
The glass envelope for high voltage reed switches is normally a very hard vacuum to maximise the voltage rating for a given blade separation and to manage arc duration as the contacts open or close. Any loss of seal will rapidly degrade the switch operation so reed switches have to be carefully managed as they are packaged into reed relays.

Relay Terminology

The relay industry has evolved with a set of its own nomenclature that describes the products that are available, not all of these terms are familiar to users. The following section seeks to describe these relay terms.

Form A

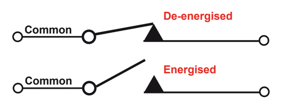
This reference describes a relay whose contact is a simple switch which is open or closed and the un-energized position is the open condition. For a single relay this would also be described as a single pole, single throw (SPST) relay with a normally open (NO) contact.



If the relay has multiple contacts in the same package it would be described as having (for example) 2 Form A contacts (DPST).

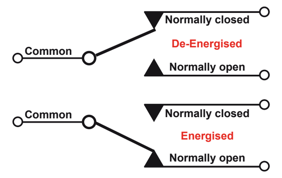
Form B

This reference describes a relay whose contact is a simple switch which is open or closed and the un-energized position is closed.



Form C (Change-over - break-before-make)

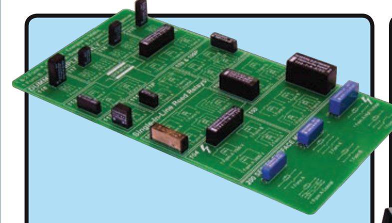
This reference describes a relay with two contact positions, the normally closed contact and the contact which becomes closed when the relay is energized. For a single relay this would also be known as a changeover switch or a single pole double throw (SPDT). If the relay has two contacts sets it would be described as 2 Form C contacts, or double pole double throw (DPDT).



Free Literature and Samples

The Reed RelayMate from Pickering Electronics is a publication which looks in detail at reed relays. In it you'll find out how reed relays are constructed, what types there are, how they work, what parameters affect their operation, how to choose the correct relay, a comparison with other relay technologies and how to drive and place reed relay coils.

The Reed RelayMate is available **free** from the home page of Pickering Electronics' website and is available as printed copy or pdf format.



FREE

A **PCB** containing **non-working** samples of Pickering Electronics' Reed Relay range is available on request.

FREE

Evaluation samples available on request.

Pickering Electronics' Product Catalogue is available on request from our sales department, or it can be downloaded from our website.

Choosing a Reed Relay

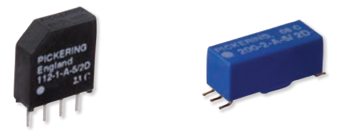
Signal Voltage, Current and Power Specification

All reed relays have specified voltage and current ratings that need to be kept within if the reed relay is to have a long service life. It important to be clear if the application envisages hot switch or cold switching, it can have a substantial impact on the cost and size of the relay used. If hot switching is likely to occur the most common mistake is to ignore the power rating of the reed relay, the fact a particular relay may be capable of 100V and 1A does not mean it can hot switch a signal with these extremes of value. A 10W reed relay for example will only switch a 100V, 100mA signal reliably.

If hot switching is not expected to happen then the user can rely on the carry current rating and to withstand the rated voltage across the contacts.

SMD or Thru Hole Mounting

Users often have a choice of using thru hole components or surface mount packages for reed relays.



With other component types the choice may be driven in part by the density that can be achieved on a PCB, however this is not always the case with reed relays. Reed relays are not particularly small devices by modern standards as magnetic interaction can be a real problem on some systems (though not on Pickering Electronics based solutions where the built in magnetic shield prevents problems).

Manufacturing processes may prefer to use SMD components, in which case there are solutions which are available for most applications. However, the choice is more difficult when the relay is considered to be a potential service item. The relay could be considered to be a service item if it is frequently exposed to hot switching events which might wear out the contact materials or where (as is the case in ATE systems) connection to faulty devices or even programming errors can result in the relay being damaged.

Removing surface mounted components is an intrusive procedure – even using specialist de-soldering tools not only the component to be removed but also adjacent components are subject to heating, solder reflow and stress. In these circumstances thru hole components are much easier to manage and require no specialist de-soldering tools or high operator skills. It is more likely the item can be serviced locally, and it is less likely to cause damage elsewhere in the assembly.

