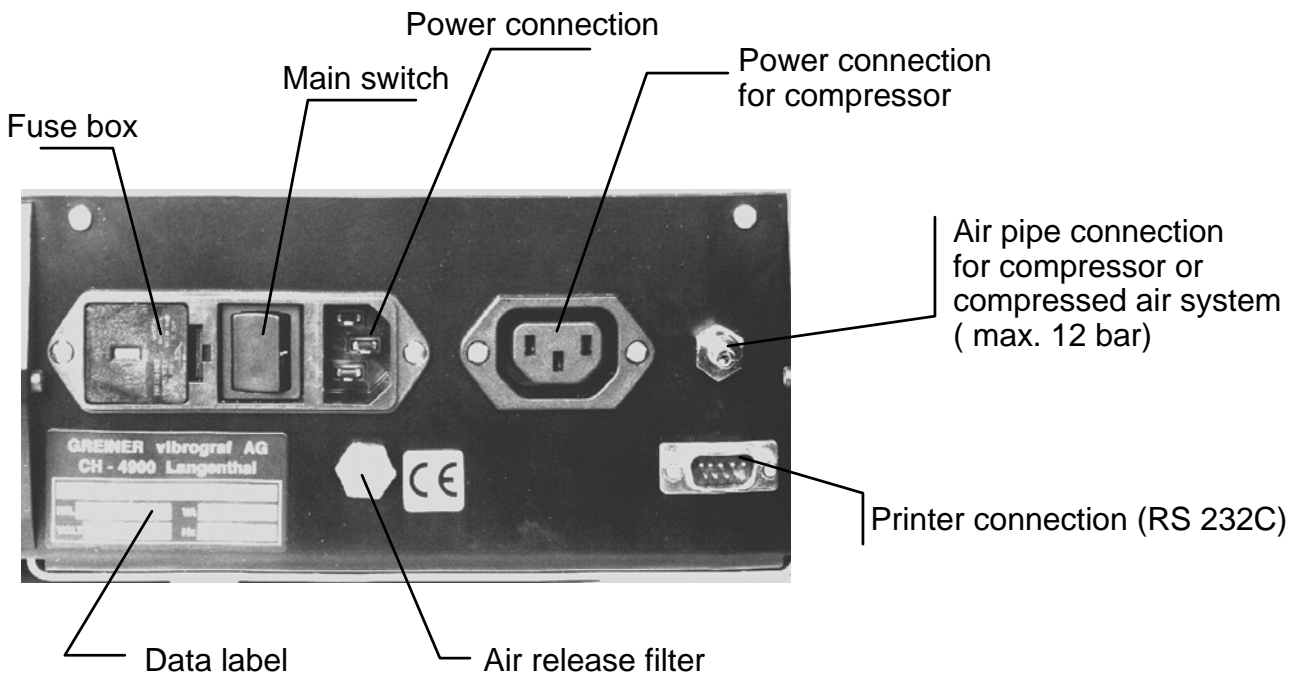


<b>CONTENTS</b>	<b>PAGE</b>
<u>Table of contents</u>	<u>1</u>
<u>Installation</u>	<u>2</u>
<u>Introduction ( Display , monitor )</u>	<u>3</u>
<u>Introduction ( Operating elements )</u>	<u>4</u>
<u>Introduction ( Result interpretation)</u>	<u>5</u>
<u>Factory default tests</u>	<u>6</u>
<u>Programing of (Single Test method )</u>	<u>7</u>
<u>Programing of ( Low and High pressure test )</u>	<u>8</u>
<u>Programing of ( Under - and Overpressure test )</u>	<u>9</u>
<u>Testing of a watch</u>	<u>10</u>
<u>Result printout</u>	<u>11</u>
<u>Printer Installation</u>	<u>12</u>
<u>Creating a new head for result printout</u>	<u>13</u>
<u>Interpretation of printed data</u>	<u>14</u>
<u>Table of ASCII - Codes</u>	<u>15</u>
<u>Error Codes</u>	<u>16</u>
<u>Installation and operation of WPL-310</u>	<u>17</u>
<u>Operating instructions of WPL-310</u>	<u>18</u>

---

**Rear side of Neptune 500 :**

The Neptune 500 can be connected either to a compressed air system or it can be used with a compressor (max. 12 bar).

Order number of the compressor of **Greiner vibrograf (223 V ) Art.Nr. 15255**

Order number of the compressor of **Greiner vibrograf (115 V ) Art.Nr. 11168**

**Connecting the compressor :**

Connect the power cord of the compressor with the corresponding plug on rear side. Plug in the metal adaptor of the plastic - pipe to the air pipe connection of compressor. The metal adaptor includes an airfilter and a one way valve.

To disconnect the air pipe from the Neptune 500, just pull out the metal adaptor. The installed one way valve prevents the outlet of compressed air.

**Power connection :**

Before connecting the power cord to the instrument, make sure that the mains voltage is equal to the voltage of the Neptune 500.

The Neptune 500 is available in 230 or 115 Volt.

**Connecting the Printer :**

Connect the data cable of the printer to the plug (RS 232C) of the instrument. Switch on the printer .

**Switching on the Neptune 500 :**

Switch on the main power switch at the rear of the instrument. After a short moment a peep-sound is heard and the display becomes active.

