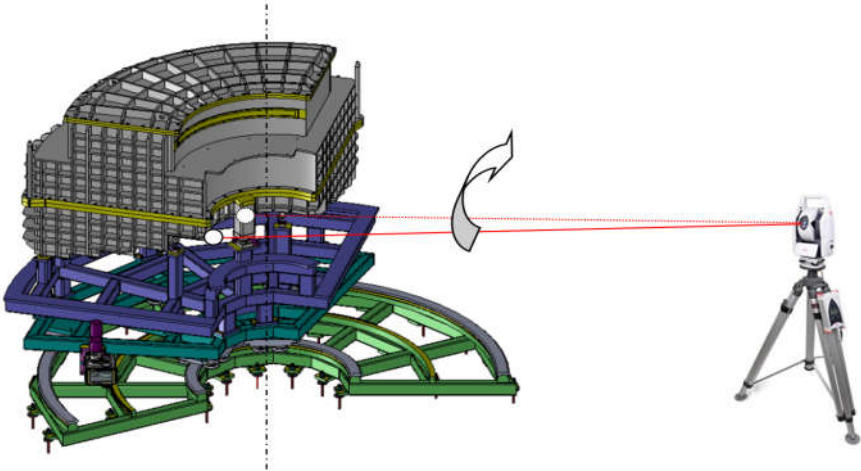# TEST REPORT SHEET

Test reference	N056.TES.021-THETA.GN.001 v2	Test conductor: see N056.TES.020

Test parameter	General parameters	Axis designation	THETA	Mech. support	see N056.TES.020
		Subsystem des.	BFR motion system	Electrical support	see N056.TES.020
Date and time	see N056.TES.020	Project code	N056	Metrol. support	see N056.TES.020
Location	AVS workshop	Associated doc	AVS.PRO.020	Client repr:	see N056.TES.020

ENVIRONMENTAL CONDITIONS

Test facility	AVS workshop : FAT TESTING	Temperature	ambient (not controlled)	Vacuum	In-air
Cleanliness	Grey room	Pressure	ambient (not controlled)	Humidity	ambient (not controlled)

SETUP DESCRIPTION

Setup designation	CONF. 01 (MAIN)
Measuring equipment	Laser tracker
Measured position	POI*
External load	**7.500kg**
Reference	Motor steps
Control loop	Open loop
Motor setup	Current 12A Motor speed 688 deg_M/s
i_gearbox	100
i_preload	2
i_pinion_chain	30,95477387
i_correction_motor	0,997168043
i_correction_encoder	0,997168043
Driver setup	Commanded in deg_motor
* see description for more details	

Setup description:

RESULTS SUMMARY

Validation parameter	SEE DATA	Test result:	Comments: NO COMMENT
Measured parameter	SEE DATA	**Satisfactory**	Client signature: / Supplier signature: PEDRO NOGUERA

TEST 1b. Limit switches position/precision	TEST 1c. Torque reduced

THESE TESTS HAVE BEEN DONE DURING THE PRE-FAT CAMPAIGN.

RESULTS ARE SUMMARISED WITHIN THIS DOCUMENT FOR EASY ACCESS.

FOR MORE INFORMATION, SEE N056.TES.020

TEST 1c. Torque reduced

	Pos. Ini	Pos. Final
Laser (deg)	0	42,017
Encoder (cts)	788172	1732224
Encoder (deg)	35,07310359	77,08275832
Pos Act (deg_M)	353358,2109	-165209,2172
Pos Act (deg)	28,62502093	-13,38335194

INC Laser (deg)	-42,017
INC Encoder (cts)	-944052
INC Encoder (deg)	-42,00965473
INC Pos Act (deg_M)	518567,4281
INC Pos Act (deg)	42,00837287

TEST 1e. Low speed test

Speed	1	deg_M/s
Current	12	A
Load	0	kg
Inc	400	deg_M
Inc	0,032305	deg
	without correction	

Speed (deg_M/s)	688
Current (A)	6
From	0
To	42
Encoder Res (deg)	4,4364E-05
i_Motor (deg_M/deg)	12381,9095
(deg/deg_M)	8,0763E-05
Correction Factor	0,99696921

	Inicio	Inc1	Inc2	Inc3	Inc4
Medida laser (deg)	0,0000	0,0324	0,0644	0,0970	0,1292
Encoder (counts)	1730312	1730988	1731676	1732379	1733091
Pos Act (deg_M)	5974,903125	5574,937500	5174,929688	4774,935938	4374,928125
Inc (deg)		0,0324	0,0320	0,0326	0,0322
Inc enc (cts)		676,0000	688,0000	703,0000	712,0000
Inc (deg_M)		-399,9656	-400,0078	-399,9938	-400,0078
	0	0,032400618	0,064804653	0,09720755	0,129611585
	0	0,030081528	0,060697047	0,091980057	0,123663559
	0,0000	0,0000	0,0004	0,0002	0,0004
	0,0000	-0,0023	-0,0037	-0,0050	-0,0055