For applications where relays may have to be serviced Pickering Electronics recommend that thru hole components are used. Outside of these applications the choice is driven by user manufacturing preferences and the component choices such as footprint area, relay ratings and relay height.

Diode or No Diode

Reed relays often have a choice to include an internal protection diode or not (in comparison this is never the case with EMRs).

The purpose of this diode is sometimes misunderstood, it is present primarily to protect the device that is driving the relay coil from the Back EMF that is generated when the current flow is interrupted.

Assuming the relay coil driver operates with an open collector drive then while the driving device is on the current flow is limited by the resistance of the relay coil. When the open collector is turned off the voltage on the output tries to rise and the current tries to drop, but the open collector drive has no conduction path to allow this to happen. The conducted current has to fall to zero to collapse the magnetic field in the coil. So the driver output voltage rises rapidly, the rate of rise being limited only by characteristics such as coil or driver capacitance. Eventually the voltage rise will limit as the driver output starts to enter voltage breakdown. This is a large impulse load for the driver and may result in premature failure.

Pickering's solution for this is to include a diode to protect the driver, when the driver output rises above the coil supply voltage the diode conducts and clamps the output voltage. As the diode clamp voltage is much less than the breakdown voltage the peak instantaneous energy dissipated is much lower, and a diode is generally designed to better handle this surge than a transistor.

Coil Voltage

Reed relays are supplied with a wide variety of coil voltage options. For logic driving 3.3V and 5V drives are the preferred choice since these voltages are directly compatible with common logic families. However, all the coils for a given reed switch have to have a certain number of Ampere Turns as previously noted, so as coil voltage is dropped the coil current required is increased. For some applications high coil currents are undesirable – they might lead to power loss in power supplies (low voltage supplies are commonly less efficient than higher voltage supplies), losses on PCB traces and the creation of larger EMC transients.

LED drivers can directly support either 5V or 12V coils, open collector drivers can support even higher voltages. However, as coil voltage increases the wire used to create the relay coil becomes finer and harder to wind without breakages. Ultimately this limits the highest voltage coils that can be offered.

For many applications 5V coils are considered a good compromise.

One factor often ignored by users is the impact of temperature on coil current. Data sheets for relays will commonly show a pick up voltage and release voltage and this is usually at a significantly lower voltage than the nominal coil voltage required. There are four principal reasons for this margin:

As temperature rises the coil resistance rises (by 0.39% per°C), the voltages are measured at more typical temperatures (25°C), so by the time the maximum rated temperature of the relay is reached the coil current can have dropped very significantly.

The coil drivers will have an output resistance which may be significant.

Actual power supply voltage can vary both from product to product and across a PCB used to distribute it.

External magnetic fields might alter the coil current needed to achieve the required field strength.

Consequently reed relays should have a reasonable operating margin to ensure reliable operation in all conditions. The lowest voltage relay coils are the most vulnerable to this type of problem.

Pickering *SoftCenter*® Technology

SoftCenter® Technology

Pickering Reed Relays are encapsulated using a soft inner material to protect the reed switch capsule. The very hard compounds used by most other manufacturers can cause stresses that can potentially damage the reed switch and degrade contact resistance stability and life expectation.

Formerless Coils

Relay operating coils are commonly wound on bobbins. The great majority of Pickering relays are manufactured with self supporting coils, thus avoiding the space required for these bobbins. In the case of the smaller relays types, this gives around 50 percent more room for the coil winding, allowing the use of less sensitive reed switches with their inherent advantages of higher operating and restoring forces. In some ranges, this technique allows Pickering to achieve extremely high coil resistance figures.

