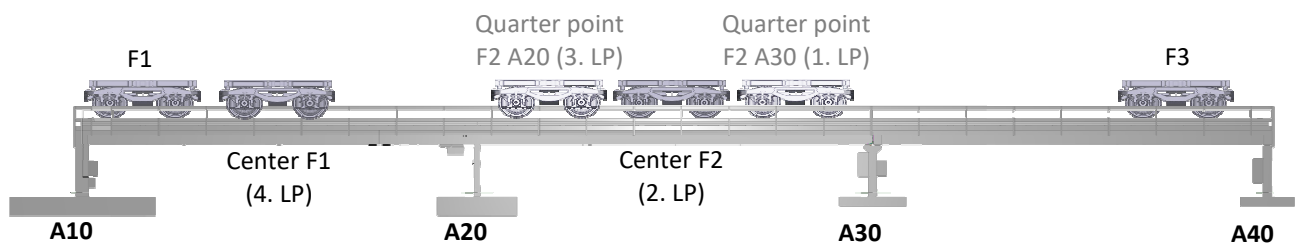


Protocol large-scale test openLAB May 2025 - Information

Abbreviation	Meaning
F1	Field 1
F2	Field 2
F3	Field 3
BW	Whole bridge
A10	Axis 10
A20	Axis 20
A30	Axis 30
A40	Axis 40
Pos. 1	Damage to the cable 3.43 m from A20 towards A 30 (two strands exposed) (F2)
Pos. 2a	Damage location on the strand 6.19 m from A30 towards A20 (core drilling 1)
Pos. 2b	Damage location on the strand 6.14 m from A30 towards A20 (core drilling 2 + hammer & chisel)
Pos. 3	Damage location on the strand 5.70 m from A30 towards A20 (two strands exposed)
L1	Strand 1
L2	Strand 2
1. LP	1. Load position
2. LP	2. Load position
3. LP	3. Load position
4. LP	4. Load position

All timestamps are based on UTC+2!

Perspective East



Protocol large-scale test openLAB May 2025 - Day 1 (2025-05-05)

Time	Event	Position	Comments
13:30	Crossing load vehicle	F3-F1-F3	
14:05	Time synchronisation		
14:34 14:36	1. load crossing	F3-F1-F3	Load crossing F3 to F1 and back
14:36 14:37	2. load crossing	F3-F1-F3	
14:37 14:38	3. load crossing	F3-F1-F3	
14:39 14:40	4. load crossing	F3-F1-F3	
14:40 14:41	5. load crossing	F3-F1-F3	
14:48 14:51	1. LP	quarter point F2 A30	Between LP load vehicle back to F3 (Start position A40)
14:52 15:04	2. LP	center F2	
14:54 15:05	Drone flight	BW	
15:13 15:15	3. LP	quarter point F2 A20	
15:18 15:22	4. LP	center F1	
15:23 15:37	Drone flight reference state	BW	
15:39 15:41	Load crossing	F3-F1-F3	
16:01 16:08	Ambient excitation reference state (load vehicle at A40)	BW	
16:14 16:21	White noise (1 - 80 Hz)	F2	
16:22 16:40	Sweep (1 Hz - 60 Hz - 1 Hz)	F2	
16:42 16:49	White noise (1 - 80 Hz)	F1	
17:00 17:10	White noise (1 - 80 Hz)	F1+F2	
17:16 17:20	Excitation at natural frequency (4,63 Hz/5ms ²)	F2	
17:20 17:21	10m/s ² ; 4,63 Hz	F2	
17:24 17:28	10,52 Hz; 7m/s ²	F2	
17:30 17:33	16,71 Hz; 5m/s ²	F2	
17:34 17:37	21,41 Hz; 4m/s ²	F2	
17:38 17:41	30,56 Hz; 3m/s ²	F2	
17:45	(Start) 2. LP (load vehicle staying in center F2)	F3 - center F2	
17:46 17:56	Ambient excitation	BW	
17:56 18:13	Sweep (1 Hz - 60 Hz - 1 Hz)	F2	
18:15 18:21	White noise (1 - 80 Hz)	F2	
18:24 18:32	White noise (1 - 80 Hz)	F1	
18:34 18:38	White noise (1 - 80 Hz)	F1+F2	
18:40	(End) load vehicle back to F3 (A40)	center F2 - F3	

	Time		Event		Position	Comments			
Reference	09:40	09:57	Sweep (1 Hz -60 Hz - 1 Hz)		F2	Natural			
	10:00	10:03	White noise (1 Hz - 80 Hz/ 0.1 (m/s²))²/Hz)		F2	frequencies: 4.5			
	10:05	10:07	White noise (1 Hz - 80 Hz/ 0.1 (m/s²))²/Hz)		F1	Hz, 4.8 Hz, 9.5			
	10:08	10:12	Restart White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)		F1	Hz, 10.2 Hz			
	10:14	10:18	White noise (1 Hz - 80 Hz/ 0.1 (m/s²))²/Hz)		F1+F2				
	10:20	10:29	Drone flight		BW				
Load step 1 - till 5 mm deformation	10:41		Start measurement fiber optics		F1+F2				