RESULTS

		Measured	Accuracy		Objective	Measured
TEST 1a Limit switches activation	Activation S1	CONFIRMED 27/10	1,19E-03 deg	TEST 1b. Maximum range	50 deg	50,096 deg
	Activation S2	CONFIRMED 27/10	4,38E-04 deg	TEST 1c. Torque reduced	42,0 deg	42,017 (accuracy 0,017deg)
	Activation S3	CONFIRMED 27/10		TEST 1d. Maximum speed	0.1 deg/s	ACHIEVED
	Activation S4	CONFIRMED 27/10	5,37E-04 deg	TEST 1e. Low speed test	steps of 0,032305deg at speed 0,1deg_M/s	steps between 0,0320 - 0,0326
	Activation S5	CONFIRMED 27/10	6,57E-04 deg			

TEST REPORT SHEET

AVS — added value solutions

Test reference	N056.TES.021-THETA.AC.001 v3		Test conductor	P Noguera/F Cacho
Test parameter	**Accuracy**	Axis designation	THETA	Mech. support	JC Mancebo
		Subsystem des.	BFR motion system	Electrical support	I Roji
Date and time	28/10/2020	Project code	N056	Metrol. support	J Álvarez
Location	AVS workshop	Associated doc	AVS.PRO.020	Client repr:	Liam Whitelegg

ENVIRONMENTAL CONDITIONS

Test facility	AVS workshop : FAT TESTING		Temperature	ambient (not controlled)	Vacuum	In-air
Cleanliness	Grey room		Pressure	ambient (not controlled)	Humidity	ambient (not controlled)

SETUP DESCRIPTION

Setup designation	CONF. 01 (MAIN)
Measuring equipment	Laser tracker
Measured position	POI*
External load	**7.500kg**
Reference	Motor steps
Control loop	Open loop
Motor setup	Current 12A Motor speed 688 deg_M/s
i_gearbox	100
i_preload	2
i_pinion_chain	30,95477387
i_correction_motor	0,997168043
i_correction_encoder	0,997168043
Driver setup	
	Commanded in deg_motor
* see description for more details	

Setup description:

RESULTS SUMMARY

Validation parameter	0,1 deg	Test result:	Comments: NO COMMENT
		Satisfactory	Client signature: / Supplier signature: PEDRO NOGUERA
Measured parameter	0,007 deg		

