

## FUNCTIONAL SAFETY CERTIFICATE

This is to certify that the

### Quarter Turn Pneumatic Double Acting and Spring Return (both, with and without Switch Box)

manufactured by

***Kinetrol Ltd***  
*Farnham Trading Estate*  
*Farnham*  
*Surrey*  
*GU9 9NU*  
UK

has been assessed by Sira Certification Service with reference to the  
CASS methodologies and found to meet the requirements of

**IEC 61508-1:2010** (clause 6)  
**IEC 61508-2:2010**

The Product and its associated data contained herein can be considered for use in the design of  
safety functions up to and including

**SIL 3\***

when used in accordance with the scope and conditions of this certificate.

\* The Product that has been certified is not implicit of the achieved Safety Integrity  
Level (SIL) of the safety related system

Certification Manager:



Wayne Thomas

Initial Certification: 09 December 2011  
This certificate issued: 28 September 2018  
Renewal date: 04 January 2022

This certificate may only be reproduced in its entirety, without any change.



## Product description and scope of certification

The certified product is a pneumatic quarter turn actuator used in conjunction with either a Kinetrol failsafe spring return or, as a double acting actuator in combination with a commercial 3-way solenoid valve which is not of Kinetrol manufacture and a switch box (which may be of the type 'Universal Limit Switch Box' or 'Explosion Proof Limit Switch Box'). It is used to convert a pneumatic signal to rotational movement with sufficient torque to move a close-coupled process valve between fully open and fully closed limits.

The actuator model sizes in the scope of this certificate are 02, 03, 05, 07, 08, 09, 10, 12, 14, 15, 16, 18, 20 and 30.

The safety application requires the return spring / 3-way solenoid valve to move the associated valve to a process safety position in the event of loss of pneumatic actuation.

## Element Safety Function(s)

**The function of the product in safety applications is to drive the pneumatic actuator to a fail-safe position (close or open) on loss of the pneumatic pressure signal.**

The element safety function is intended for use in low demand *Mode Of Operation*<sup>1</sup> as indicated by the certified failure data overleaf.

## Certified Data in support of use in safety functions

The assessment has been carried out with reference to the *Conformity Assessment of Safety-related Systems* (CASS) methodology<sup>1</sup> using the Route 1<sub>H2</sub> approach. A Failure Mode and Effect Analysis (FMEA) has established the failure modes and failure rates shown in the tables below. Failure sources have mainly been taken from FARADIP.THREE, ver 5.0, ISA ('Safety Instrumented System verification') and NPRD-95. The following notes/assumptions are associated with the failure data tables that follow:

- 1) Failure rates stated are in units of FIT (failures in time, 10<sup>-9</sup> per hour).
- 2) The PFD<sub>AVG</sub> figures shown are for illustration only assuming a **proof test interval of 8,760** hours and **MTTR of 8 hours**. Refer to IEC 61508-6 for guidance on PFD<sub>AVG</sub> calculations from the failure data.
- 3) Environment / stress criteria used in the FMEA: 'Ground; stationary; non-weather protected' conditions.
- 4) The 'SIL' indicated is in terms of hardware safety integrity (systematic safety integrity is assessed in Sira report R56A23232B).

The FMEA assessments have been selected to cover a variety of arrangements as listed below.

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<sup>1</sup> [www.cass.uk.net](http://www.cass.uk.net)

<sup>2</sup> Refer to IEC 61508-2, 7.4.4, for a definition of this term



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**Arrangement one:** Spring return mounted next to valve (valve not included); Actuator on valve; switch box mounted as noted either direct on the actuator or indirectly coupled

Kinetrol Part	No. of Springs	No. of vanes	No. of vane bolts	Switch box included?	Switch Box Direct Mount	PVST? (Partial valve stroke test)	$\lambda_{DD}$ FITS	$\lambda_{DU}$ FITS	$\lambda_S$ FITS	$\lambda_{no\ effect}$ FITS	SFF %	HFT	PFD <sub>AVG</sub>	SIL	Demand Mode
02**12*	1	1	2	Yes	Yes	No	0	46	793	3488	95	0	0.0002	3	Low
02**12*	1	1	2	Yes	Yes	Yes	19	27	793	3488	97	0	0.0001	3	Low
02**12*	1	1	2	No	No	No	0	46	685	3128	94	0	0.0002	3	Low
02**12*	1	1	2	No	No	Yes	19	27	685	3128	96	0	0.0001	3	Low
03**12*	1	1	2	Yes	Yes	No	0	46	793	3488	95	0	0.0002	3	Low
03**12*	1	1	2	Yes	Yes	Yes	19	27	793	3488	97	0	0.0001	3	Low
03**12*	1	1	2	No	No	No	0	46	685	3128	94	0	0.0002	3	Low
03**12*	1	1	2	No	No	Yes	19	27	685	3128	96	0	0.0001	3	Low
05**12*	1	1	2	Yes	Yes	No	0	46	793	3488	95	0	0.0002	3	Low
05**12*	1	1	2	Yes	Yes	Yes	19	27	793	3488	97	0	0.0001	3	Low
05**12*	1	1	2	No	No	No	0	46	685	3128	94	0	0.0002	3	Low
05**12*	1	1	2	No	No	Yes	19	27	685	3128	96	0	0.0001	3	Low
07**12*	1	1	4	Yes	Yes	No	0	52	793	3492	94	0	0.0002	3	Low
07**12*	1	1	4	Yes	Yes	Yes	23	30	793	3492	97	0	0.0001	3	Low
07**12*	1	1	4	No	No	No	0	52	685	3132	93	0	0.0002	3	Low
07**12*	1	1	4	No	No	Yes	23	30	685	3132	96	0	0.0001	3	Low
07**12*-4000	1	1	4	Yes	Yes	No	0	52	793	3492	94	0	0.0002	3	Low
07**12*-4000	1	1	4	Yes	Yes	Yes	23	30	793	3492	97	0	0.0001	3	Low
07**12*-4000	1	1	4	No	No	No	0	52	685	3132	93	0	0.0002	3	Low
07**12*-4000	1	1	4	No	No	Yes	23	30	685	3132	96	0	0.0001	3	Low
08**12*	1	1	4	Yes	Yes	No	0	52	793	3492	94	0	0.0002	3	Low
08**12*	1	1	4	Yes	Yes	Yes	23	30	793	3492	97	0	0.0001	3	Low
08**12*	1	1	4	No	No	No	0	52	685	3132	93	0	0.0002	3	Low



