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Willkommen im BEV

Bundesamt für Eich- und Vermessungswesen

Project 821:
Bilateral comparison with Slovenia
interim report

EUROMET Projekte 2006

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(1) In Project 699 the flow range 1.000 L/h ≤ *Q* ≤ 10.000 L/h is analyzed

- Practically: the flow range < 100 L/h is also important (heat energy)
- As a master meter there are only few types are available (electromagnetic meters, ultrasonic, Coriolis ...)

(2) We try to use an electromagnetic meter DN 4 for an intercomparison Austria ⟷ Slovenia

- The results are unsatisfactory (see diagram)
- We look for a better measuring type in the following flow range for water: **6 L/h ≤ *Q* ≤ 100 L/h**

Proposal for a bilateral comparison at small flow rates

PROPOSED EUROMET PROJECT

1. Ref. No: **821** (please leave blank)	2. Subject Field: Flow measurement/water
3. Type of collaboration: **Bilateral comparison of an electromagnetic flow meter**	
4A: Partners: **BEV, MIRS (JP Energetika Ljubljana)** (institutions)	4B: CEC funded
5. Participating countries: **AT, SI**	
6. Title: **Bilateral comparison of the test rigs of BEV and JP Energetika Ljubljana (representative laboratory for water flow measurements in Slovenia)**	

7. Description:

An electromagnetic flow meter will be tested under the following conditions in BEV and JP Energetika Ljubljana:

- small flow rates: 50 L/h, 25 L/h, 10 l/h
- temperature of the water: (50 ± 1) °C
- pressure at the outlet of the meter: 0,6 bar
- number of repeated measurements: 10 times

Tested volume at all flow rates: 10 L, 5 L, 3 L

The measurements procedures are planned for the period: November/December 2004.

8. Additional remarks:
This is an additional test to project No 699. Like in project No 699, the test rigs are compared by electromagnetic flow meters but now the flow rates are lower, because at lower flow rates normally higher discrepancies are assumed to be found than at higher flow rates.
Moreover, the participants dispose of only 1 single meter of that size.

9. Proposer's name: Prof. Dr. Franz Adunka
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10. Proposer's signature:	11. Date: **November 4th, 2004**	12. Proposed starting date: **now**

The colleagues from Slovenia flow group

Results - 1

Intercomparison JPE (Ljubljana) - BEV (Vienna)

instrument: MID, Krohne, IFS 5000 1 DPS

puls rate 7200/L

Nr.: 541 001/1990/52 t = 50 °C +/- 1°C

Q	V	time											Q	mean	s_{1s}	N	s_m	d	Q	mean	s_{1s}
L/h	L	s	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	L/h	%	%		%	%	L/h	%	%
50	10	720	-0,14	-0,13	-0,19	-0,27	-0,17	-0,12	-0,12				50	-0,16	0,054	7	0,020	0,15	50	-0,17	0,02
50	5	360	-0,27	-0,31	-0,03	-0,27	-0,32	-0,11	-0,07				50	-0,20	0,122	7	0,046	0,29	25	1,30	0,24
50	3	216	-0,39	-0,34	-0,25	-0,21	-0,04	0,05	0,05				50	-0,16	0,182	7	0,069	0,44	10	2,24	0,37
25	10	1440	0,62	1,60	1,28	1,25	0,93	1,33	0,50				25	1,07	0,402	7	0,152	1,10			
25	5	720	2,06	0,82	1,70	0,55	1,66	0,97					25	1,29	0,595	6	0,243	1,51			
25	3	432	0,60	2,59	0,73	2,96	2,08	0,30					25	1,54	1,139	6	0,465	2,66			
10	10	3600	2,85	1,73	1,86	2,16	2,17	1,34					10	2,02	0,511	6	0,208	1,51			
10	5	1800	1,89	5,17	2,40	2,80	2,38	1,36					10	2,67	1,323	6	0,540	3,81			
10	3	1080	1,72	1,37	1,79	1,85	2,67	2,77					10	2,03	0,563	6	0,230	1,40			
t °C			48,0	48,1	48,1	48,1	48,1							48,1	0,000	5	0,000	0,10			
Date:			2.11	2.11	2.11	3.11	3.11	3.11	3.11												