RECORDED MEASUREMENTS

Motor (deg)	**40,032**	**35,03100283**	**30,03000566**	**25,0290085**	**20,02801133**	**15,02701416**	**10,02601699**	**5,025019824**	**0,024022656**
Motor (cts)	0	61734,22255	123468,4451	185202,6676	246936,8902	308671,1127	370405,3353	432139,5578	493873,7804
Laser (deg)	40,032	35,0292	30,0309	25,0286	20,0293	15,0263	10,028	5,0231	0,02
Encoder (cts)	881531	993956	1106147	1218523	1330987	1443435	1555839	1668239	1780727
Encoder (deg)	40,03078869	35,0279547	30,03553355	25,03488003	20,03031056	15,02645309	10,02455359	5,022832079	0,017194634
Pos Act (deg_M)	493935,236719	432201,016406	370466,796094	308732,575781	246998,348438	185264,128125	123529,907813	61795,687500	61,460156
Pos Act (deg)	39,89168511	34,90584507	29,92000504	24,93416501	19,94832441	14,96248437	9,97664434	4,990804307	0,004963706
INC Motor (deg)		-5,000997168	-5,000997168	-5,000997168	-5,000997168	-5,000997168	-5,000997168	-5,000997168	-5,000997168
INC Laser (deg)		-5,0028	-4,9983	-5,0023	-4,9993	-5,003	-4,9983	-5,0049	-5,0031
INC Encoder (cts)		112425	112191	112376	112464	112448	112404	112400	112488
INC Encoder (deg)		-5,002833989	-4,992421153	-5,000653524	-5,004569462	-5,003857473	-5,001899504	-5,001721507	-5,005637445
INC Pos Act (deg_M)		-61734,22031	-61734,22031	-61734,22031	-61734,22734	-61734,22031	-61734,22031	-61734,22031	-61734,22734
INC Pos Act (deg)		-4,985840033	-4,985840033	-4,985840033	-4,985840601	-4,985840033	-4,985840033	-4,985840033	-4,985840601
DESV motor (deg)	0	0,001802832	-0,000894336	0,000408496	-0,001288672	0,00071416	-0,001983008	0,001919824	0,004022656
DESV encoder (deg)	-0,001211308	-0,001245298	0,00463355	0,006280026	0,001010564	0,00015309	-0,003446414	-0,000267921	-0,002805366
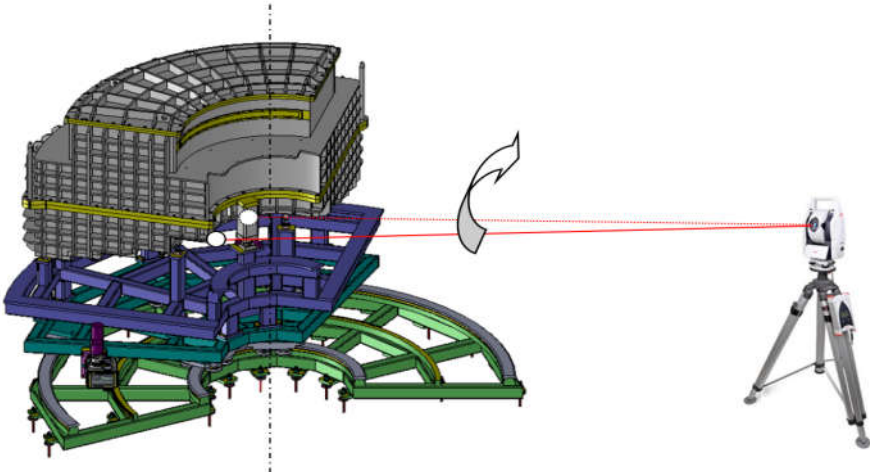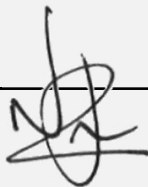
RESULTS

TOTAL ACCURACY

accuracy motor (deg)	0,007447272
accuracy encoder (deg)	0,012940049

TEST REPORT SHEET

Test reference	N056.TES.021-THETA.RP.001 v3			Test conductor	P Noguera/F Cacho
Test parameter	**Bi-directional repeatability**	Axis designation	Rotation	Mech. support	JC Mancebo
		Subsystem des.	BFR motion system	Electrical support	I Roji
Date and time	28/10/2020	Project code	N056	Metrol. support	J Álvarez
Location	AVS workshop	Associated doc	AVS.PRO.020	Client repr:	NOT PRESENT

ENVIRONMENTAL CONDITIONS

Test facility	AVS workshop : FAT TESTING		Temperature	*ambient (not controlled)*	Vacuum	*In-air*
Cleanliness	Grey room		Pressure	*ambient (not controlled)*	Humidity	*ambient (not controlled)*

SETUP DESCRIPTION

Setup designation	CONF. 01 (MAIN)
Measuring equipment	Laser tracker
Measured position	POI*
External load	**7.500kg**
Reference	Motor steps
Control loop	Open loop
Motor setup	Current 12A Motor speed 688 deg_M/s
i_gearbox	100
i_preload	2
i_pinion_chain	30,95477387
i_correction_motor	0,997168043
i_correction_encoder	0,997168043
Driver setup	
	Commanded in deg_motor
* see description for more details	

Setup description:

RESULTS SUMMARY

		Test result:	Comments: NO COMMENT
Validation parameter	0,05 deg	**Satisfactory**	
Measured parameter	0,03468 deg		Client signature: Supplier signature: PEDRO NOGUERA

RECORDED MEASUREMENTS : POSITION 1

-0,5 to 0deg					1	2	3	4	5	6	7	8	9	10
Starting Pos (deg)	0,0001	→ Laser (deg)		0,0001	-0,0003	-0,0007	-0,0005	-0,0006	-0,0005	-0,001	-0,0008	-0,0005	-0,0008	-0,0007
Increment (deg)	0,5	→ Encoder (cts)			1781043	1781044	1781044	1781047	1781051	1781051	1781052	1781055	1781056	1781059
Increment (deg_M)	6172,191312	→ Encoder (deg)			0,003132855	0,003088355	0,003088355	0,002954857	0,00277686	0,00277686	0,002732361	0,002598863	0,002554364	0,002420866
		→ Pos Act (deg_M)			236,636719	236,636719	236,629688	236,629688	236,636719	236,636719	236,629688	236,636719	236,629688	236,629688
		→ Pos Act (deg)			0,019111488	0,019111488	0,01911092	0,01911092	0,019111488	0,019111488	0,01911092	0,019111488	0,01911092	0,01911092
		INC Laser (deg)			-0,0004	0,0002	-1E-04	1E-04	-0,0005	0,0002	0,0003	-0,0003	0,0001	
		INC Encoder (cts)			1	0	3	4	0	1	3	1	3	
		INC Encoder (deg)			-4,44993E-05	0	-0,000133498	-0,000177997	0	-4,44993E-05	-0,000133498	-4,44993E-05	-0,000133498	
		INC Pos Act (deg_M)			0	-0,007031	0	0,007031	0	-0,007031	0,007031	-0,007031	0	
		INC Pos Act (deg)			0	-5,67845E-07	0	5,67845E-07	0	-5,67845E-07	5,67845E-07	-5,67845E-07	0	

