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Manual KREBS Viscometer PCE-RVI 5



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1 Introduction

Thank you for purchasing a viscometer from PCE Instruments.

The PCE-RVI 5 viscometer was designed to measure the viscosity of paints, varnishes, adhesives, pastes and liquid inks according to the ASTM D562 standard. The readings are displayed in KU (KREBS units), g (grams) or cP (centipoises). The viscosity measurements can be performed automatically (by using pre-defined settings) or manually. Once you finished a measurement, the results can be sent to a printer via the integrated RS 232 interface. This makes the viscometer an ideal device for industrial and research applications.

2 Safety notes

Please read this manual carefully and completely before you use the device for the first time. The device may only be used by qualified personnel and repaired by PCE Instruments personnel. There is no warranty of damages or injuries caused by non-observance of the manual.

- The device may only be used in approved the temperature range.
- The case should only be opened by qualified personnel of PCE Instruments.
- The instrument should never be placed with the user interface facing an object (e.g. keyboard side on a table).
- You should not make any technical changes to the device.
- The appliance should only be cleaned with a damp cloth / use only pH-neutral cleaner.
- The viscometer should only be operated by specially trained personnel.
- Do not expose the device or its components (except the spindle) to water or other liquids. Do not operate the device with wet hands.
- The viscometer must not be operated in areas with explosive or inflammable atmospheres.
- The device should only be operated in a controlled electromagnetic environment. Transmitters, such as cell phones, should not be used close to the viscometer.
- Make sure that the device is levelled properly before taking a measurement. Use a water level to check and adjust.

This user's handbook is published by PCE Instruments without any guarantee.

We expressly point to our general guarantee terms which can be found in our general terms of business.

If you have any questions please contact PCE Instruments.

3 Specification

3.1 Technical specifications

Rotational speed	200 rpm \pm 1 rpm
Viscosity range	KU: 40.2 ... 141 g: 32 ... 1,099 cP: 27 ... 5,274
Resolution	KU: 0.1 KU g: 1.0 g cP: 5 cP
Accuracy	\pm 1 % F. S.
Repeatability	\pm 0.5 %
Power supply	100 ... 240 V AC \pm 10 %; 50 ... 60 Hz
Fuses	1 x 2 AT
Overvoltage category	II
Operating conditions	+10 ... +40 °C \leq 80 %, non-condensing Max. altitude: 2,000 m above mean sea level
Pollution degree	2
Protection class	IP 20
Dimensions	325 x 190 x 500 mm
Weight	8.5 kg

