Anhang 2 zu Ergebnisbericht Nr. T16-1157 über die Labortests der SW zum kontinuierlichen Totalisieren der Bauart "F-EBW"

- Wiederholung von Punkt 1.5 "Static temperatures",
- Wiederholung von Punkt 1.7.3 "Discrimination at zero totalization" und
- Wiederholung von Punkt 1.7.4 "Stability of zero"   Mai 2020

INTERNATIONAL
RECOMMENDATION

OIML R 50-3
Edition 2014 (E)

Continuous totalizing automatic weighing instruments (belt weighers).

Part 3: Test report format

Instruments de pesage totalisateurs continus à fonctionnement automatique (peseuses sur bande).

Partie 3: Format du rapport d'essais

OIML

ORGANISATION INTERNATIONALE
DE MÉTROLOGIE LÉGALE

INTERNATIONAL ORGANIZATION
OF LEGAL METROLOGY

Identification of the instrument

Application no.:	BEV-13.414/0016-NB/2017	Type designation:	F-EBW
Identification no.:	209 und 54	Manufacturer:	Kukla Waagenfabrik
Software version:	W 02.00.02		
Report date:			

Documentation from the manufacturer

(Record as necessary to identify the equipment under test)

System or module name	Drawing number or software reference	Issue level	Serial no.
Waage	Kukla DWC-7B		209 und 54
Wägezelle	HBM Z6FC3, 20 kg		31444990

Simulator documentation

System or module name	Drawing number or software reference	Issue level	Serial no.
Impulsgeber	Keysight "33500 B"		MM004006
Labornetzteil	ISO-Tech "IPS-405"		712D009G1
Thermo-Hygrometer	Lufft "OPUS 10"		MM003615
Gewichtsstücke	2 kg und 10 kg	MM003551 und MM003552	

General information concerning the type

Application no.: BEV-13.414/0016-NB/2017 Manufacturer: Kukla Waagenfabrik

Type designation: F-EBW Applicant: Kukla Waagenfabrik

Instrument category: SW zum kont. Totalisieren

Testing on: [ ] Complete instrument [X] Module*

Accuracy class: [ ] 0.2 [X] 0.5 [ ] 1 [ ] 2

Q_{min} = | 1,8 | t/h Q_{max} = | 9,0 | t/h Σ_{min} = | 4000 | kg

Speed, v = | 1 | m/s v_{min} = | -- | m/s v_{max} = | -- | m/s

Max = | 9 | kg d = | 1 | kg W_L = | 1 | m

U_{nom}** = | 24 | vDC U_{min} = | | V U_{max} = | | V f = | -- | Hz Battery, U = | -- | V

Zero-setting device: [ ] Non-automatic [ ] Semi-automatic [ ] Automatic

Temperature range | -10 bis + 40 | °C

Printer: [ ] Built-in [ ] Connected [X] Non present but connectable [ ] No connection

		Load sensor:	Z6 F C3
Instrument submitted:			
Identification no.:	siehe Seite 3	Manufacturer:	HBM
Software version:		Type:	Z6
Connected equipment:		Capacity:	20 kg
		Number:	31444990
		Classification symbol:	

Interfaces (number, nature):		OIML R 60 Certificate of conformity. Please tick. If "Yes" supply certificate number.	Yes	No
			X	
Evaluation period:		Certificate number:	TC 2207	
Date of report:				
Observer:				

---

* The test equipment (simulator or part of a complete instrument) connected to the module shall be defined in the test form(s) used