If the instrument is not operated during 10 minutes, the information on the display is deleted and replaced by a line segment moving from the left to the right. This means, the Neptune 500 is in standby and economic mode. To reactivate it, simply press the stop key.

**Introduction :**

The Neptune 500 operates with an overpressure from 0,2 up to 10 bar and a underpressure down to - 0,7 bar. The outfit can be compared with the WPC 300 A. The operating as well as the automatic result calculation have been modernised and automated. The programed Test-parameters remain stored even after switching off.

The Neptune 500 operates with the same compressor as the WPC 300 A. (Oil free compressor without tank.)

The factory default test-parameters can be restored and or modified anytime by the user.

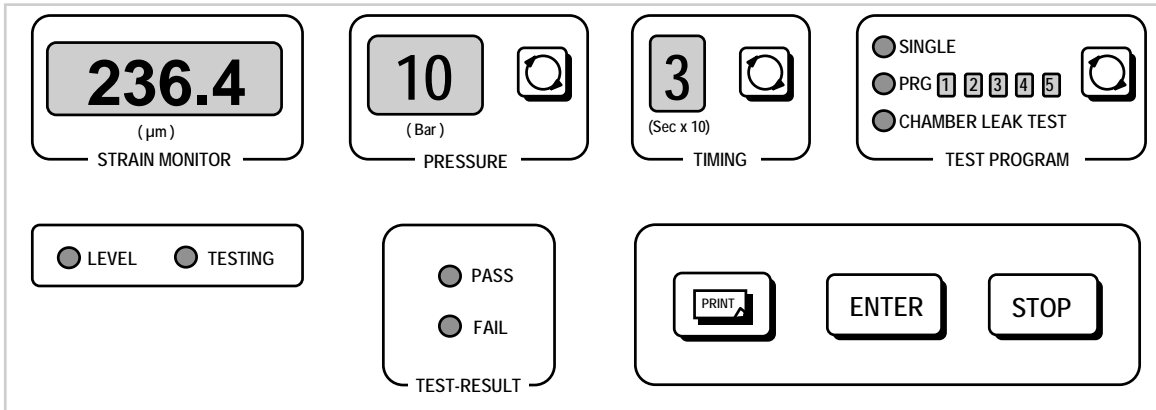
The Neptune 500 is equipped with a serial printer interface (RS-232C) .

If the instrument is switched on, but not in operation during 10 minutes, the actual value on the display will be replaced by a line segment moving from the left to the right. This means, the Neptune 500 is in Standby-mode. To reactivate the instrument, simply press the STOP key . The values from the last test are visible again.

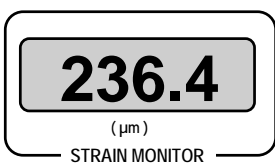
**Warming up :**

The Neptune 500 must be switched on about 10 minutes before a watch is tested to stabilize the electronic components. Only this way a high precision of results can be guaranteed.

**\*\*\* THE FRONT PANEL \*\*\***



**Strain Monitor (Display)**

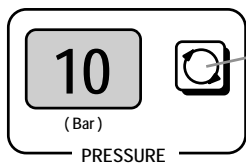


The monitor shows the following :

1. The maximum available range of deformation before the watch is under pressure.
2. The deformation of the watchcase during the test .
3. After the stabilisation period, the trend of any further deformation in (1/10 of µm) , determines whether the watch is waterproof or not.

**PRESSURE**

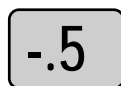
The following is displayed :



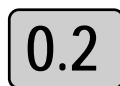
1. The programmed over-, resp. underpressure. By pressing the key, the value can be modified in a single test method.
2. During a test, the effective pressure in the chamber is displayed.

Example of the displayed values :

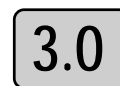
-0.5 bar



0.2 bar



3.0 bar



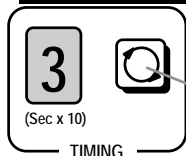
10 bar



**TIMING**

**(Testing-time)**

The following is displayed :



1. Before a test is started : the selected testing time.
2. During a test : the remaining testing time.

By pressing the key, the testing time can be modified in steps of 10 seconds, between 30 and 90 seconds .

Example of the displayed testing time :

30 seconds =

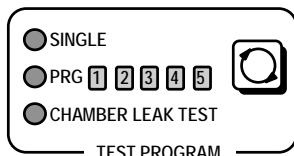


90 seconds =



**TEST PROGRAM**

The lighting display means the following :



SINGLE

The pressure and the testing time can be changed without altering the programs 1 to 5 . The test will be executed according to the selected pressure resp. testing time .

PRG 1 2 3 4 5

The test will be executed according to the selected program .

CHAMBER LEAK TEST

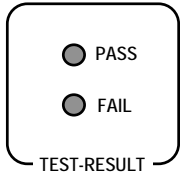
Used to check whether the chamber, pipe-connections and valves of the instrument are leakproof . The desired pressure for this test can be selected previously. The duration of the test is min. 90 seconds. It cannot be changed.



**SINGLE, PRG or CHAMBER LEAK TEST** can be selected by pressing this key.

**REMARKS :**

During a test the following parameters cannot be changed:  
**TEST PROGRAM, PRESSURE, TESTING-TIME.**



**DISPLAY OF TEST - RESULTS**

**Interpretation of lighting or flashing lights :**

**Single and Double - test method :**

- PASS lights : The watch is waterproof

---

- FAIL lights : The watch is not waterproof

---

- FAIL flashing : The initial deformation of the watch is not big enough.  
Reasons : The watch has a big leak.  
The watch is too hard.