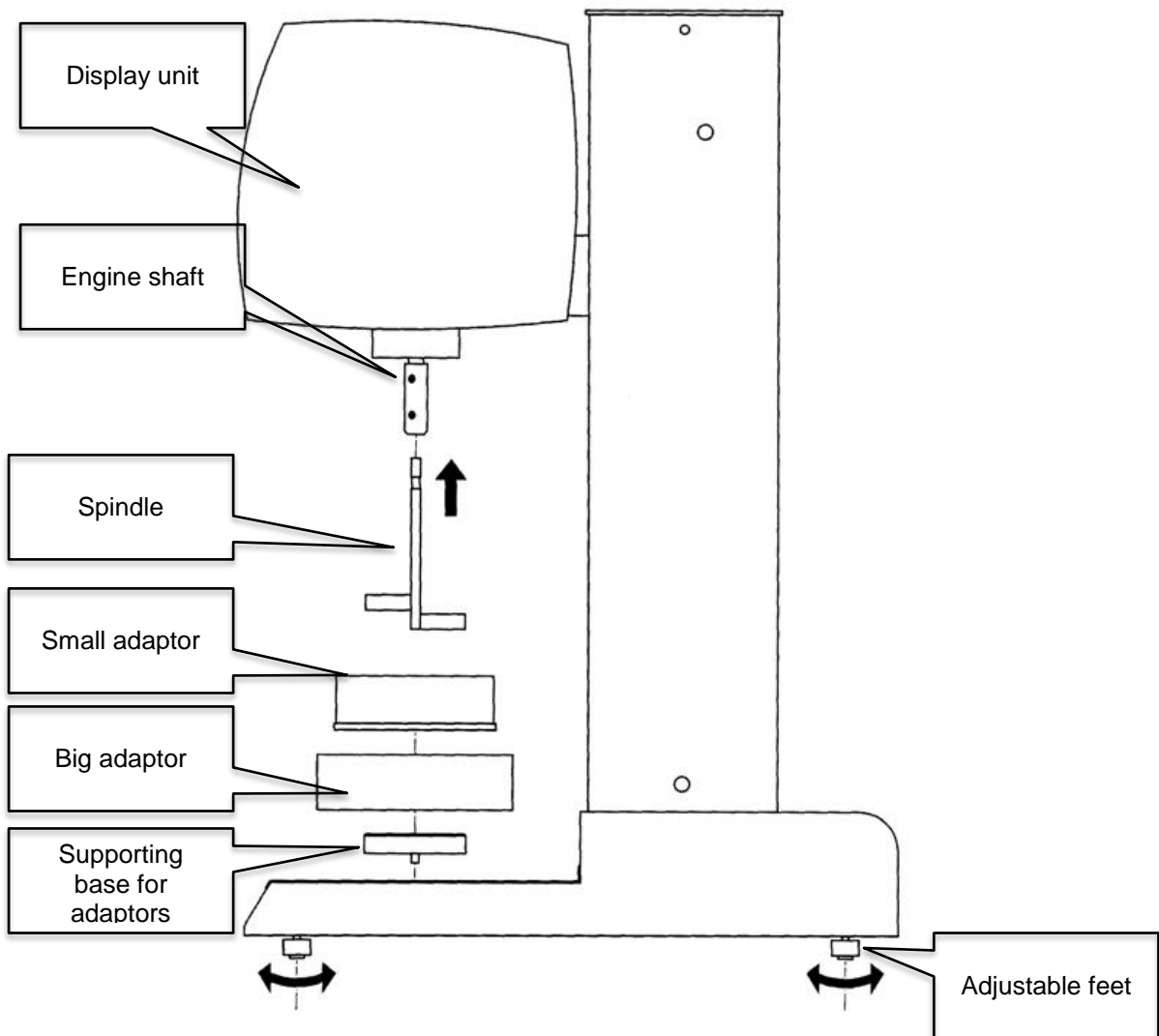
3.2 Contents of delivery

- 1 x viscometer PCE-RVI 5
- 1 x standard KREBS-type spindle
- 2 x adaptors for big and small cans
- 1 x supporting base for adaptors
- 1 x 600 ml beaker
- 1 x mains cable
- 1 x instruction manual