0,5 to 0deg					1	2	3	4	5	6	7	8	9	10
Starting Pos (deg)	-0,0007	← Laser (deg)			0,0262	0,0263	0,0263	0,0261	0,0264	0,0267	0,0261	0,026	0,0264	0,0262
Increment (deg)	0,5	← Encoder (cts)			1780591	1780591	1780588	1780588	1780587	1780587	1780587	1780587	1780588	1780588
Increment (deg_M)	6172,191312	← Encoder (deg)			0,023246539	0,023246539	0,023380037	0,023380037	0,023424536	0,023424536	0,023424536	0,023424536	0,023380037	0,023380037
		← Pos Act (deg_M)			148,232812	148,232812	148,232812	148,232812	148,232812	148,232812	148,232812	148,225781	148,232812	148,225781
		← Pos Act (deg)			0,011971725	0,011971725	0,011971725	0,011971725	0,011971725	0,011971725	0,011971725	0,011971157	0,011971725	0,011971157
		INC Laser (deg)			1E-04	0	-0,0002	0,0003	0,0003	-0,0006	-0,0001	0,0004	-0,0002	
		INC Encoder (cts)			0	-3	0	-1	0	0	0	1	0	
		INC Encoder (deg)			0	0,000133498	0	4,44993E-05	0	0	0	-4,44993E-05	0	
		INC Pos Act (deg_M)			0	0	0	0	0	0	-0,007031	0,007031	-0,007031	
		INC Pos Act (deg)			0	0	0	0	0	0	-5,67845E-07	5,67845E-07	-5,67845E-07	

RESULTS

Repeatability

Unidirectional repeatability (deg)	8,04E-04
Bidirectional repeatability (deg)	8,01E-04
Backlash (deg)	2,69E-02
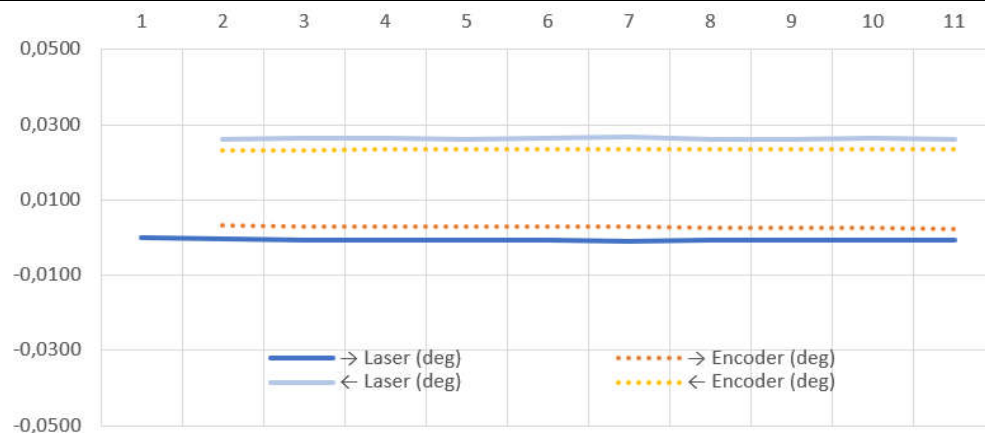
RECORDED MEASUREMENTS : POSITION 2