** The voltage U_{nom} shall be as defined in IEC 61000-4-11 section 5

Summary of type evaluation tests

Application no.: BEV-13.414/0016-NB/2017   Type designation: F-EBW

Report date: 2020-05-30   Manufacturer: Kukla Waagenfabrik

R 50-3	Tests	Report page	Passed	Failed	Remarks
1	Simulation tests				
1.1	Warm-up time				
1.2	Variation of simulation speed				
1.3	Eccentric loading				
1.4	Zero-setting device				
1.4.1	Zero-setting (range)				
1.4.2	Zero-setting (semi-automatic and automatic)				
1.5	Influence quantities		X		
1.5.1	Static temperatures		X		
1.5.2	Temperature effect at zero flowrate		X		
1.5.3	Damp heat		X		
1.5.3.1	Damp heat, steady state (non-condensing)		X		
1.5.3.2	Damp heat, cyclic (condensing)				
1.5.4	Mains voltage variation				
1.5.4.1	AC mains voltage variation				
1.5.4.2	DC mains voltage variation				
1.5.5	Battery voltage variation, not mains connected (DC)				
1.6	Disturbances				
1.6.1	AC mains voltage dips, short interruptions and reductions				
1.6.2	Bursts (fast transient tests) on:				
1.6.2.1	- AC and DC mains power lines				
1.6.2.2	- signal, data and control lines				
1.6.3	Surges on:				
1.6.3.1	- AC and DC mains power lines				
1.6.3.2	- signal, data and control lines				
1.6.4	Electrostatic discharge				
1.6.4.1	Direct application				

1.6.4.2	Indirect application (contact discharges only)				
1.6.5	Immunity to electromagnetic fields:				
1.6.5.1	- radiated electromagnetic fields				
1.6.5.2	- conducted electromagnetic fields				
1.7	Metrological characteristics				
1.7.1	Repeatability				
1.7.2	Discrimination of the totalization indicating device				
1.7.3	Discrimination of the totalization indicating device used for zero totalization		X		
1.7.4	Short- and long-term stability of zero		X		
1.8	In-situ tests				
1.8.1	Maximum permissible errors on checking of zero				
1.8.2	Discrimination of the indicator used for zero-setting				
2	In-situ product tests				
2.1	Accuracy of control instrument				
2.2	Repeatability				
	MPE for type evaluation				
	MPE for initial verification and in-service inspection				

1.5 Influence quantities (R 50-1, 3.7.4 & R 50-2, 7)
1.5.1 Static temperatures (R 50-1, 3.7.4.1 & R 50-2, 7.2.1)

Application no.: <u>BEV-13.414/0016-NB/2017</u>   Type designation: F-EBW

Resolution during test: 1 kg   Observer: Pohl
(smaller than *d*)

Automatic zero-setting:

[ ] Non existent   [X] Not in operation   [ ] Out of working range

Pre-test information:

	Flowrate (kg /h)	Equivalent pulses for Σ_{min}	Static load, *L*, for Σ_{min} (kg)
Q_{max}	9000	80000	9
$Q_{intermediate}$	5400	134000	5,4
Q_{min}	1800	400000	1,8

Test results (note that at each "*Q*", the test is repeated)

Test 1 - Static temperature 20 °C

	At start	At end	
Temp.:	20,0	20,1	°C
Rel. h.:	60,0	59,0	%
Date:	2019-04-11	2019-04-12	yyyy-mm-dd
Time:	14:00	14:20	hh:mm:ss
Barometric pressure:	--	--	hPa

Q (kg /h)	Load, *L* (kg)	Pulses*	Calculated totalization, T** (kg)	Indicated totalization, *I* (kg)	Difference, *I – T* (kg)	*E* %***	Q_{ist} kg/h
Q_{min} 1800	1,8	400000	3998	4000	2	0,05	1799
			3998	3998	0	0,00	1799
$Q_{intermediate}$ 5400	5,4	134000	4019	4019	0	0,00	5399
			4019	4019	0	0,00	5398
Q_{max} 9000	9,0	80000	3999	3998	-1	-0,03	8998
			3999	3999	0	0,00	8997
Q_{min} 1800	1,8	400000	3998	4000	2	0,05	1799
			3998	3998	0	0,00	1799

[X] Passed   [ ] Failed

*   The pulses sent by the displacement transducer (or simulator) to simulate belt movement
**   See the simulation page in clause1 for the simulated totalization calculation formula
***   See the "explanatory notes" section for the *E* % calculation formula

1.5.1 Static temperatures (continued)

Application no.: BEV-13.414/0016-NB/2017   Type designation: F-EBW

Resolution during test:
(smaller than *d*)   1 kg   Observer: Wasylewski

Test 2 - Static temperature specified high (40 °C)

