

# CMOS Drive DIL/DIP Reed Relays

Direct drive from 74HC or HCT

## Features

- **SoftCenter®** construction
- Pin compatible with standard DIL relays
- Board space may be saved by eliminating drivers
- Encapsulated in a plastic package with internal mu-metal magnetic screen
- Wide range of switch configurations - 1 Form A, 1 Form B, 2 Form A, 1 Form C
- Dry and mercury wetted switches are available with the same pin configuration and footprint (see "A useful tip" below)
- 5, 12 and 24 Volt coils with or without internal diode
- 100% tested for dynamic contact resistance for guaranteed performance

The Pickering Series 98 is a range of Dual-In-Line relays, electrically equivalent to the Series 101 CMOS drive, Single-In-Line types, but pin compatible with standard DIL relays. The range features very high coil resistances, the 5 volt dry devices may be driven directly from 74HC or 74HCT logic without the need for additional drivers. Naturally, high resistance 12 and 24 volt coils are also available in this series.

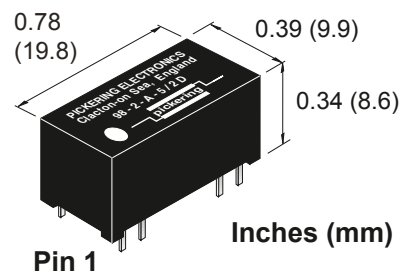
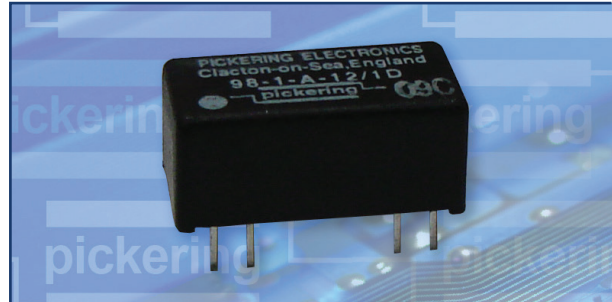
74HC logic will drive up to 4mA at 5 volts which means that a nominal coil resistance of 1600 ohms is required to avoid running the IC at its maximum rating; 1600 ohms is the coil resistance of the single pole dry Series 98. A special model with an even higher coil resistance of 3000 ohms is also available, our type number 98-1-A-5/17D (the D suffix indicates an internal diode).

It is often possible to replace TTL ICs with their equivalent CMOS ones and replace standard DIL relays with Pickering Series 98, to obtain the benefits of CMOS without any circuit or PCB redesign.

The range like its SIL equivalent has an internal mu-metal screen to enable high packing density with negligible interaction between adjacent devices.

### A useful tip

If there is a chance that you might want to use mercury wetted relays instead of dry relays at a later date, for example to increase switch ratings, lay out the PCB initially as though for the mercury wetted type with pins 1 and 14 uppermost. This allows upgrading later without PCB changes. The mercury versions in the Series 98 have identical pin configurations to the dry types.



### Switch Ratings - Dry switches

- 1 Form A (energize to make), 10 or 15 watts at 200V
- 1 Form A (energize to make), 10 watts at 300V
- 1 Form B (energize to break), 15 watts at 200V
- 1 Form C (change-over), 3 watts at 200V
- 2 Form A (energize to make), 10 or 15 watts at 200V

### Switch Ratings - Mercury Wetted switches

- 1 Form A (energize to make), 50 watts at 500V
- 1 Form A (Position insensitive), 50 watts at 500V
- 2 Form A (energize to make), 50 watts at 500V

## Dry Reed - Series 98 switch ratings

The contact ratings for each switch type are shown below:

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note <sup>1</sup> below)	Operate time inc bounce (max)	Release time	Special features
1	A or B	15 W	1.0 A	1.2 A	200	10 <sup>8</sup>	1.0 ms	0.75 ms	General purpose
2	A	10 W	0.5 A	1.2 A	200	10 <sup>8</sup>	1.0 ms	0.75 ms	Low level
3	C	3 W	0.25 A	1.2 A	200	10 <sup>7</sup>	1.25 ms	1.0 ms	Change over
4	A	10 W	0.5 A	1.2 A	300	10 <sup>8</sup>	1.0 ms	0.75 ms	500V stand-off