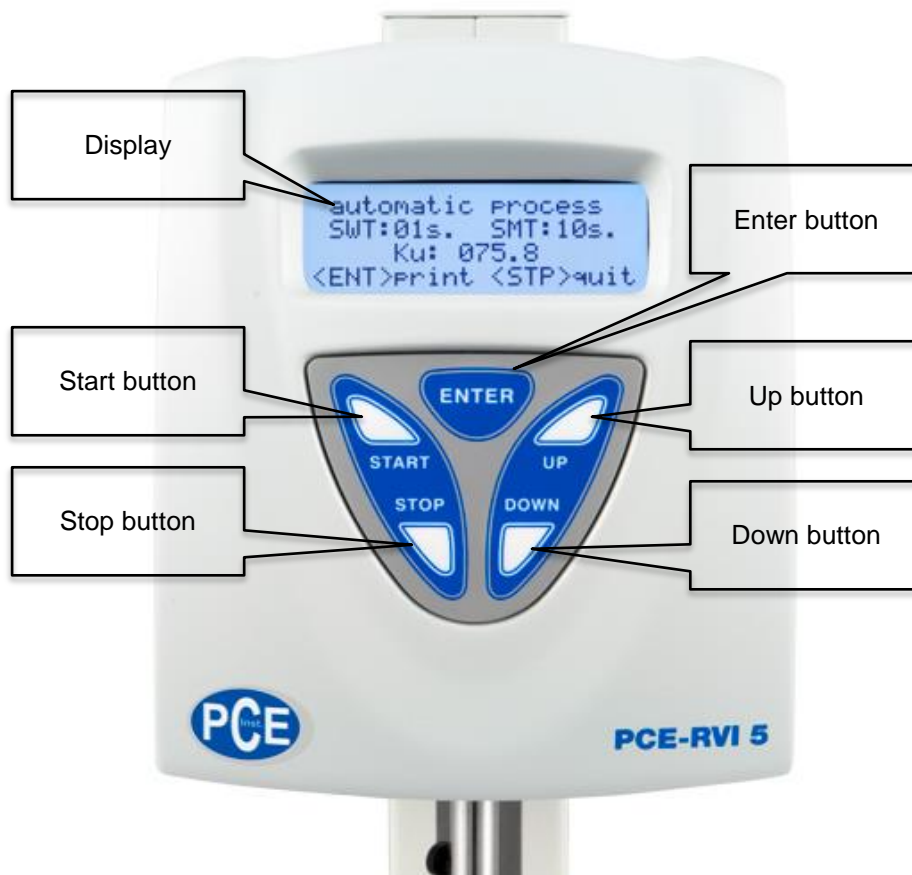
3.3 Optional accessories

- KREBS calibration oil
- Thermal printer
- Special paste spindle

4 System description



Button description



Interface description



Power switch, mains connection and RS 232 interface are located at the back of the viscometer.

5 Set up the viscometer

5.1 Level the viscometer

It is very important that the viscometer is levelled properly when taking a measurement. Use the adjustable feet and a water level to do so.

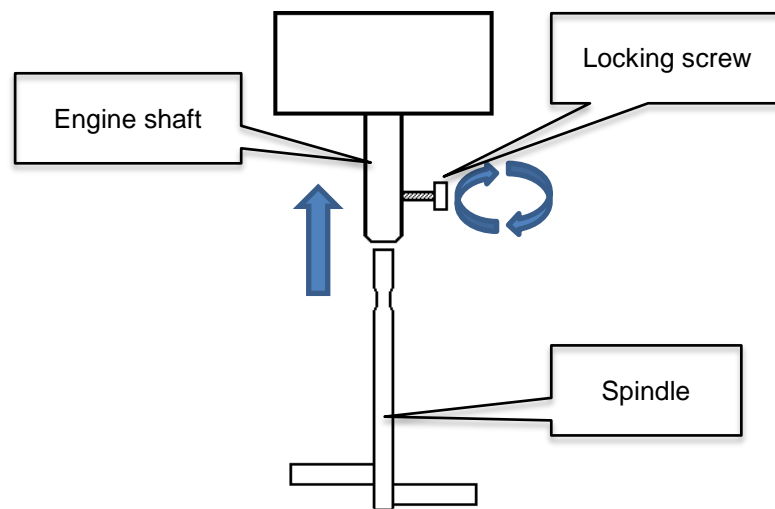
5.2 Power connection and printer connection

As seen in chapter 4, the power connector is located at the rear side of the device. Plug in the mains cable and connect it to a power outlet.

The printer connection is located at the rear side of the device as well. Use a regular RS-232 cable to connect the viscometer to a printer.

5.3 Attach the spindle

To attach the spindle, insert its top end into the hole at the bottom side of the engine shaft. Then use the locking screw and fix the spindle by rotating clockwise, as seen on the picture below.



After that, gently pull the spindle down, until it reaches the lowest position possible and check if it fits correctly.