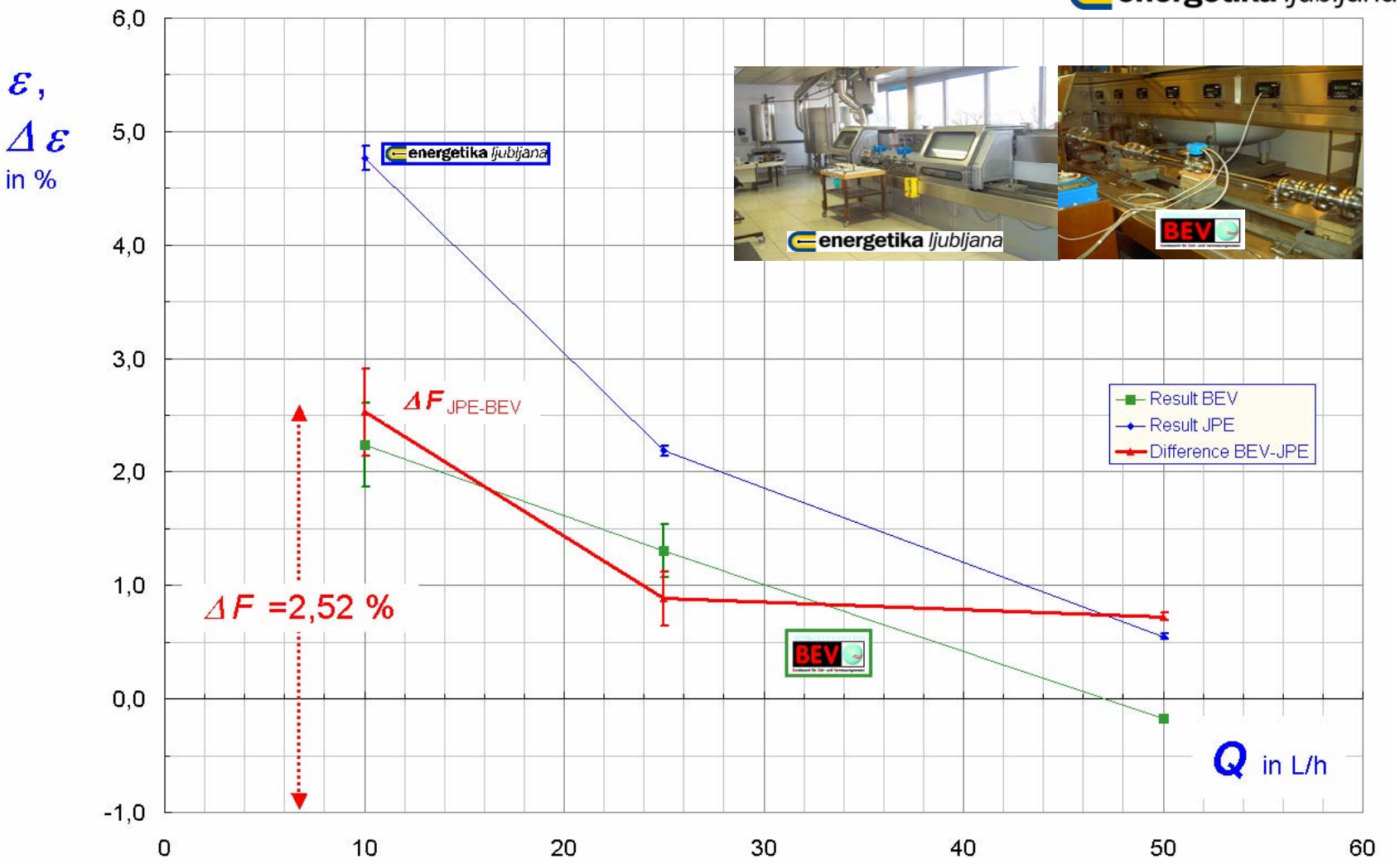
instrument: MID, Krohne, IFS 5000 1 DPS

puls rate 7200/L

Nr.: 541 001/1990/52 t = 50 °C +/- 1°C

Q	V	time											Q	mean	s_{1s}	N	s_m	d	Q	mean	s_{1s}	$\Delta F_{JPE-BEV}$	$s_{JPE-BEV}$
L/h	L	s	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	L/h	%	%		%	%	L/h	%	%	%	%
50	10	720	0,45	0,35	0,36	0,35	0,38	0,41	0,39	0,45	0,42	0,43	50	0,40	0,039	10	0,012	0,10	50	0,55	0,03	0,72	0,03
50	5	360	0,57	0,44	0,38	0,31	0,32	0,34	0,24	0,35	0,30	0,35	50	0,36	0,090	10	0,029	0,33	25	2,19	0,04	0,88	0,24
50	3	216	0,94	0,94	0,90	1,01	0,91	0,84	0,88	0,93	0,77	0,78	50	0,89	0,075	10	0,024	0,24	10	4,76	0,11	2,52	0,39
25	10	1440	1,39	1,37	1,71	1,74	1,72	1,89	2,00	2,06	1,94	2,00	25	1,78	0,246	10	0,078	0,69					
25	5	720	1,66	2,05	2,10	2,12	2,10	2,21	2,30	2,11	2,27	2,40	25	2,13	0,199	10	0,063	0,74					
25	3	432	2,05	2,45	2,57	2,45	2,60	2,72	2,77	2,82	3,02	2,96	25	2,64	0,285	10	0,090	0,97					
10	10	3600	2,91	3,73	4,00	4,19	4,46	4,69	4,97	5,32	5,25	5,47	10	4,50	0,810	10	0,256	2,56					
10	5	1800	3,84	4,24	3,82	4,60	4,83	4,30	5,20	4,65	4,92	5,76	10	4,62	0,602	10	0,190	1,94					
10	3	1080	4,52	4,23	4,84	4,48	5,30	5,75	5,03	5,52	6,38	5,69	10	5,17	0,677	10	0,214	2,15					
t °C			49,1	48,7	48,6	48,6	47,8	47,8	47,6	47,5	47,9	47,9		48,2	0,461	10	0,146	1,60					
Date:			2.12	2.12	2.12	3.12	3.12	3.12	3.12	3.12	4.12	4.12											