**Double - test method :**

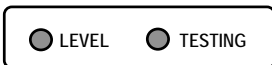
- PASS lights : Test in low pressure range is ok.
- FAIL lights : Test in high pressure range is bad.

---

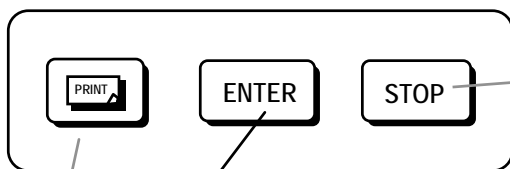
- PASS lights : Test in low pressure range is ok.
- FAIL flashing : Test in high pressure range is bad (big leak).

**LEVEL : Warning of sensor position**

**TESTING : Test in operation**



- TESTING lights : The test is executed.
- LEVEL lights : The sensor of the measuring head does not touch the watch correctly .  
Set the measuring head in a higher or lower position.
- LEVEL flashing : The deformation of the watch is higher than the instrument allows .



By pressing the **STOP** key, a test can be interrupted anytime.

By pressing the **ENTER** key ( if no test is in action ), the compressor is working. This function is reserved for use of **WPL - 310** in combination with Neptune 500 .

The **PRINT** key activates the result printout.

**Default ( factory setting ) of test programs.**

5 test programs are stored initially from factory.

	vacuum	low pressure	time	high pressure	time
Test No. 1	----	0,2	60	2,0	40
Test No. 2	----	0,2	60	3,0	40
Test No. 3	----	0,5	60	2,0	40
Test No. 4	0,2	----	60	3,0	40
Test No. 5	0,5	----	60	3,0	40


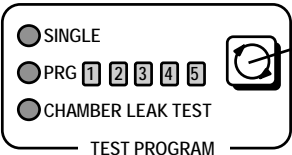

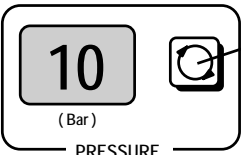
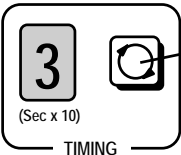


These test programs can be modified (see pages 7 to 9. )

The original factory setting programs can be re-loaded any time, as follows.

1. Switch off the instrument .
2. Switch on the instrument again while pressing the **STOP** key and release after a long single peep-sound is heard.

The 5 original factory setting test programs are restored again .

**Programming of a single test (only one over- or under pressure )**

1. Switch off the instrument.
2.  Switch on the instrument again while the ENTER key is pressed and release after 3 peep sounds .  
**PRG** light is flashing and the display shows **P1**
3.  Press this key until the desired program number (1- 5) lights up.  
The display shows e.g. **P1** (Program 1)
4.  Press the Enter key . The display shows **P1.1**
5.  Press this key until the desired over - or underpressure is displayed.
6.  Press this key until the desired testing time is displayed.  
3 means 30 seconds .
7.  Press Enter key to store the data.  
The display shows P1.2 (Program 1, step 2)
8.  To end program, press Stop key.

**To program a further test : Return to point 3.**

**Print-out of programs :**

example

1. Switch off Neptune 500.
2. Switch printer on and set it to ON- LINE resp. SEL.
3. Switch Neptune 500 on again and press continuously key " PRINT " until 1 peep sound is heard.


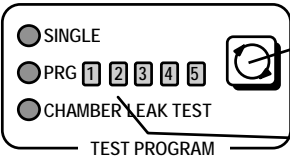

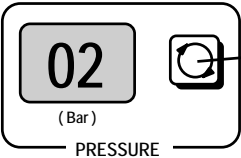
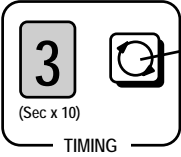

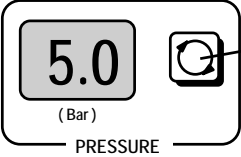
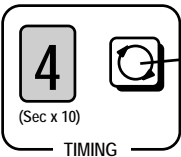


The 5 test programs are now printed automatically.

```

*****
GREINER NEPTUNE
PROGRAM PRINTOUT
*****
PRG 1 SETTING :


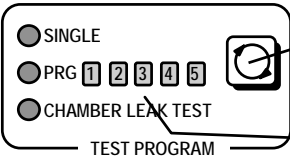

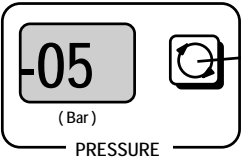
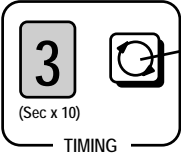

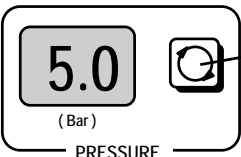
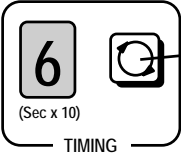


TEST MODE       : DOUBLE
TEST 1 TIMING   : 60 SECONDS
TEST 1 PRESSURE : 0.2 BAR
TEST 2 TIMING   : 40 SECONDS
TEST 2 PRESSURE : 2.0 BAR
*****
    
```