	-9,5 to 10deg				1	2	3	4	5	6	7	8	9	10
Starting Pos (deg)	9,9998	Laser (deg)		9,9998	9,9943	9,9936	9,9935	9,9931	9,9933	9,9932	9,9932	9,9932	9,9928	9,9926
Increment (deg)	0,5	Encoder (cts)			1556535	1556540	1556547	1556551	1556555	1556559	1556560	1556564	1556567	1556567
Increment (deg_M)	6172,191312	Encoder (deg)			9,993582072	9,993359576	9,993048081	9,992870083	9,992692086	9,992514089	9,99246959	9,992291593	9,992158095	9,992158095
		Pos Act (deg_M)			123622,558594	123622,565625	123622,565625	123622,565625	123622,558594	123622,558594	123622,565625	123622,558594	123622,565625	123622,565625
		Pos Act (deg)			9,984127094	9,984127662	9,984127662	9,984127662	9,984127094	9,984127094	9,984127662	9,984127094	9,984127662	9,984127662
		INC Laser (deg)			-0,0007	-0,0001	-0,0004	0,0002	-1E-04	0	0		-0,0004	-0,0002
		INC Encoder (cts)			5	7	4	4		4	1	4	3	0
		INC Encoder (deg)			-0,000222497	-0,000311495	-0,000177997	-0,000177997	-0,000177997	-4,44993E-05	-0,000177997	-0,000133498		0
		C Pos Act (deg_M)			0,007031	0	0	-0,007031	0	0,007031	-0,007031	0,007031		0
		INC Pos Act (deg)			5,67845E-07	0	0	-5,67845E-07	0	5,67845E-07	-5,67845E-07	5,67845E-07		0

	10,5 to 10deg				1	2	3	4	5	6	7	8	9	10
Starting Pos (deg)	9,9924	Laser (deg)			10,031	10,0317	10,0318	10,0323	10,0326	10,0326	10,0327	10,0323	10,0327	10,0324
Increment (deg)	0,5	Encoder (cts)			1555752	1555740	1555735	1555728	1555724	1555723	1555720	1555732	1555731	1555732
Increment (deg_M)	6172,191312	Encoder (deg)			10,02842503	10,02895902	10,02918151	10,02949301	10,02967101	10,02971551	10,029849	10,02931501	10,02935951	10,02931501
		Pos Act (deg_M)			123622,650000	123622,650000	123622,650000	123622,657031	123622,650000	123622,650000	123622,650000	123610,042969	123610,042969	123610,042969
		Pos Act (deg)			9,984134476	9,984134476	9,984134476	9,984135044	9,984134476	9,984134476	9,984134476	9,983116295	9,983116295	9,983116295
		INC Laser (deg)			0,0007	0,0001	0,0005	0,0003	0,0000	0,0001	-0,0004	0,0004	-0,0003	
		INC Encoder (cts)			-12	-5	-7	-4	-1	-3	12	-1	1	
		INC Encoder (deg)			0,000533992	0,000222497	0,000311495	0,000177997	4,44993E-05	0,000133498	-0,000533992	4,44993E-05	-4,44993E-05	
		C Pos Act (deg_M)			0	0	0,007031	-0,007031	0	0	-12,607031	0	0	
		INC Pos Act (deg)			0	0	5,67845E-07	-5,67845E-07	0	0	-0,001018181	0	0	

RESULTS

Repeatability

Unidirectional repeatability (deg)	**1,86E-03**
Bidirectional repeatability (deg)	**2,20E-03**
Backlash (deg)	**3,89E-02**
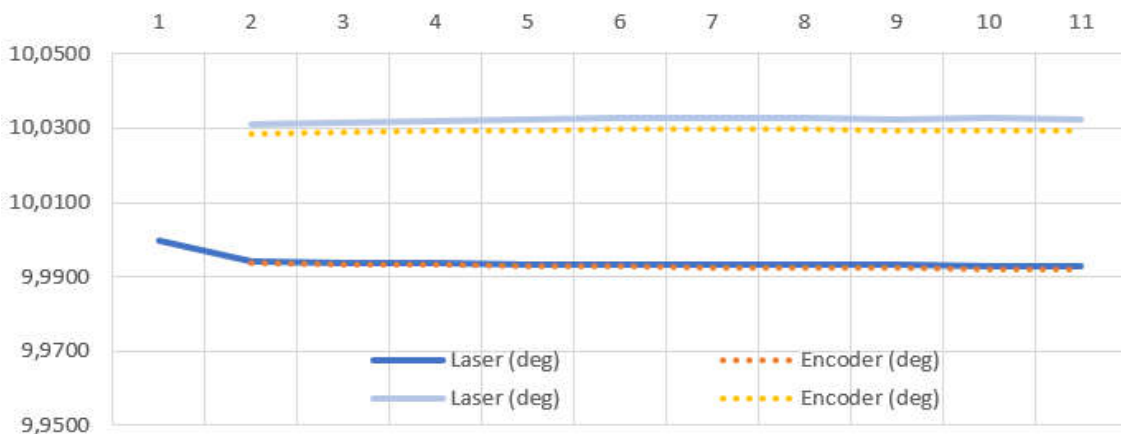
19,5 to 20deg