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

## Dry Relay - Coil data and type numbers

Device type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum)		Capacitance (typical) (see Note <sup>2</sup> below)	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A (energize to make) General Purpose Switch No. 1	98-1-A-5/1D	5	1600 Ω					
	98-1-A-12/1D	12	6000 Ω	0.15 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	2.5 pF	0.1 pF
	98-1-A-24/1D	24	6000 Ω					
1 Form A (energize to make) Low Level Switch No. 2	98-1-A-5/2D	5	1600 Ω					
	98-1-A-12/2D	12	6000 Ω	0.12 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	2.5 pF	0.1 pF
	98-1-A-24/2D	24	6000 Ω					
1 Form A (energize to make) High Voltage Switch No. 4	98-1-A-5/4D	5	1600 Ω					
	98-1-A-12/4D	12	6000 Ω	0.15 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	2.5 pF	0.1 pF
	98-1-A-24/4D	24	6000 Ω					
1 Form C (change-over) Switch No. 3	98-1-C-5/3D	5	1600 Ω				See Note <sup>3</sup>	See Note <sup>3</sup>
	98-1-C-12/3D	12	6000 Ω	0.20 Ω	10 <sup>12</sup> Ω	10 <sup>10</sup> Ω		
	98-1-C-24/3D	24	6000 Ω					
1 Form B (energize to break) General Purpose Switch No. 1	98-1-B-5/1D	5	3000 Ω					
	98-1-B-12/1D	12	6000 Ω	0.15 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	2.5 pF	0.1 pF
	98-1-B-24/1D	24	6000 Ω					
2 Form A (energize to make) General Purpose Switch No. 1	98-2-A-5/1D	5	1000 Ω					
	98-2-A-12/1D	12	3000 Ω	0.17 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	See Note <sup>3</sup>	See Note <sup>3</sup>
	98-2-A-24/1D	24	6000 Ω					
2 Form A (energize to make) Low Level Switch No. 2	98-2-A-5/2D	5	1000 Ω					
	98-2-A-12/2D	12	3000 Ω	0.15 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	See Note <sup>3</sup>	See Note <sup>3</sup>
	98-2-A-24/2D	24	6000 Ω					
1 Form A (energize to make) Special Extra Sensitive Version Low Level Switch No. 2	98-1-A-5/17D	5	3000 Ω	0.12 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	2.5 pF	0.1 pF

When an internal diode is required, the suffix D is added to the part number as shown in the table.

## Mercury Reed: Series 98 switch ratings

The contact ratings for each switch type are shown below:

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note <sup>1</sup> below)	Operate time (max)	Release time	Special features
6	A	50 W	2 A	3 A	500	10 <sup>8</sup>	1.75 ms	1.75 ms	Standard Mercury
8	A	50 W	2 A	3 A	500	10 <sup>8</sup>	1.75 ms	1.75 ms	Position Insensitive

## Mercury Relay: Coil data and type numbers

Device type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum)		Capacitance (typical) (see Note <sup>2</sup> below)	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A (energize to make) Switch No. 6	98-1-A-5/6D	5	375 Ω					
	98-1-A-12/6D	12	1000 Ω	0.075 Ω	10 <sup>12</sup> Ω	10 <sup>11</sup> Ω	4.5 pF	0.08 pF
	98-1-A-24/6D	24	3000 Ω					
1 Form A (energize to make) Position Insensitive Switch No. 8	98-1-A-5/8D	5	375 Ω					
	98-1-A-12/8D	12	1000 Ω	0.100 Ω	10 <sup>12</sup> Ω	10 <sup>11</sup> Ω	4.5 pF	0.08 pF
	98-1-A-24/8D	24	3000 Ω					
2 Form A (energize to make) Switch No. 6	98-2-A-5/6D	5	150 Ω					
	98-2-A-12/6D	12	650 Ω	0.100 Ω	10 <sup>12</sup> Ω	10 <sup>11</sup> Ω	See Note <sup>3</sup>	See Note <sup>3</sup>
	98-2-A-24/6D	24	2000 Ω					

When an internal diode is required, the suffix D is added to the part number as shown in the table.

### Note<sup>1</sup> Life expectancy

The life of a reed relay depends upon the switch load and end of life criteria. For example, for an 'end of life' contact resistance specification of 1 Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 1 x 10<sup>8</sup> ops. At the maximum load (resistive), typical life is 1 x 10<sup>7</sup> ops. In the event of abusive conditions, e.g. high currents due to capacitive inrushes, this figure reduces considerably. Pickering will be pleased to perform life testing with any particular load condition.

### Note<sup>2</sup> Capacitance across open switch

The capacitance across the open switch was measured with other connections guarded.

### Note<sup>3</sup> Capacitance values

The value will depend upon on the mode of connection/guarding of unused terminals. Please contact technical sales for details.

