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Manual PCE-2000 and PCE-2000DL Hardness Tester



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1. Introduction

PCE-2000 is an advanced Hand-held hardness tester, characterized by its high accuracy, wide measuring range and simplicity for operation. It is suitable for testing hardness of the ordinary metal and widely applied in many industrial fields, such as petroleum, chemistry machinery and electric power industries etc.

2. Typical Applications

- Installed machines and permanent parts of assembled system
- Molding surface of die
- Heavy work-pieces
- Ineffectiveness analysis of pressure-vessel, turbo-generator set etc.
- Bearing and other messy produced parts at production line
- Obtaining test data requested as original formal records
- Identifying metallic material stored in a warehouse

3. Technical Data

Display : 128×64 LCD

Display error: ± 0.5

Relative repetitive display error: ± 0.8

Memory: 1250







Battery: 2 pieces AAA batters with working more than 48 hours continuously (no backlight)

Auto-off: 2 minutes without working

Size: 108×62×25 mm

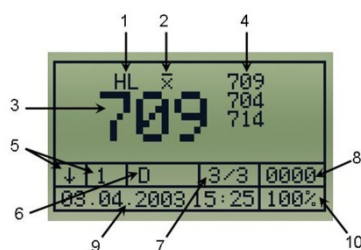
Weight: 180g

4. Function of Keyboard

- ①  ON/OFF
- ②  Move/Print data
- ③  Move/Backlight
- ④  Delete
- ⑤  Re-read
- ⑥  Menu/Enter

5. Function of Display

- ① hardness scale
- ② symbol of average
- ③ average value
- ④ measuring value
- ⑤ direction and materials
- ⑥ type of impact device
- ⑦ times of measurement/average
- ⑧ memory location
- ⑨ date and time
- ⑩ battery power



6. Pretreatment of Samples

6.1. Pre-treatment of Samples Surface

To eliminate hardness error possibly resulted from the roughness of sample surface, the test surface should be polished smooth, neat appearing metallic luster until its roughness Ra attends no more than 2um. The test surface should be clean and free from oil stain.

6.2. Support to test samples

- For test samples weight over 5kg, no support is needed.
- Samples of cantilever or thin shell shape and weight over 5kg to be coupled firmly and tightly with them so as to prevent themselves from bending deformation or displacement due to impact force.
- Test sample weight less than 2kg should be coupled grimly and tightly with support weight over 5kg
- Minimum weight of a test sample should not be less than 100g, minimum thickness not less than 5 mm and minimum depth of hardened layer, not less than 0.8mm.

6.3. Advice

When the test sample is a large plate, long bar or bent work piece, impact force can cause it deformed or unstable and bring about error in measurement even if its weight or thickness seems applicable. In this case reinforcement should be bound to the back of the sample surface opposite to the impact force.

6.4. Test sample should not be magnetic in property.

Note: table 1 show the relationship of impact and sample

Sample	Sample Weight (kg)			Min Thickness (mm)		Max Roughness	
	Need suppo-rt	Need to be stabilized	No Strengthe-ning need	sample	Hard-ened layer	ISO	Ra
D DC	0.05-2	2.5	>5	3	0.8	N7	2
G	0.5-5	5-15	>15	10		N9	7
C	0.02-0.05	0.5-1.5	>1.5	1	0.2	N5	0.4

7. Operation of the Instrument


7.1. Starting

Insert the plug of impact device to the gauge and press  key turning on the power, then detailed items of available function last used will display on the LCD.

7.2. Function of Menu


Users can change or modify the function of gauge by selecting different items of menu.

Press  key into menu state, then press  key or  key to select item you want to change or modify.

The display like this: 

1. MEASUREMENT
2. IMPACT DEVICE
3. DIRECTION
4. AVERAGE TIMES
5. MATERIAL
6. SCALE
7. TOLERANCE
8. DATE AND TIME
9. LOCATION
10. MEMORY
11. PRINT
12. CALIBRATION
13. DEFAULT




7.2.1. Measurement

- Press  key, the gauge will go back measurement state.

7.2.2. Impact Device

There are 7 types of impact device be selected according to the measurement and material.




1. D
2. DC
3. D+15
4. DL
5. C
6. G
7. E

- Press  key or  key to select the type of impact device
- Press  key to confirm

7.2.3. Direction

You can select 5 directions, such as:

1. ↓
2. ↘
3. →
4. ↗
5. ↑

- Press  key or  key to select the direction
- Press  key to confirm

7.2.4. Average Times


The average times from 2 to 8, selected by pressing  key to increase times, Press  key to confirm.

7.2.5. Material

The gauge provides 9 types of material,

1. STEEL
2. TOOL STEEL
3. STAINLESS
4. GREY CAST IRON
5. CAST IRON GGG
6. CAST ALUMINUM
7. BRASS
8. BRONZE
9. COPPER




- Press  key or  key to select the required material

- Press  key to confirm

7.2.6. Scale




7 types of scale can be selected according to measurement.

1. HL 2. HRC 3. HRB 4. HB 5. HS 6. HV



- Press  key or  key to select the required scale
- Press  key to confirm

7.2.7. Tolerance

If the measurement value is lower than lower limit value or upper than upper limit value, the sign “ L “ or “ H “ will appear on the LCD.




- Press  key to increase limit value
- Press  key to change setting value
- Press  key to confirm

7.2.8. Date and Time

The gauge provides real display of date and time. Through pressing  key or  key, you can change or modify the date and time.

7.2.9. Location

The gauge provides 1250 memory locations, from 0000 to 1249.

- Press  key to increase location value
- Press  key to change location value
- Press  key to confirm

7.2.10. Memory

You can select “AUTO STORE ”or “CLOSE STORE ”states to determining store or not store measuring value.

7.2.11. Print

Through determining the desired initial and end location number, you can print the value stored in the gauge.

7.2.12. Calibration

You can modify measurement value when an error happening by changing desired value.

7.2.13. Default

The gauge will recover the default parameters when confirm "DEFAULT" state.

Materials	HL	HRC	HRB	HB		HS	HV
				30D ²	10D ²		
Steel	300~900	20.0~68.0	38.4~99.5	80~647		32.5~99.5	80~940
Tool steel	300~640	20.4~67.1	46.5~101.7				80~898
Stainless steel	300~800	19.6~62.4		85~656			85~802
Cast iron GG	360~650			90~334			
Cast iron GGG	400~660			131~367			
Cast aluminum	174~560				20~190		
Brass	200~550		13.5~95.3		40~173		
Bronze	300~700				60~290		
Copper	200~690				45~315		

No.	Materials	D	DC	D 15	C	E	G	DL
1	Steel	★	★	★	★	★	★	★
2	Tool steel	★	★	★		★		★
3	Stainless steel	★	★					
4	Cast iron GG	★	★				★	
5	Cast iron GGG	★	★				★	
6	Cast aluminum	★	★					
7	Brass	★	★					
8	Bronze	★	★					
9	Copper	★	★					

Note: ★ means available

In this direction will find a vision of the measurement technique:
<http://www.industrial-needs.com/measuring-instruments.htm>

NOTE: "This instrument doesn't have ATEX protection, so it should not be used in potentially explosive atmospheres (powder, flammable gases)."