**To program a double test with low and high pressure.**

1. Switch off instrument
2.  Switch instrument on again and press the ENTER - key continuously until 3 peep-sounds are heard.  
The display **PRG** is flashing and shows P1.
3.  Press the key until the desired program number lights up.  
Display shows, for example, P2 (Program 2)  
(Program number)
4.  Press Enter key      Display shows P2.1  
(Program 2, step 1)
5.  Press key until the desired pressure appears.  
Step 1 is always lower pressure.
6.  Press key until the desired testing time appears.  
3 means 30 seconds.
7.  Press Enter key to store the data.  
Display shows P2.2 (Program 2, step 2)
8.  Press key until the desired high pressure appears.
9.  Press key until the desired testing time for the higher pressure appears. 4 means 40 seconds.
10.  Press Enter key to store the data.  
**To program a further test : Return to point 3**
11.  To end the test programming: Press Stop key.



**Programming a double test with underpressure and overpressure.**

1. Switch off instrument
2.  Switch instrument on again and keep ENTER - key pressed down until 3 peeps are heard.  
The display **PRG** flashes and shows **P3**
3.  Press the key until the desired program number lights up.  
The display shows, for example, P3 (Program 3)  
(Program number)
4.  Press Enter key Display shows P3.1  
(Program 3, step 1)
5.  Press key until the desired underpressure appears.  
  
 Press key until the desired testing time appears.  
3 means 30 seconds.
6.  Press Enter key to store the data.  
Display shows P3.2 (Program 3, step 2)
7.  Press key until the desired overpressure appears.
8.  Press key until the desired testing time for high pressure appears.  
6 means 60 seconds.
9.  Press Enter key to store the data.
10.  To end programming: Press Stop key.

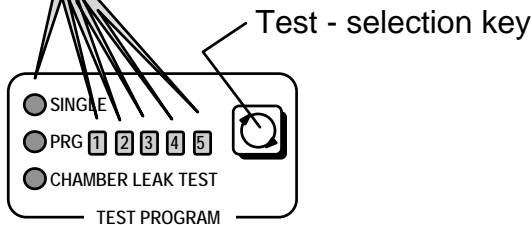
***To program a further test, return to point 3.***

**Important :**

The Neptune 500 must be switched on ca. 10 minutes before a watch is being tested, so that a stable temperature of the electronic can guarantee a high precision measurement.

**Procedure for testing a watch :**

1. Place watch on the inset on the table. Keep pressing the black button with your thumb and thus lower the measuring head with the sensor onto the watch. The sensor in the measuring head is then placed correctly when on the display the sign "level" is switched off.
2. By pressing the test selection button, you can choose your desired test program 1-5.

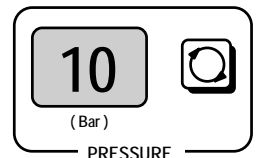
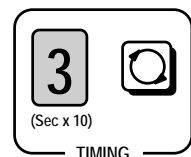


The selected test is showing on the lighted display.

3. Close the dome.  
The selected test will start automatically.

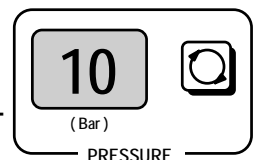
**SINGLE TEST:**

1. Select measuring time.
2. Select under- or overpressure.  
Close the dome.  
The test starts automatically.



**CHAMBER LEAK TEST:**

1. Select desired under- or overpressure.
2. Close dome, without a watch inside the instrument. The tightness test of the instrument starts automatically.  
After the stabilizing time, the test always takes 90 seconds.



Tests can be stopped by pressing the **STOP** key at any time.

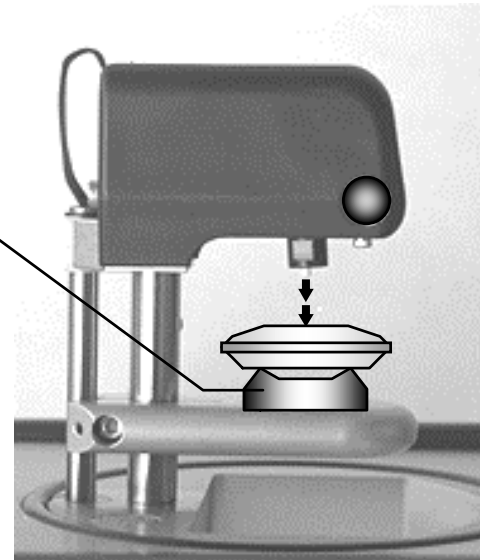
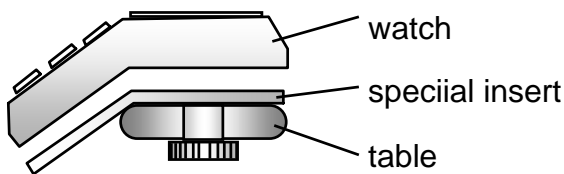
### Remarks to the measuring of normal big watches and relatively soft watches.

The inset is normally placed as shown in the picture on the right.

For small and very hard watches, the inset can be placed upside down.

For watches with a special form, for example Bang Olufsen, an individual special inset can be ordered.

