NICOMATIC R&D LABORATORY	QUALIFICATION TEST REPORT	QTR18014a
EMM SERIE ACCORDING TO MIL-DTL-83513G STANDARD		Page : 1 /19
		Qualification status : PASSED

MATING UNMATING Forces (Initial)

According to MIL-DTL-83513G §3.5.2 & §4.5.4 and EIA-364-13D test procedure

ISSUE	MODIFICATION	VISA	DATE
a	Original Issue	AJ	21/05/18
b			
c			

	Name	Duty	Date	Visa
Written by	A.JAGHMIM	Test & Measurement Manager	18/05/18	AJ
Test Operator(s)	A.JAGHMIM	Test & Measurement Manager	18/05/18	AJ
Checked by	J.RIGAT	Project Manager	18/05/18	JR
Approved by	C.CHIFFARD	Product Manager	18/05/18	CC
Requested by	J.RIGAT	Project Manager	18/05/18	JR

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1 Conclusion

The EMM connectors are **qualified** regarding MATING UNMATING Forces (Initial) according to MIL-DTL-83513G standard.

2 Technical Features Proposal

EMM connectors:
Mating force = 1.7 N max
Unmating force = 0.1N min

3 Connate Reports

4 Information about the tests

4.1 Object

Determine the forces required to mate and un-mate EMM connectors with gages or devices.

4.2 Reference documents/Qualification Plan

- MDC.P16020.a
- MIL-DTL-83513G
- EIA-364-13D

4.3 Tested Products

Designation	Article Reference*	Drawing issue*	Batch / DI*	Quantity
C18892-30 (Female, Straight on PCB, E60 guiding)	C18892-30	na	DI7576	20
C18900-30 (Female Straight on PCB, E50)	C18900-30	na	DI7577	20
C18891-30 (Male, Straight on PCB, E10)	C18891-30	na	DI7579	20
C18904-30 (Male, 90° on PCB, E11 guiding)	C18904-30	na	DI7578	20
C18893-30 (Female, 90° on PCB, E61 guiding)	C18893-30	na	DI7580	20
C18901-30 (Female, 90° on PCB, E51 jackscrew)	C18901-30	na	DI7581	20
C18981-30-0250 (Male, on cable AWG30, E01 jackscrew)	C18981-30-0250	na	DI7592	20
C18980-30-0250 (Male, on cable AWG28, E01 jackscrew)	C18980-30-025	na	DI7591	20
C18902-30-0250 (Male, on cable AWG26, E01 jackscrew)	C18902-30-0250	na	DI7588	20
C18979-30-0250 (Male, on cable AWG24, E01 jackscrew)	C18979-30-0250	na	DI7589	20
C18902-30-0250-BP (Male, on cable AWG26, E01 jackscrew BP)	C18902-30-0250-BP	na	DI7586	20
18224-AWG24	18224-AWG24	na	DI7594	25
18224-AWG26	18224-AWG26	na	DI7596	25
18240-AWG28	18240-AWG28	na	DI7597	25
18240-AWG30	18240-AWG30	na	DI7598	25

4.4 Persons present during the tests

Name	Duty
A.JAGHMIM	Test & Measurement Manager

4.5 Date and place of the tests

NICOMATIC France Lab. from 12/02/18 to 16/02/18

4.6 Environmental conditions

Ambient temperature: 24.3°C
Pressure: 973 mbar
Humidity: 26 % HR

4.7 Incidents during the test

None

4.8 Test Equipments

Designation	Calibration Data	
ANDILOG - SPIP S2 50 N N°00601	**Last calibration date**	18/01/18
	Next calibration date	18/01/19

4.9 Test Tooling

Designation	Tooling reference
Test Vertical Bench	DIV 23

5 Requirements according to MIL-DTL-83513G standard

Internal requirements:
The maximum mating and un-mating force shall not exceed a value equal to 35 ounces times the number of contacts.
10 ounces = 283,5 gr = 283,5/1000*9,81 = 2,781 N; so 35 ounces = 9.733 N

Connectors shall be rigidly mounted in a manner to permit mating and un-mating of the counterpart connectors, and with instrumentation capable of measuring the specified forces.

Gradually increasing axial loads shall be applied until plugs and receptacles are fully.
Then the forces shall be applied to disengage the connectors.
The forces shall be measured in both directions and shall conform to the requirements.

No one connector half may be used as a test fixture for more than 500 cycles of mating and un-mating. Subject connector pairs to three mate/un-mate cycles before initial measurements are taken.

6 Test Procedure

Connector or device. Unless otherwise specified, the specimen shall be mounted to mounting fixtures by the normal mounting means.