	10:41	10:46	Load application	Deformation [mm]*	Load [kN]*	*Information from on-site readings - accurate measurement data recorded by OML			
				0	0				
				0.4	5				
				1	16				
				2	29				
	10:46			2.5	38				
	10:46	10:53	Holding time		2.5	38	FT2.1		
	10:53	10:55	Load application	2.5	38	FT2.1			
				3	47				
				3.5	55				
				4	63				
	10:55			5	75				
			Holding time			FT2.1	(--> Reduction of load during holding time		
	10:55	11:05		5	75 (-->62)				
	11:05	11:08		Deformation [mm]*	Load [kN]*			FT2.1	
				5	62				
				3	33				
		2	19						
		1	5						
11:08			0.8	0					
Intermediate measurement	11:09	11:20	Ambient excitation			BW			
	11:21	11:35	Sweep (1 Hz -60 Hz - 1 Hz)			F2			
	11:31		New tare FOSD_BR01_OW			F1+F2			
	11:36	11:39	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1			
	11:44	12:03	Additional weight on frame foot			F2			
	12:04	12:07	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1			
	12:08	12:12	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1+F2			
Load step 2 - till 10 mm deformation	12:08	12:12	Start fiber optics			F1+F2			
	12:15	12:17	Load application	Deformation [mm]*	Load [kN]*	FT2.1			
				3	44				
				4	62				
	12:17			5	78				
	12:17	12:19	Holding time		5	78	FT2.1		
	12:19	12:21	Load application	5	78	FT2.1			
				6	92				
				7	103				
				8	112				
				9	123				
	12:21			10	133				
	12:21	12:40	Holding time		10	130 -->125	FT2.1	Crack width max. 0.1 mm	
	12:40	12:43	Unloading	Deformation [mm]	Load [kN]	FT2.1			
				10	125				
				8	97				
				5	62				
				3	29				
	12:43			0.4	0				
12:45		Stop measurement fiber optics							
Intermediate measurement	12:43	12:54	Ambient excitation			BW			
	12:54	13:08	Sweep (1 Hz -60 Hz - 1 Hz)			F2			
	13:09	13:14	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F2			
	13:15	13:18	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1			
	13:20	13:23	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1+F2			
	Load step 3 till 20 mm deformation	13:20	13:30	Start fiber optics			F1+F2		
13:30		13:33	Load application	Deformation [mm]	Load [kN]	FT2.1			
				3	40				
				5	72				
				8	110				
13:33				10	130				
13:33		13:36	Holding time		10	130-->126	FT2.1		
13:37		13:40	Load application	10	126	FT2.1			
				12	146				
				14	162				
				15	172				
				16	182				
				18	196				
13:40				20	212				
13:40		14:00	Holding time		20	212-->206	FT2.1	Crack width max. 0.2 - 0.25 mm	
14:00		14:04	Drone flight			BW			
			Unloading	Deformation [mm]	Load [kN]	FT2.1			
				20	206				
				18	178				
				16	154				
				15	141				
				12	109				
				10	91				
				8	71				
				6	50				
				4	26				
							Complete crack closure/no yielding of the steel		
			2	0					
Intermediate measurement	14:04	14:06	Ambient excitation			BW			
	14:17	14:31	Sweep (1 Hz -60 Hz - 1 Hz)			F2			
	14:32	14:36	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F2			
	14:38	14:41	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1			
