Reliability Data for: Product series SY3000/5000/7000

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Important !

All use of the products described in this document shall comply with the currently valid technical documentation (Catalogue, Instruction Manual (IM) or Operation Manual (OM), Handling Precautions for SMC products, e.t.c.) and is under the sole risk and responsibility of the user. SMC gives no warranty, neither express nor implied for the suitability of any component for the users intended application.
Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.

B_{10} / B_{10D} data

Based on the following endurance test results and assuming a failure mode following the Weibull distribution the following B_{10} and B_{10D} data have been estimated. (90% confidence level).

Series models		B_{10}	B_{10D}	Pressure MPa
SY31*0/SY51*0/SY71*0	Rubber seal	59 million cycles	118 million cycles	0.7MPa
SY3**0/SY5**0/SY7**0 (3POS)		26 million cycles	52 million cycles	0.7MPa
SY3(A,B,C)*0/SY5(A,B,C)*0 (4POS)		52 million cycles	104 million cycles	0.7MPa
SY7(A,B,C)*0 (4POS)		40 million cycles	80 million cycles	0.7MPa
SY3**1/SY5**1/SY7**1	Metal seal	156 million cycles	312 million cycles	0.7MPa

NOTES:

1) The estimated reliability data provided is only applicable to the component in the stated operating conditions. Other operating conditions may lead to different results.
2) The B_{10D} value is based on the provided B_{10} value using B_{10}×2 in accordance with ISO 13849.
3) The component is not a safety component as defined by Article2(c) of the Machinery Directive 2006/42/EC and is not supplied to directly provide a safety function.
4) The determination of B_{10} is generally based on the methods described in ISO 19973 "Pneumatic fluid power – Assessment of component reliability by testing" excluding the air pressure.

Result of reviewing the design with respect to ISO 13849-1:2015

SMC have tested this product in laboratory conditions to establish the life time data which can be supplied to you as an estimated B_{10} value.
The target life was reached with no failures under those laboratory conditions.

The ISO 13849-1 standard defines a well-tried component to be one that has been:
a) widely used in the past with successful results in similar applications, or
b) made and verified using principles which demonstrate its suitability and reliability for safety related applications.

Regarding a) SMC is a major supplier of components to many customers and hence cannot be aware of all the specific applications that the component has been or maybe used for, so is not able to comment on this requirement.
Regarding b) SMC has reviewed the basic and well tried safety principles in accordance with the supplied information.

For these reasons the user must make his own judgement based on his knowledge and experience if it is appropriate or not to consider this product as a well-tried component for his application.

Result of reviewing the design with respect to ISO 13849-2:2012

This component is capable of meeting the relevant basic safety principles*. ☐ yes
This component is capable of meeting the relevant basic and well-tried safety principles*. ☑ yes

Please refer to the table below.

Product	ISO 13849-2 : 2012								
	Annex A			Annex B			Annex D		
	A-1	A-2	A-3 I A-5	B-1	B-2	B-3 I B-18	D-1	D-2	D-3 I D-21
SY3000/5000/7000	●	●	-	●	●	-	●	●	-

A-1 , B-1 , D-1 : Basic safety principles
A-2 , B-2 , D-2 : Well-tried safety principles

●: reviewed
- : not reviewed

*Only when used as a component of a safety related part of a control system (SRP/CS) which is specified, designed, tested and maintained in accordance with the applicable safety requirements under the responsibility of a suitably qualified professional engineer.

Exceptions: the component does not meet the following relevant safety principles.

1. Valve closed by load pressure (B-2)
2. Fault avoidance in cables (conductors are not individually screened) (D-2)
3. Oriented failure mode (A-2,D-2)

Refer to IM No. SY7000V-SMU07 for details

Refer to the following how to order for validated products

How to Order Valves

SY 3 1 0 0 □ □ □ □ – 5 □ □ 1 – □

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾ ❿ ⓫

• Base mounted

❶ Series

3	SY3000
5	SY5000
7	SY7000

❷ Type of actuation

1	2-position	Single
2		Double *2
3	3-position	Closed center
4		Exhaust center
5		Pressure center
A*1	4-position dual 3-port	N.C./N.C.
B*1		N.O./N.O.
C*1		N.C./N.O.