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Kinetrol Part	No. of Springs	No. of vanes	No. of vane bolts	Switch box included?	Switch Box Direct Mount	PVST? (Partial valve stroke test)	$\lambda_{DD}$ FITS	$\lambda_{DU}$ FITS	$\lambda_S$ FITS	$\lambda_{no\ effect}$ FITS	SFF %	HFT	PFD <sub>AVG</sub>	SIL	Demand Mode
08**12*	1	1	4	No	No	Yes	23	30	685	3132	96	0	0.0001	3	Low
09**12*	1	1	4	Yes	Yes	No	0	52	793	3492	94	0	0.0002	3	Low
09**12*	1	1	4	Yes	Yes	Yes	23	30	793	3492	97	0	0.0001	3	Low
09**12*	1	1	4	No	No	No	0	52	685	3132	94	0	0.0002	3	Low
09**12*	1	1	4	No	No	Yes	23	30	685	3132	96	0	0.0001	3	Low
09**12*-4200	1	1	4	Yes	Yes	No	0	52	793	3492	94	0	0.0002	3	Low
09**12*-4200	1	1	4	Yes	Yes	Yes	23	30	793	3492	97	0	0.0001	3	Low
09**12*-4200	1	1	4	No	No	No	0	52	685	3132	93	0	0.0002	3	Low
09**12*-4200	1	1	4	No	No	Yes	23	30	685	3132	96	0	0.0001	3	Low
10**12*	1	1	4	Yes	Yes	No	0	52	793	3492	94	0	0.0002	3	Low
10**12*	1	1	4	Yes	Yes	Yes	23	30	793	3492	97	0	0.0001	3	Low
10**12*	1	1	4	No	No	No	0	52	685	3132	93	0	0.0002	3	Low
10**12*	1	1	4	No	No	Yes	23	30	685	3132	96	0	0.0001	3	Low
10**12*-5800	1	1	4	Yes	Yes	No	0	52	793	3492	94	0	0.0002	3	Low
10**12*-5800	1	1	4	Yes	Yes	Yes	23	30	793	3492	97	0	0.0001	3	Low
10**12*-5800	1	1	4	No	No	No	0	52	685	3132	93	0	0.0002	3	Low
10**12*-5800	1	1	4	No	No	Yes	23	30	685	3132	96	0	0.0001	3	Low
12**12*	1	1	6	Yes	Yes	No	0	57	793	3496	93	0	0.0002	3	Low
12**12*	1	1	6	Yes	Yes	Yes	25	31	793	3496	96	0	0.0001	3	Low
12**12*	1	1	6	No	No	No	0	57	685	3135	92	0	0.0002	3	Low
12**12*	1	1	6	No	No	Yes	25	31	685	3135	96	0	0.0001	3	Low



