

Table S1: MEA and PE for both channels for all the available EM27/SUN instruments and for every single calibration measurement carried out at KIT.

SN	Date	MEA _{1Ch}	PE _{1Ch}	MEA _{2Ch}	PE _{2Ch}
29	2015-08-18	0.9808	-0.000500	N/A	N/A
29	2018-07-03	0.9878	-0.000224	0.9891	0.000836
32	2015-07-29	0.9717	-0.000681	N/A	N/A
32	2015-08-13	0.9833	0.001675	N/A	N/A
32	2016-09-09	0.9870	0.001280	N/A	N/A
32	2021-01-04	0.9827	0.002953	0.9851	0.001077
32	2021-02-16	0.9829	0.002201	0.9879	0.000460
33	2017-08-08	0.9832	-0.003117	0.9853	-0.002626
34	2018-07-17	0.9877	-0.000327	0.9873	-0.001319
37	2014-06-03	0.9782	-0.001389	N/A	N/A
37	2014-07-15	0.9852	-0.002241	N/A	N/A
37	2014-09-25	0.9886	-0.001965	N/A	N/A
37	2015-08-13	0.9843	-0.000683	N/A	N/A
37	2016-09-09	0.9881	0.002557	N/A	N/A
37	2017-03-17	0.9881	0.001853	N/A	N/A
37	2017-05-15	0.9873	0.001759	N/A	N/A
37	2017-07-25	0.9872	0.001826	N/A	N/A
37	2017-09-20	0.9880	0.001771	N/A	N/A
37	2017-10-11	0.9882	0.002000	N/A	N/A
37	2017-11-21	0.9875	0.001770	N/A	N/A
37	2018-01-25	0.9837	0.002044	0.9850	0.001199
37	2018-11-12	0.9826	0.001929	0.9842	-0.000920
37	2019-04-23	0.9826	0.003163	0.9853	0.000692
37	2020-12-29	0.9823	0.002088	0.9952	0.000034
37	2021-01-05	0.9813	0.001135	0.9848	-0.000259
37	2021-02-18	0.9805	0.001501	0.9854	-0.000877
37	2021-03-19	0.9824	0.001824	0.9827	0.001206
38	2015-08-13	0.9878	-0.001417	N/A	N/A
38	2020-01-16	0.9813	-0.000139	0.9866	-0.000768
39	2014-06-03	0.9759	-0.002198	N/A	N/A
39	2014-07-15	0.9817	-0.001653	N/A	N/A
39	2015-08-13	0.9782	-0.001052	N/A	N/A
39	2016-09-09	0.9792	-0.002300	N/A	N/A
39	2017-02-10	0.9816	-0.002440	N/A	N/A
39	2020-07-22	0.9792	-0.002988	0.9761	-0.003129
41	2014-06-03	0.9780	-0.001540	N/A	N/A
41	2014-07-15	0.9842	-0.000914	N/A	N/A
41	2015-08-13	0.9846	-0.000856	N/A	N/A
41	2017-05-15	0.9840	-0.002494	1.0530	-0.022330
42	2016-07-28	0.9770	0.001905	N/A	N/A

42	2019-04-02	0.9836	0.002447	0.9712	-0.000393
44	2017-02-28	0.9728	-0.005602	0.9807	-0.005904
45	2017-07-25	0.9847	0.001866	0.9854	0.000401
46	2017-07-25	0.9859	0.000993	0.9843	0.000075
50	2015-09-09	1.0300	0.002448	N/A	N/A
50	2020-02-19	0.9904	0.001564	0.9899	0.001157
50	2021-02-16	0.9881	0.001292	0.9892	0.000060
50	2021-02-18	0.9880	0.001203	0.9842	0.003910
51	2016-01-19	0.9800	0.001218	N/A	N/A
51	2019-01-22	0.9877	0.000823	0.9900	0.000456
51	2021-08-02	0.9901	-0.002350	0.9894	-0.001304
52	2015-08-12	0.9671	0.003372	N/A	N/A
52	2018-11-13	0.9865	0.004455	0.9862	0.003067
53	2015-08-12	0.9758	0.000228	N/A	N/A
53	2018-11-12	0.9891	0.000584	0.9982	0.001968
53	2021-02-16	0.9875	0.000989	0.9832	0.001001
59	2017-06-30	0.9899	0.001515	0.9892	0.000986
59	2021-01-25	0.9851	0.001716	0.9862	0.000164