Results - 2


ε ,
Δ ε
in %
6,0
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
0
10
20
30
40
50
60
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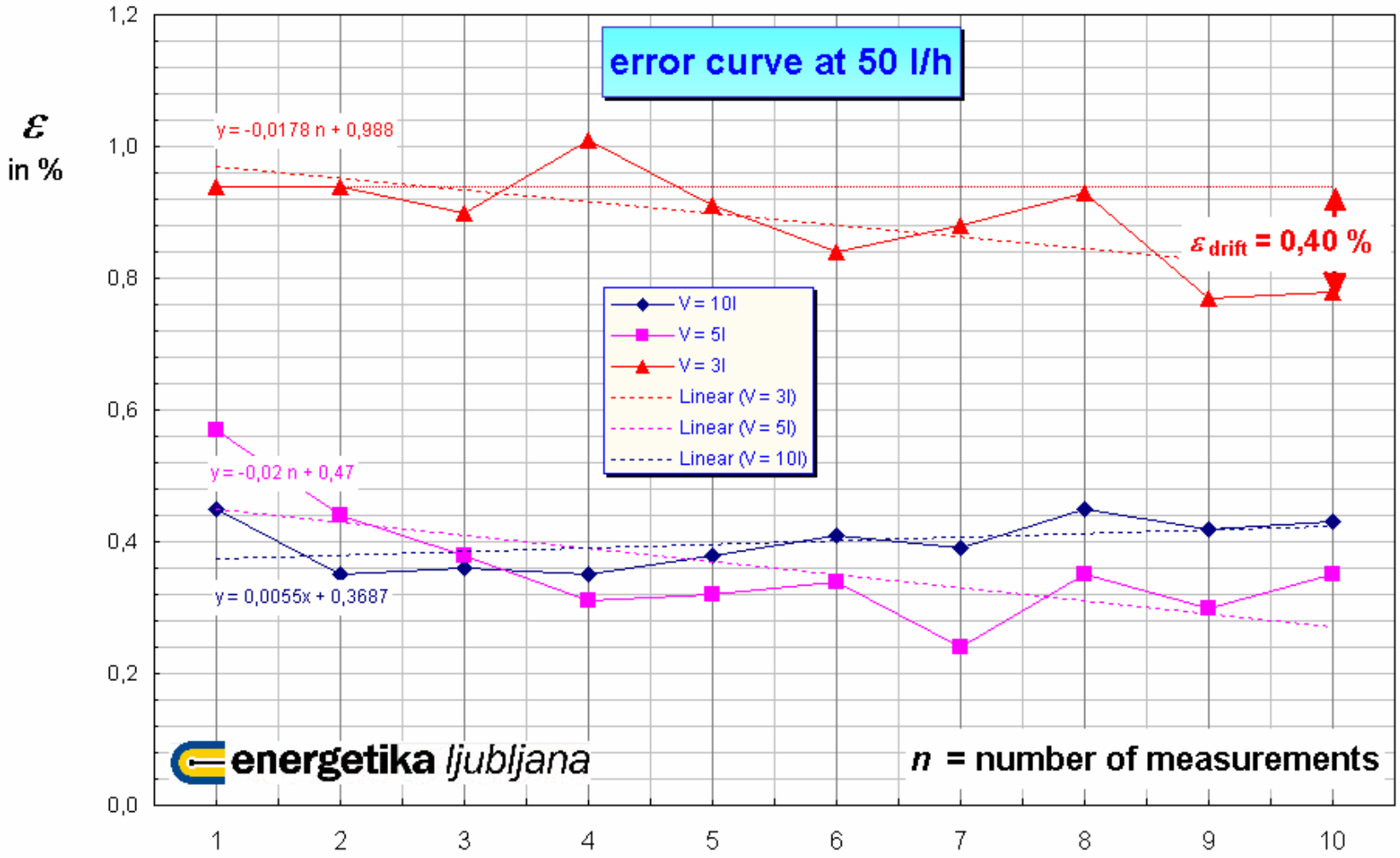
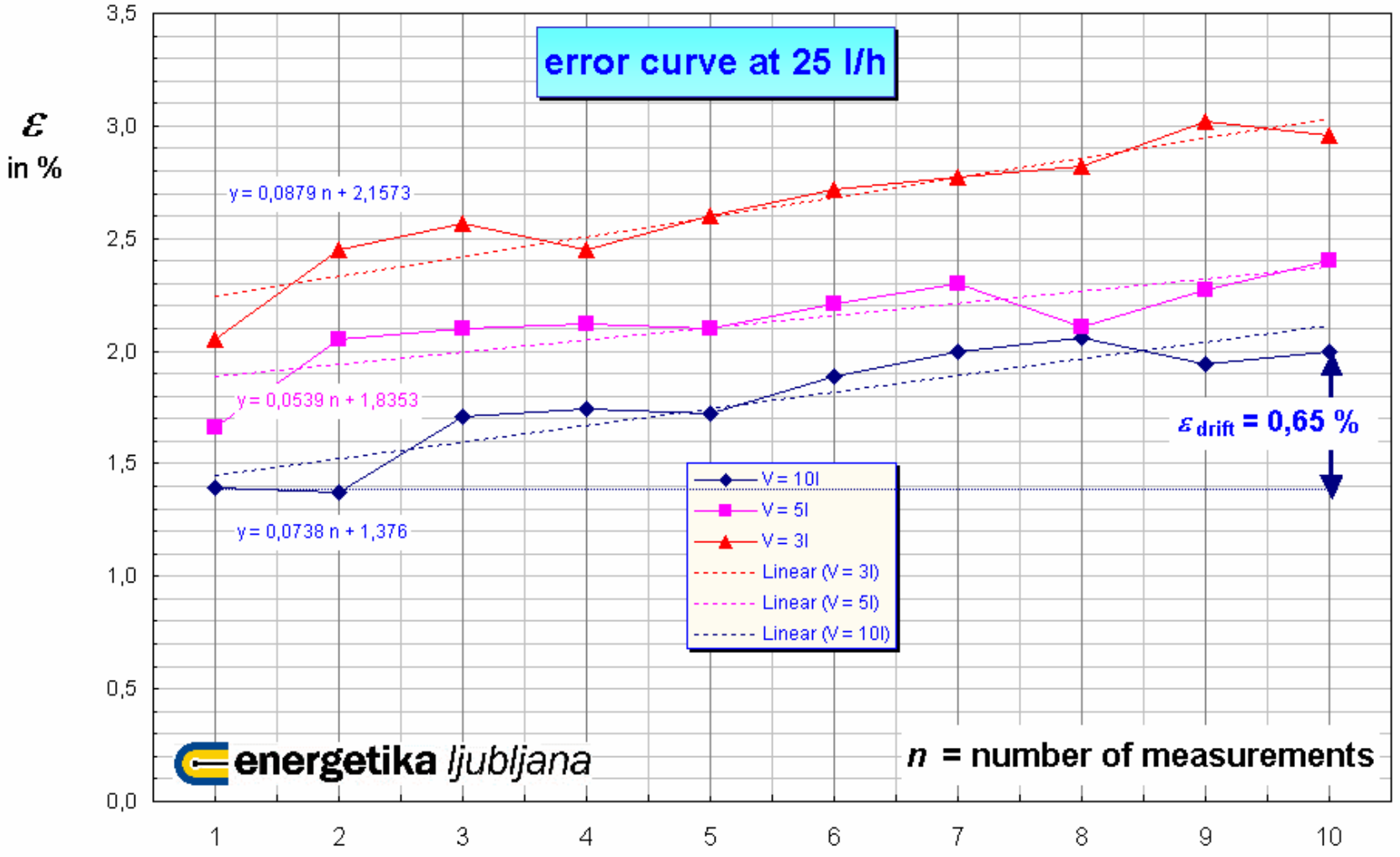
ΔF JPE-BEV
ΔF =2,52 %
BEV
Result BEV
Result JPE
Difference BEV-JPE
Q in L/h