#### Example



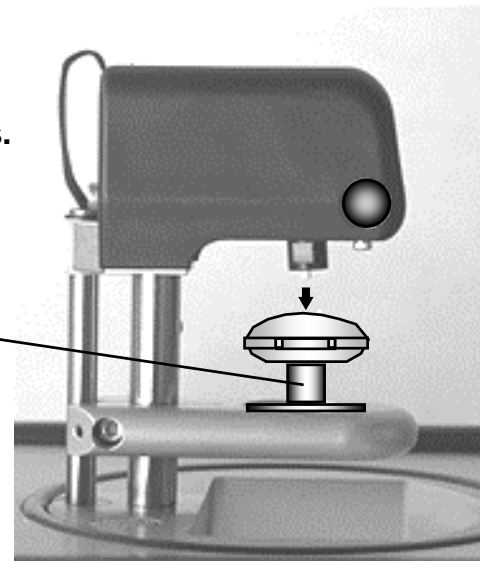
### Remarks to the measuring of very hard and small watches.



FAIL

If the display "FAIL" flashes during the measurement of a watch, it can be that the watch is too hard and therefore cannot be deformed enough.

In this case the inset on the table can be removed and put back upside down (see picture on the right). This means that with the same under- and overpressure, a larger deformation can be measured.



### Result printout :

If a printer is connected to the Neptune 500, the result may be printed out manually or automatically.

#### Activate the manual printout mode :

First switch on the Neptune 500 and after that, put the printer to **ON-LINE resp. SEL** .

In this mode, the result can be printed out by pressing the key



#### Activate the automatic printout mode :

1. Switch off the Neptune 500
  2. Switch on the printer and set to **ON-LINE resp. SEL** .
  3. Switch on the Neptune 500 . The automatic result printout is activated.
- The result will be printed automatically , if the test of a watch has come to end .

#### Deactivate the automatic printout mode :

Set the printer to **OFF- LINE resp. DS** . The Display shows EE60  
Now set the printer again to **ON - LINE resp. SEL** .

**To connect printer to the Neptune 500.**

- a) Switch off Neptune 500, connect the Databable and the serial connection of the Neptune 500 to the printer (see page 2).
- b) Connect the printer with the mains cable to the net and switch on.

**Printer specifications**

Following types of printers are recommended : Citizen iDP 560 or iDP 562.  
Both types are executed with an integrated serial interface ( RS 232C).

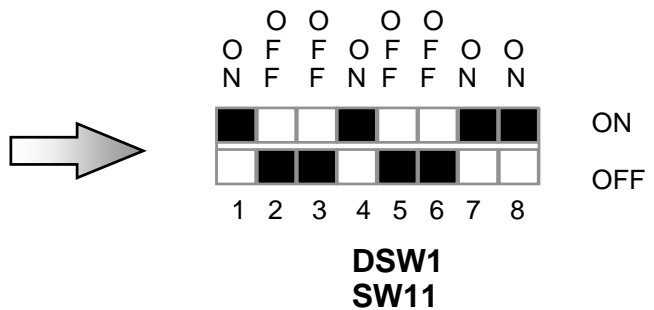
**Printer configuration:**

The printer can be configured by means of Code - switches which are placed inside the printer.  
To do this, the printer must be switched off and un-plugged. The bottom plate of the printer has to be taken off to reach the Code-switches.

Please read full details in the printer manual.

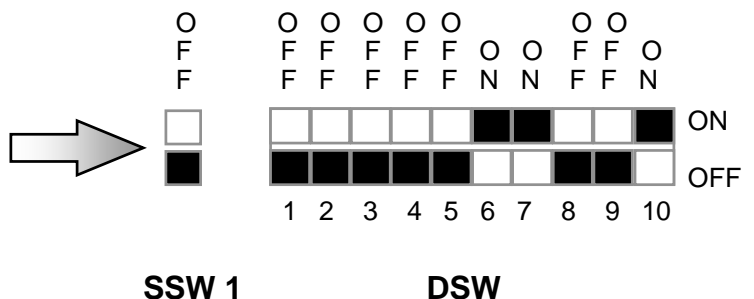
**Citizen iDP 560** Code-switches inside printer

Baud rate	: 4'800 bps
Data format	: 8 bits
Stop bit	: 1 or 2 bit
Parity bit	: no parity check
Signal level	: RS-232 C

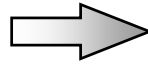


**Citizen iDP 562** Code-switches inside printer

Baud rate	: 4'800 bps
Data format	: 8 bits
Stop bit	: 1 or 2 bit
Parity bit	: no parity check
Signal level	: RS-232 C



Head of result printout



The head above the result printout may contain up to 5 lines with each 20 signs. These can be changed individually, as follows :

1. Write the desired text in the list on page 15. Each position from 1 to 20 should be filled in. Is there no text, a space must be added (ASCII-Code 32).
2. For each sign, the respective ASCII-Code is shown.
3. Has the head less than 5 lines, the end of the text is listed in the first position with NUL (ASCII-Code 0).

```

GREINER VIBROGRAF AG
CH-4900 LANGENTHAL

*****
NEPTUNE 500 : PRG 1
*****

SAMPLING TIME      : 50 OF 60 SEC.
TEST PRESSURE      : - 0.512 BAR
INITIAL STRAIN     : +002.1 µm
STRAIN TREND       : +0.026 %µm/MIN

TEST 1 : PASSED

SAMPLING TIME      : 40 OF 60 SEC.
TEST PRESSURE      : 3.125 BAR
INITIAL STRAIN     : -042.6 µm
STRAIN TREND       : +002.6 %µm/MIN

TEST 2 : FAILED
*****
    
```