61	2015-08-05	0.9892	-0.001082	N/A	N/A
62	2016-01-21	0.9799	0.004075	N/A	N/A
63	2016-01-21	0.9827	0.000105	N/A	N/A
63	2017-12-19	0.9885	0.001434	0.9854	0.001132
65	2016-05-10	0.9872	0.001057	N/A	N/A
69	2016-08-25	0.9873	0.002111	N/A	N/A
69	2019-10-15	0.9876	0.002075	0.9866	0.000242
70	2016-08-02	0.9789	0.004659	N/A	N/A
72	2017-02-08	0.9975	0.001792	N/A	N/A
75	2017-05-15	0.9969	0.002442	0.9834	0.003803
76	2017-06-08	1.0210	-0.000313	1.0050	-0.000892
77	2017-09-26	0.9871	0.000233	0.9876	-0.000525
80	2018-04-17	0.9865	-0.002753	0.9875	-0.001511
80	2020-06-04	0.9861	-0.012950	0.9893	-0.011090
81	2018-11-12	0.9918	0.001715	0.9911	0.000585
81	2020-06-04	0.9898	0.003007	0.9919	0.000924
81	2021-02-26	0.9928	0.003160	0.9952	0.001903
82	2018-07-16	0.9841	0.002818	0.9843	0.001056
83	2018-05-02	0.9881	0.005742	0.9863	0.003796
83	2019-08-08	0.9883	0.006970	0.9863	0.004094
84	2018-03-27	0.9900	-0.000094	2.4840	-0.018970
84	2020-06-04	0.9871	0.000828	0.9873	-0.000291
85	2018-10-25	0.9894	0.000950	0.9874	0.000656
86	2018-01-10	0.9845	0.001965	0.9810	0.001271
88	2018-03-05	0.9850	-0.001101	1.0080	-0.001195
88	2019-11-29	0.9869	-0.001827	0.9850	-0.001932

91	2018-02-26	0.9859	0.001310	0.9802	0.000646
92	2018-05-15	0.9845	0.002905	N/A	N/A
92	2019-12-17	0.9838	0.004053	0.9844	0.002009
94	2018-06-18	0.9808	0.000974	0.9830	-0.002992
95	2018-06-19	0.9820	-0.000238	0.9826	-0.000241
96	2019-09-17	0.9840	0.001917	0.9862	-0.000265
97	2019-02-20	0.9889	0.000029	0.9841	0.000038
97	2020-06-04	0.9858	0.001895	0.9855	0.000198
98	2019-02-20	0.9894	0.004378	0.9920	0.000953
98	2021-02-26	0.9873	0.000968	0.9912	0.000308
99	2018-11-06	0.9807	0.004082	0.9840	0.002695
103	2019-02-04	0.9851	0.002262	0.9873	0.001320
104	2019-02-04	0.9847	0.002773	0.9857	0.001908
106	2019-03-25	0.9819	-0.000163	0.9873	-0.001472
109	2019-03-25	0.9852	0.001953	0.9860	0.000450
110	2019-03-26	0.9878	0.005564	0.9633	0.000883
111	2019-02-11	0.9880	-0.000586	0.9856	-0.003916
112	2019-07-09	0.9881	-0.002138	0.9887	-0.002514
113	2019-07-15	0.9860	0.002527	0.9841	0.000328
114	2019-07-24	0.9865	0.002282	0.9882	-0.000072
115	2019-07-24	0.9862	0.000944	0.9839	-0.000467
116	2019-09-30	0.9862	0.002884	0.9819	0.000889
117	2019-10-22	0.9777	0.002248	0.9819	0.001116
118	2019-11-11	0.9847	0.005822	0.9879	0.005157
119	2019-11-01	0.9809	-0.002006	0.9831	-0.001204
120	2019-11-07	0.9845	0.002689	0.9892	0.000866
120	2020-12-29	0.9738	0.002641	0.9829	-0.000287
120	2021-02-18	0.9859	0.002210	0.9868	0.001430
120	2021-02-19	0.9844	0.002942	0.9889	0.001367
121	2019-11-19	0.9816	0.007284	0.9845	0.004085
122	2019-11-19	0.9888	-0.000258	0.9856	-0.000914
