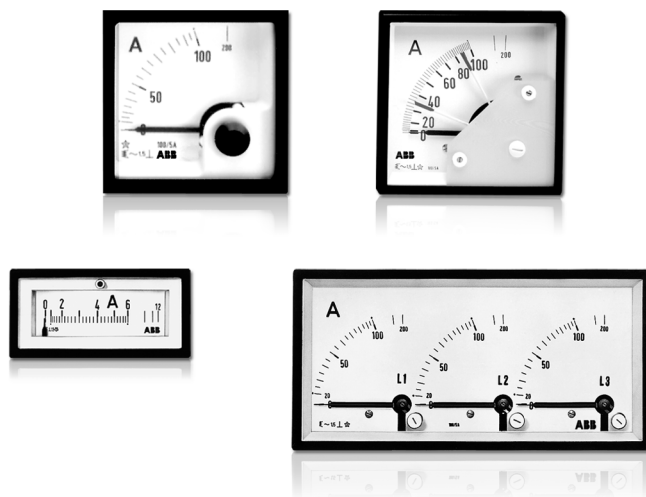


Moving Iron Indicators for sinusoidal or nonsinusoidal AC currents or voltages



Inputs

- For sinusoidal or nonsinusoidal AC currents or voltages, up to 100 A and 600 V directly

Overload capability

- Up to quintuple

Formats

- Square indicators
48 x 48 mm; 72 x 72 mm; 96 x 96 mm;
144 x 144 mm
- Edgewise indicators
72 x 36 mm; 96 x 48 mm; 144 x 72 mm
- Triple indicators
192 x 96 mm
- Contact indicators
96 x 96 mm

Mounting orientation

- Edgewise indicators upright or transverse format

Contact indicator (96 x 96 mm)

- 1 or 2 contacts (min., max.)

Excellent environmental and mechanical capabilities

General data

Standards

The indicators comply with DIN EN 60051 and with the safety regulations according to DIN EN 61010-1.

In the sections below you can find a short description of the most important parts of these regulations regarding the construction and the characteristics of electrical measuring instruments.

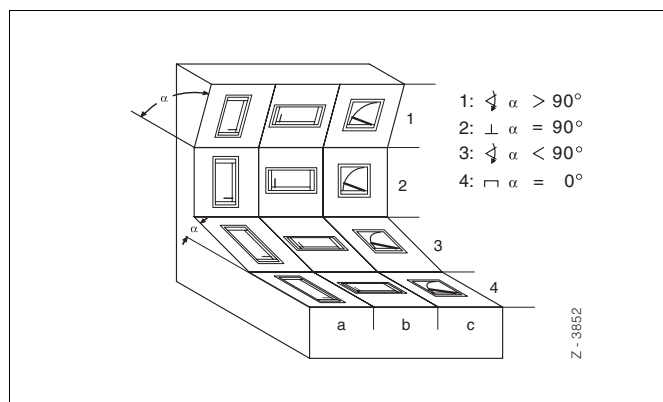
Measured error

The measured error of an indicator or its accessories is given by the limits through basic errors and effects.

The indicators comply with Class 1.5, if no other measured error rating has been given for specific types. Optionally, indicators can also be supplied for higher class measured errors, if this is possible. The class involved is always stated on the scale.

Mounting orientation

Generally, the nominal position is indicated by a position symbol. For indicators without such a position identification, the reference range is any vertical or horizontal position. The nominal mounting orientation is 5° in every direction of the reference position. Note that the effect (in addition to the indicated error) must not be greater than 50 % of the respective classified error.



Temperature effect

If not otherwise stated, the reference temperature is 23 °C ± 2 K for indicators of Class 0.5 to 5. The additional error for a nominal range of ±10 K within this temperature range must not exceed the classified error.