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Kinetrol Part	No. of Springs	No. of vanes	No. of vane bolts	Switch box included?	Switch Box Direct Mount	PVST? (Partial valve stroke test)	$\lambda_{DD}$ FITS	$\lambda_{DU}$ FITS	$\lambda_S$ FITS	$\lambda_{no\ effect}$ FITS	SFF %	HFT	PFD <sub>AVG</sub>	SIL	Demand Mode
12**12*-4300	1	1	6	Yes	Yes	No	0	57	793	3496	93	0	0.0002	3	Low
12**12*-4300	1	1	6	Yes	Yes	Yes	25	31	793	3496	96	0	0.0001	3	Low
12**12*-4300	1	1	6	No	No	No	0	57	685	3135	92	0	0.0002	3	Low
12**12*-4300	1	1	6	No	No	Yes	25	31	685	3135	96	0	0.0001	3	Low
12**12*-4400	2	1	6	Yes	Yes	No	0	82	793	6591	91	0	0.0003	3	Low
12**12*-4400	2	1	6	Yes	Yes	Yes	30	44	793	6591	95	0	0.0002	3	Low
12**12*-4400	2	1	6	No	No	No	0	74	685	6215	90	0	0.0003	3	Low
12**12*-4400	2	1	6	No	No	Yes	30	44	685	6215	94	0	0.0002	3	Low
14**12*	1	1	8	Yes	Yes	No	0	61	793	3500	93	0	0.0003	3	Low
14**12*	1	1	8	Yes	Yes	Yes	28	33	793	3500	96	0	0.0001	3	Low
14**12*	1	1	8	No	No	No	0	61	685	3136	92	0	0.0003	3	Low
14**12*	1	1	8	No	No	Yes	28	33	685	3136	96	0	0.0001	3	Low
14**12*-4900	2	1	8	Yes	Yes	No	0	80	793	6596	91	0	0.0004	3	Low
14**12*-4900	2	1	8	Yes	Yes	Yes	32	48	793	6596	95	0	0.0002	3	Low
14**12*-4900	2	1	8	No	No	No	0	80	685	6235	90	0	0.0004	3	Low
14**12*-4900	2	1	8	No	No	Yes	32	48	685	6235	94	0	0.0002	3	Low
14**12*-5000	1	1	8	Yes	Yes	No	0	61	793	3500	93	0	0.0003	3	Low



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Kinetrol Part	No. of Springs	No. of vanes	No. of vane bolts	Switch box included?	Switch Box Direct Mount	PVST? (Partial valve stroke test)	$\lambda_{DD}$ FITS	$\lambda_{DU}$ FITS	$\lambda_S$ FITS	$\lambda_{no\ effect}$ FITS	SFF %	HFT	PFD <sub>AVG</sub>	SIL	Demand Mode
14**12*-5000	1	1	8	Yes	Yes	Yes	28	33	793	3500	96	0	0.0001	3	Low
14**12*-5000	1	1	8	No	No	No	0	61	685	3136	92	0	0.0003	3	Low
14**12*-5000	1	1	8	No	No	Yes	28	33	685	3136	96	0	0.0001	3	Low
15**12*	1	1	8	Yes	Yes	No	0	61	793	3500	93	0	0.0003	3	Low
15**12*	1	1	8	Yes	Yes	Yes	28	33	793	3500	96	0	0.0001	3	Low
15**12*	1	1	8	No	No	No	0	61	685	3136	92	0	0.0003	3	Low
15**12*	1	1	8	No	No	Yes	28	33	685	3136	96	0	0.0001	3	Low
16**12*	1	1	8	Yes	Yes	No	0	61	793	3500	93	0	0.0003	3	Low
16**12*	1	1	8	Yes	Yes	Yes	28	33	793	3500	96	0	0.0001	3	Low
16**12*	1	1	8	No	No	No	0	61	685	3136	92	0	0.0003	3	Low
16**12*	1	1	8	No	No	Yes	28	33	685	3136	96	0	0.0001	3	Low
16**12*-6100	1	1	8	Yes	Yes	No	0	61	793	3500	93	0	0.0003	3	Low
16**12*-6100	1	1	8	Yes	Yes	Yes	28	33	793	3500	96	0	0.0001	3	Low
16**12*-6100	1	1	8	No	No	No	0	61	685	3136	92	0	0.0003	3	Low
16**12*-6100	1	1	8	No	No	Yes	28	33	685	3136	96	0	0.0001	3	Low
18**12*	1	1	8	Yes	Yes	No	0	61	793	3500	93	0	0.0003	3	Low
18**12*	1	1	8	Yes	Yes	Yes	28	33	793	3500	96	0	0.0001	3	Low
18**12*	1	1	8	No	No	No	0	61	685	3136	92	0	0.0003	3	Low
18**12*	1	1	8	No	No	Yes	28	33	685	3136	96	0	0.0001	3	Low
18**12*-7000	1	1	8	Yes	Yes	No	0	61	793	3500	93	0	0.0003	3	Low
18**12*-7000	1	1	8	Yes	Yes	Yes	28	33	793	3500	96	0	0.0001	3	Low