	14:41	14:44	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1+F2			
	Load step 4 - till 30 mm deformation	14:44	14:50	Start fiber optics			F1+F2		
14:50		14:55	Load application	Deformation [mm]	Load [kN]	FT2.1			
				3	50				
				5	72				
				10	121				
				15	170				
14:55			20	215	FT2.1	6 kN difference press 1 & 2			
14:55		15:00	Holding time				20	215-->211	
14:59		15:01	Load application	20			211	FT2.1	
				22			232		
15:01				25	249				
15:01		15:10	Holding time		25	249-->243	FT2.1	Crack width max. 0.2 - 0.25 mm	
15:10		15:12	Load application	25	243	FT2.1			
				27	263				
15:12				30	275				
15:12		15:37	Holding time		30	275-->263	FT2.1		
15:13		15:22	Drone flight			BW			
15:22		15:41	Unloading	Deformation [mm]	Load [kN]	FT2.1	Crack width max. FT2.1 0.3 mm/ FT2.2 0.2 mm		
		30		263					
		10		80					
15:41		2		0					
Intermediate measurement	15:42	15:53	Ambient excitation			BW			
	15:54	16:09	Sweep (1 Hz -60 Hz - 1 Hz)			F2			
	16:09	16:13	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F2			
	16:14	16:17	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1			
	16:18	16:23	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1+F2			
	Load step 5 - till 40 mm deformation	16:23	16:26	Start fiber optics			F1+F2		
		16:26	16:30	Load application	Deformation [mm]	Load [kN]	FT2.1		
			5		69				
			10		115				
			15		157				
			20		200				
			25		240				
16:30			30	277	FT2.1				
16:30		16:37	Holding time				30	277-->273	
16:37		16:39	Load application	30	273	FT2.1			
				32	286				
16:39				35	301				
16:39		16:52	Holding time		35	301-->294	FT2.1	Crack width max. 0.35 mm	
16:52		16:54	Load application	35	294	FT2.1			
				36	301				
				38	315				
16:54				40	324				
16:55		17:19	Holding time		40	324-->312	FT2.1	Crack width max. 0.4 mm	
16:55		17:04	Drone flight			BW			
17:19		17:23	Unloading	Deformation [mm]	Load [kN]	FT2.1			
				40	312				
				35	265				
		30		226					
		25		184					
		20		148					
		15		111					
		10		70					
		5		19					
17:23		2	0			Complete closure of cracks			
Intermediate measurement	17:23	17:34	Ambient excitation			BW			
	17:34	17:49	Sweep (1 Hz -60 Hz - 1 Hz) F2			F2			
	17:50	17:54	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F2			
	17:55	17:58	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1			
	18:00	18:04	White noise (1 Hz - 80 Hz/ 0.09 (m/s²))²/Hz)			F1+F2			
	Load step 6 - till 50 mm deformation	18:04	18:11	Start fiber optics			F1+F2		
18:11		18:17	Load application	Deformation [mm]	Load [kN]	FT2.1			
				10	99				
				20	176				
				30	250				
18:17				40	316	FT2.1			
18:17		18:25	Holding time		40			316-->309	
18:25		18:27	Load application	40	309	FT2.1			
				43	333				
				44	340				
				45	344				
18:27		18:39	Holding time		45	344-->336	FT2.1	13kN difference between cylinders/ Visible opening Working joint A10/ Crack width max. 0.5 mm	