				1	2	3	4	5	6	7	8	9	10
Starting Pos (deg)	20,0000	Laser (deg)	20,0000	20,0005	20,0005	20	20,0007	20,0004	20,0002	20,0003	20,004	20,0002	20,0003
Increment (deg)	0,5	Encoder (cts)		1331555	1331567	1331575	1331556	1331563	1331564	1331567	1331567	1331568	1331571
Increment (deg_m)	6172,191312	Encoder (deg)		20,00503496	20,00450097	20,00414497	20,00499046	20,00467897	20,00463447	20,00450097	20,00450097	20,00445647	20,00432297
		Pos Act (deg_M)		247152,473438	247152,473438	247152,466406	247171,120313	247171,120313	247171,120313	247171,120313	247171,113281	247171,120313	247171,113281
		Pos Act (deg)		19,960772	19,960772	19,96077143	19,96227798	19,96227798	19,96227798	19,96227798	19,96227741	19,96227798	19,96227741
		INC Laser (deg)		0	-0,0005	0,0007	-0,0003	-0,0002	1E-04	1E-04	-0,0002	1E-04
		INC Encoder (cts)		12	8	-19	7	1	3	0	1	3
		INC Encoder (deg)		-0,000533992	-0,000355994	0,000845487	-0,000311495	-4,44993E-05	-0,000133498	0	-4,44993E-05	-0,000133498
		INC Pos Act (deg_M)		0	-0,007032	18,653907	0	0	0	-0,007032	0,007032	-0,007032
		INC Pos Act (deg)		0	-5,67925E-07	0,001506545	0	0	0	-5,67925E-07	5,67925E-07	-5,67925E-07

20,5 to 20deg

				1	2	3	4	5	6	7	8	9	10
Starting Pos (deg)	20,0002	Laser (deg)		20,0378	20,0384	20,0389	20,0392	20,0395	20,0396	20,0398	20,0401	20,0402	20,0404
Increment (deg)	0,5	Encoder (cts)		1330783	1330764	1330752	1330747	1330739	1330732	1330728	1330723	1330720	1330716
Increment (deg_m)	6172,191312	Encoder (deg)		20,03938842	20,04023391	20,0407679	20,0409904	20,04134639	20,04165789	20,04183588	20,04205838	20,04219188	20,04236987
		Pos Act (deg_M)		247171,211719	247171,211719	247171,204687	247171,204687	247171,211719	247171,204687	247171,211719	247171,204687	247171,204687	247171,211719
		Pos Act (deg)		19,96228536	19,96228536	19,96228479	19,96228479	19,96228536	19,96228479	19,96228536	19,96228479	19,96228479	19,96228536
		INC Laser (deg)		0,0006	0,0005	0,0003	0,0003	1E-04	0,0002	0,0003	1E-04	0,0002
		INC Encoder (cts)		-19	-12	-5	-8	-7	-4	-5	-3	-4
		INC Encoder (deg)		0,000845487	0,000533992	0,000222497	0,000355994	0,000311495	0,000177997	0,000222497	0,000133498	0,000177997
		INC Pos Act (deg_M)		0	-0,007032	0	0,007032	-0,007032	0,007032	-0,007032	0	0,007032
		INC Pos Act (deg)		0	-5,67925E-07	0	5,67925E-07	-5,67925E-07	5,67925E-07	-5,67925E-07	0	5,67925E-07