	At start	At end	
Temp.:	39,4	39,8	°C
Rel. h.:	58,5	55,0	%
Date:	2019-04-19	2019-04-27	yyyy-mm-dd
Time:	07:30	13:30	hh:mm:ss
Barometric pressure:	--	--	hPa

Q (kg /h)	Load, L (kg)	Pulses*	Calculated totalization, T** (kg)	Indicated totalization, I (kg)	Difference, $I - T$ (kg)	E %***	Q_{ist} kg/h
Q_{min} 1800	1,8	400000	4000	4003	3	0,08	1800
			4000	4002	2	0,05	1800
$Q_{intermediate}$ 5400	5,4	134000	4019	4019	0	0,00	5398
			4019	4019	0	0,00	5398
Q_{max} 9000	9,0	80000	3998	3998	0	0,00	8996
			3999	3998	-1	-0,03	8997
Q_{min} 1800	1,8	400000	3998	4000	2	0,05	1799
			3998	3998	0	0,00	1799

X Passed   ☐ Failed

*   The pulses sent by the displacement transducer (or simulator) to simulate belt movement
**   See the simulation page in clause1 for the simulated totalization calculation formula
***   See the "explanatory notes" section for the *E* % calculation formula

1.5.1   Static temperatures (continued)

Application no.:   BEV-13.414/0016-NB/2017   Type designation: F-EBW

Resolution during test: 1 kg   Observer: Pohl, Wasylewski
(smaller than *d*)

Test 3 - Static temperature specified low (-10 °C)

	At start	At end	
Temp.:	-10,1	-9,9	°C
Rel. h.:	74,5	70,0	%
Date:	2019-05-09	2019-05-10	yyyy-mm-dd
Time:	07:30	15:00	hh:mm:ss
Barometric pressure:	--	--	hPa

Q (kg /h)	Load, L (kg)	Pulses*	Calculated totalization, T** (kg)	Indicated totalization, I (kg)	Difference, $I - T$ (kg)	E %***	Q_{ist} kg/h
Q_{min} 1800	1,8	400000	3998	3998	0	0,00	1799
			3998	3997	-1	-0,025	1799
$Q_{intermediate}$ 5400	5,4	134000	4019	4018	-1	-0,025	5399
			4019	4020	1	0,025	5399
Q_{max} 9000	9,0	80000	4000	3998	-2	-0,05	8999
			4000	4000	0	0,00	8999
Q_{min} 1800	1,8	400000	4000	3996	-4	-0,10	1800
			3998	3996	-2	-0,05	1799

☒ Passed   ☐ Failed

*   The pulses sent by the displacement transducer (or simulator) to simulate belt movement
**   See the simulation page in clause1 for the simulated totalization calculation formula
***   See the "explanatory notes" section for the *E* % calculation formula

1.5.1   Static temperatures (continued)

Application no.:   BEV-13.414/0016-NB/2017   Type designation: F-EBW

Resolution during test: 1 kg   Observer: Wasylewski
(smaller than *d*)

Test 4 - Static temperature 5 °C

	At start	At end	
Temp.:	5,6	5,3	°C
Rel. h.:	60,5	60,0	%
Date:	2019-05-13	2019-05-14	yyyy-mm-dd
Time:	07:30	15:00	hh:mm:ss
Barometric pressure:	--	--	hPa

Q (kg /h)	Load, L (kg)	Pulses*	Calculated totalization, T** (kg)	Indicated totalization, I (kg)	Difference, $I - T$ (kg)	E %***	Q_{ist} kg/h
Q_{min} 1800	1,8	400000	4000	3998	-2	-0,05	1800
			3998	3998	0	0,00	1799
$Q_{intermediate}$ 5400	5,4	134000	4019	4019	0	0,00	5399
			4020	4019	-1	-0,025	5400
Q_{max} 9000	9,0	80000	4000	4000	0	0,00	8999
			4000	4000	0	0,00	9000
Q_{min} 1800	1,8	400000	3998	4000	2	0,05	1799
			3998	3998	0	0,00	1799