General technical specifications

Measured error

Class 1.5 to DIN EN 60051

Measuring ranges

The measuring ranges comply with DIN 43701 (standardized progression: 1 - 1.5 - 2.5 - 4 - 6 and their decadic multiples), see the respective codes in the measuring range tables

Mounting orientation

vertical, if not otherwise specified, 2a...2c in the illustration

Connection

directly or via transformer

Ambient temperature

23 °C ± 2 K

Temperature influence

< 1 %/10 K

Front frame

to DIN 43700
exchangeable front pane (only for square instruments with plastic housings)

Front color

black, RAL 9005

Environmental conditions to DIN EN 60721-2-1, 2, 5

Conditions	Permissible variables	
	Normal measuring instruments → H, Y, G	Relatively tropicalized instruments → H, V, F
Operating temperature	-25...+40 °C	-25...+55 °C
Relative humidity	max. 85 %, but not more than 60 days per year, otherwise 75 %, annual average 65 % (max. temperature +27 °C)	max. 95 %, but not more than 30 days per year, otherwise 85 %, annual average 75 % (max. temperature +25 °C)
Condensation	none	none

Mechanical category to DIN EN 60068

Vibration = Part 2-6

normal version
frequency range 5...55 Hz
acceleration max. 2.5 g
No. of cycles 5
runtime 1 octave per minute

Shock = Part 2-27

normal version
acceleration max. 15 g
time of action 11 ms

Scale and pointer design

The scales and pointers for square, circular, vertical or horizontal scales comply with DIN 43802, Parts 2 and 4.