RESULTS

Repeatability

Unidirectional repeatability (deg)	7,83E-04
Bidirectional repeatability (deg)	3,32E-03
Backlash (deg)	3,90E-02
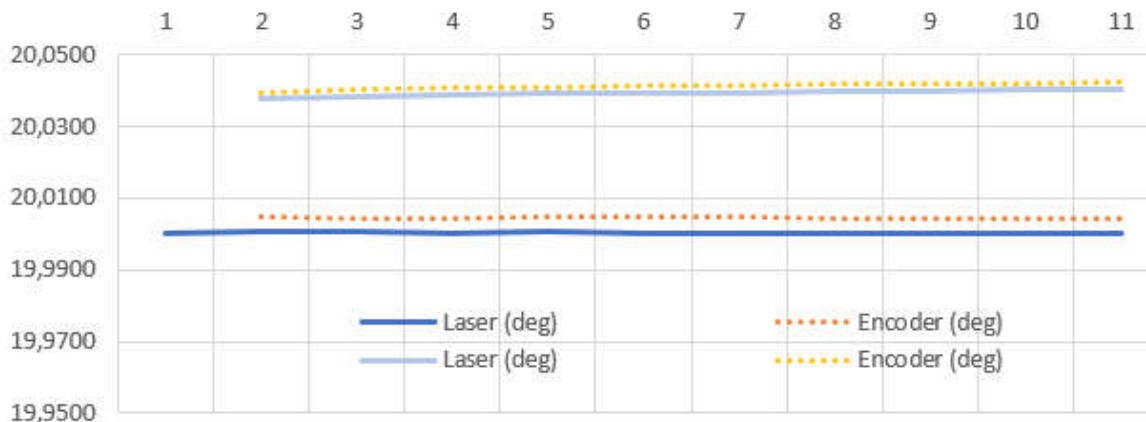
29,5 to 30deg				1	2	3	4	5	6	7	8	9	10
Starting Pos (deg)	29,9999	Laser (deg)	29,9999	29,9786	29,9786	29,9783	29,9782	29,9778	29,9776	29,9776	29,9774	29,9772	29,9776
Increment (deg)	0,5	Encoder (cts)		1107211	1107215	1107220	1107223	1107227	1107231	1107232	1107235	1107236	1107235
Increment (deg_m)	6172,191312	Encoder (deg)		29,98818629	29,9880083	29,9877858	29,9876523	29,9874743	29,98729631	29,98725181	29,98711831	29,98707381	29,98711831
		Pos Act (deg_M)		370312,375781	370312,368750	370312,368750	370312,375781	370312,368750	370312,368750	370312,375781	370312,368750	370312,375781	370312,368750
		Pos Act (deg)		29,9075336	29,90753303	29,90753303	29,9075336	29,90753303	29,90753303	29,9075336	29,90753303	29,9075336	29,90753303
-0,0003	-1E-04	-0,0004		-0,0002									
										0	-0,0002	-0,0002	0,0004
		INC Encoder (cts)		4	5	3	4	4	1	3	1	-1
		INC Encoder (deg)		-0,000177997	-0,000222497	-0,000133498	-0,000177997	-0,000177997	-4,44993E-05	-0,000133498	-4,44993E-05	4,44993E-05
		INC Pos Act (deg_M)		-0,007031	0	0,007031	-0,007031	0	0,007031	-0,007031	0,007031	-0,007031
		INC Pos Act (deg)		-5,67845E-07	0	5,67845E-07	-5,67845E-07	0	5,67845E-07	-5,67845E-07	5,67845E-07	-5,67845E-07

30,5 to 30deg				1	2	3	4	5	6	7	8	9	10
Starting Pos (deg)	29,9776	Laser (deg)		30,0147	30,014	30,0147	30,0148	30,0153	30,0159	30,0155	30,016	30,016	30,0162
Increment (deg)	0,5	Encoder (cts)		1106511	1106500	1106491	1106483	1106476	1106471	1106467	1106463	1106459	1106459
Increment (deg_m)	6172,191312	Encoder (deg)		30,0193358	30,0198253	30,02022579	30,02058178	30,02089328	30,02111578	30,02129377	30,02147177	30,02164977	30,02164977
		Pos Act (deg_M)		370312,467188	370312,460156	370312,460156	370312,467188	370312,460156	370312,460156	370312,460156	370312,460156	370312,460156	370312,460156
		Pos Act (deg)		29,90754098	29,90754041	29,90754041	29,90754098	29,90754041	29,90754041	29,90754041	29,90754041	29,90754041	29,90754041
		INC Laser (deg)		-0,0007	0,0007	1E-04	0,0005	0,0006	-0,0004	0,0005	0	0,0002
		INC Encoder (cts)		-11	-9	-8	-7	-5	-4	-4	-4	0
		INC Encoder (deg)		0,000489492	0,000400494	0,000355994	0,000311495	0,000222497	0,000177997	0,000177997	0,000177997	0
		INC Pos Act (deg_M)		-0,007032	0	0,007032	-0,007032	0	0	0	0	0	0
		INC Pos Act (deg)		-5,67925E-07	0	5,67925E-07	-5,67925E-07	0	0	0	0	0	0