6.1 Mating force

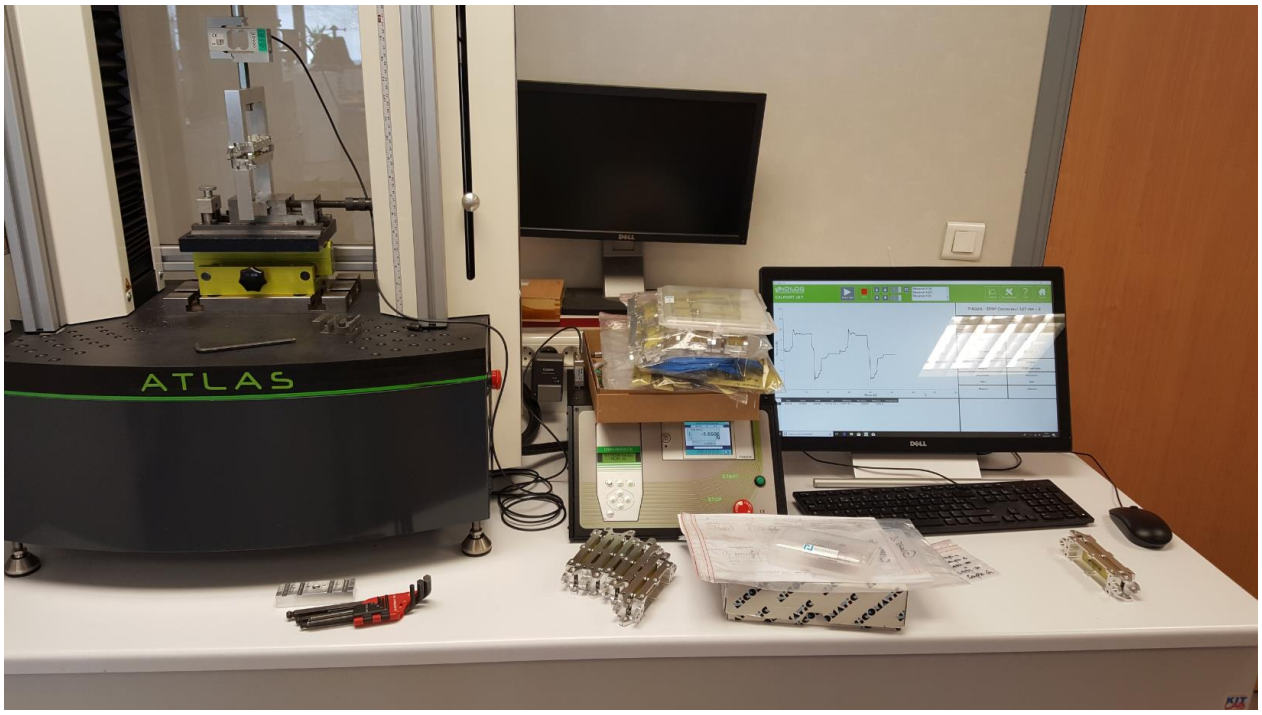
The two mating connectors shall be brought to a position where mechanical mating begins and the force or torque gage is at zero indication.

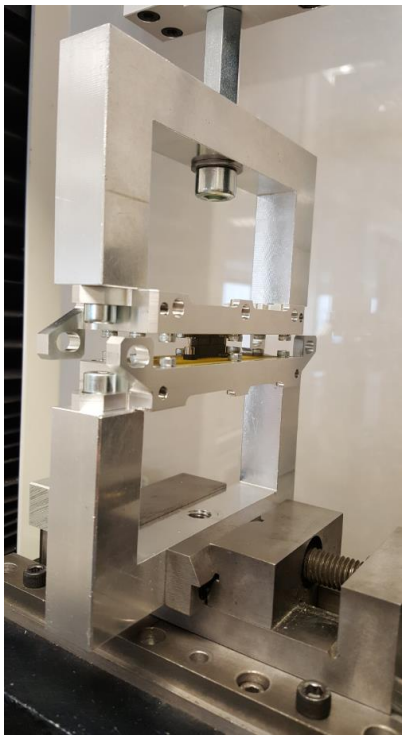
The connectors shall then be fully mated or coupled at a rate of 25.4 millimetres/minute, unless otherwise specified in the referencing document, and the peak force or torque required for mating shall be recorded.

6.2 Un-mating force

The mated connectors shall be fully unmated at a rate of 25.4 millimetres/minute, unless otherwise specified in the referencing document, and the peak force or torque required shall be recorded.

7 Test setup







8 Measurements results

8.1 Resume

	Initial (Connector 30 points)					
	Per Connector			Per Contact		
	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
Min	9.26	9.92	9.36	0.31	0.33	0.31
Max	36.90	29.48	27.25	1.23	0.98	0.91
Average	19.96	18.47	17.24	0.67	0.62	0.57

	Initial (Connector 60 points)					
	Per Connector			Per Contact		
	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
Min	20.42	12.18	11.46	0.34	0.20	0.19
Max	51.60	40.72	39.74	0.86	0.68	0.66
Average	31.05	23.50	22.25	0.52	0.39	0.37