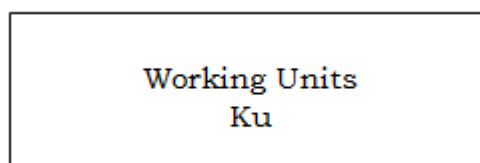
5.4 Initial turn-on and configuration

Before starting a measurement, you should set up the device first.

To do so, turn on the viscometer by pressing the power switch on the back of the device.

An information screen appears on the display. Now press the Start button and the Enter button shortly afterwards to enter the configuration menu.

The display now shows the **measuring unit** selection screen:



Use the Up and Down buttons to select the desired measuring unit. You can choose between Ku (Krebs units), cP (centipoises) and g (grams). Press Enter to confirm your selection.

Now you get to the **sample wait time** settings:

SWT: 01
Sample Wait Time

Here you can adjust the time, which the spindle remains immersed in the fluid without any movement before starting the rotation. The fluid can stabilize during this period of time.

By default, the sample wait time is set to 1 second. By using the Up and Down buttons, you can set it up to 99 seconds. Once you have set your desired value, press Enter to confirm.

Next you get to the **sample measure time** settings:

SMT: 10
Sample Measure Time

Here you can set the rotation time of the spindle within the fluid after the measurement has started. After this period of time, the reading appears on the display.

By default, the rotation time is set to 10 seconds, but you can set it to anything between 5 and 99 seconds by using the Up and Down buttons. Once you have reached the desired value, press Enter to confirm.

Now you get to the **time and date** settings:

TIME/DATE
EU mode

First, you have to select how the date shall be displayed. You can choose between EU mode (day-month-year) and US mode (month-day-year). Use the Up and Down buttons to select and press enter to confirm.

Based on your selection, you can now set the date and time in EU or US mode:

Set Clock EU mode	
Friday	(day)
04-12-09	(ddmmyy)
13:04:05	(hhmmss)

First, select the day of the week by using the Up and Down buttons. Press Enter to confirm.

Next, set up the date. In EU mode you first have to select the day, followed by the month and the year. In US mode it is the month first, followed by the day and the year. Use the Up and Down buttons to select a value. By pressing Enter, you get to the next selection. After confirming all three values (day, month, year) by pressing Enter, you get to the time setting.

You set the time just as you have set the date before. First choose the hours by using the Up and Down buttons and press Enter to confirm. Then do the same with the minutes and with the seconds afterwards. After confirming the seconds by pressing Enter, the setup is finished and you will be redirected to the information screen automatically.

6 Measuring

When you turn on the viscometer by pressing the power switch, you first see the information screen, followed by a working mode selection screen:

```
VK 2000 1.5
<START> automatic
<ENTER> manual
13:14:09
```

Here you can choose between automatic measuring mode and manual measuring mode.

6.1 Automatic measuring mode

In automatic mode, the spindle goes down automatically to the lowest position possible when starting the measurement. You can use the automatic measuring mode for any sample container that fits between the working platform and the spindle, as long as the spindle can reach its lowest position.

To enter the automatic measuring mode, press the Start button when in working mode selection. Now you get to the following screen:

```
automatic process
SWT: 01s. SMT: 05s.
Ku: 000.0
Press <START>
```

Here you can see and adjust the measuring settings. The sample wait time settings are selected and flashing when you enter this screen. Use the Up and Down buttons to change the value and press Enter to confirm. Next, the sample measure time setting becomes active. Again, use the Up and Down buttons and the Enter button. Last, the measuring unit setting becomes active. Select the desired measuring unit by using Up and Down and confirm by pressing Enter.

Once all parameters are set as desired, press the Start button to start the measuring procedure.