Type of protection

If not otherwise specified, the indicators comply with DIN EN 60529

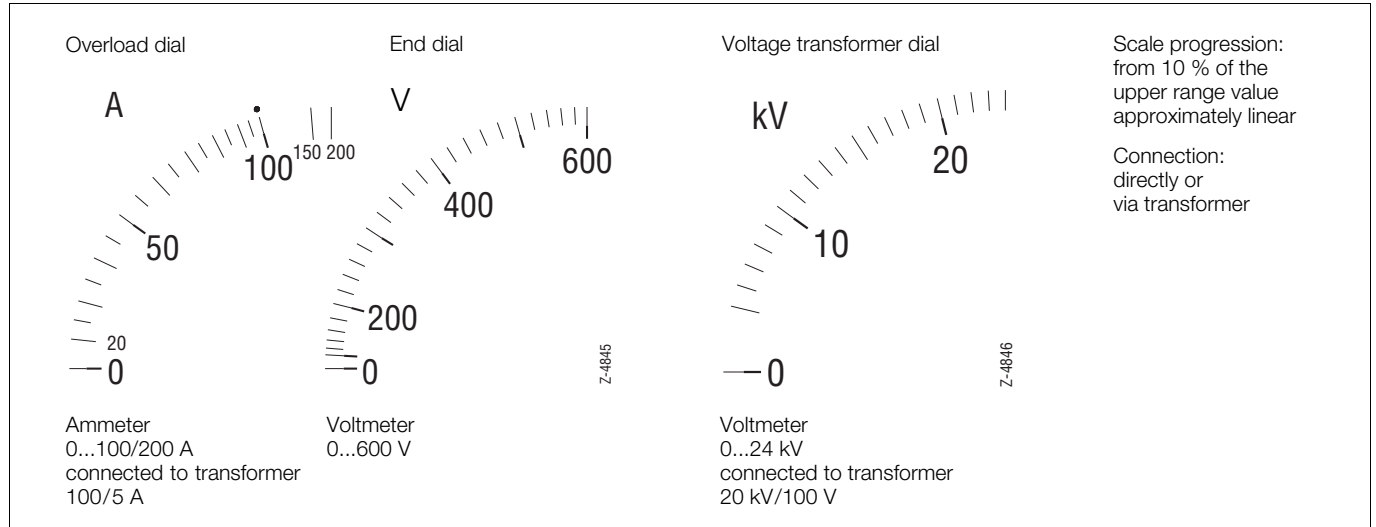
- IP 52 for case
- IP 00 for terminals

Application range

Square indicators

15...100 Hz

Moving iron indicator dials



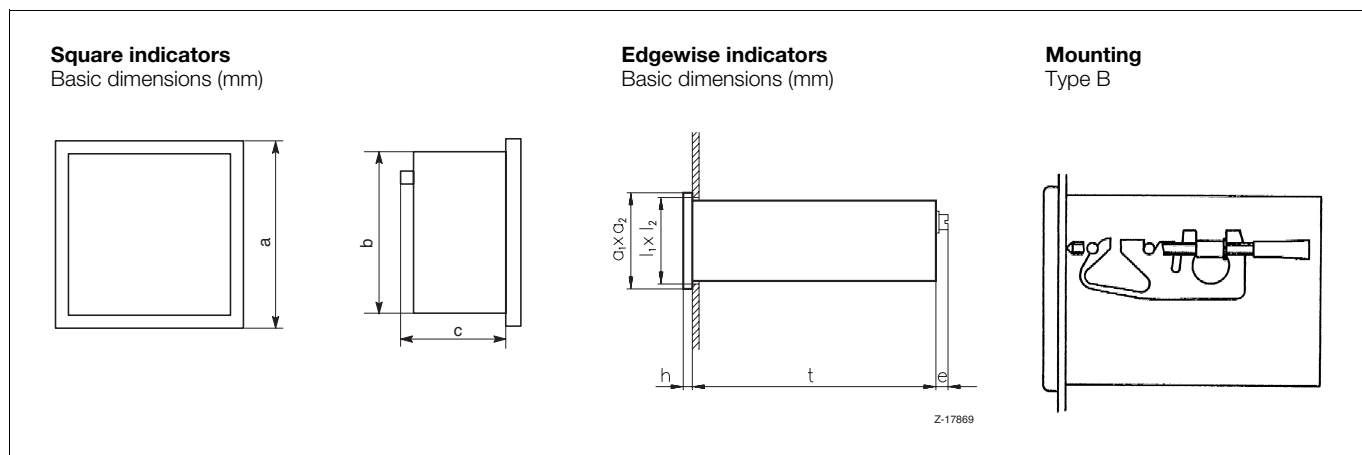
Device specifications

	Square indicators					Edgewise indicators				
					with contacts				triple No.	
Front dimensions (mm)	48 x 48	72 x 72	96 x 96	144 x 144	96 x 96	72 x 36	96 x 48	144 x 72	192 x 96	
Scale length (mm)	41	61	97	146	78	45	67	92	3 x 72	
Class	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
Weight (kg)	0.1	0.15	0.2	0.25	0.5	0.28	0.45	1	0.9	
Own consumption when connected to current transformer	sec./1 A sec./5 A	app. 0.4 VA app. 0.4 VA	app. 0.5 VA app. 0.4 VA	app. 0.5 VA app. 0.4 VA	app. 0.5 VA app. 0.4 VA	app. 0.5-1 VA app. 0.5-1 VA	app. 0.5-1 VA app. 0.5-1 VA	app. 0.5-1 VA app. 0.5-1 VA	app. 0.5-1 VA app. 0.5-1 VA	app. 0.5-1 VA app. 0.5-1 VA
Connection to voltage transformer	sec./100 V sec./110 V	app. 2.1 VA app. 2.3 VA	app. 3.5 VA app. 3.7 VA	app. 3.5 VA app. 3.7 VA	app. 3.5 VA app. 3.7 VA	app. 1.5-3 VA app. 1.5-3 VA	app. 1.5-3 VA app. 1.5-3 VA	app. 1.5-3 VA app. 1.5-3 VA	app. 1.5-3 VA app. 1.5-3 VA	app. 1.5-3 VA app. 1.5-3 VA
Operating voltage	300 V	300 V	600 V	600 V	600 V	according to DIN 61010				
Measuring voltage category	CAT III	CAT III	CAT III	CAT III	CAT III	CAT III	CAT III	CAT III	CAT III	
Degree of pollution	2	2	2	2	2	2	2	2	2	
Front panel protection	IP 52	IP 52	IP 52	IP 52	IP 40	IP 52	IP 52	IP 52	IP 40	
Mounting	Screwed spindle	Screwed spindle	Screwed spindle	Screwed spindle	Screwed bracket	Screwed bracket	Screwed bracket	Screwed bracket	Screwed bracket	
Housing material	Polycarbon. to UL94V-0	Polycarbon. to UL94V-0	Polycarbon. to UL94V-0	Polycarbon. to UL94V-0	Sheet metal	Sheet metal	Sheet metal	Polycarbon. to UL94V-0	Sheet metal	