8.2 Details

8.2.1 Couple 1 - C18891-30 + C18892-30

		Per Connector		
Connector Ref	Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
C18891-30 + C18892-30	1	12.65	12.61	11.47
	2	10.63	14.60	13.81
	3	10.73	15.32	13.82
	4	10.12	14.45	13.80
	5	9.26	15.06	14.64
	6	10.58	13.56	12.72
Min		9.26	12.61	11.47
Max		12.65	15.32	14.64
Average		10.66	14.26	13.38
		Per Contact		
Connector Ref	Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
C18891-30 + C18892-30	1	0.42	0.42	0.38
	2	0.35	0.49	0.46
	3	0.36	0.51	0.46
	4	0.34	0.48	0.46
	5	0.31	0.50	0.49
	6	0.35	0.45	0.42
Min		0.31	0.42	0.38
Max		0.42	0.51	0.49
Average		0.36	0.48	0.45

Tableau 1 - 30 Points Measurements

				Per Connector		
Samples Ref			Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
E221Y60E10	vs	E222Y60E60	1	24.66	13.96	13.28
			2	22.86	13.30	12.54
			3	22.32	12.24	11.46
Min				22.32	12.24	11.46
Max				24.66	13.96	13.28
Average				23.28	13.17	12.43
				Per Contact		
Samples Ref			Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
E221Y60E10	vs	E222Y60E60	1	0.41	0.23	0.22
			2	0.38	0.22	0.21
			3	0.37	0.20	0.19
Min				0.37	0.20	0.19
Max				0.41	0.23	0.22
Average				0.39	0.22	0.21

Tableau 2 - 60 Points Measurements

8.2.2 Couple 2 - C18891-30 with C18893-30

		Per Connector		
Connector Ref	Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
C18891-30 + C18893-30	1	27.12	24.02	22.61
	2	22.60	21.53	19.13
	3	26.09	23.91	22.59
	4	24.04	25.27	24.55
	5	26.84	24.11	22.89
	6	26.97	25.46	23.56
Min		22.60	21.53	19.13
Max		27.12	25.46	24.55
Average		25.61	24.05	22.55
		Per Contact		
Connector Ref	Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
C18891-30 + C18893-30	1	0.90	0.80	0.75
	2	0.75	0.72	0.64
	3	0.87	0.80	0.75
	4	0.80	0.84	0.82
	5	0.89	0.80	0.76
	6	0.90	0.85	0.79
Min		0.75	0.72	0.64
Max		0.90	0.85	0.82
Average		0.85	0.80	0.75

Tableau 3 - 30 Points Measurements

				Per Connector		
Samples Ref			Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
E221Y60E10	vs	E222V60E61	1	20.70	12.56	12.26
			2	20.42	12.18	11.92
			3	20.86	12.58	12.24
Min				20.42	12.18	11.92
Max				20.86	12.58	12.26
Average				20.66	12.44	12.14
				Per Contact		
Samples Ref			Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
E221Y60E10	vs	E222V60E61	1	0.35	0.21	0.20
			2	0.34	0.20	0.20
			3	0.35	0.21	0.20
Min				0.34	0.20	0.20
Max				0.35	0.21	0.20
Average				0.34	0.21	0.20

Tableau 4 - 60 Points Measurements

8.2.3 Couple 3 - C18904-30 with C18893-30

		Per Connector		
Connector Ref	Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
C18904-30 + C18893-30	1	36.40	27.75	26.89
	2	32.95	27.71	26.41
	3	28.45	21.46	21.13
	4	31.13	25.15	23.50
	5	32.84	25.54	24.17
	6	36.90	29.48	27.25
Min		28.45	21.46	21.13
Max		36.90	29.48	27.25
Average		33.11	26.18	24.89
		Per Contact		
Connector Ref	Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
C18904-30 + C18893-30	1	1.21	0.92	0.90
	2	1.10	0.92	0.88
	3	0.95	0.72	0.70
	4	1.04	0.84	0.78
	5	1.09	0.85	0.81
	6	1.23	0.98	0.91
Min		0.95	0.72	0.70
Max		1.23	0.98	0.91
Average		1.10	0.87	0.83

Tableau 5 - 30 Points Measurements

				Per Connector		
Samples Ref			Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
E221V60E11	vs	E222V60E61	1	30.66	24.42	22.74
			2	31.56	27.46	26.70
			3	40.16	37.04	33.94
Min				30.66	24.42	22.74
Max				40.16	37.04	33.94
Average				34.13	29.64	27.79
				Per Contact		
Samples Ref			Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
E221V60E11	vs	E222V60E61	1	0.51	0.41	0.38
			2	0.53	0.46	0.45
			3	0.67	0.62	0.57
Min				0.51	0.41	0.38
Max				0.67	0.62	0.57
Average				0.57	0.49	0.46

Tableau 6 - 60 Points Measurements

8.2.4 Couple 4 - C18901-30 with C18979-30-0250

		Per Connector		
Connector Ref	Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
C18979-30-250 + C18901-30	1	15.42	14.32	13.52
	2	16.98	15.94	15.53
	3	14.93	13.49	12.46
	4	17.93	14.39	13.32
	5	16.57	14.54	13.62
	6	16.10	12.66	12.13
Min		14.93	12.66	12.13
Max		17.93	15.94	15.53
Average		16.32	14.22	13.43
		Per Contact		
Connector Ref	Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
C18979-30-250 + C18901-30	1	0.51	0.48	0.45
	2	0.57	0.53	0.52
	3	0.50	0.45	0.42
	4	0.60	0.48	0.44
	5	0.55	0.48	0.45
	6	0.54	0.42	0.40
Min		0.50	0.42	0.40
Max		0.60	0.53	0.52
Average		0.54	0.47	0.45