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Kinetrol Part	No. of Springs	No. of vanes	No. of vane bolts	Switch box included?	Switch Box Direct Mount	PVST? (Partial valve stroke test)	$\lambda_{DD}$ FITS	$\lambda_{DU}$ FITS	$\lambda_S$ FITS	$\lambda_{no\ effect}$ FITS	SFF %	HFT	PFD <sub>AVG</sub>	SIL	Demand Mode
18**12*-7000	1	1	8	No	No	No	0	61	685	3136	92	0	0.0003	3	Low
18**12*-7000	1	1	8	No	No	Yes	28	33	685	3136	96	0	0.0001	3	Low
20**12*	2	2	8	Yes	Yes	No	0	189	1240	10060	87	0	0.0008	2	Low
20**12*	2	2	8	Yes	Yes	Yes	94	95	1240	10060	94	0	0.0004	3	Low
20**12*	2	2	8	No	No	No	0	188	1127	10025	86	0	0.0008	2	Low
20**12*	2	2	8	No	No	Yes	94	94	1127	10025	93	0	0.0004	3	Low
20**12*-8000	1	2	8	Yes	Yes	No	0	61	793	3500	93	0	0.0003	3	Low
20**12*-8000	1	2	8	Yes	Yes	Yes	28	33	793	3500	96	0	0.0001	3	Low
20**12*-8000	1	2	8	No	No	No	0	61	685	3136	92	0	0.0003	3	Low
20**12*-8000	1	2	8	No	No	Yes	28	33	685	3136	96	0	0.0001	3	Low
20**12*-7300	3	2	8	Yes	Yes	No	0	195	1418	10813	88	0	0.0009	2	Low
20**12*-7300	3	2	8	Yes	Yes	Yes	96	99	1418	10813	94	0	0.0008	3	Low
20**12*-7300	3	2	8	No	No	No	0	195	1309	10421	87	0	0.001	2	Low
20**12*-7300	3	2	8	No	No	Yes	96	99	1310	10421	94		0.0004	3	Low
30**12*	3	3	8	Yes	Yes	No	0	248	1890	16850	88	0	0.0011	2	Low
30**12*	3	3	8	Yes	Yes	Yes	124	125	1890	16850	94	0	0.0005	3	Low
30**12*	3	3	8	No	No	No	0	247	1779	16484	88	0	0.001	2	Low
30**12*	3	3	8	No	No	Yes	124	124	1779	16484	94	0	0.0005	3	Low
30**12*-7600	3	3	8	Yes	Yes	No	0	221	2048	9777	90	0	0.001	2	Low



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Kinetrol Part	No. of Springs	No. of vanes	No. of vane bolts	Switch box included?	Switch Box Direct Mount	PVST? (Partial valve stroke test)	$\lambda_{DD}$ FITS	$\lambda_{DU}$ FITS	$\lambda_S$ FITS	$\lambda_{no\ effect}$ FITS	SFF %	HFT	PFD <sub>AVG</sub>	SIL	Demand Mode
30**12*-7600	3	3	8	Yes	Yes	Yes	106	114	2047	9777	95	0	0.0005	3	Low
30**12*-7600	3	3	8	No	No	No	0	221	1940	9416	90	0	0.001	2	Low
30**12*-7600	3	3	8	No	No	Yes	102	100	1940	9416	95	0	0.0004	3	Low
30**12*-8300	2	3	8	Yes	Yes	No	0	189	1240	10060	87	0	0.0008	2	Low
30**12*-8300	2	3	8	Yes	Yes	Yes	94	95	1240	10060	94	0	0.0004	3	Low
30**12*-8300	2	3	8	No	No	No	0	188	1127	10025	86	0	0.0008	2	Low
30**12*-8300	2	3	8	No	No	Yes	94	94	1127	10025	93	0	0.0004	3	Low
30**12*-7800	5	3	8	Yes	Yes	No	0	255	1642	15929	87	0	0.001	2	Low
30**12*-7800	5	3	8	Yes	Yes	Yes	116	139	1642	15929	93	0	0.0006	3	Low
30**12*-7800	5	3	8	No	No	No	0	255	1534	15568	86	0	0.0011	2	Low
30**12*-7800	5	3	8	No	No	Yes	116	139	1534	15568	92	0	0.0006	3	Low

**Note:**

- 1-The asterisks (\*) are where the product code invokes options such as alternative flange or thread options.
- 2- Where SIL 2 is declared in the tables, this is due to architecture constraints.



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**Arrangement two:** No Spring return; Double Acting Actuator on valve; switch box mounted as noted either direct on the actuator or indirectly coupled; With and Without PVST; USING EXIDA DATA FOR AN RGS TYPE SOLENOID VALVE; AIR SUPPLY NOT INCLUDED; (Note that the RGS type solenoid valve is Kinetrol's preferred choice for this application)