The head of the viscometer with the spindle at the bottom now moves down to the lowest position possible. After the set sample wait time (SWT), the spindle starts to rotate and the measurement begins. Now you can see the sample measure time indication (SMT) on the display counting down. Once the measuring time is over, the spindle stops and the head of the viscometer moves back to its starting position. You can now see the final reading on the display.

```
automatic process
SWT: 01s. SMT: 05s.
Ku: 000.0
<ENT> print <STP> quit
```

If a printer is connected to the viscometer, you can now press Enter to print the results.

```
-----
KREBS VISCOMETER
-----
Model: VK2000
Ser.No. VK1200910006
-----
Time: 17:25:55
Date: 14-12-09
-----
RESULTS
-----
Ku: 104.7
g: 0538
cP: 1881
-----
Signature
-----
```

Press the Stop button to return to the working mode selection.

Note: If you use the included 600 ml beaker, we recommend filling it up to the 450 ml mark when working in automatic mode. Use the big adaptor.

Note: You can stop the measuring procedure at any point by pressing the Stop button. The viscometer stops at its current position and returns to the working mode selection screen.

Note: If the head of the viscometer is not in its starting position (highest position) when entering automatic measuring mode, it automatically moves back to its starting position.

6.2 Manual measuring mode

When using the manual measuring mode, you can adjust the height of the spindle manually. This means that you can use different sample containers or sample volumes which cannot be used in automatic mode.

To enter manual measuring mode, press the Enter button when in working mode selection. You get to the following screen:

```
<UP/DOWN> spindle
<START/STOP> measure
Ku: 000.0
<ENTER> print
```

Now you can use the Up and Down buttons to move the spindle to the desired height. After that, you can start the measurement by pressing the Start button. If you want to stop the measurement, just press the Stop button. Once you are done with the measurement, you can print out the results by pressing the Enter button. To return to the working mode selection, press the Stop button again.

Note: When entering manual measuring mode, the spindle does not move back to its starting position automatically. You have to do this manually.

Note: Make sure that the spindle is completely covered by the fluid before starting the measurement.

7 Troubleshooting

Problem	Possible solution
The viscometer does not work	Check the power switch
	Check the mains connection
The instrument does not show “zero” without any fluids	Check if the device is levelled properly
	Contact our customer support
Viscosity reading is unstable or inaccurate	Check if device is levelled properly
	Check if the temperature of the sample is stable
	Check the characteristics of the sample to be measured

8 Further information

8.1 Calibration

The viscometer comes factory-calibrated and with a calibration certificate.

However, we recommend checking the accuracy of the viscometer on a regular basis by using optional calibration oils.