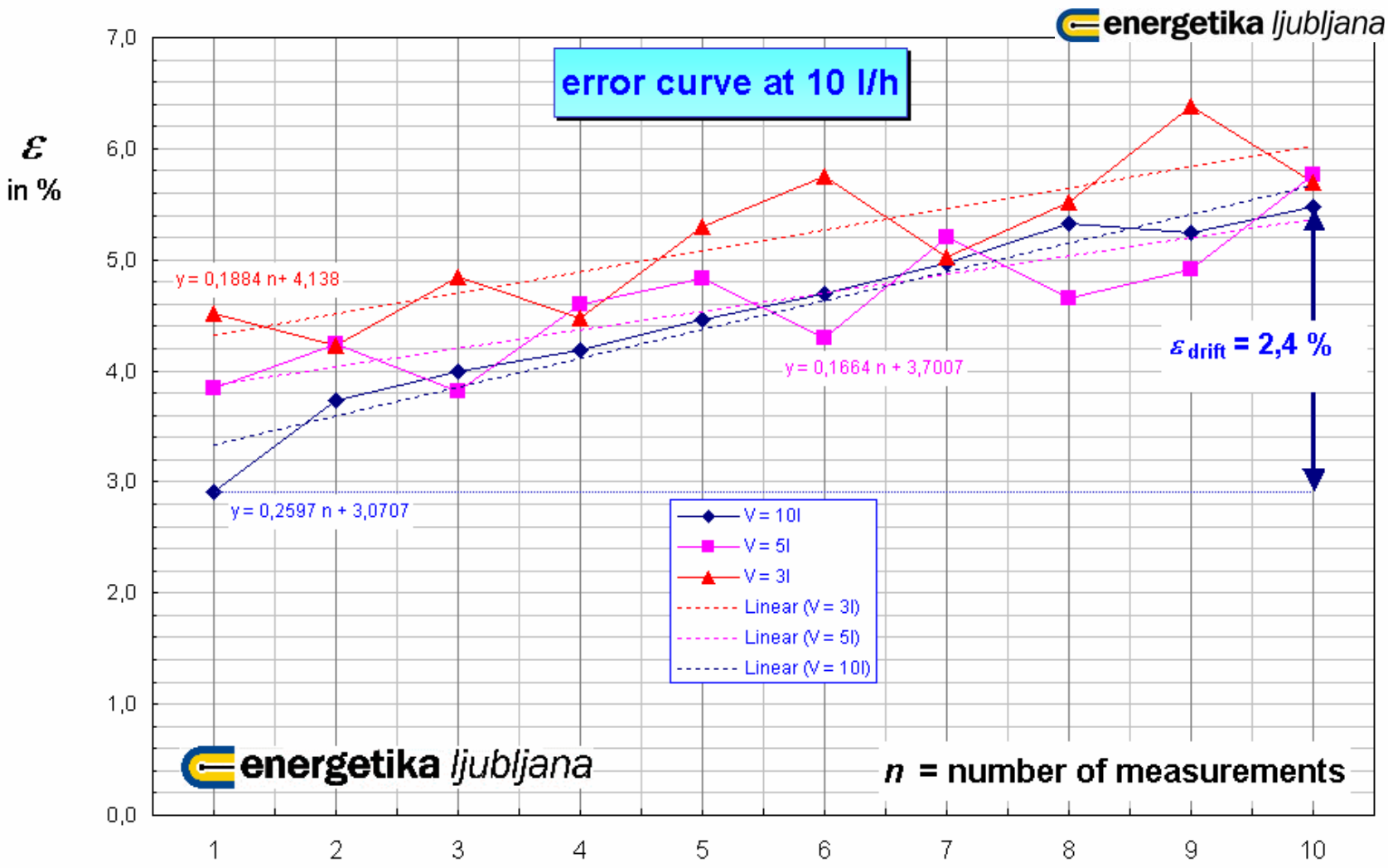
Drift of the master at 50 L/h and different volumes