Mechanical construction

Front dimensions (mm)	Rated dimensions		Cutout dimensions	Mounting depth		Connections: e				
	a	h		Plastic	Sheet metal	Plastic housing		Metal housing		
Square indicators	a	h	b	c	c	< 25 A	> 25 A	< 3 A	> 3...30 A	> 30 A
48 x 48	48 x 48	5	45 ^{+0.6} x 45 ^{+0.6}	53	—	M4	M6	—	—	—
72 x 72	72 x 72	5	68 ^{+0.7} x 68 ^{+0.7}	53	57	M4	M6	M3	M5	M6
96 x 96	96 x 96	5	92 ^{+0.8} x 92 ^{+0.8}	53	60	M4	M6	M3	M5	M6
96 x 96 with contacts	96 x 96	5	92 ^{+0.8} x 92 ^{+0.8}	—	78	—	—	M5	M5	—
144 x 144	144 x 144	8	138 ⁺¹ x 138 ⁺¹	53	60	M4	M6	M3	M5	M6
Edgewise indicators	a1 x a2	h	l1 x l2	t	t					
72 x 36	72 x 36	5	68 ^{+0.7} x 33 ^{+0.6}	—	94	—	—	M3	M5	—
96 x 48	96 x 48	5	92 ^{+0.8} x 45 ^{+0.6}	—	107	—	—	M3	M5	—
144 x 72	144 x 72	8	138 ⁺¹ x 68 ^{+0.7}	192	—	Flat plug 6.3 x 0.8		—	—	—
192 x 96 triple indicator	192 x 96	8	186 ^{+0.1} x 92 ^{+0.8}	—	60	—	—	M3	M5	—

Dimensional drawings



Contact indicators (96 x 96 mm)

Application

The contact indicator FO 96 with one or two alarm values is installed in a sheet metal case and is suitable for monitoring currents or voltages.

It is equipped with one or two relay outputs with change-over contacts. The contacts are optionally available as min. or max. contacts, so there are five different versions:

- **Min.** minimum contact
- **Max.** maximum contact
- **Min./Max.** minimum and maximum contact
- **Min./Min.** minimum and early warning contact
- **Max./Max.** maximum and early warning contact

The standard version relays operate according to the NC operating principle: they open, when an alarm limit is exceeded or fallen below or in case of a power failure. Optionally, the devices are available with NO contact operation.

Functional principle

Moving iron mechanism with M-core system, silicon oil damping and resilient jewel bearing. Integrated components optically measure the set alarm values via the pointer position and control the potential-free relay outputs.

Technical data

Contact indicators

current: 15...400 Hz; voltage: 5...100 Hz

Power supply

24 V DC (21 ...27 V)
 115 V AC ±10%, 48...62 Hz
 230 V AC (198...242 V), 48...62 Hz

Power consumption: max. 1.2 VA

Electrical isolation: between measuring circuit and power circuit

Measured error

Threshold value: ± 1 % of scale length

Repeatability: < 0.2 % of scale length

Switching difference: < 1 % of scale length

Outputs

1 change-over contact per alarm contact, max. switching capacity for resistive load