18:39		18:40	Load application	45	336	FT2.1			
				48	354				
18:40				50	365				
18:40		18:56	Holding time		50	365-->352	FT2.1		
18:56		19:00	Unloading	Deformation [mm]	Load [kN]	FT2.1			
				50	352				
				40	263				
				30	199				
				20	133				
		10		53					
19:00		3.8		0					
Intermediate measurement	19:00	19:17	Ambient excitation			BW			
	19:17	19:31	Sweep (1 Hz -60 Hz - 1 Hz)			F2			
	Load step 7 - till 60 mm deformation	19:31	19:39	Start fiber optics			F1+F2		
19:39		19:44	Load application	Deformation [mm]	Load [kN]	FT2.1			
				10	84				
				20	162				
				30	229				
				40	293				
19:44			50	359	FT2.1				
19:44		19:45	Holding time				50	359	
19:45		19:46	Load application	50	359	FT2.1			
				52	366				
				54	377				
19:46				55	382				
19:46		19:49	Holding time		55	382-->369	FT2.1		
19:49		19:50	Load application	55	369	FT2.1			
				58	390				
19:50				60	396				
19:50		20:10	Holding time		60	396-->386	FT2.1		
20:10		20:15	Unloading	Deformation [mm]	Load [kN]	FT2.1			
				60	386				
				50	304				
		40		239					
		30		174					
		20		112					
		10	32						
		6	0						
Intermediate measurement	20:23	20:40	Ambient excitation			BW			

		Time	Event	Position	Comments
Reference	Reference	09:34		Start fiber optics	F1+F2
		09:37	09:39	load crossing	F3-F1-F3
		09:39	09:40	load crossing	F3-F1-F3
		09:41	09:42	load crossing	F3-F1-F3
		09:43	09:44	load crossing	F3-F1-F3
		09:44	09:46	load crossing	F3-F1-F3
		09:47	09:55	1. LP	quarter point F2 (direction A30)
		09:55	10:00	2. LP	center F2
		10:00	10:07	3. LP	quarter point F2 (direction A20)
		10:09	10:14	4. LP	center F1
Prying Pos. 1 strand 1 + 2	Prying Pos. 1 strand 1 + 2	10:20	11:10	Prying strand	Pos. 1 L1/L2
				Registration of opening in fiber optic measurement	
		10:31			Pos. 1 L1/L2
		11:22	11:25	Cutting reinforcement stirrups (2 pieces)	Pos. 1 L1/L2
		11:26	11:27	Polishing strands	Pos. 1 L1/L2
Reference	Reference	11:30	11:52	Installation of strain gauges at strands	Pos. 1 L1/L2
		11:32	11:43	Ambient excitation	BW
		11:45	11:48	White noise (1 - 80 Hz)	F2
		11:49	11:54	White noise (1 - 80 Hz)	F1
Strand cutting strand 1 Pos. 1 wire 1 - 3	Strand cutting strand 1 Pos. 1 wire 1 - 3	11:56	11:59	Restart white noise (1 - 80 Hz)	F1+F2
		12:03	12:17	Sweep (1 Hz - 60 Hz - 1 Hz)	F2
		12:30	12:33	Damage 1. wire using a rotary tool	Pos. 1 L1
		12:33		Breakage 1. wire	Pos. 1 L1
		12:34	12:36	Load crossing	F3-F1-F3
		12:36	12:37	2. LP	F3-center F2-F3
		12:45	12:46	Damage 2. wire	Pos. 1 L1
Control measurement	Control measurement	12:46		Breakage 2. wire	Pos. 1 L1
		12:46	12:47	Damage 3. wire	Pos. 1 L1
		12:47		Breakage 3. wire	Pos. 1 L1
		12:50	12:52	Load crossing	F3-F1-F3
		12:52	12:54	Load crossing	F3-F1-F3
		12:54	12:55	Load crossing	F3-F1-F3
		12:55	13:02	2. LP	F3-center F2-F3
		13:03	13:18	Sweep (1 Hz - 60 Hz - 1 Hz)	F2