RESULTS

Repeatability

Unidirectional repeatability (deg)	2,00E-03
Bidirectional repeatability (deg)	2,94E-03
Backlash (deg)	3,74E-02
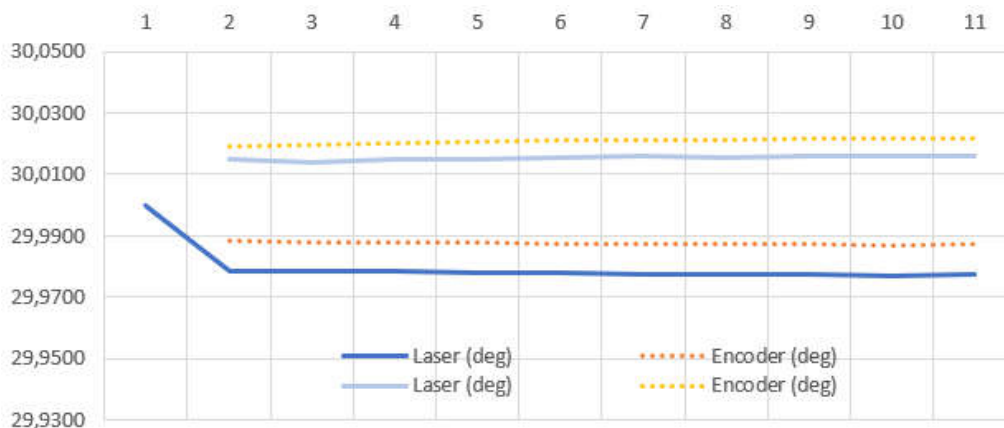
RECORDED MEASUREMENTS : POSITION 5

	39,5 to 40deg			1	2	3	4	5	6	7	8	9	10
Starting Pos (deg)	39,9999	**Laser (deg)**	39,9999	40,0011	40,0005	40,0002	40	40	39,9997	39,9995	39,9991	39,9992	39,999
Increment (deg)	0,5	**Encoder (cts)**		882183	882192	882200	882207	882212	882219	882220	882227	882231	882231
Increment (deg_m)	6172,191312	**Encoder (deg)**		40,00177515	40,00137465	40,00101866	40,00070716	40,00048467	40,00017317	40,00012867	39,99981718	39,99963918	39,99963918
		Pos Act (deg_M)		493935,152344	493935,152344	493935,157596	493935,152344	493935,152344	493935,152344	493935,159375	493935,152344	493935,152344	493935,159375
		Pos Act (deg)		39,89167829	39,89167829	39,89167872	39,89167829	39,89167829	39,89167829	39,89167886	39,89167829	39,89167829	39,89167886
		INC Laser (deg)		-0,0006	-0,0003	-0,0002	0	-0,0003	-0,0002	-0,0004	0,0001	-0,0002
		INC Encoder (cts)		9	8	7	5	7	1	7	4	0
		INC Encoder (deg)		-0,000400494	-0,000355994	-0,000311495	-0,000222497	-0,000311495	-4,44993E-05	-0,000311495	-0,000177997	0
		INC Pos Act (deg_M)		0	0,005252	-0,005252	0	0	0,007031	-0,007031	0	0,007031
		INC Pos Act (deg)		0	4,24167E-07	-4,24167E-07	0	0	5,67845E-07	-5,67845E-07	0	5,67845E-07

	40,5 to 40deg			1	2	3	4	5	6	7	8	9	10
Starting Pos (deg)	39,9990	**Laser (deg)**		40,029	40,03	40,0305	40,0308	40,031	40,0315	40,0314	40,0318	40,0318	40,0322
Increment (deg)	0,5	**Encoder (cts)**		881592	881576	881564	881559	881552	881548	881543	881539	881535	881528
Increment (deg_m)	6172,191312	**Encoder (deg)**		40,02807423	40,02878622	40,02932021	40,02954271	40,02985421	40,0300322	40,0302547	40,0304327	40,03061069	40,03092219
		Pos Act (deg_M)		493935,243750	493935,243750	493935,243750	493935,236719	493935,243750	493935,243750	493935,236719	493935,243750	493935,243750	493935,236719
		Pos Act (deg)		39,89168568	39,89168568	39,89168568	39,89168511	39,89168568	39,89168568	39,89168511	39,89168568	39,89168568	39,89168511
		INC Laser (deg)		0,001	0,0005	0,0003	0,0002	0,0005	-0,0001	0,0004	0	0,0004
		INC Encoder (cts)		-16	-12	-5	-7	-4	-5	-4	-4	-7
		INC Encoder (deg)		0,000711989	0,000533992	0,000222497	0,000311495	0,000177997	0,000222497	0,000177997	0,000177997	0,000311495
		INC Pos Act (deg_M)		0	0	-0,007031	0,007031	0	-0,007031	0,007031	0	-0,007031
		INC Pos Act (deg)		0	0	-5,67845E-07	5,67845E-07	0	-5,67845E-07	5,67845E-07	0	-5,67845E-07

RESULTS

Repeatability

Unidirectional repeatability (deg)	2,67E-03
Bidirectional repeatability (deg)	3,87E-03
Backlash (deg)	3,12E-02