Switching voltage: 230 V DC

Switching current: 4 A

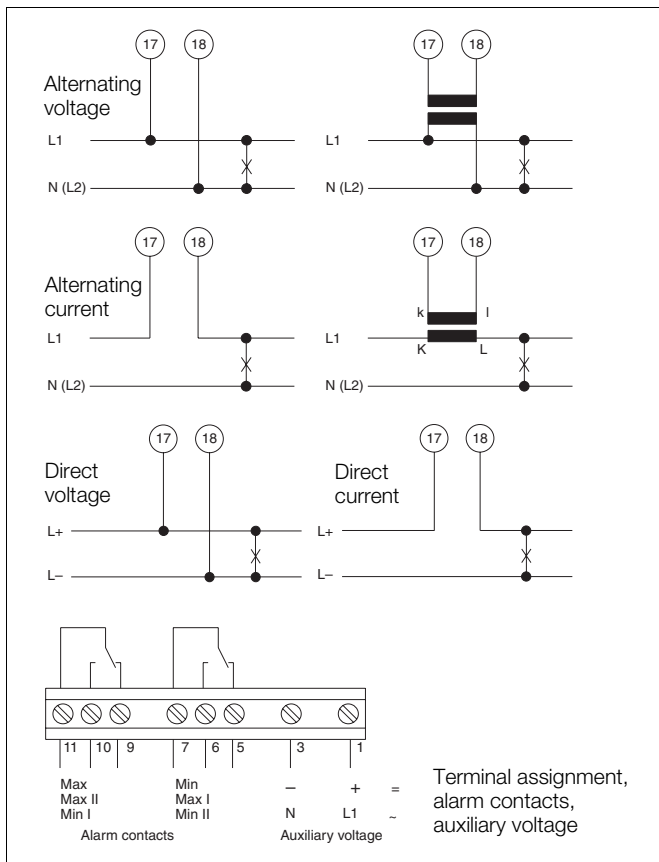
Switching capacity: 920 VA

Life span for rated load: 2 × 10⁶ operating cycles

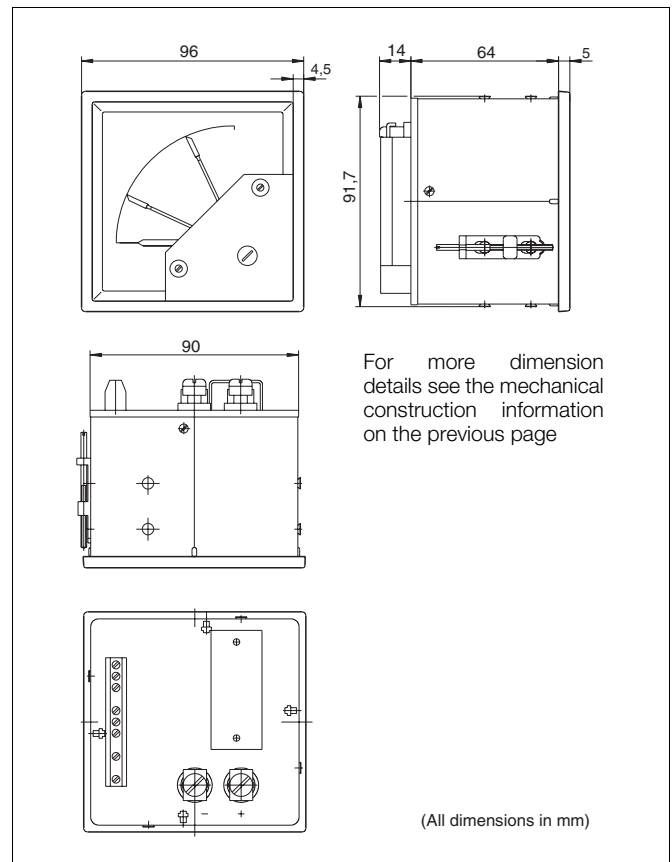
Mechanical life span: 10⁷ operating cycles

For more technical details please refer to the device specifications

Connection diagrams



Dimensional drawings



Ordering information

Moving Iron Indicator Square, 90° scale F48-NW 48 x 48 mm max. 25 A F72-NW 72 x 72 mm F96-NW 96 x 96 mm F144-W 144 x 144 mm	Variant digit No.	1-8	Code			
	Catalog No.					
		V30078A-				
		V30077A-				
		V30079A-				
	V30080A-					
Measuring Range Via current transformer x A/1 A (primary current acc. to ZWU code No.) Via current transformer x A/5 A (primary current acc. to ZWU code No.) Via voltage transformer x V/100 V (primary voltage acc. to ZWU code No.) Via voltage transformer x V/110 V (primary voltage acc. to ZWU code No.) 40 mA...100 A (indicate code No., see measuring range table) 6 V...600 V (indicate code No., see measuring range table) As specified (clear text)			801			
			800			
			703			
			704			
			3__			
			7__			
			ZAM			
Scale Same as measuring range Without graduation, start/end marked, with symbol strip and company logo As specified (in clear text, ZEM code No.) Via transformer connector (indicate code No. ZWU see scale table)			ZSA			
			ZSN			
			ZEM			
Overload Range Without overload 1.2-fold overload 2-fold overload (only for current ranges) 5-fold overload (only for current ranges)			ZFS			
			ZFU			
			ZFD			
			ZFF			
Moving Iron Indicator Edgewise F72-PW 72 x 36 mm F96-PW 96 x 48 mm F144-PW 144 x 72 mm F192-3PW 192 x 96 mm (triple indicator)	Variant digit No.	1-8	Code			
	Catalog No.					
		V30073A-				
		V30074A-				
		V30082A-				
	V30076A-					
Measuring Range Via current transformer x A/1 A (primary current acc. to ZWU code No.) Via current transformer x A/5 A (primary current acc. to ZWU code No.) Via voltage transformer x V/100 V (primary voltage acc. to ZWU code No.) Via voltage transformer x V/110 V (primary voltage acc. to ZWU code No.) 100 mA...25 A (indicate code No., see measuring range table) 6 V...600 V (indicate code No., see measuring range table) As specified (in clear text, ZAM code No.)			801			
			800			
			703			
			704			
			3__			
			7__			
			ZAM			
Scale Same as measuring range Without graduation, start/end marked, with symbol strip and company logo As specified (in clear text, ZEM code No.) Via transformer connector (indicate code No. ZWU see scale table)			ZSA			
			ZSN			
			ZEM			
Overload Range Without overload 1.2-fold overload 2-fold overload (only for current ranges)			ZFS			
			ZFU			
			ZFD			
Mounting Orientation Transverse format Upright format			ZFQ			
			ZFH			
Special Features Transformer ratio (code No. according to measuring range table)			ZWU			