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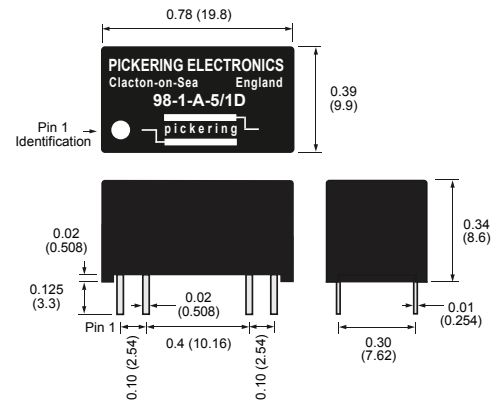
China: email: [chinasales@pickeringtest.com](mailto:chinasales@pickeringtest.com) | Tel. +86 4008-799-765

For a full list of agents and representatives visit: [pickeringrelay.com/agents](http://pickeringrelay.com/agents)

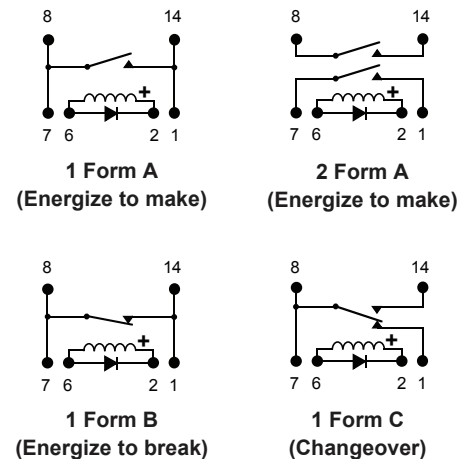


## Pin Configuration and Dimensional Data

Dimensions in Inches (Millimeters in brackets)



Schematics are shown from UNDERNEATH the relay.



**Important:** Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed, as shown by the + symbol on the schematics.

3D Models: Interactive models of Pickering relay products can be downloaded here: [pickeringrelay.com/3d-models](http://pickeringrelay.com/3d-models)

## Mercury Relays

With the exception of the position insensitive type, mercury relays should be mounted vertically with pin 1 uppermost.

## Order Code

98 - 1 - A - 5 / 2 D

Series \_\_\_\_\_  
 Number of reeds \_\_\_\_\_  
 Switch form \_\_\_\_\_  
 Coil voltage \_\_\_\_\_  
 Switch number (See table adjacent) \_\_\_\_\_  
 Diode if fitted (Omit if not required) \_\_\_\_\_

## Help

If you need any technical advice or other help, for example, any special tests that you would like carried out, please do not hesitate to contact our Technical Sales Department. We will always be pleased to discuss Pickering relays with you. email: [techsales@pickeringrelay.com](mailto:techsales@pickeringrelay.com)

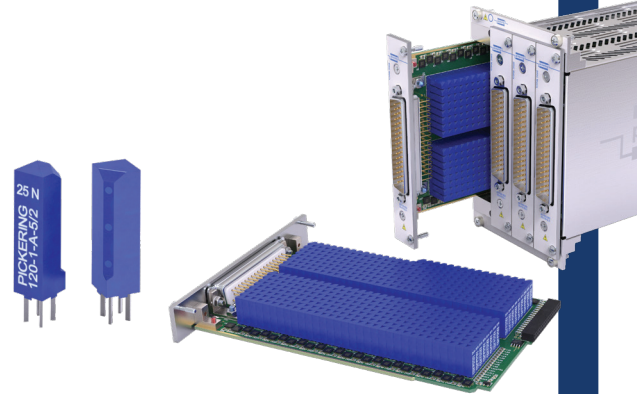
Please ask us for a FREE evaluation sample.

# Why Pickering Electronics?

## Because Quality Matters

Pickering Electronics continue to lead the high-end reed relay market through innovative product design, high performance components and exceptional quality control.

Part of the privately-owned Pickering Group, company operations employ around 200 staff across quality accredited factories in the UK and Czech Republic, supplying demanding Aerospace, Infrastructure, Test & Measurement and ATE applications worldwide.



**Reliability through quality** – 50 Year reputation for exceptional product life longevity derived from continuous staged manufacturing inspection, strenuous full range thermal cycling and 100% testing for all operating parameters.



**Reliability through design** – Environmentally compliant designs and unique Softcenter® technology combine to create an optimised assembly that minimises internal lifetime stresses, extending working life and contact stability.



**Switching Performance** – Compared with common bobbin based products, our formless coil constructions maximise magnetic efficiency resulting in faster switching speeds, optimal switching action and several orders of extended lifetime at operational extremes.



**Cost & Size Performance** – Industry leading mu-metal magnetically screened packages deliver ultra-high PCB packing densities, saving significant cost and space.



**Designers toolkit** – Free samples, worldwide tech support and an unrivalled range of specialist and custom devices, Pickering engineers work alongside customers to deliver problem solving solutions for complex and challenging applications.



**Quality Assurance and compliance** - certified to ISO 9001-2015 and audited by the British Standards Institution. Committed to RoHS & REACH compliance.



**Distribution** – An established global network of group sales offices supported by local agents and distributors, Pickering operate an established logistical supply chain worldwide.



**The Pickering Group** – Employing around 400 staff across 8 sites in the UK and CZ, Pickering Electronics are a key technology partner for Pickering Interfaces and Pickering Connect, supporting the design and manufacture of high performance modular signal switching and simulation systems.