

Electro-Mechanical Switches



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Narda offers a complete line of RF/microwave electro-mechanical switches: stocked SEMs, standard custom part, and one of a kind custom.

All Narda switches offer exceptional reliability and performance. A unique actuator design enables Narda to guarantee operation of one million to two million cycles per switch position without noticeable performance degradation. This means:

No intermittent contacts in RF or indicator circuits

Operating reliability is complemented by RF specifications that equal or exceed industry standards.

The unique design of the coil and solenoid allows the solenoid to be actuated more than one million cycles.

These switches can also include a self-termination technique that does not require a separate RF cavity. All switches are designed to meet MIL-S-3928 and are fully compatible with both military and commercial logic integrated circuits.

After assembly, switches are tested for VSWR, insertion loss, and isolation. Individual switches are then cycled in each position in accordance with Narda's comprehensive test procedures to assure trouble-free operation. Before shipping, final testing is performed. In addition to electrical and mechanical testing, the switches are tested at greater than 10 megohms, 500 volts for DC resistance between the switch body, the terminal, and indicator circuitry.

Narda electro-mechanical switches are available in single pole double throw (SP2T) through single pole twelve throw (SP12T), as well as transfer switch configurations. Standard options include four activation modes, 50 ohm terminations, and TTL logic circuits.

SEM models have either SMA or Type N connectors, indicator circuitry, solder-control terminals, 12, 24 or 28 Vdc actuating voltage, and a typical switching speed of 15 ms. TTL models include suppression diodes. Polarity is common positive for all pulse-latching models.

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Custom part switches and one-of-a-kind switches designed and manufactured to your specific requirements benefit from the same rigorous standards and environment maintained for our SEM switch line.

SEMs - Standard, Stocked Switches

Narda has brought its most popular custom switches into the mainstream by making them standard, stocked catalog products that are always available when you need them. These Stocked Electro-Mechanical switches – or SEM switches – are the definitive answer to most switch requirements.

With nearly forty distinct models, Narda's SEM switches address applications in many industries: ATE, satellite communications, wireless communications, avionics, and military (Radar/EW/communications and commercial test equipment).

Standard, Custom Switches

Narda custom switches range from single pole, double throw configurations (SP2T) to single pole, twelve throw (SP12T) units, plus transfer switches.

Options include four different activation modes, all popular RF connector types, all common operating voltages, frequencies up to 26.5 GHz, and such special

options as built-in 50-ohm terminations, self de-energizing circuits, indicator circuits, TTL logic circuits, MOSFET drivers and BCD decoders.

With this wide assortment of options, almost all requirements can be satisfied without resorting to the development of one-of-a-kind switches. If you have unique specifications, however, Narda is ready to design a switch that will precisely meet each of your parameters.

Extensive implementation of manufacturing and quality procedures, along with shop flow travelers, ensure that each step of the manufacturing process is completed correctly. Registration to ISO9001: 2008 reflects our commitment to serving customers throughout the world.

Assemblies

In many instances, it may be advantageous to have Narda incorporate a specified switch into a Narda designed assembly of high performance products, such as filters, amplifiers, power dividers, and couplers.

Like Narda switches, these assemblies will satisfy your most rigid performance requirements and will be manufactured, assembled, inspected and tested under the guidance and regulation of a quality assurance organization without industry equal.