Tableau 7 - 30 Points Measurements

				Per Connector		
Samples Ref			Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
HE221J6P60E01ZF0250	vs	E222V60E61	1	28.72	17.86	17.40
HE221I2P60E01ZF0250	vs		2	37.08	31.44	29.96
HE221H6P60E01ZF0250	vs		3	38.40	36.72	34.50
HE221D5P60E01ZF0250	vs		4	40.10	37.34	35.82
Min				28.72	17.86	17.40
Max				40.10	37.34	35.82
Average				36.08	30.84	29.42
				Per Connector		
Samples Ref			Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
HE221J6P60E01ZF0250	vs	E222V60E61	1	0.48	0.30	0.29
HE221I2P60E01ZF0250	vs		2	0.62	0.52	0.50
HE221H6P60E01ZF0250	vs		3	0.64	0.61	0.58
HE221D5P60E01ZF0250	vs		4	0.67	0.62	0.60
Min				0.48	0.30	0.29
Max				0.67	0.62	0.60
Average				0.60	0.51	0.49

Tableau 8 - 60 Points Measurements

8.2.5 Couple 5 - C18900-30 with C18979-30-0250

		Per Connector		
Connector Ref	Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
C18979-30-250 + C18900-30	1	14.31	10.91	10.62
	2	12.41	16.85	14.31
	3	15.87	9.92	9.36
	4	13.56	13.95	12.11
	5	14.16	16.87	12.66
	6	15.78	16.18	14.88
Min		12.41	9.92	9.36
Max		15.87	16.87	14.88
Average		14.35	14.11	12.32
		Per Contact		
Connector Ref	Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
C18979-30-250 + C18900-30	1	0.48	0.36	0.35
	2	0.41	0.56	0.48
	3	0.53	0.33	0.31
	4	0.45	0.46	0.40
	5	0.47	0.56	0.42
	6	0.53	0.54	0.50
Min		0.41	0.33	0.31
Max		0.53	0.56	0.50
Average		0.48	0.47	0.41

Tableau 9 - 30 Points Measurements

				Per Connector		
Samples Ref			Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
HE221J6P60E01ZF0250	vs	E222Y60E10	1	31.92	19.82	18.48
HE221I2P60E01ZF0250	vs		2	39.94	38.22	34.78
HE221H6P60E01ZF0250	vs		3	37.54	32.68	30.56
HE221D5P60E01ZF0250	vs		4	51.60	40.72	39.74
Min				31.92	19.82	18.48
Max				51.60	40.72	39.74
Average				40.25	32.86	30.89
				Per Contact		
Samples Ref			Sample N°	Mating Force Max (N)	Unmating Force Max (N)	Unmating Force Min (N)
HE221J6P60E01ZF0250	vs	E222Y60E10	1	0.53	0.33	0.31
HE221I2P60E01ZF0250	vs		2	0.67	0.64	0.58
HE221H6P60E01ZF0250	vs		3	0.63	0.54	0.51
HE221D5P60E01ZF0250	vs		4	0.86	0.68	0.66
Min				0.53	0.33	0.31
Max				0.86	0.68	0.66
Average				0.67	0.55	0.51