X Passed   ☐ Failed

*   The pulses sent by the displacement transducer (or simulator) to simulate belt movement
**   See the simulation page in clause1 for the simulated totalization calculation formula
***   See the "explanatory notes" section for the *E* % calculation formula

OIML R 50-3:2014 (E)

1.5.1 Static temperatures (continued)

Application no.: BEV-13.414/0016-NB/2017 Type designation: F-EBW

Resolution during test: 1 kg Observer: Wasylewski
(smaller than *d*)

Test 5 - Static temperature 20 °C

	At start	At end	
Temp.:	20,6	20,6	°C
Rel. h.:	60,0	60,5	%
Date:	2019-05-15	2019-05-16	yyyy-mm-dd
Time:	07:30	12:30	hh:mm:ss
Barometric pressure:	--	--	hPa

Q (kg /h)	Load, L (kg)	Pulses*	Calculated totalization, T** (kg)	Indicated totalization, I (kg)	Difference, $I - T$ (kg)	E %***	Q_{ist} kg/h
Q_{min} 1800	1,8	400000	3998	3998	0	0,00	1799
			3998	3998	0	0,00	1799
$Q_{intermediate}$ 5400	5,4	134000	4019	4018	-1	-0,025	5399
			4019	4020	1	0,025	5398
Q_{max} 9000	9,0	80000	3999	3998	-1	-0,025	8998
			3999	3998	-1	-0,025	8997
Q_{min} 1800	1,8	400000	3998	3999	1	0,025	1799
			3998	3998	0	0,00	1799

[X] Passed   [ ] Failed

* The pulses sent by the displacement transducer (or simulator) to simulate belt movement
** See the simulation page in clause1 for the simulated totalization calculation formula
*** See the "explanatory notes" section for the *E* % calculation formula

Remarks:

Include information that affect the test conditions, as indicated in the last paragraph of R 50-2, 7.1

1.5.2 Temperature effect at zero flowrate (R 50-1, 3.7.4.2 & R 50-2, 7.2.2)

Application no.: BEV-13.414/0016-NB/2017   Type designation: F-EBW

Resolution during test: (smaller than *d*)   1 kg   Observer: Pohl

Automatic zero-setting:

☐ Non existent   ☒ Not in operation   ☐ Out of working range

Temperature at start specified minimum (-10) °C

	At start	At end	
Rel. h.:	55,0	55,5	%
Date:	2019-01-24	2019-01-31	yyyy-mm-dd
Time:	10:00	17:00	hh:mm:ss
Barometric pressure:	--	--	hPa

Temp. SOLL °C		Temp. °C	Pulses	Indicated totalization, *I*, at start (t)	Indicated totalization, *I*, at end (t)	Change in indication (kg)	Report page*	Date	Time
-10	Start temp.	-9,5	18000	0,000				24.1	11:00
0	End temp.	-0,5	18000		0,000	0		24.1	13:00
0	Start temp.	-0,5	18000	0,000				25.1	6:00
10	End temp.	9,2	18000		0,000	0		25.1	10:00
10	Start temp.	9,2	18000	0,000				25.1	10:30
20	End temp.	19,0	18000		0,000	0		25.1	12:30
20	Start temp.	19,8	18000	0,000				31.1	10:00
30	End temp.	29,0	18000		0,000	0		31.1	14:00
30	Start temp.	29,0	18000	0,000				31.1	14:15
40	End temp.	39,2	18000		0,000	0		31.1	17:00

☒ Passed   ☐ Failed

Where: temp. = temperature

The rate of temperature change between totalizations shall not exceed 5 °C per hour.

Remarks:

---

*   Indicate the report page of the relevant test where the temperature effect at zero flowrate and static temperature tests are conducted together.

1.5.3 Damp heat (R 50-1, 5.5.1 & R 50-2, 7.2.3)

Application no.: BEV-13.414/0016-NB/2017 Type designation: F-EBW

Resolution during test: 1 kg Observer: Wasylewski
(smaller than *d*)

Damp heat tests are performed according to one of the options in R 50-1, 5.5.1. The results for the option chosen are recorded in 1.5.3.1 or 1.5.3.2 below accordingly.