see next page for more special features

Ordering information

Moving Iron Indicator FO96 Contact indicator, 96 x 96 mm	Variant digit No.	1- 8	9	10	Code			
	Catalog No.	V30089A-						
Alarm Contacts								
1 min. relay			1					
1 max. relay			2					
1 min. relay, 1 max. relay			3					
2 min. relays			4					
2 max. relays			5					
Power Supply								
230 V AC			1					
115 V AC			2					
24 V DC			3					
Measuring Range								
Via current transformer x A/1 A	(primary current acc. to ZWU code No.)				801			
Via current transformer x A/5 A	(primary current acc. to ZWU code No.)				800			
Via voltage transformer x V/100 V	(primary voltage acc. to ZWU code No.)				703			
Via voltage transformer x V/110 V	(primary voltage acc. to ZWU code No.)				704			
40 mA...15 A	(indicate code No., see measuring range table)				3__			
40 V...600 V	(indicate code No., see measuring range table)				7__			
As specified	(in clear text)				ZAM			
Scale								
Same as measuring range					ZSA			
Without graduation, start/end marked, with symbol strip and company logo					ZSN			
As specified	(in clear text, ZEM code No.)				ZEM			
Via transformer connector	(indicate code No. ZWU see scale table)							
Overload Range								
Without overload					AFS			
1.2-fold overload					AFU			
2-fold overload	(only for current ranges)				AFD			
Special Features								
Transformer ratio	(code No. according to measuring range table)				ZWU			

Additional ordering information								
		Indicators	Contact indicators	Code				
Scale sector (color)	(clear text)			ZPF				
Red mark at:	(clear text)			ZPR				
Additional numbers	(clear text)			ZZB				
Additional labelling	(clear text)			ZZA				
Front frame RAL 7032 (pebble gray)			x	ZGH				
Front frame RAL 7037 (dusty gray)				ZGG				
Low-reflection pane				ZGB				
Metal case			x	ZGD				
Terminal cover IP 20				ZOK				
Mounting orientation as specified (15°...165°)	(clear text)			ZGE				
Case identification	(clear text)			ZGJ				
Relay with NO contact operation		x		380				
Category 2/3 (vibration-proof)				ZAA				
Climate group 2 (relatively tropicalized)				ZAK				
Design acc. to GL certificate	(on request)		x	ZOM				

Additional special features on request

x = not possible

Measuring range table

Grad.	Code No.	Format		Format	
		48 x 48	72 x 72 96 x 96 144 x 144	Contact indicators	72 x 36 96 x 48 144 x 72 192 x 96
mA	mA				
40	361				x
60	381				x
100	312				
150	322				
250	342				
400	362				
600	382				
A	A				
1	313				
1.5	323				
2.5	343				
4	363				
5	373				
6	383				
10	314				
15	324				
25	344			x	
40	364	x		x	x
60	384	x		x	x
V	V				
6	780				
10	711				
15	721				
25	741				
40	761				
60	781				
100	712				
150	722				
250	742				
400	762				
500	772				
600	782				

x = not possible or only on request

Transformer/scale table

Graduation	Code No.
A	A
10	314
15	324
20	334
25	344
30	354
40	364
50	374
60	384
75	358
100	315
150	325
200	335
250	345
300	355
400	365
500	375
600	385
750	368
800	395
kA	kA
1	316
1.2	318
1.5	326
2	336
2.5	346
3	356
kV	kV
0.5	272
0.6	282
1	213
3	253
5	273
6	283
10	214
20	234
25	244
30	254

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