Tableau 10 - 60 points Measurements

9 Visual Inspection

Required by the applicable standard ?			
YES		NO	☐

**********END OF REPORT**********

10 APPENDIX

Internal use only ?			
YES	☐	NO	☒

10.1 Couple 1 - C18891-30 + C18892-30

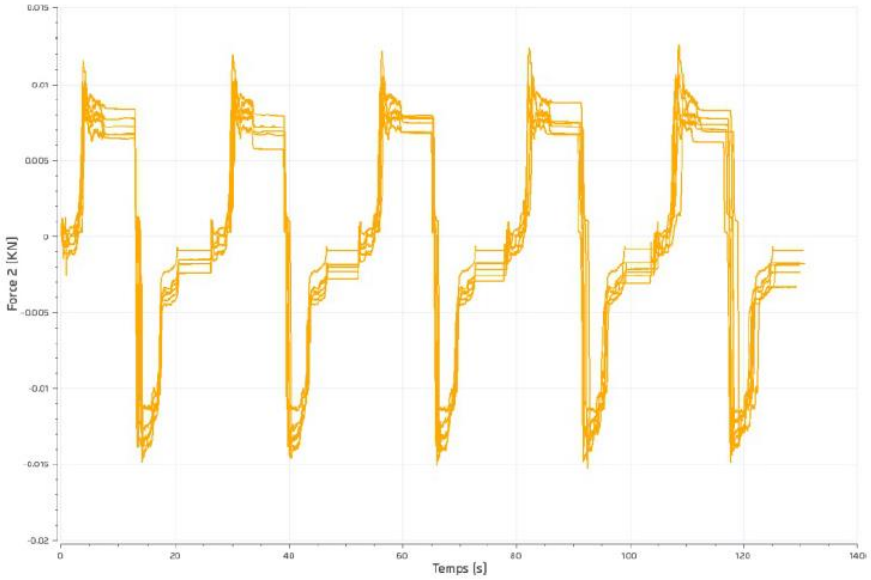


Figure 1 - 30 points Measurements