Strand cutting strand 1 Pos. 1 wire 4 - 7	Strand cutting strand 1 Pos. 1 wire 4 - 7	13:22	13:24	Damage 4. wire	Pos. 1 L1
		13:24		Breakage 4. wire	Pos. 1 L1
		13:26	13:26	Damage 5. wire	Pos. 1 L1
		13:26		Breakage 5. wire	Pos. 1 L1
		13:27	13:28	Damage 6. wire	Pos. 1 L1
		13:28		Breakage 6. wire	Pos. 1 L1
		13:30	13:30	Damage 7. wire	Pos. 1 L1
				Breakage 7. wire (L1 completely cutted)	
		13:30			Pos. 1 L1
Control measurement	Control measurement	13:33	13:44	Ambient excitation	BW
		13:45	13:59	Sweep (1 Hz - 60 Hz - 1 Hz)	F2
		13:49	13:59	Drohnenflug	BW
		14:00	14:03	White noise (1 - 80 Hz)	F2
		14:05	14:08	White noise (1 - 80 Hz)	F1
		14:15	14:16	Load crossing	F3-F1-F3
		14:17	14:18	Load crossing	F3-F1-F3
		14:18	14:20	Load crossing	F3-F1-F3
		14:20	14:31	2. LP	F3-center F2-F3
Strand cutting strand 1 Pos. 2 core drilling 1	Strand cutting strand 1 Pos. 2 core drilling 1	14:22	14:30	Drone flight	BW
		14:31	14:39	Setting up the supports for core drilling	Pos. 2a L1
		14:40	14:48	Core drilling	Pos. 2a L1
		14:41		Damage	Pos. 2a L1
		14:43		Breakage 1. wire	Pos. 2a L1
		14:43		Breakage 2. wire	Pos. 2a L1
		14:44		Breakage 3. wire	Pos. 2a L1
		14:48		Breakage drill bit	Pos. 2a L1
Strand cutting strand 1 Pos. 2b core drilling 2	Strand cutting strand 1 Pos. 2b core drilling 2				
		14:50	14:56	Setting up the supports for core drilling	Pos. 2b L1
		14:56	15:09	Core drilling 2	Pos. 2b L1
		14:58		2 mm in front of L1	Pos. 2b L1
		14:59		Breakage 1. wire	Pos. 2b L1
		15:00		Drill bit jammed, breakage 2. wire?	Pos. 2b L1
		15:09		Dismantling drill including supports	Pos. 2b L1
Strand cutting strand 1 Pos. 2b core drilling 2 Continued	Strand cutting strand 1 Pos. 2b core drilling 2 Continued	15:12	15:23	Ambient excitation	BW
		15:24	15:38	Sweep (1 Hz - 60 Hz - 1 Hz)	F2
		15:38	15:42	White noise (1 - 80 Hz)	F2
		15:43	15:47	White noise (1 - 80 Hz)	F1
		15:47	15:51	White noise (1 - 80 Hz)	F1+F2
		15:50	15:55	Setting up the supports for core drilling	Pos. 2b
		15:55		Core drilling	Pos. 2b
		16:07		Strand reached	Pos. 2b
		16:07		Breakage wire?	Pos. 2b
Control measurement	Control measurement				
		16:08	16:09	Breakage drill bit, dismantling drill including supports	Pos. 2b
		15:55	16:05	Lift down of shaker	F2
		16:05	16:27	Deconstruction work	F1
		16:27	16:29	Load crossing	F3-F1-F3
		16:29	16:30	Load crossing	F3-F1-F3
		16:31	16:32	Load crossing	F3-F1-F3
		16:32	16:40	2. LP	F3-center F2-F3
Continued damage strand 1 Pos. 2b	Continued damage strand 1 Pos. 2b	16:40	16:48	Damage all wires with a hammer and chisel	Pos. 2b L1
		16:47		L1 completely damaged	Pos. 2b L1
		16:52	17:12	Cutting	Pos. 1 L2
		16:52	16:52	Breakage 1. wire	Pos. 1 L2
		16:55	16:55	Damage 2. wire	Pos. 1 L2
		16:55	16:55	Breakage 2. wire	Pos. 1 L2
		16:56	16:56	Damage 3. wire	Pos. 1 L2
		16:56	16:56	Breakage 3. wire	Pos. 1 L2
		16:58	16:58	Damage 4. wire	Pos. 1 L2