126	2019-12-13	0.9861	0.000598	0.9892	0.000199
127	2019-12-11	0.9805	0.002659	0.9850	0.001382
128	2019-12-11	0.9860	-0.000554	0.9862	-0.001052
130	2019-12-17	0.9839	0.002367	0.9855	0.001113
131	2020-01-20	0.9869	-0.000480	0.9840	-0.001214
132	2020-01-16	0.9839	-0.001991	0.9872	-0.003004
134	2020-03-17	0.9888	0.003688	0.9877	0.001704
136	2020-07-02	0.9879	0.004427	0.9911	0.002265
136	2021-02-16	0.9881	0.004911	0.9898	0.003329
136	2021-02-18	0.9890	0.005411	0.9905	0.003368
136	2021-02-19	0.9881	0.005162	0.9886	0.003246
136	2021-03-03	0.9901	0.005367	0.9891	0.003531
138	2020-03-11	0.9883	0.002182	0.9837	0.000559

138	2020-07-02	0.9875	0.003924	0.9851	0.002787
139	2021-01-25	0.9845	0.000714	0.9860	-0.000588
140	2021-02-05	0.9852	0.002233	0.9821	0.000512
141	2021-02-12	0.9841	0.003084	0.9853	0.001731
142	2020-08-14	0.9939	0.002832	0.9930	0.002315
142	2021-04-23	0.9890	0.000884	0.9866	0.000388
143	2020-11-10	0.9870	0.000795	0.9863	0.004561
144	2020-11-13	0.9859	-0.001597	0.9849	-0.002115
145	2021-01-04	0.9852	0.000635	0.9855	-0.000230
146	2021-01-04	0.9875	0.002578	0.9882	0.001299
147	2021-03-06	0.9867	0.002605	0.9874	0.001681
148	2021-04-23	0.9884	-0.002023	0.9858	-0.001938
149	2021-03-05	0.9867	-0.001832	0.9895	-0.001389
150	2021-03-22	0.9850	-0.005994	0.9867	-0.004125
150	2021-04-01	0.9862	-0.006687	0.9872	-0.005458
155	2021-05-06	0.9887	0.001532	0.9923	0.000897
155	2021-05-19	0.9914	0.000865	0.9864	0.000689
156	2021-09-05	0.9867	0.007324	0.9936	0.004239

Table S2: Correction factors for XCO_2 , XCH_4 , XCO , XH_2O and $XAir$ for all the available EM27/SUN instruments with respect to the COCCON reference spectrometer SN37 for every single side-by-side measurement carried out at KIT, Karlsruhe

SN	Date	No. co.	K_{XCO_2}	K_{XCH_4}	K_{XCO}	K_{XH_2O}	K_{XAir}
29	2014-07-18	380	1.000292	0.999420	N/A	0.999480	1.001287
32	2015-04-14	376	0.999746	1.001052	N/A	1.000731	0.997599
32	2015-04-22	360	0.999833	1.001129	N/A	1.000352	0.997497
33	2017-08-07	135	0.999746	0.999575	N/A	0.999161	1.001134
33	2017-08-15	128	0.999477	0.999833	N/A	0.998651	1.000389
34	2018-07-18	194	0.999767	0.999861	1.015124	0.999827	1.000653
34	2018-07-19	288	0.999837	0.999919	1.011808	1.000296	1.000481
38	2015-04-10	247	1.000129	0.998249	N/A	0.998667	1.002866
38	2015-04-21	390	1.000153	0.998340	N/A	0.998187	1.003176
39	2014-07-17	356	0.999764	0.999566	N/A	0.999360	1.000129
39	2015-04-14	408	0.999563	0.999691	N/A	0.999456	1.000161
39	2015-04-15	449	0.999676	0.999660	N/A	0.999348	1.000088
41	2014-07-17	354	0.999901	1.000076	N/A	0.999920	0.999264
41	2015-04-14	404	1.000038	0.999629	N/A	0.999814	1.000516
41	2015-04-22	345	1.000021	1.000139	N/A	0.998330	1.000049