Drift of the master at 25 L/h and different volumes



Drift of the master at 10 L/h and different volumes



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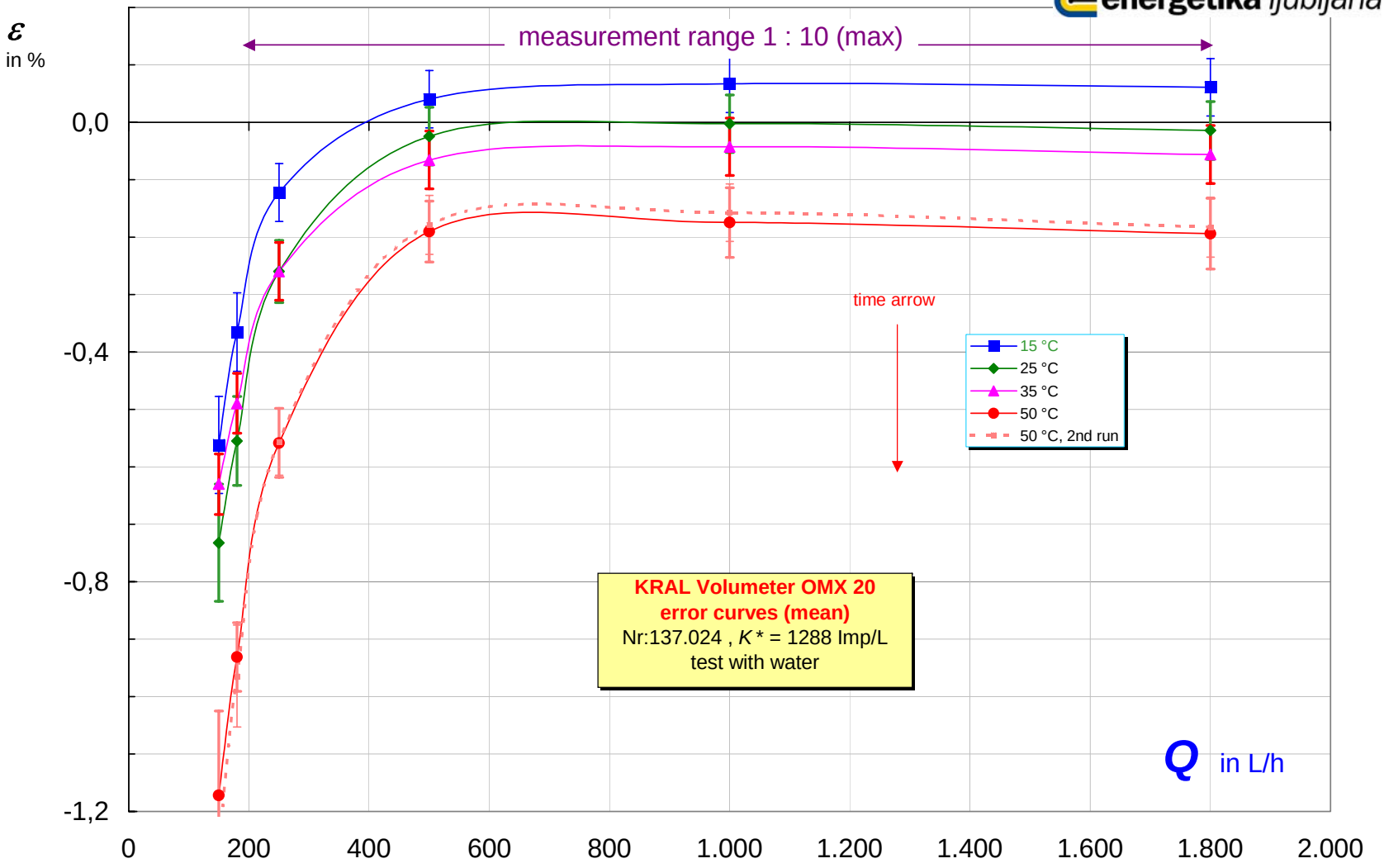
We will test **other measuring principles** for this comparison

- **screw meter by KRAL (manufacturer) – in petrol there are best experiences with this type. We test a meter OMX 20 (DN 20) .... see diagram. In water: measurement range 1 : 7 - 10, petrol: 1 : 15**

- **in future we will try to compare with a coriolis master meter**

typical error curve of a srew meter (KRAL), medium: water



- comparison with a KRAL, DN 13
- comparison with a coriolis master meter