* 1: Only rubber seal type is available for the 4-position dual 3-port valve.
* 2: Rubber seal type is excluded.

❸ Seal type

0	Rubber seal
1	Metal seal

❹ Pilot type

Nil	Internal pilot
R	External pilot

❺ Back pressure check valve (Built-in valve type)

Nil	None
H	Built-in

* Only rubber seal type
* Back pressure check valve is not available for the 3-position type and the SY7000.

❻ Pilot valve option

Nil	Standard (0.7 MPa)
B	Quick response type (0.7 MPa)
K*	High pressure type (1.0 MPa)

* Only metal seal type is available for the high pressure type.

❼ Coil type

Nil	Standard
T	With power saving circuit (Continuous duty type)

❽ Rated voltage

5	24 VDC
6	12 VDC

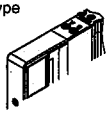
❾ Light/surge voltage suppressor and common specification

Symbol	With light	Surge voltage suppressor	Common specification
Nil	—	—	Non-polar
R	—	●	
U	●		
S	—		Positive common
Z	●		
NS	—		Negative common
NZ	●		

* Only "Z" and "NZ" types are available for with the power saving circuit.

❿ Manual override

Nil:
Non-locking push type



⓫ Type of mounting screw

Nil	Round head combination screw
B	Hexagon socket head cap screw
K	Round head combination screw (Falling-out-prevention type)
H	Hexagon socket head cap screw (Falling-out-prevention type)

How to Order Valves

SY 3 1 3 0 □ □ □ □ - 5 □ □ 1 - C6 □ - □

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾ ❿ ⓫ ⓬ ⓭

• Top ported

❶ Series

3	SY3000
5	SY5000
7	SY7000

❷ Type of actuation

1	2-position	Single
2		Double *2
3	3-position	Closed center
4		Exhaust center
5		Pressure center
A*1	4-position dual 3-port	N.C./N.C.
B*1		N.O./N.O.
C*1		N.C./N.O.

* 1: Only rubber seal type is available for the 4-position dual 3-port valve.
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❸ Seal type

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1	Metal seal

❹ Pilot type

Nil	Internal pilot
R	External pilot

❺ Back pressure check valve (Built-in valve type)

Nil	None
H	Built-in

* Only rubber seal type
* Back pressure check valve is not available for the 3-position type and the SY7000.

❻ Pilot valve option

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B	Quick response type (0.7 MPa)
K*	High pressure type (1.0 MPa)

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❼ Coil type

Nil	Standard
T	With power saving circuit (Continuous duty type)

❽ Rated voltage

5	24 VDC
6	12 VDC

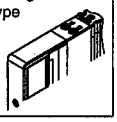
❾ Light/surge voltage suppressor and common specification

Symbol	With light	Surge voltage suppressor	Common specification
Nil	—	—	Non-polar
R	—	●	
U	●		
S	—		Positive common
Z	●		
NS	—		Negative common
NZ	●		

* Only "Z" and "NZ" types are available for with the power saving circuit.

❿ Manual override

Nil:
Non-locking push type



⓫ A, B port size

Thread piping

Symbol	Port size	Applicable series
M5	M5 x 0.8	SY3000
01	1/8	SY5000
02	1/4	SY7000

One-touch fitting (Metric)

Symbol	A, B port	SY3000	SY5000	SY7000
C2	ø2	●	—	—
C3	ø3.2	●	—	—
C4	ø4	●	●	—
C6	ø6	●	●	●
C8	ø8	—	●	●
C10	ø10	—	—	●
C12	ø12	—	—	●

One-touch fitting (Inch)

Symbol	A, B port	SY3000	SY5000	SY7000
N1	ø1/8"	●	—	—
N3	ø5/32"	●	●	—
N7	ø1/4"	●	●	●
N9	ø5/16"	—	●	●
N11	ø3/8"	—	—	●

⓬ Thread type

Nil	Rc
F	G
N	NPT
T	NPTF

* Only Nil is available for M5.

⓭ Type of mounting screw

Nil	Round head combination screw
B	Hexagon socket head cap screw
K	Round head combination screw (Falling-out-prevention type)
H	Hexagon socket head cap screw (Falling-out-prevention type)