4. Example

line 1

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
SIGN																					
CODE																					

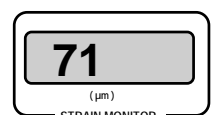
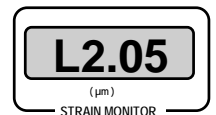
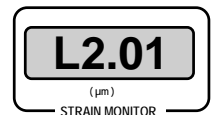
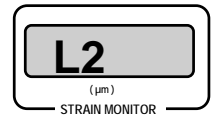
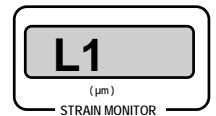
line2

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
SIGN																					
CODE																					

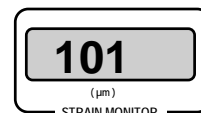
line 3

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
SIGN																					
CODE																					

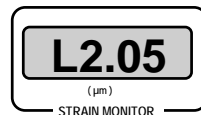
5. Switch off the Neptune 500. Switch the instrument on again by pressing the key "PRINT" until 2 peeps are heard. The display shows " L1 " .
6. To choose the line : Press "STOP" key until the desired line is displayed.
7. To confirm the line : Press "ENTER" key.
8. To change signs : Press "STOP" key as needed until the respective position is shown i.e. fifth sign from left.
9. To confirm position of signs : Press "ENTER" key. The display shows an ASCII-Code (i.e. 71 = G)



10. To change signs:  
Press **STOP**" key until the desired ASCII-Code ( 0, 32 - 126) is displayed i.e. Code 101 = e



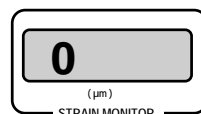
11. To change signs:  
Press " **ENTER**" key.  
The system returns back automatically to the desired sign position.



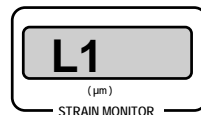
For each additional sign, repeat point 8 until 11.  
After the 20th sign position, the system returns back to the chosen line.

12. Choose new line: Repeat point 6 and 7.

13. Has the chosen text less than 5 lines, the following line shows in the first position " NUL" (ASCII-Code 0).

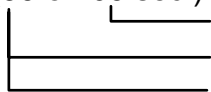


14. **Printout of one line** : In the line choosing mode i.e. line 1 press " **Print** " key.  
The printer must be at ON-LINE.



**Interpretation of printed data**

1. **Sampling time**  
(50 of 60 sec.)



the second figure **60** shows the selected sampling time.  
**50** shows the effective testing time if the result is ok.  
**50** shows the moment of time during which a leak has been found, if the result is bad ( 60-50 =10 sec.) after test start.

2. **Test printing**

Effective pressure in the chamber during sampling time.

3. **Initial strain**

Total deformation of the watch in the chamber.

4. **Strain trend**

Initial strain of the watch during sampling time.  
Data in % per minute with reference to the initial strain.

Is the strain trend and the initial strain the same,  
no leak has been found.

Is the strain trend and the initial strain different,  
a leak has been found.

The bigger the value, the bigger the leak.

example of printout

```

GREINER VIBROGRAF AG
CH-4900 LANGENTHAL

*****
NEPTUNE 500 : PRG 1
*****

SAMPLING TIME      : 50 OF 60 SEC.
TEST PRESSURE     : - 0.512 BAR
INITIAL STRAIN    : +002.1 µm
STRAIN TREND      : +0.026 %µm/MIN

TEST 1 : PASSED

SAMPLING TIME      : 40 OF 60 SEC.
TEST PRESSURE     : 3.125 BAR
INITIAL STRAIN    : -042.6 µm
STRAIN TREND      : +002.6 %µm/MIN

TEST 2 : FAILED
*****
    
```

List of signs with the respective ASCII - Codes

SIGN	CODE	SIGN	CODE	SIGN	CODE	SIGN	CODE	SIGN	CODE
NUL	00	3	51	G	71	[	91	o	111
SPACE	32	4	52	H	72	\	92	p	112
!	33	5	53	I	73	]	93	q	113
”	34	6	54	J	74	^	94	r	114
#	35	7	55	K	75	_	95	s	115
\$	36	8	56	L	76	`	96	t	116
%	37	9	57	M	77	a	97	u	117
&	38	:	58	N	78	b	98	v	118
'	39	;	59	O	79	c	99	w	119
(	40	<	60	P	80	d	100	x	120
)	41	=	61	Q	81	e	101	y	121
*	42	>	62	R	82	f	102	z	122
+	43	?	63	S	83	g	103	{	123
,	44	@	64	T	84	h	104		124
-	45	A	65	U	85	i	105	}	125
.	46	B	66	V	86	j	106	~	126
/	47	C	67	W	87	k	107		
0	48	D	68	X	88	l	108		
1	49	E	69	Y	89	m	109		
2	50	F	70	Z	90	n	110		

The following table, containing the lines (signs) for the desired text, and the lines (code) for the respective number of the text signs (see above chart), must be completed.

line 1

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SIGN																				
CODE																				

line 2

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SIGN																				
CODE																				

line 3

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SIGN																				
CODE																				

line 4

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SIGN																				
CODE																				

line 5

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SIGN																				
CODE																				