g	KU	cP	g	KU	cP	g	KU	cP	g	KU	cP	g	KU	cP	g	KU	cP	g	KU	cP
626	121.0	2948	701	125.1	3317	776	129.7	3686	851	133.8	4054	926	137.0	4423	1001	139.8	4792	1076	141.0	5161
627	121.1	2953	702	125.1	3322	777	129.8	3691	852	133.9	4059	927	137.1	4428	1002	139.8	4797	1077	141.0	5166
628	121.1	2958	703	125.2	3327	778	129.8	3695	853	133.9	4064	928	137.1	4433	1003	139.8	4802	1078	141.0	5171
629	121.2	2963	704	125.2	3332	779	129.9	3700	854	134.0	4069	929	137.2	4438	1004	139.8	4807	1079	141.0	5176
630	121.2	2968	705	125.3	3336	780	130.0	3705	855	134.0	4074	930	137.2	4443	1005	139.9	4812	1080	141.0	5181
631	121.3	2972	706	125.4	3341	781	130.0	3710	856	134.0	4079	931	137.2	4448	1006	139.9	4817	1081	141.0	5186
632	121.3	2977	707	125.4	3346	782	130.1	3715	857	134.1	4084	932	137.3	4453	1007	139.9	4822	1082	141.0	5191
633	121.4	2982	708	125.5	3351	783	130.2	3720	858	134.1	4089	933	137.3	4458	1008	139.9	4827	1083	141.0	5196
634	121.4	2987	709	125.5	3356	784	130.2	3725	859	134.2	4094	934	137.4	4463	1009	139.9	4832	1084	141.0	5201
635	121.5	2992	710	125.6	3361	785	130.3	3730	860	134.2	4099	935	137.4	4468	1010	139.9	4836	1085	141.0	5205
636	121.6	2997	711	125.7	3366	786	130.4	3735	861	134.3	4104	936	137.4	4472	1011	139.9	4841	1086	141.0	5210
637	121.6	3002	712	125.7	3371	787	130.4	3740	862	134.3	4109	937	137.5	4477	1012	140.0	4846	1087	141.0	5215
638	121.7	3007	713	125.8	3376	788	130.5	3745	863	134.4	4113	938	137.5	4482	1013	140.0	4851	1088	141.0	5220
639	121.7	3012	714	125.8	3381	789	130.5	3750	864	134.4	4118	939	137.6	4487	1014	140.0	4856	1089	141.0	5225
640	121.8	3017	715	125.9	3386	790	130.6	3754	865	134.5	4123	940	137.6	4492	1015	140.0	4861	1090	141.0	5230
641	121.8	3022	716	126.0	3391	791	130.7	3759	866	134.5	4128	941	137.6	4497	1016	140.0	4866	1091	141.0	5235
642	121.9	3027	717	126.0	3395	792	130.7	3764	867	134.6	4133	942	137.7	4502	1017	140.0	4871	1092	141.0	5240
643	121.9	3032	718	126.1	3400	793	130.8	3769	868	134.6	4138	943	137.7	4507	1018	140.0	4876	1093	141.0	5245
644	122.0	3036	719	126.1	3405	794	130.8	3774	869	134.7	4143	944	137.8	4512	1019	140.1	4881	1094	141.0	5250
645	122.0	3041	720	126.2	3410	795	130.9	3779	870	134.7	4148	945	137.8	4517	1020	140.1	4886	1095	141.0	5254
646	122.0	3046	721	126.3	3415	796	131.0	3784	871	134.8	4153	946	137.8	4522	1021	140.1	4891	1096	141.0	5259
647	122.1	3051	722	126.3	3420	797	131.0	3789	872	134.8	4158	947	137.9	4527	1022	140.1	4896	1097	141.0	5264
648	122.1	3056	723	126.4	3425	798	131.1	3794	873	134.9	4163	948	137.9	4532	1023	140.1	4901	1098	141.0	5269
649	122.2	3061	724	126.4	3430	799	131.1	3799	874	134.9	4168	949	138.0	4537	1024	140.1	4906	1099	141.0	5274
650	122.2	3066	725	126.5	3435	800	131.2	3804	875	134.9	4172	950	138.0	4541	1025	140.1	4910			
651	122.3	3071	726	126.6	3440	801	131.2	3809	876	135.0	4177	951	138.0	4546	1026	140.2	4915			
652	122.3	3076	727	126.6	3445	802	131.3	3813	877	135.0	4182	952	138.1	4551	1027	140.2	4920			
653	122.4	3081	728	126.7	3450	803	131.3	3818	878	135.1	4187	953	138.1	4556	1028	140.2	4925			
654	122.4	3086	729	126.7	3454	804	131.4	3823	879	135.1	4192	954	138.2	4561	1029	140.2	4930			