Stocked Electro-Mechanical Switches

Quick Reference Guide – SEM Series Index

SEM	TYPE	FREQUENCY RANGE (GHz)	CONNECTOR	ACTUATION	TERMINATION 50 ohms	INDICATOR CIRCUITRY	SUPPRESSION DIODES	TTL LOGIC	SELF DE-ENERGIZING CIRCUIT	PAGE
020	SP2T	DC TO 18	SMA	FAILSAFE, 28V						206
020-12	SP2T	DC TO 18	SMA	FAILSAFE, 12V						206
020-24	SP2T	DC TO 18	SMA	FAILSAFE, 24V						206
020L	SP2T	DC TO 18	SMA	LATCHING, 28V						206
123	SP2T	DC TO 18	SMA	FAILSAFE, 28V		✓				206
123D	SP2T	DC TO 18	SMA	FAILSAFE, 28V		✓	✓	✓		206
123T	SP2T	DC TO 18	SMA	FAILSAFE, 28V	✓	✓				206
123L	SP2T	DC TO 18	SMA	LATCHING, 28V		✓	✓			206
123LT	SP2T	DC TO 18	SMA	LATCHING, 28V	✓	✓	✓			206
123LD	SP2T	DC TO 18	SMA	LATCHING, 28V		✓	✓	✓		207
123DT	SP2T	DC TO 18	SMA	FAILSAFE, 28V	✓	✓	✓	✓		207
123LDT	SP2T	DC TO 18	SMA	LATCHING, 28V	✓	✓	✓	✓	✓	207
123LDT-24	SP2T	DC TO 18	SMA	LATCHING, 24V	✓	✓	✓	✓	✓	207
123N	SP2T	DC TO 12.4	N	FAILSAFE, 28V		✓				207
123DN	SP2T	DC TO 12.4	N	FAILSAFE, 28V		✓	✓	✓		207
124	SP2T	DC TO 26.5	SMA	FAILSAFE, 28V		✓				207
133	SP3T	DC TO 18	SMA	NORMALLY OPEN, 28V		✓				213
133D	SP3T	DC TO 18	SMA	NORMALLY OPEN, 28V		✓	✓	✓		213
133DT	SP3T	DC TO 18	SMA	NORMALLY OPEN, 28V	✓	✓	✓	✓		213
133LT	SP3T	DC TO 18	SMA	LATCHING, 28V	✓	✓				213
133T	SP3T	DC TO 18	SMA	NORMALLY OPEN, 28V	✓	✓				213
143	SP4T	DC TO 18	SMA	NORMALLY OPEN, 28V		✓				216
143D	SP4T	DC TO 18	SMA	NORMALLY OPEN, 28V		✓	✓	✓		216
143DT	SP4T	DC TO 18	SMA	NORMALLY OPEN, 28V	✓	✓	✓	✓		216
143DT-24	SP4T	DC TO 18	SMA	NORMALLY OPEN, 24V	✓	✓	✓	✓		216
143T	SP4T	DC TO 18	SMA	NORMALLY OPEN, 28V	✓	✓				216
153	SP5T	DC TO 18	SMA	NORMALLY OPEN, 28V		✓				218
066	SP6T	DC TO 18	SMA	NORMALLY OPEN, 28V						219
163	SP6T	DC TO 18	SMA	NORMALLY OPEN, 28V		✓				219
163D	SP6T	DC TO 18	SMA	NORMALLY OPEN, 28V		✓	✓	✓		219
163DT	SP6T	DC TO 18	SMA	NORMALLY OPEN, 28V	✓	✓	✓	✓		219
163LD	SP6T	DC TO 18	SMA	LATCHING, 28V		✓	✓	✓	✓	219
163LDT-24	SP6T	DC TO 18	SMA	LATCHING, 24V	✓	✓	✓	✓	✓	219
163T	SP6T	DC TO 18	SMA	NORMALLY OPEN, 28V	✓	✓				219
XSEM323	TRANSFER	DC TO 18	SMA	FAILSAFE, 28V		✓				223
XSEM323D	TRANSFER	DC TO 18	SMA	FAILSAFE, 28V		✓	✓	✓		223
XSEM323L	TRANSFER	DC TO 18	SMA	LATCHING, 28V		✓				223
XSEM323LD	TRANSFER	DC TO 18	SMA	LATCHING, 28V		✓	✓	✓		223
XSEM323LD-24	TRANSFER	DC TO 18	SMA	LATCHING, 24V		✓	✓	✓		223

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Quick Reference Guide – Commercial Use Index

MODEL	TYPE	FREQUENCY RANGE (GHz)	CONNECTOR	PAGE
MS-SMA-020	SP2T	DC TO 3	SMA	226
MS-SMA-020-12	SP2T	DC TO 3	SMA	226
MS-SMA-020L	SP2T	DC TO 3	SMA	226
MS-N-023	SP2T	DC TO 3	N	226
MS-SMA-223	DP2T	DC TO 3	SMA	226
MS-SMA-223L	DP2T	DC TO 3	SMA	226
MS-SMA-033	SP3T	DC TO 3	SMA	226
MS-SMA-063	SP6T	DC TO 3	SMA	226

Glossary

All switches are bi-directional. Inputs and Outputs are interchangeable.

SP2T – A single pole, double throw switch has one input port and two selectable output ports.

Multiposition Switch – A multiposition switch has one input port and more than two selectable output ports. Unlike some switches, Narda models can be switched directly to any one of the available output positions without sequencing through intervening positions.

Transfer Switch – A transfer switch has two independent paths that operate simultaneously in one of two selected positions.

Failsafe – The switch moves to the closed position when the actuating voltage is applied and always returns to a predetermined position when the voltage is removed.

Latching – Also called Pulse Latching, the switch remains in a preselected position whenever the actuating voltage is removed or interrupted and holds that preselected position until a voltage is applied to another position. This configuration must be pulse controlled with a pulse width of 20 ms to 100 ms duration. Standard polarity is common positive.

Normally Open – All output ports of the switch are disconnected from the input port until a voltage is applied to a selected position.

Terminated Units – Each unused or open output RF port is internally terminated in a 50-ohm resistive load (1W CW max.).

TTL – Selected position of the switch is controlled by a TTL Logic High. The switch requires only nominal +28 Vdc (additional 5 Vdc is not required).

TTL Logic Voltage Level:
Low 0 to 0.8 Vdc
High 2.5 to 5.0 Vdc

TTL Logic Input Current:
Low 0 mA
High 1.6 mA max. @ 3.85 Vdc

TTL Units – Transistor-Transistor-Logic circuitry enables the status of the switch to be controlled by the level of TTL logic input.

Suppression Diodes – Fast recovery silicon rectifiers (diodes) connected in parallel with the coils of the switch to suppress any transient voltage that may be generated by the coils.

Indicator Circuitry – A set of internally mounted contacts that allows external monitoring of switch RF status. Some switch series include a steering diode drive due to the electronic indicator.

Solder Terminal – A turret terminal is standard on all switches.

Self De-energizing Circuitry – With this option, a set of internally mounted contacts or electronically generated pulses disconnects the driver voltage as soon as RF contact has been made. This option is only available with latching type switches. Suppression diodes must be specified with this option.

Common Specifications

RF Impedance.....	50 ohms nominal
Actuating Voltage.....	28 Vdc \pm 2 V
Switching Time.....	15 ms (max.)
Switching Sequence.....	Break Before Make
Operating Ambient Temp.....	-35°C to +70°C
Operating Life.....	1 million cycles/position
Designed to meet	MIL-S-3928