Kinetrol Part	No. of Springs	No. of vanes	No. of vane bolts	Switch box included?	Switch Box Direct Mount	PVST? (Partial valve stroke test)	$\lambda_{DD}$ FITS	$\lambda_{DU}$ FITS	$\lambda_S$ FITS	$\lambda_{no\ effect}$ FITS	SFF %	HFT	PFD <sub>AVG</sub>	SIL	Demand Mode
02**10*	0	1	2	Yes	Yes	No	0	627	2277	616	78	0	0.003	2	Low
02**10*	0	1	2	Yes	Yes	Yes	373	254	2277	616	91	0	0.001	2	Low
02**10*	0	1	2	No	No	No	0	627	2172	254	78	0	0.003	2	Low
02**10*	0	1	2	No	No	Yes	373	253	2172	254	91	0	0.001	2	Low
03**10*	0	1	2	Yes	Yes	No	0	627	2277	616	78	0	0.003	2	Low
03**10*	0	1	2	Yes	Yes	Yes	373	254	2277	616	91	0	0.001	2	Low
03**10*	0	1	2	No	No	No	0	627	2172	254	78	0	0.003	2	Low
03**10*	0	1	2	No	No	Yes	373	253	2172	254	91	0	0.001	2	Low
05**10*	0	1	2	Yes	Yes	No	0	627	2277	616	78	0	0.003	2	Low
05**10*	0	1	2	Yes	Yes	Yes	373	254	2277	616	91	0	0.001	2	Low
05**10*	0	1	2	No	No	No	0	627	2172	254	78	0	0.003	2	Low
05**10*	0	1	2	No	No	Yes	373	253	2172	254	91	0	0.001	2	Low
07**10*	0	1	4	Yes	Yes	No	0	629	2284	622	78	0	0.003	2	Low
07**10*	0	1	4	Yes	Yes	Yes	373	256	2284	622	91	0	0.001	2	Low
07**10*	0	1	4	No	No	No	0	629	2176	262	78	0	0.003	2	Low
07**10*	0	1	4	No	No	Yes	373	256	2176	262	91	0	0.001	2	Low
08**10*	0	1	4	Yes	Yes	No	0	629	2284	622	78	0	0.003	2	Low
08**10*	0	1	4	Yes	Yes	Yes	373	256	2284	622	91	0	0.001	2	Low
08**10*	0	1	4	No	No	No	0	629	2176	262	78	0	0.003	2	Low
08**10*	0	1	4	No	No	Yes	373	256	2176	262	91	0	0.001	2	Low
09**10*	0	1	4	Yes	Yes	No	0	629	2284	622	78	0	0.003	2	Low
09**10*	0	1	4	Yes	Yes	Yes	373	256	2284	622	91	0	0.001	2	Low
09**10*	0	1	4	No	No	No	0	629	2176	262	78	0	0.003	2	Low
09**10*	0	1	4	No	No	Yes	373	256	2176	262	91	0	0.001	2	Low
10**10*	0	1	4	Yes	Yes	No	0	629	2284	622	78	0	0.003	2	Low
10**10*	0	1	4	Yes	Yes	Yes	373	256	2284	622	91	0	0.001	2	Low



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Kinetrol Part	No. of Springs	No. of vanes	No. of vane bolts	Switch box included?	Switch Box Direct Mount	PVST? (Partial valve stroke test)	$\lambda_{DD}$ FITS	$\lambda_{DU}$ FITS	$\lambda_S$ FITS	$\lambda_{no\ effect}$ FITS	SFF %	HFT	PFD <sub>AVG</sub>	SIL	Demand Mode
10**10*	0	1	4	No	No	No	0	629	2176	262	78	0	0.003	2	Low
10**10*	0	1	4	No	No	Yes	373	256	2176	262	91	0	0.001	2	Low
12**10*	0	1	6	Yes	Yes	No	0	632	2294	630	78	0	0.003	2	Low
12**10*	0	1	6	Yes	Yes	Yes	373	258	2290	630	91	0	0.001	2	Low
12**10*	0	1	6	No	No	No	0	632	2186	270	78	0	0.003	2	Low
12**10*	0	1	6	No	No	Yes	374	258	2186	270	91	0	0.001	2	Low
14**10*	0	1	8	Yes	Yes	No	0	635	2298	638	78	0	0.003	2	Low
14**10*	0	1	8	Yes	Yes	Yes	374	261	2298	638	91	0	0.001	2	Low
14**10*	0	1	8	No	No	No	0	635	2196	277	78	0	0.003	2	Low
14**10*	0	1	8	No	No	Yes	374	261	2196	277	91	0	0.001	2	Low
15**10*	0	1	8	Yes	Yes	No	0	635	2298	638	78	0	0.003	2	Low
15**10*	0	1	8	Yes	Yes	Yes	374	261	2298	638	91	0	0.001	2	Low
15**10*	0	1	8	No	No	No	0	635	2196	277	78	0	0.003	2	Low
15**10*	0	1	8	No	No	Yes	374	261	2196	277	91	0	0.001	2	Low
16**10*	0	1	8	Yes	Yes	No	0	635	2298	638	78	0	0.003	2	Low
16**10*	0	1	8	Yes	Yes	Yes	374	261	2298	638	91	0	0.001	2	Low
16**10*	0	1	8	No	No	No	0	635	2196	277	78	0	0.003	2	Low
16**10*	0	1	8	No	No	Yes	374	261	2196	277	91	0	0.001	2	Low
18**10*	0	1	8	Yes	Yes	No	0	635	2298	638	78	0	0.003	2	Low
18**10*	0	1	8	Yes	Yes	Yes	374	261	2298	638	91	0	0.001	2	Low
18**10*	0	1	8	No	No	No	0	635	2196	277	78	0	0.003	2	Low
18**10*	0	1	8	No	No	Yes	374	261	2196	277	91	0	0.001	2	Low
20**10*	0	2	8	Yes	Yes	No	0	731	2660	951	78	0	0.003	2	Low
20**10*	0	2	8	Yes	Yes	Yes	424	306	2259	951	91	0	0.001	2	Low
20**10*	0	2	8	No	No	No	0	730	2538	590	78	0	0.003	2	Low
20**10*	0	2	8	No	No	Yes	425	306	2538	590	91	0	0.001	2	Low
30**10*	0	3	8	Yes	Yes	No	0	848	3016	1300	78	0	0.004	2	Low
30**10*	0	3	8	Yes	Yes	Yes	475	352	3016	1300	91	0	0.002	2	Low
30**10*	0	3	8	No	No	No	0	828	2908	937	78	0	0.004	2	Low
30**10*	0	3	8	No	No	Yes	476	352	2908	937	91	0	0.002	2	Low



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**Note:** Where SIL 2 is declared in the tables, this is due to architecture constraints or PFD.