**List of error codes**

Error No.	Type	Description
EE00	Fatal	Program concluded
EE01	Fatal	Illegal stop information
EE02	Fatal	Heap Overflow
EE03	Fatal	Stack Overflow
EE04	Fatal	Real Overflow
EE07	Warning	Back-up batterie empty
EE10	Fatal	Time of air exit exceeded
EE30	Warning	Deformation of the watch too big Test break-up
EE51	Warning	Pressure increase during test
EE52	Warning	Pressure decrease during test
EE60	Warning	COM 1 not ready
EE61	Warning	COM 1 Buffer is full
EE62	Warning	COM 2 not ready
EE63	Warning	COM 2 Buffer is full

**Reasons and Remedy :**

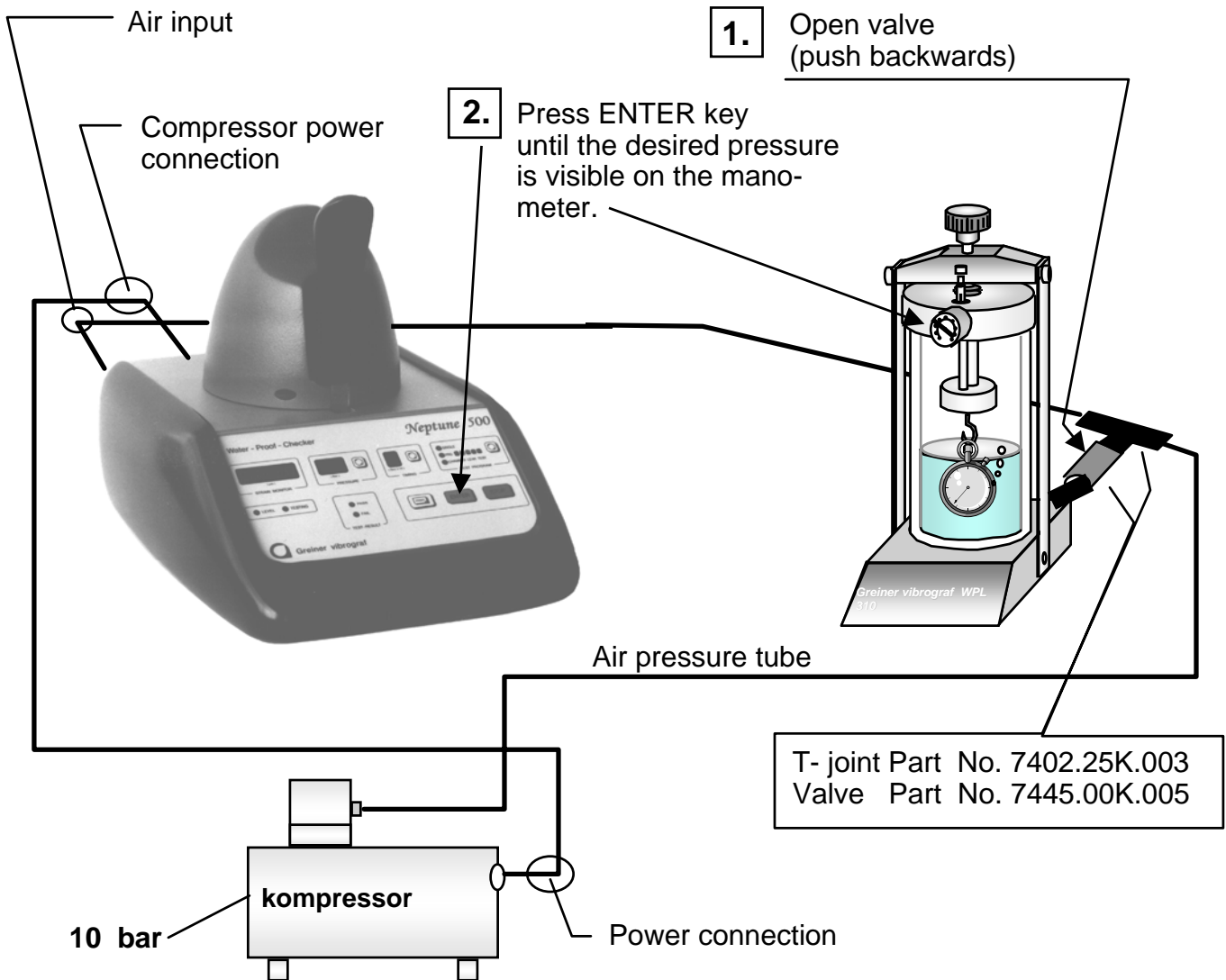
- EE30 :** **The deformation of the watch is too big** (happens with very big or soft watches).  
The test can be carried out with a lower pressure.
- EE51 :** **Pressure increase during the test:** the instrument is connected to an air pressure system and the entry valve is dirty. The entry valve must be cleaned.  
An oil microfilter should be added between the air pressure system and Neptune 500.
- EE52 :** **Pressure decrease during the test.**  
The chamber seal is dirty or scratched (must always be clean).  
The exit valve is leaky. Disassemble exit valve and clean it.
- EE60 :** **The printer is not ready.**  
The printer is not switched on to ON-LINE resp. SEL or the connection between Neptune 500 and the printer is not o.k..