1.5.3.1 Damp heat, steady state (non-condensing) (R 50-1, 5.5.1 & R 50-2, 7.2.3.1)

Automatic zero-setting:

[ ] Non existent [X] Not in operation [ ] Out of working range

Pre-test information:

	Flowrate (kg /h)	Equivalent pulses for Σ_{min}	Static load, L, for Σ_{min} (kg)
Q_{max}	9000	80000	9
$Q_{intermediate}$	5400	134000	5,4
Q_{min}	1800	400000	1,8

Test results (Note that at each "Q", the test is repeated)

Initial test at reference temperature of 20 °C and relative humidity of 50 %

	At start	At end	
Temp.:	20,6	20,6	°C
Rel. h.:	60,0	60,5	%
Date:	2019-05-15	2019-05-16	yyyy-mm-dd
Time:	07:30	12:30	hh:mm:ss
Barometric pressure:	--	--	hPa

Q (kg /h)	Load, L (kg)	Pulses*	Calculated totalization, T** (kg)	Indicated totalization, I (kg)	Difference, $I - T$ (kg)	E %***	Q_{ist} kg/h
Q_{min} 1800	1,8	400000	3998	3998	0	0,00	1799
			3998	3998	0	0,00	1799
$Q_{intermediate}$ 5400	5,4	134000	4019	4018	-1	-0,025	5399
			4019	4020	1	0,025	5398
Q_{max} 9000	9,0	80000	3999	3998	-1	-0,025	8998
			3999	3998	-1	-0,025	8997
Q_{min} 1800	1,8	400000	3998	3999	1	0,025	1799
			3998	3998	0	0,00	1799

[X] Passed [ ] Failed

* The pulses sent by the displacement transducer (or simulator) to simulate belt movement
** See the simulation page in clause1 for the simulated totalization calculation formula
*** See the "explanatory notes" section for the E % calculation formula

---

1.5.3.1 Damp heat, steady state (non-condensing) (continued)

Application no.: <u>BEV-13.414/0016-NB/2017</u> Type designation: <u>F-EBW</u>

Resolution during test: (smaller than *d*) <u>1 kg</u> Observer: <u>Pohl</u>

Test at specified high temperature (40 °C), relative humidity 85 %

	At start	At end	
Temp.:	39,8	39,8	°C
Rel. h.:	88,5	87,0	%
Date:	2019-05-22	2019-05-24	yyyy-mm-dd
Time:	13:30	10:30	hh:mm:ss
Barometric pressure:	--	--	hPa

Q (kg /h)	Load, L (kg)	Pulses*	Calculated totalization, T** (kg)	Indicated totalization, I (kg)	Difference, $I - T$ (kg)	E %***	Q_{ist} kg/h
Q_{min} 1800	1,8	400000	3996	~~3997~~	~~1~~	~~0,025~~	1798
			3996	~~3998~~	2	~~0,05~~	1798
$Q_{intermediate}$ 5400	5,4	134000	4017	4017	0	0,00	5396
			4017	4018	1	0,025	5396
Q_{max} 9000	9,0	80000	3997	3997	0	0,00	8994
			3997	3997	0	0,00	8994
Q_{min} 1800	1,8	400000	3993	3998	5	0,125	1797
			3993	3995	2	0,05	1797

[X] Passed [ ] Failed

Final test at reference temperature 20 °C, relative humidity 50 %

	At start	At end	
Temp.:	39,8	39,8	°C
Rel. h.:	88,5	87,0	%
Date:	2019-05-22	2019-05-24	yyyy-mm-dd
Time:	13:30	10:30	hh:mm:ss
Barometric pressure:	--	--	hPa

Q (kg /h)		Load, L (kg)	Pulses*	Calculated totalization, T** (kg)	Indicated totalization, I (kg)	Difference, $I - T$ (kg)	E %***	Q_{ist} kg/h
Q_{min}	1800	1,8	400000	3998	3997	-1	-0,025	1799
				3998	3998	0	0,00	1799
$Q_{intermediate}$	5400	5,4	134000	4019	4019	0	0,00	5398
				4019	4019	0	0,00	5398
Q_{max}	9000	9,0	80000	3998	3998	-1	-0,025	8997
				3998	3998	-1	-0,025	8997
Q_{min}	1800	1,8	400000	3999	3999	3	0,075	1798
				3998	3998	2	0,05	1798