**Arrangement three:** No Spring return, Double Acting Actuator on valve, switch box mounted as indicated; With and Without PVST; PILOT SOLENOID OR AIR SUPPLY NOT INCLUDED

Kinetrol Part	No. of Springs	No. of vanes	No. of vane bolts	Switch box included?	Switch Box Direct Mount	PVST? (Partial valve stroke test)	$\lambda_{DD}$ FITS	$\lambda_{DU}$ FITS	$\lambda_S$ FITS	$\lambda_{no\ effect}$ FITS	SFF %	HFT	PFD <sub>AVG</sub>	SIL	Demand Mode
02**10*	0	1	2	Yes	Yes	No	0	89	434	616	83	0	0.0004	2	Low
02**10*	0	1	2	Yes	Yes	Yes	50	39	434	616	93	0	0.0002	3	Low
02**10*	0	1	2	No	No	No	0	89	326	254	79	0	0.0004	2	Low
02**10*	0	1	2	No	No	Yes	50	38	326	254	91	0	0.0002	3	Low
03**10*	0	1	2	Yes	Yes	No	0	89	434	616	83	0	0.0004	2	Low
03**10*	0	1	2	Yes	Yes	Yes	50	39	434	616	93	0	0.0002	3	Low
03**10*	0	1	2	No	No	No	0	89	326	254	79	0	0.0004	2	Low
03**12*	0	1	2	No	No	Yes	50	38	326	254	91	0	0.0002	3	Low
05**10*	0	1	2	Yes	Yes	No	0	89	434	616	83	0	0.0004	2	Low
05**10*	0	1	2	Yes	Yes	Yes	50	39	434	616	93	0	0.0002	3	Low
05**10*	0	1	2	No	No	No	0	89	326	254	79	0	0.0004	2	Low
05**10*	0	1	2	No	No	Yes	50	38	326	254	91	0	0.0002	3	Low
07**10*	0	1	4	Yes	Yes	No	0	91	444	623	83	0	0.0004	2	Low
07**10*	0	1	4	Yes	Yes	Yes	51	41	444	623	93	0	0.0002	3	Low
07**10*	0	1	4	No	No	No	0	91	336	262	79	0	0.0004	2	Low
07**10*	0	1	4	No	No	Yes	51	41	336	262	90	0	0.0002	3	Low
08**10*	0	1	4	Yes	Yes	No	0	91	444	623	83	0	0.0004	2	Low
08**10*	0	1	4	Yes	Yes	Yes	51	41	444	623	93	0	0.0002	3	Low
08**10*	0	1	4	No	No	No	0	91	336	262	79	0	0.0004	2	Low
08**10*	0	1	4	No	No	Yes	51	41	336	262	90	0	0.0002	3	Low
09**10*	0	1	4	Yes	Yes	No	0	91	444	623	83	0	0.0004	2	Low
09**10*	0	1	4	Yes	Yes	Yes	51	41	444	623	93	0	0.0002	3	Low
09**10*	0	1	4	No	No	No	0	91	336	262	79	0	0.0004	2	Low
09**10*	0	1	4	No	No	Yes	51	41	336	262	90	0	0.0002	3	Low
10**10*	0	1	4	Yes	Yes	No	0	91	444	623	83	0	0.0004	2	Low