42	2016-07-30	75	0.999478	1.001446	N/A	0.999510	0.996979
42	2016-08-01	276	0.999557	1.001482	N/A	1.000332	0.996801
44	2017-02-27	263	0.999670	1.000466	N/A	0.999120	0.997940
45	2017-08-07	236	0.999679	0.999597	N/A	0.999066	1.000206
45	2017-08-15	75	0.999670	0.999263	N/A	0.999037	1.000153
46	2017-08-07	291	0.999952	0.999497	N/A	0.999024	1.000352
46	2017-08-15	135	0.999851	0.999555	N/A	0.998959	1.000079
50	2015-04-21	245	1.001486	0.990659	N/A	0.995849	1.020543
50	2015-04-22	393	1.001695	0.990915	N/A	0.995452	1.020320
51	2016-01-26	150	0.999271	1.000836	N/A	1.000373	0.997709
51	2016-01-29	147	0.999378	1.000692	N/A	0.999818	0.997772
52	2015-04-21	277	0.997996	1.002407	N/A	1.002243	0.994085
52	2015-04-22	392	0.998664	1.003166	N/A	1.001557	0.993196
52	2018-02-21	219	0.999824	0.999966	1.000158	1.000693	1.000233
52	2018-10-18	243	1.000163	0.999949	0.998452	0.999970	1.000717
52	2018-11-14	302	0.999757	0.999736	1.002854	1.000029	1.000912
52	2018-11-16	288	0.999881	0.999793	0.992038	1.000095	1.000971
53	2015-04-21	278	0.998796	1.001383	N/A	1.000828	0.996826
53	2015-04-22	386	0.998591	1.001149	N/A	1.001168	0.997154
59	2016-03-18	300	0.999843	0.999483	N/A	0.998759	1.001176
61	2015-10-02	305	0.999861	0.998129	N/A	0.998404	1.003772
62	2016-01-21	163	0.999328	1.000225	N/A	0.999680	0.998406
63	2016-01-21	152	1.000445	1.001258	N/A	1.001036	0.998018

65	2016-05-11	206	1.000415	1.000224	N/A	1.000599	1.000855
69	2016-09-08	300	0.999514	0.999649	N/A	0.999494	1.000157
70	2016-08-31	387	0.999807	1.001454	N/A	1.000982	0.997049
70	2016-09-06	102	0.999753	1.001380	N/A	1.001328	0.997256
72	2017-02-15	177	0.998327	0.999288	N/A	1.000643	1.000007
72	2017-02-16	335	0.998520	0.998320	N/A	1.000130	1.001943
75	2017-05-16	320	0.998061	0.998548	N/A	0.999866	1.001337
75	2017-05-17	396	0.998058	0.998547	N/A	0.999914	1.001327
76	2017-06-08	298	0.996716	0.997341	N/A	1.000363	1.002931
77	2017-09-27	374	1.000023	0.999836	N/A	0.999972	1.000151
80	2018-04-18	304	0.999968	1.000296	1.010162	0.999863	0.999910
80	2018-04-19	462	0.999834	1.000320	1.003831	1.000316	0.999709
80	2020-10-31	186	0.999622	0.999549	0.980766	1.000120	0.999822
81	2018-07-18	198	1.000385	0.998933	1.012114	0.999529	1.002041
81	2018-07-19	374	1.000330	0.998963	1.015495	0.999772	1.001819
81	2018-07-25	291	1.000369	0.999011	1.008416	0.999927	1.001970
81	2018-10-18	324	0.999877	0.999522	0.999741	0.999651	1.001829
81	2019-04-18	454	0.999621	1.000084	1.010366	0.999742	1.000031
81	2019-04-25	61	0.999600	1.000334	0.978844	0.999368	0.999276
81	2019-04-30	214	0.999638	1.000145	1.000728	0.999457	1.000023
81	2019-06-19	293	0.999659	1.000517	0.999353	1.000165	0.999543
82	2018-07-17	122	0.999994	1.000890	1.025654	1.001119	0.998441