X Passed ☐ Failed

* The pulses sent by the displacement transducer (or simulator) to simulate belt movement
** See the simulation page in clause1 for the simulated totalization calculation formula
*** See the "explanatory notes" section for the E % calculation formula

Remarks:

Include information that affect the test condition, as indicated in the last paragraph of R 50-2, 7.1

1.7.3 Discrimination of the totalization indicating device used for zero totalization
(R 50-1, 3.7.5.3 & R 50-2, 8.3)

		At start	At end	
Application no.:	BEV-13.414/0016-NB/2017			
Type designation:	F-EBW	Temp.: 23,5	23,5	°C
Observer:	Wasylewski	Rel. h.:		%
Resolution during test: (smaller than *d*)	1kg	Date: 2019-01-23	2019-01-23	yyyy-mm-dd
		Time: 14:35	15:10	hh:mm:ss
		Barometric pressure: --	--	hPa

Test duration = 3 minutes, equivalent pulses = 9000   v = 100 %

Test	Initial total, T_1 (t)	Pulses	Final total, T_2 (t)	Pulses	Difference, $T_1 - T_2$ (kg)
Weight added					
1	0,000	9000	0,000	9000	0
2+	0,000	9000	0,001	9000	1
3	0,001	9000	0,001	9000	0
4+					
5					
6+					
Weight removed					
7+	0,000	9000	0,001	9000	1
8	0,001	9000	0,001	9000	0
9+	0,001	9000	0,003	9000	2
10					
11+					
12					

[X] Passed   [ ] Failed

Where: + indicates presence of test weight on the load receptor

$$\text{Test weight} = \begin{cases} 0.02\,\%\text{ of Max for class }0.2 \\ 0.05\,\%\text{ of Max for class }0.5 \\ 0.1\,\%\text{ of Max for class }1 \\ 0.2\,\%\text{ of Max for class }2 \end{cases}$$ --> entspricht 2,5 g

Remarks: Zählersperre war aktiv mit +/- 2,5 %   -->   auf 0 % umgestellt;
nach erfolgter Prüfung wieder auf +/- 2,5 % eingestellt.

1.7.4 Short- and long-term stability of zero (R 50-1, 3.7.5.4 & R 50-2, 8.4)

		At start	At end	
Application no.:	BEV-13.414/0016-NB/2017			
Type designation:	F-EBW	Temp.: 20,8	22,5	°C
Observer:	Wasylewski	Rel. h.: 67,5	65,0	%
Resolution during test: (smaller than *d*)	1kg	Date: 2019-06-12	2019-06-12	yyyy-mm-dd
		Time: 10:00	13:45	hh:mm:ss
		Barometric pressure: --	--	hPa

alle Werte in kg

Elapsed time in min.	ZTID indication	Load totalized in 3 min.		Elapsed time in min.	ZTID indication	Load totalized in 3 min.
0	0			195	0	
3	0	0		198	0	0
6	0	0		201	0	0
9	0	0		204	0	0
12	0	0		207	0	0
15	0	0		210	0	0

Where ZTID = Zero totalization indicating device

	class 0.2: 0.000 5 %	class 0.5: 0.001 25 %	class 1: 0.002 5 %	class 2: 0.005 %
Requirement (R 50 -1, 3.7.5.4.1)				
Difference between the highest and lowest indicated values obtained in the set of the six readings from 0 minutes to 15 minutes =		0		
Difference between the highest and lowest indicated values obtained in the set of the six readings from 195 minutes to 210 minutes =		0		
Requirement (R 50-1, 3.7.5.4.2)	class 0.2: 0.000 7 %	class 0.5: 0.001 75 %	class 1: 0.003 5 %	class 2: 0.007 %
Difference between the highest and lowest indicated values obtained in the set of the twelve readings from 0 minute to 210 minutes =		0		

X	Passed		Failed

Remarks:

Include information that affect the test condition, as indicated in the last paragraph of R 50-2, 7.1