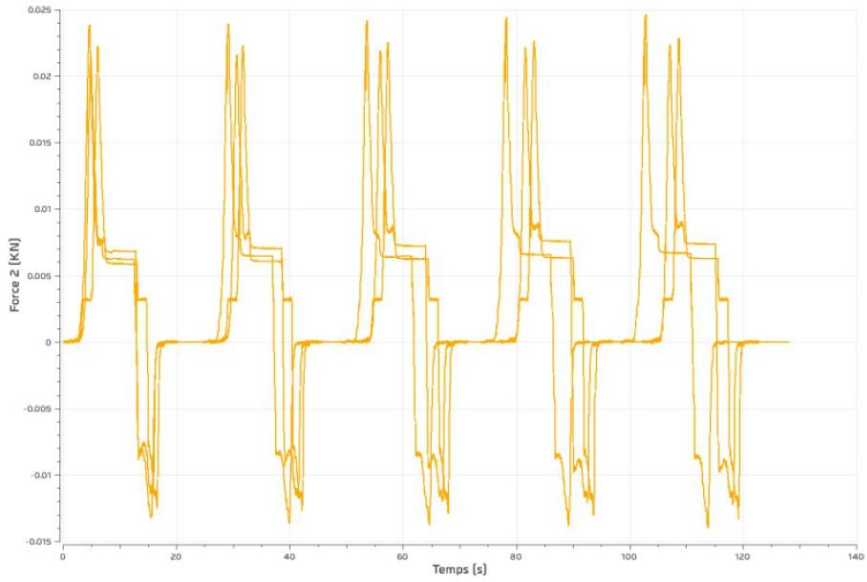


Figure 2 - 60 Points Measurements

10.2 Couple 2 - C18891-30 with C18893-30

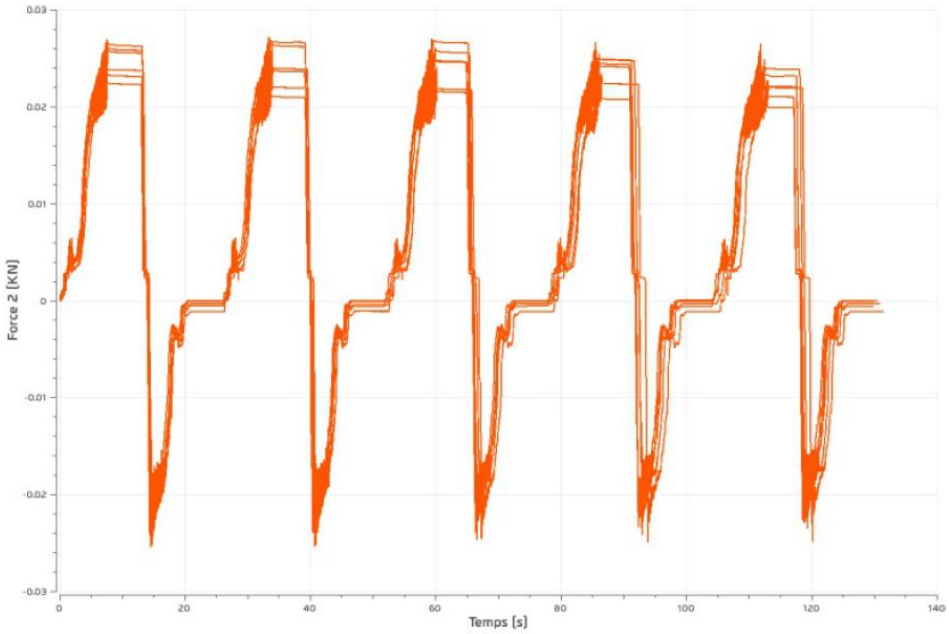


Figure 3 - 30 Points Measurements

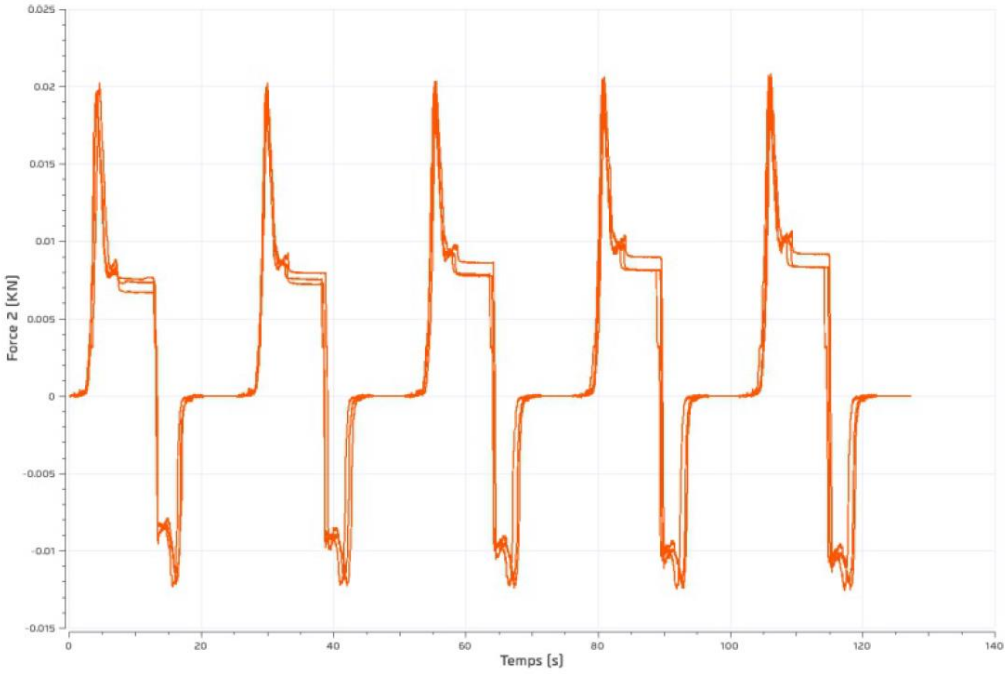


Figure 4 - 60 Points Measurements

10.3 Couple 3 - C18904-30 with C18893-30