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10**10*	0	1	4	Yes	Yes	Yes	51	41	444	623	93	0	0.0002	3	Low
10**10*	0	1	4	No	No	No	0	91	336	262	<b>79</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
10**10*	0	1	4	No	No	Yes	51	41	336	262	90	0	0.0002	3	Low
12**10*	0	1	6	Yes	Yes	No	0	94	454	630	<b>83</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
12**10*	0	1	6	Yes	Yes	Yes	51	43	450	630	92	0	0.0002	3	Low
12**10*	0	1	6	No	No	No	0	94	348	270	<b>78</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
12**10*	0	1	6	No	No	Yes	51	43	348	270	90	0	0.0002	3	Low
14**10*	0	1	8	Yes	Yes	No	0	97	458	638	<b>83</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
14**10*	0	1	8	Yes	Yes	Yes	51	46	458	638	92	0	0.0011	3	Low
14**10*	0	1	8	No	No	No	0	97	350	277	<b>79</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
14**10*	0	1	8	No	No	Yes	51	46	350	277	90	0	0.0002	3	Low
15**10*	0	1	8	Yes	Yes	No	0	97	458	638	<b>83</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
15**10*	0	1	8	Yes	Yes	Yes	51	46	458	638	92	0	0.0011	3	Low
15**10*	0	1	8	No	No	No	0	97	350	277	<b>79</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
15**10*	0	1	8	No	No	Yes	51	46	350	277	90	0	0.0002	3	Low
16**10*	0	1	8	Yes	Yes	No	0	97	458	638	<b>83</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
16**10*	0	1	8	Yes	Yes	Yes	51	46	458	638	92	0	0.0002	3	Low
16**10*	0	1	8	No	No	No	0	97	350	277	<b>78</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
16**10*	0	1	8	No	No	Yes	51	46	350	277	90	0	0.0002	3	Low
18**10*	0	1	8	Yes	Yes	No	0	97	458	638	<b>83</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
18**10*	0	1	8	Yes	Yes	Yes	51	46	458	638	92	0	0.0002	3	Low
18**10*	0	1	8	No	No	No	0	97	458	277	<b>78</b>	<b>0</b>	<b>0.0004</b>	<b>2</b>	Low
18**10*	0	1	8	No	No	Yes	51	46	350	277	90	0	0.0002	3	Low
20**10*	0	2	8	Yes	Yes	No	0	193	820	951	<b>81</b>	<b>0</b>	<b>0.0008</b>	<b>2</b>	Low
20**10*	0	2	8	Yes	Yes	Yes	102	91	819	951	91	0	0.0004	3	Low
20**10*	0	2	8	No	No	No	0	193	694	590	<b>78</b>	<b>0</b>	<b>0.0008</b>	<b>2</b>	Low
20**10*	0	2	8	No	No	Yes	102	91	698	590	90	0	0.0004	3	Low
30**10*	0	3	8	Yes	Yes	No	0	311	1176	1300	<b>79</b>	<b>0</b>	<b>0.0014</b>	<b>2</b>	Low
30**10*	0	3	8	Yes	Yes	Yes	153	137	1176	1300	91	0	0.0006	3	Low
30**10*	0	3	8	No	No	No	0	290	1068	939	<b>79</b>	<b>0</b>	<b>0.0013</b>	<b>2</b>	Low
30**10*	0	3	8	No	No	Yes	153	137	1068	939	90	0	0.0006	3	Low



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The failure data above is supported by the base information given in the table below.

**Information supporting the failure rate data**

1	Product identification:	Kinetrol Quarter turn pneumatic actuator with failsafe spring/double acting solenoid, and switch box (which may be Universal or Ex-d type), corresponding to actuator size models: 02, 03, 05, 07, 08, 09, 10, 12, 14, 15, 16, 18, 20 and 30 as described in manufacturer's 'Rotary Actuators' catalogue (KF-84 07/09)
2	Functional specification:	To drive the pneumatic actuator to a fail-safe position (close or open) on detection of a loss of the pneumatic pressure signal. Refer to full specification in manufacturer's product catalogue.
3-5	Random hardware failure rates:	Refer to previous tables
6	Environment limits:	Generic temperature range: -20 to +80°C Special version temperature range: -40 to +100°C – see document TD129 for details.
7	Lifetime/replacement limits:	No constraints other than manufacturer's recommendation
8	Proof Test requirements:	Refer to manufacturer's Safety Manual
9	Maintenance requirements:	Refer to manufacturer's Safety Manual
10	Diagnostic coverage:	Refer to previous tables
11	Diagnostic test interval:	Refer to manufacturer's Safety Manual
12	Repair constraints:	Refer to manufacturer's Safety Manual
13	Safe Failure Fraction:	Refer to previous table or to be made after application context is determined
14	Hardware fault tolerance (HFT):	Refer to previous tables
15	Highest SIL (architecture/type A/B):	Refer to previous tables
16	Systematic failure constraints:	Refer to manufacturer's Safety Manual
17	Evidence of similar conditions in previous use:	Compliance Route 2 <sub>H</sub> (proven-in-use) not used
18	Evidence supporting the application under different conditions of use:	Compliance Route 2 <sub>H</sub> (proven-in-use) not used
19	Evidence of period of operational use:	Compliance Route 2 <sub>H</sub> (proven-in-use) not used
20	Statement of restrictions on functionality:	Compliance Route 2 <sub>H</sub> (proven-in-use) not used
21	Systematic capability:	SC3, (refer to Sira report R56A23232B)
22	Systematic fault avoidance measures:	Refer to Sira assessment report: R56A23232B Kinetrol Common Lifecycle and Functional Safety Management (includes techniques and measures used from IEC 61508-2 Annex B).
23	Systematic fault tolerance measures:	No specific measures at the device level.
24	Validation records:	Product and process documentation have been reviewed (product specifications, test plans/results, design reviews, modification control). Refer to Sira assessment report: R56A23232B.

Reference numbers in left column refer to CASS Targets of Evaluation for sub-system data.



## Management of functional safety

The assessment has demonstrated that the product is supported by an appropriate functional safety management system that meets the relevant requirements of IEC 61508-1:2010 clause 6.

## Identification of certified equipment

The certified equipment and its safe use is defined in the manufacturer's documentation listed in the table below.