82	2018-07-18	255	0.999987	1.000862	1.019237	1.000951	0.998487
82	2018-07-19	299	0.999967	1.000796	1.024719	1.000955	0.998533
83	2018-05-07	388	0.999568	0.999711	1.011595	1.000029	1.000359
84	2018-04-06	351	0.999846	0.999436	1.004520	0.999695	1.001346
84	2018-04-11	423	1.000073	0.999727	1.004404	0.999575	1.000966
84	2018-04-18	339	0.999850	0.999515	1.005300	0.999677	1.001431
84	2018-04-19	477	1.000135	0.999554	1.009196	0.999947	1.001129
85	2018-01-24	129	0.999910	0.999527	0.924988	0.999105	0.999992
85	2018-02-08	137	0.999620	0.999265	1.010130	0.999763	1.001262
85	2018-02-13	228	0.999680	0.999267	1.004048	1.000352	1.001152
85	2018-02-14	182	1.000033	0.999290	0.996659	0.999899	1.001568
86	2018-01-24	179	0.999639	0.999768	0.940946	0.999775	0.998909
86	2018-02-08	167	0.999742	0.999628	1.004275	1.000140	0.999545
86	2018-02-13	316	0.999719	0.999646	1.002725	1.000866	0.999481
86	2018-02-14	302	0.999785	0.999703	1.003655	0.999993	0.999137
88	2018-03-14	160	0.999881	1.000228	1.006994	1.000591	0.999989
91	2018-02-28	269	0.999420	0.999986	0.995523	1.000346	1.000309
92	2018-05-15	18	0.999990	0.999915	1.012568	1.001652	0.999707
96	2019-02-13	173	0.999311	1.000066	0.985728	1.000659	0.999069
96	2019-06-19	269	0.999822	1.000423	0.996482	1.000140	0.999326
96	2021-09-01	186	1.000209	1.000480	0.963405	0.999462	1.000311
96	2021-09-02	256	0.999890	0.998614	1.047150	1.000947	0.998414

96	2021-09-03	496	0.999989	0.999923	1.011451	0.999773	1.000101
99	2018-11-09	178	0.999119	0.999757	0.983937	1.000142	0.999207
97	2019-02-25	373	1.000353	0.998278	1.010598	0.999270	1.003794
97	2019-02-26	440	1.000552	0.998408	1.008618	0.999612	1.003212
97	2019-02-27	419	1.000549	0.998437	1.009864	0.999684	1.003111
97	2019-02-28	373	1.000477	0.998520	1.009467	0.999429	1.002925
98	2019-02-25	381	1.000211	0.997951	1.009182	0.999236	1.004401
98	2019-02-26	438	1.000420	0.998104	1.009917	0.999758	1.003737
98	2019-02-27	418	1.000353	0.998109	1.009045	0.999743	1.003701
98	2019-02-28	382	1.000372	0.998108	1.009468	0.999284	1.003537
103	2019-02-05	301	0.999678	0.999405	0.981226	1.000054	1.000286
103	2019-02-06	201	0.999550	0.999055	0.994940	1.000072	1.001232
104	2019-02-04	229	0.999549	0.999579	0.949667	1.000264	0.999971
104	2019-02-05	337	0.999671	0.999767	0.981718	0.999940	0.999393
104	2019-02-06	193	0.999602	0.999601	1.000725	0.999925	1.000204
106	2019-03-28	194	1.000083	0.998764	1.007227	0.999716	1.001900
109	2019-03-28	173	1.000462	0.999022	1.008688	1.000239	1.001705
110	2019-03-28	201	1.000425	0.998077	1.002886	0.999744	1.003435
111	2019-02-13	315	0.999927	0.999788	0.997346	0.999476	1.000482
112	2019-07-10	407	0.999755	1.000262	1.027484	0.999507	1.000915