655	122.5	3091	730	126.8	3459	805	131.4	3828	880	135.2	4197	955	138.2	4566	1030	140.2	4935			
656	122.6	3095	731	126.9	3464	806	131.5	3833	881	135.2	4202	956	138.2	4571	1031	140.2	4940			
657	122.6	3100	732	126.9	3469	807	131.6	3838	882	135.3	4207	957	138.3	4576	1032	140.2	4945			
658	122.7	3105	733	127.0	3474	808	131.6	3843	883	135.3	4212	958	138.3	4581	1033	140.3	4950			
659	122.7	3110	734	127.0	3479	809	131.7	3848	884	135.4	4217	959	138.4	4586	1034	140.3	4954			
660	122.8	3115	735	127.1	3484	810	131.7	3853	885	135.4	4222	960	138.4	4591	1035	140.3	4959			
661	122.8	3120	736	127.2	3489	811	131.8	3858	886	135.4	4227	961	138.4	4596	1036	140.3	4964			
662	122.9	3125	737	127.2	3494	812	131.8	3863	887	135.5	4232	962	138.5	4601	1037	140.3	4969			
663	122.9	3130	738	127.3	3499	813	131.9	3868	888	135.5	4236	963	138.5	4606	1038	140.4	4974			
664	123.0	3135	739	127.3	3504	814	131.9	3872	889	135.6	4241	964	138.6	4611	1039	140.4	4979			
665	123.0	3140	740	127.4	3509	815	132.0	3877	890	135.6	4246	965	138.6	4615	1040	140.4	4984			
666	123.1	3145	741	127.5	3513	816	132.0	3882	891	135.6	4251	966	138.6	4620	1041	140.4	4989			
667	123.1	3150	742	127.5	3518	817	132.1	3887	892	135.7	4256	967	138.7	4625	1042	140.4	4994			
668	123.2	3154	743	127.6	3523	818	132.1	3892	893	135.7	4261	968	138.7	4630	1043	140.5	4999			
669	123.2	3159	744	127.6	3528	819	132.2	3897	894	135.8	4266	969	138.8	4635	1044	140.5	5004			
670	123.3	3164	745	127.7	3533	820	132.2	3902	895	135.8	4271	970	138.8	4640	1045	140.5	5009			
671	123.3	3169	746	127.8	3538	821	132.3	3907	896	135.8	4276	971	138.8	4645	1046	140.5	5013			
672	123.4	3174	747	127.8	3543	822	132.3	3912	897	135.9	4281	972	138.9	4650	1047	140.5	5018			
673	123.4	3179	748	127.9	3548	823	132.4	3917	898	135.9	4286	973	138.9	4654	1048	140.6	5023			
674	123.5	3184	749	128.0	3553	824	132.4	3922	899	136.0	4291	974	139.0	4659	1049	140.6	5028			
675	123.6	3189	750	128.0	3558	825	132.5	3927	900	136.0	4295	975	139.0	4664	1050	140.6	5033			
676	123.6	3194	751	128.1	3563	826	132.6	3932	901	136.0	4300	976	139.0	4669	1051	140.6	5038			
677	123.7	3199	752	128.2	3568	827	132.6	3936	902	136.1	4305	977	139.1	4674	1052	140.6	5043			
678	123.7	3204	753	128.2	3572	828	132.7	3941	903	136.1	4310	978	139.1	4679	1053	140.7	5048			
679	123.8	3209	754	128.3	3577	829	132.7	3946	904	136.2	4315	979	139.1	4684	1054	140.7	5053			
680	123.8	3213	755	128.4	3582	830	132.8	3951	905	136.2	4320	980	139.2	4689	1055	140.7	5058			
681	123.9	3218	756	128.4	3587	831	132.8	3956	906	136.2	4325	981	139.2	4694	1056	140.7	5063			
682	123.9	3223	757	128.5	3592	832	132.9	3961	907	136.3	4330	982	139.2	4699	1057	140.7	5068			
683	124.0	3228	758	128.6	3597	833	132.9	3966	908	136.3	4335	983	139.3	4704	1058	140.7	5072			
684	124.0	3233	759	128.6	3602	834	133.0	3971	909	136.4	4340	984	139.3	4709	1059	140.8	5077			
685	124.1	3238	760	128.7	3607	835	133.0	3976	910	136.4	4345	985	139.3	4713	1060	140.8	5082			
686	124.2	3243																		

9 Contact

If you have any questions about our range of products or measuring instruments please contact PCE Instruments.

9.1 PCE Instruments UK

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