### Certified drawings

Document no.	Rev	Date	Document description
TD129	Z	03/18	Installation, Operation and Maintenance Instructions – Rotary ¼ turn actuator / double acting & spring return models.
Drg 98-270	E	07/12/16	Kinetrol Actuators and Other mechanical ancillaries IEC 61508 (SIL) Approval Drawing
Drg 98-271	E	13/12/16	Kinetrol spring return units IEC 61508 (SIL) Approval Drawings
Drg305-000-082	B	16/07/15	03-14 Actuators direct & discrete mount units Universal Limit Switch (ULS) Box assemblies Approval Drawing for IEC 61508 (SIL)
Drg315-000-039	B	16/07/15	XLS Box, General Construction Approval Drawing for IEC 61508 (SIL)
TD 170	D	28/09/18	Safety Manual

## Conditions of Certification

The validity of the assessed failure data is conditional on the Manufacturer complying with the following conditions:

1. The manufacturer shall analyse failure data from returned products on an on-going basis. Sira Certification Service shall be informed in the event of any indication that the actual failure rates are worse than the certified failure rates. (A process to rate the validity of field data should be used. To this end, the manufacturer should co-operate with users to operate a formal field-experience feedback programme).
2. Sira shall be notified in advance (with an impact analysis report) before any modifications to the certified equipment or the functional safety information in the user documentation is carried out. Sira may need to perform a re-assessment if modifications are judged to affect the product's functional safety certified herein.
3. On-going lifecycle activities associated with this product (e.g., modifications, corrective actions, field failure analysis) shall be subject to surveillance by Sira in accordance with 'Regulations Applicable to the Holders of Sira Certificates'.
4. The manufacturer shall ensure that the relevant Operating and Maintenance Manual is amended for safety applications. The amendments shall address the requirements of IEC 61508-2 Annex D and include the addition of a specific functional safety section comprising:
  - Clarification that the failure data does not include the pilot operator (e.g., solenoid valve), pneumatic supply or the process safety valve which must all be calculated for SIL applications



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- Restrictions in use
- Fault Tolerance and Safe Failure Fraction
- Safe and Dangerous failure rates in both the normally operational applications, i.e. Valve 'open' on loss of air and valve 'closed' on loss of air.
- Recommended proof test procedure
- Recommended mean time to repair
- Recommended in service operation and maintenance limits, particularly with respect to an overall lifetime limit between service/overhauls in order to minimise the degradation affect due to wear and tear.

### Conditions of Safe Use

The following conditions apply to the installation, operation and maintenance of the assessed equipment. Failure to observe these may compromise the safety integrity of the assessed equipment:

1. The user shall comply with the requirements given in the manufacturer's product manual in regard to all relevant functional safety aspects such as application of use, installation, operation, maintenance, proof tests, maximum ratings, environmental conditions, repair, etc;
2. Selection of this equipment for use in safety functions and the installation, configuration, overall validation, maintenance and repair shall only be carried out by competent personnel, observing all of the manufacturer's conditions and recommendations in the user documentation.
3. All information associated with any field failures of this product should be collected under a dependability management process (e.g., IEC 60300-3-2) and reported to the manufacturer.
4. Correction of any detected faults (e.g., by PVST) must be performed within the MTTR.
5. The user shall take all necessary steps to prevent collection of fluids on the spring actuator and switch box. Ideally this may be achieved by careful alignment of same to ensure that any water spray is encouraged to run off the assembly.
6. In applications where the switch box is directly connected to the actuator the end user must carry out a regular maintenance inspection to confirm that the switch box internals are clean and dry and free of corrosion products.
7. This product assembly **MUST ONLY** be used in the arrangement where the spring is assembled next to the valve with the actuator on top of the spring. This is the arrangement analysed in the FMEA and provides the highest certainty of closure on loss of actuating air pressure.
8. The user must confirm that all supporting equipment, required in the application of the Kinetrol products are fully capable of SIL use, such as the associated pilot device (e.g., solenoid operator), pneumatic supply and the process safety valve.
9. The use of the Kinetrol actuator in its double acting configuration may be used with PVST up to SIL2 **BUT** the end user **MUST** ensure that the air supply has a sufficiently low probability of failure for all SIL loops that it supports.



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### General Conditions and Notes

1. This certificate is based upon a functional safety assessment of the product described in Sira Test & Certification Assessment Report R56A23232A and R56A23232B.
2. If certified product or system is found not to comply, Sira Certification Service should be notified immediately at the address shown on this certificate.
3. The use of this Certificate and the Sira Certification Mark that can be applied to the product or used in publicity material are subject to the 'Regulations Applicable to the Holders of Sira Certificates' and 'Supplementary Regulations Specific to Functional Safety Certification'.
4. This document remains the property of Sira and shall be returned when requested by the issuer.

### Certificate History

Issue	Date	Report no.	Comment
02	11/02/2016	R56A23232A R56A23232B	Certificate updated to include model 15 variant, this is now in arrangement 1 table on page 6.
03	05/01/2017	R70105144 R56A23232A	Certificate re-issued after completion of a satisfactory surveillance.
04	14/08/2017	N/A	Certificate updated to reflect reduced no. of springs in models 18, 20 & 30.
05	28/09/2018	N/A	Minor corrections received from client.



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