113	2019-07-16	301	1.000015	1.000491	0.991814	1.000814	0.999787
113	2019-07-17	381	1.000010	1.000585	0.989887	1.000514	0.999602
114	2019-07-24	155	0.999847	1.000141	1.018357	1.000521	1.001245
115	2019-07-25	422	0.999852	1.000209	1.028141	0.999798	1.000790
116	2019-10-14	327	0.999927	0.999285	1.005141	0.999180	1.001041
117	2019-10-31	309	0.999949	1.000036	1.003073	1.000302	0.999963
118	2019-11-22	47	1.000127	0.999448	0.966857	0.999973	1.001340
119	2019-11-22	51	0.999571	0.999652	0.988616	0.999770	1.000080
121	2019-11-30	228	0.999762	0.999766	0.982319	1.000585	0.998644
122	2019-11-30	165	0.998602	0.999058	0.987770	0.999427	1.001091
126	2019-12-16	160	0.999880	0.999885	0.951584	0.999559	0.999524
127	2019-12-10	264	1.000403	1.000175	0.990600	1.000476	0.998972
128	2019-12-10	253	1.000360	1.000269	0.997030	0.999765	0.998933
130	2019-12-29	183	0.998820	0.999881	1.003674	1.000924	0.998229
131	2020-01-21	314	1.000187	0.999339	0.994538	1.000197	1.001422
132	2020-01-15	283	0.999889	1.000284	0.987270	1.000286	1.000357
134	2020-03-18	297	1.000155	0.999901	1.005764	1.000866	1.000000
136	2021-07-19	43	1.000053	0.999560	0.933800	1.000187	1.000210
138	2020-07-07	238	1.000129	0.999899	1.012863	1.000262	1.000409
139	2021-02-11	396	1.000248	0.999163	0.988336	1.000002	1.001686
139	2021-02-13	338	0.999930	0.999349	0.997897	0.999757	1.001555
139	2021-02-14	387	1.000005	0.999178	0.991988	0.999713	1.001240
140	2021-02-11	148	1.000002	0.998894	0.993187	1.000321	1.003456
140	2021-02-13	357	0.999857	0.999419	0.994007	0.999889	1.001826

140	2021-02-14	369	0.999976	0.999442	0.988563	0.999740	1.001240
141	2021-02-13	272	1.000184	0.999231	0.993377	0.999961	1.001949
141	2021-02-14	381	1.000182	0.999236	0.985607	1.000285	1.001513
142	2020-08-20	170	1.000304	0.998414	0.970518	0.999025	1.003127
142	2021-04-24	370	1.000191	0.999697	1.000878	1.000788	1.001057
143	2020-11-18	231	1.001476	1.000205	1.004962	0.999849	0.998218
144	2020-11-18	228	0.999126	1.000294	1.008717	1.000789	0.997622
145	2021-01-15	273	1.000155	1.000442	0.970292	1.000792	0.998361
146	2021-01-11	343	1.000257	0.999662	0.985213	1.000079	1.000107
147	2021-03-06	350	1.000351	0.999847	1.000995	1.000174	1.001006
148	2021-04-24	333	1.000251	0.999800	1.013563	1.000735	1.000963
148	2021-04-26	459	1.000284	0.999691	1.010905	1.000080	1.001191
149	2021-03-06	350	1.000254	0.999808	1.004445	0.999816	1.000705
150	2021-03-30	455	1.000080	1.000077	1.005934	0.999812	0.999982
150	2021-03-31	427	1.000078	1.000165	1.006747	0.999822	0.999691
155	2021-05-31	415	1.000245	0.999332	1.019804	0.999927	1.001786
156	2021-09-08	160	1.000723	0.999926	1.002241	0.999931	1.000104