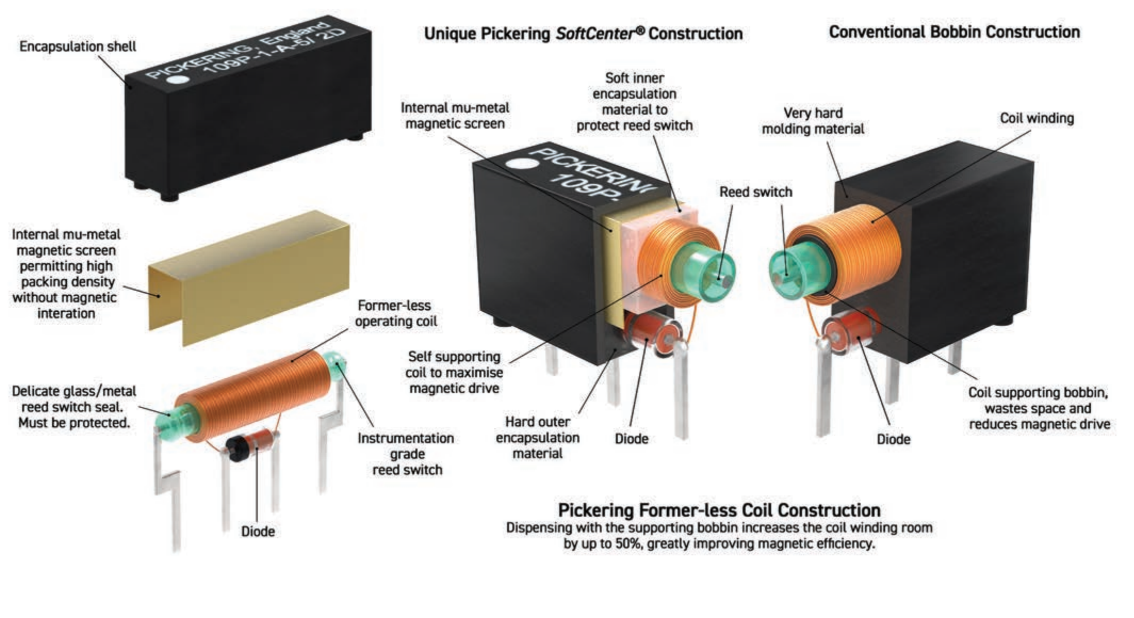
Highest Grade Reed Switches

Pickering relays feature the very highest quality 'instrumentation grade' reed switches to meet the exacting demands and long life required of today's equipment manufacturers.

To learn more about our unique technology visit:

pickeringrelay.com/softcenter

Typical Pickering Construction using Former-less Coils and our *SoftCenter*® technology



Pickering Former-less Coil Construction

Dispensing with the supporting bobbin increases the coil winding room by up to 50%, greatly improving magnetic efficiency.

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Reed Relay Finder

- Highest Quality Instrumentation Grade Reed Switches
- Coaxial/RF/High Speed Digital
- Ultra High Packing Density
- Direct Drive from CMOS
- ***SoftCenter***® Technology
- Up to 50W Switching
- Custom Reed Relays
- Low Thermal EMF
- Low Capacitance
- High Voltage
- High Power

SoftCenter®

The **Reed Relay Finder** is a single sheet reference to Pickering's high quality range of Reed Relays, including their basic specifications.

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Reed Relay Finder

About Pickering Electronics

Pickering Electronics was formed in January 1968 to design and manufacture high quality reed relays, intended principally for use in instrumentation and automatic test equipment.

Today, the UK facility is responsible for Product Development, Technical Back-up, Sales, Marketing and Administration.

Manufacturing is shared between the UK factory and a large modern plant in Trinec, Czech Republic, with strict Quality Control and ISO 2001 certification at both facilities. Pickering Electronics s.r.o. is 100% owned by Pickering Electronics Ltd., England.

Pickering Electronics offer an extensive range of high quality instrumentation grade reed relays designed for applications requiring the highest levels of performance and reliability at an affordable price. Through the experience of supporting the most demanding manufacturers of large ATE systems with high relay counts the company has refined its assembly and quality control methods to optimise its manufacturing methods.

Working with its sister company, Pickering Interfaces (pickeringtest.com), Pickering Electronics has developed innovative reed relay solutions designed to provide high coil efficiency, low switch volume and low PCB footprint solutions to meet the demands of modern equipment manufacturers.

SoftCenter® | Highest Grade Reed Switches | Mu-Metal Magnetic Screens | Custom Designs

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