Cutting strand 2 Pos. 1 (SmartStrand)	Cutting strand 2 Pos. 1 (SmartStrand)	16:58	16:58	Breakage 4. wire	Pos. 1 L2
		16:59	16:59	Damage 5. wire	Pos. 1 L2
		16:59	16:59	Breakage 5. wire	Pos. 1 L2
		17:01	17:01	Damage 6. wire	Pos. 1 L2
		17:01	17:01	Breakage 6. wire	Pos. 1 L2
		17:03	17:03	Damage 7. wire (first a rotary tool, then a drill hammer and chisel)	Pos. 1 L2
		17:12	17:12	Breakage 7. wire (strand completely cutted)	Pos. 1 L2
Control measurement	Control measurement	17:17	17:18	Load crossing	F3-F1-F3
		17:18	17:20	Load crossing	F3-F1-F3
		17:20	17:22	Load crossing	F3-F1-F3
		17:22	17:29	2. LP	F3-center F2-F3
		17:30	17:41	Ambient excitation	BW
		17:41	17:56	Sweep (1 Hz - 60 Hz - 1 Hz)	F2
		17:58	18:01	White noise (1 - 80 Hz)	F2
Cutting strand 2 Pos. 3	Cutting strand 2 Pos. 3	18:03	18:43	Opening strand 1+2 (drill hammer)	Pos. 3
		18:51	18:52	Load crossing	F3-F1-F3
		18:52	18:54	Load crossing	F3-F1-F3
		18:54	18:18	Load crossing	F3-F1-F3
		18:18	19:02	2. LP	F3-center F2-F3
		19:04	19:07	Cutting	Pos. 3 L1
		probably already during the prying open		Breakage 1. wire	Pos. 3 L1
Control measurement	Control measurement			Damage 2. wire	Pos. 3 L1
		19:07	19:07	Breakage 2. wire	Pos. 3 L1
		19:07	19:07	Damage 3. wire	Pos. 3 L1
		19:07	19:07	Breakage 3. wire	Pos. 3 L1
		19:07	19:07	Damage 4. wire	Pos. 3 L1
		19:08	19:08	Breakage 4. wire	Pos. 3 L1
		19:09	19:09	Damage 5. wire	Pos. 3 L1
		19:09	19:09	Breakage 5. wire	Pos. 3 L1
		19:09		Damage 6. wire	Pos. 3 L1
		19:10		Breakage 6. wire	Pos. 3 L1
Cutting strand 2 Pos. 3	Cutting strand 2 Pos. 3				
		19:11		Damage 7. wire (first a rotary tool, then a drill hammer and chisel)	Pos. 3 L1
		19:13		Breakage 7. wire (strand completely cutted)	Pos. 3 L1
		19:19	19:20	Load crossing	F3-F1-F3
		19:21	19:22	Load crossing	F3-F1-F3
		19:23	19:24	Load crossing	F3-F1-F3
		19:24	19:30	2. LP	F3-center F2-F3
Control measurement	Control measurement	19:32		Trennung	Pos. 3 L2
		19:33		Breakage 1. wire	Pos. 3 L2
		19:33		Damage 2. wire	Pos. 3 L2
		19:33		Breakage 2. wire	Pos. 3 L2
		19:34		Damage 3. wire	Pos. 3 L2
		19:35		Breakage 3. wire	Pos. 3 L2
		19:35		Damage 4. wire	Pos. 3 L2
		19:35		Breakage 4. wire	Pos. 3 L2
		19:36		Damage 5. wire	Pos. 3 L2
		19:40		Breakage 5. wire	Pos. 3 L2
Control measurement	Control measurement	19:40		Damage 6. wire	Pos. 3 L2
		19:43		Breakage 6. wire?	Pos. 3 L2
		19:45		Damage 7. wire (first a rotary tool, then a drill hammer and chisel)	Pos. 3 L2
		19:46		Breakage 7. wire (strand completely cutted)	Pos. 3 L2
Control measurement	Control measurement	19:49	19:55	2. LP	F3-center F2-F3
		19:56	19:56	Load crossing	F3-F1-F3
		19:57	19:57	Load crossing	F3-F1-F3
		19:58	20:00	Load crossing	F3-F1-F3
Control measurement	Control measurement	20:01	20:12	Ambient excitation	BW
		20:13	20:28	Sweep (1 Hz - 60 Hz - 1 Hz)	F2
		20:29	20:32	White noise (1 - 80 Hz)	F2