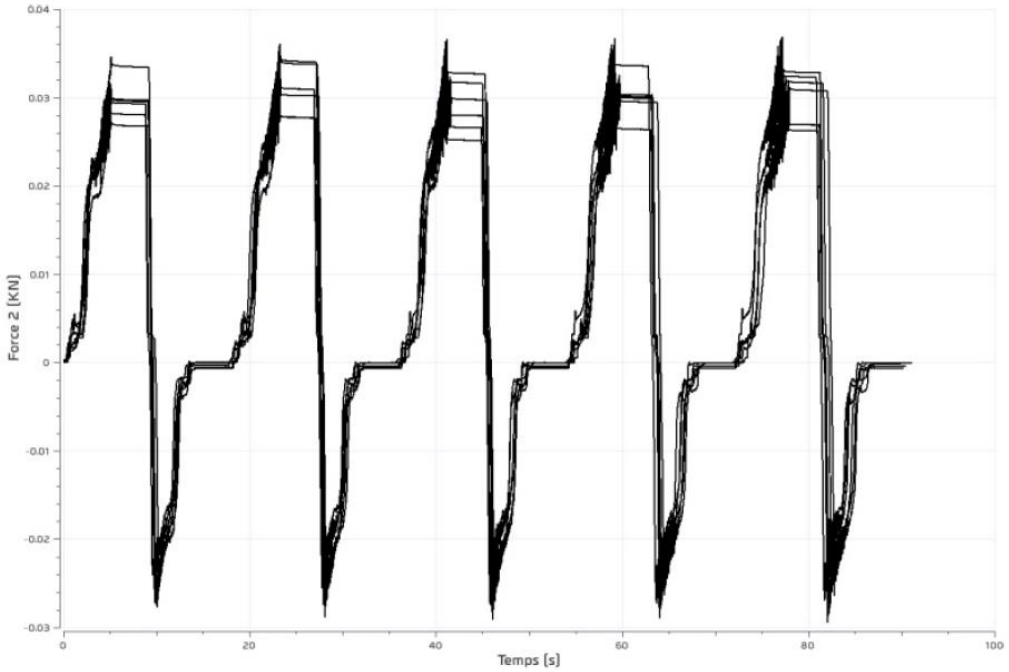


Figure 5 - 30 Points Measurements

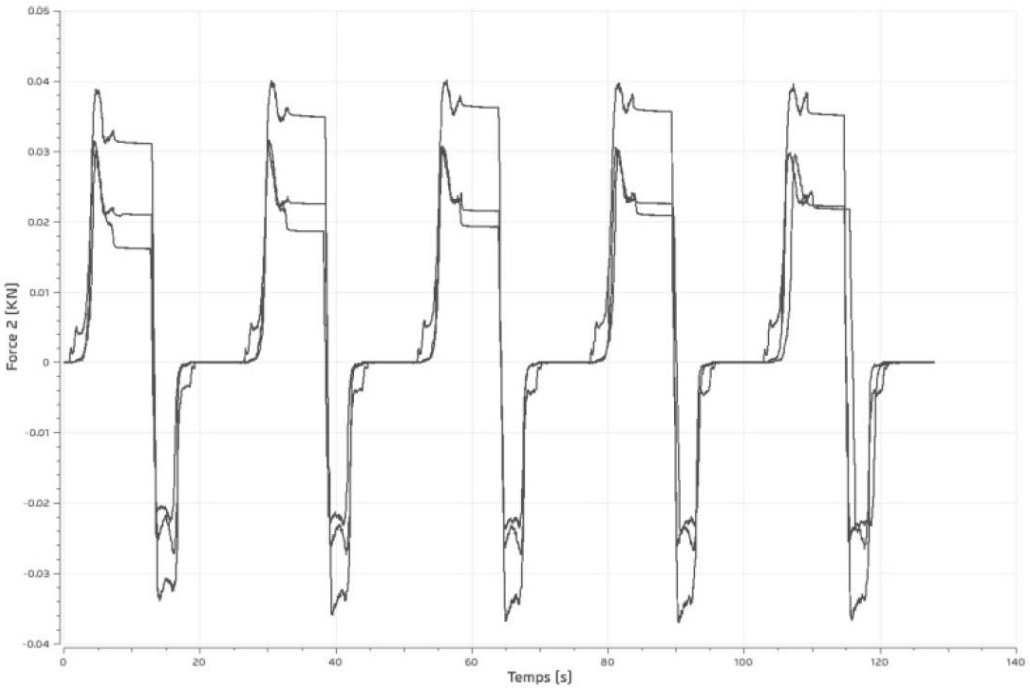


Figure 6 - 60 Points Measurements

10.4 Couple 4 - C18901-30 with C18979-30-0250

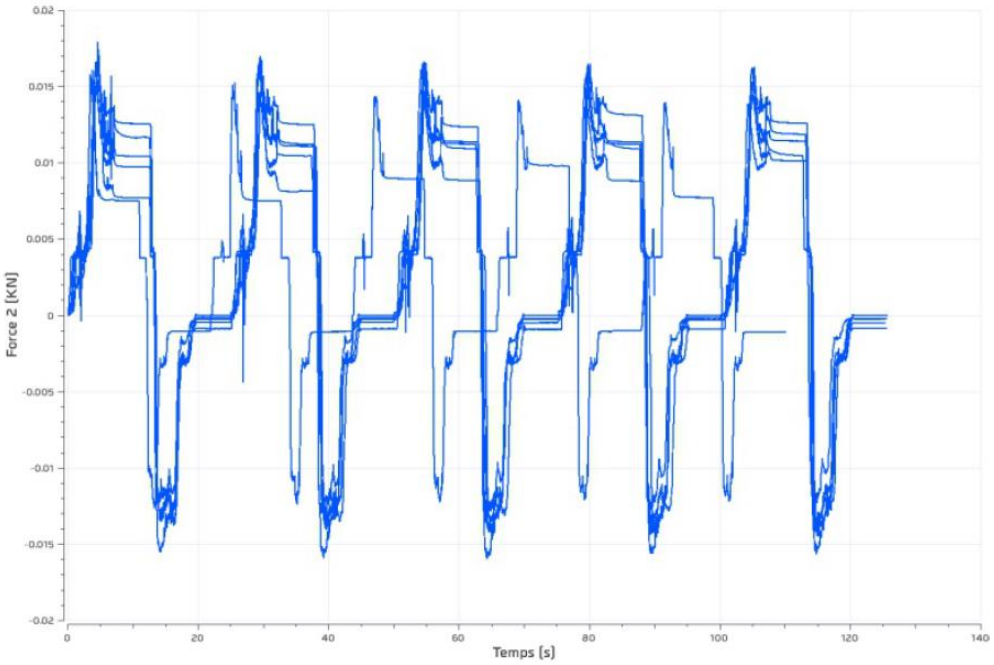


Figure 7 - 30 Points Measurements

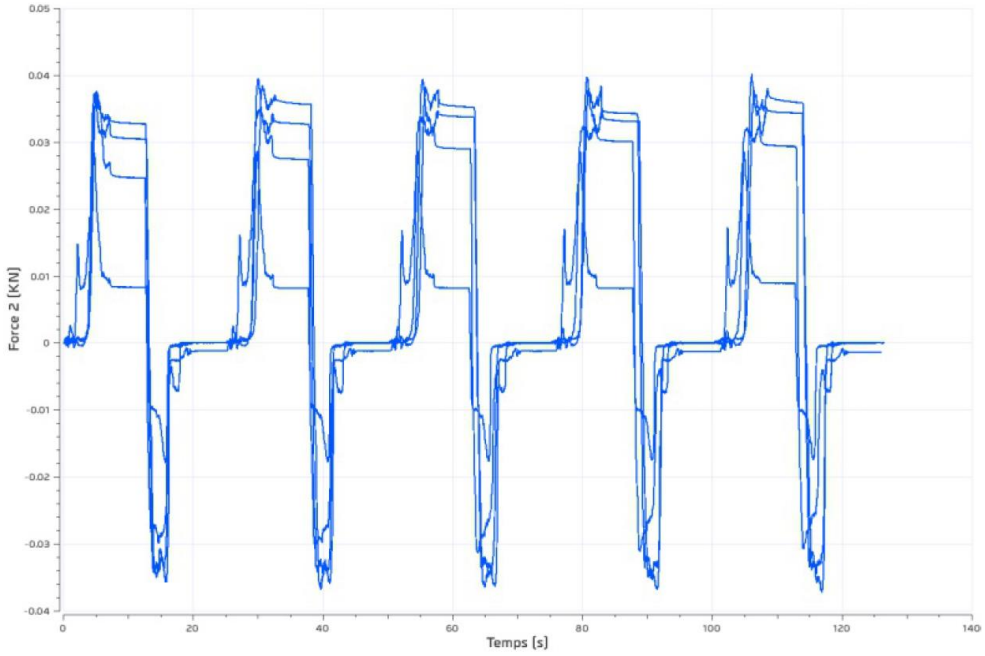


Figure 8 - 60 Points Measurements

10.5 Couple 5 - C18900-30 with C18979-30-0250

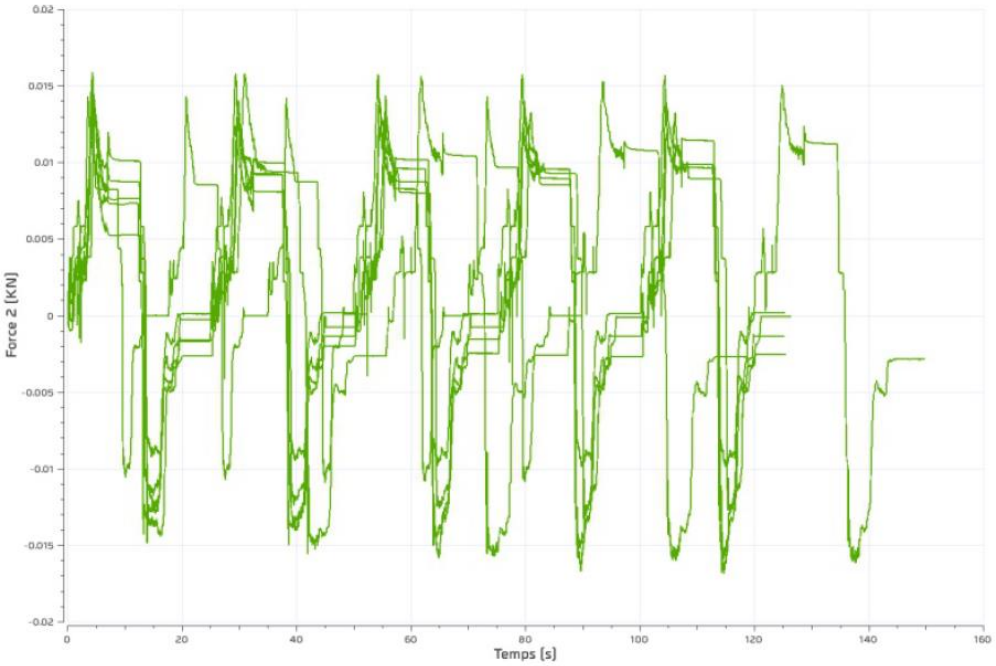


Figure 9 - 30 Points Measurements

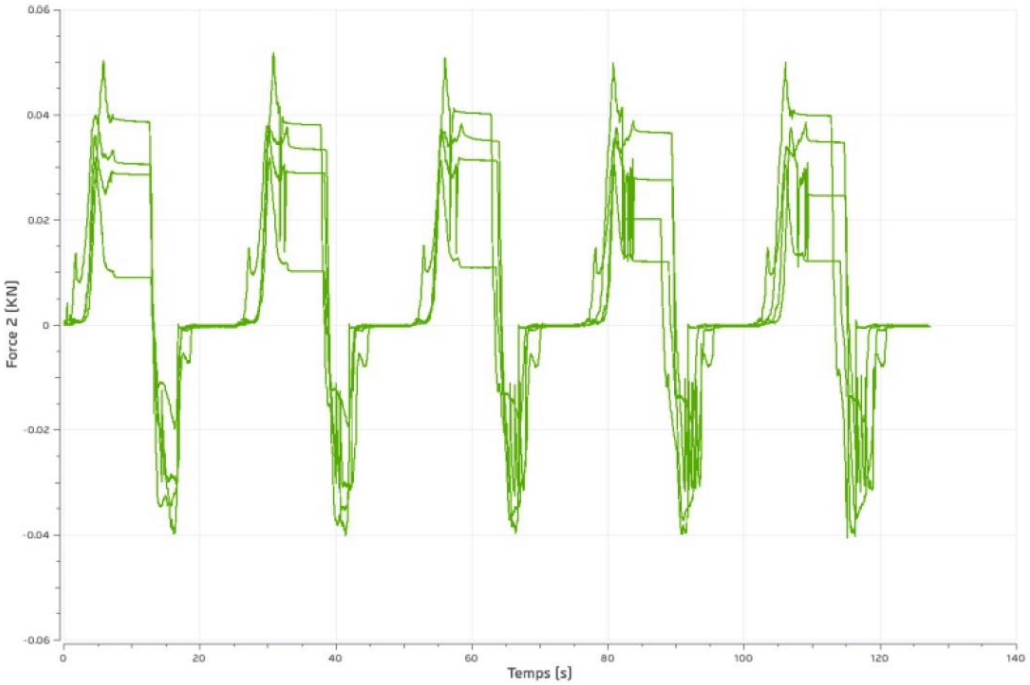


Figure 10 - 60 Points Measurements

**********END OF APPENDIX**********