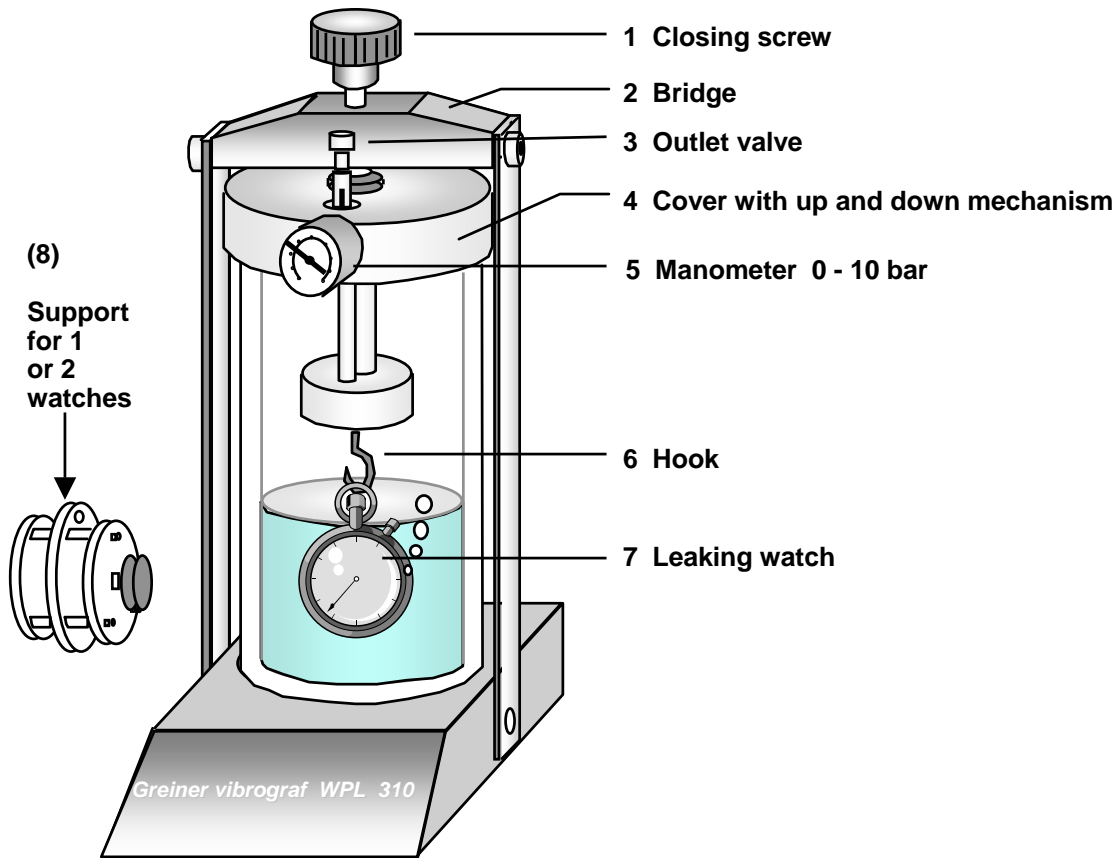


The **WPL-310** can be used with the same compressor which is connected to the Neptune 500.

The WPL - 310 can only be used with air pressure if the Neptune 500 is in Stand-by position i.e. no test is being made.

**Action :**

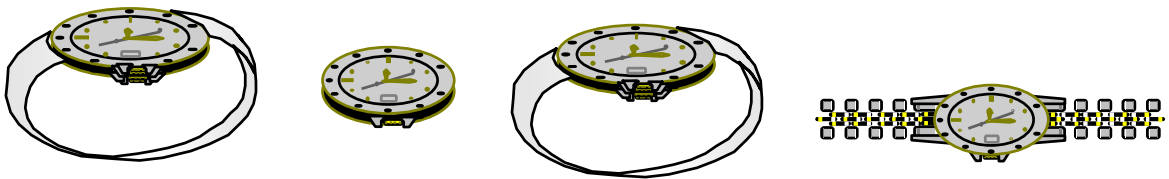




1. Loosen fastening screw (1) and tilt handle (2) backwards. Take off cover (4).
2. Fill cylinder with distilled water up to the air-input mark at the back.
3. Place the watches to be tested (1) or (2) between the plexiglas plates of the holder (8) and tighten it slightly with the screws.
4. Hang up the holder (8) with the watch onto the hook (6).
5. Replace cover (4) with holder/watch. Tilt handle (2) forward and tighten fastening screw (1).
6. Fill cylinder with the desired pressure.
  - 1 bar = 10 meter
  - 10 bar = 100 meter

The pressure in the cylinder is visible on the Manometer (5).
7. Wait ca. 1 minute (in case the watch is not waterproof) until the air pressure can enter into the watchcase.
8. By pressing the exit valve (3) the watch descends automatically into the water. Keep an eye on the watch while it is entering the water. Should air bubbles appear out of the watchcase, you will know exactly where the leak is. Are there no air bubbles, this means that the watch is waterproof.

**Important:** The outlet valve (3) must be pressed continuously until the watch has emerged from the water. This happens between ca. 0,8 and 0,5 bar. The high pressure in the watch which is not waterproof, avoids that water enters the watch.



Water - Proof - Checker

Neptune 500

236.4

(µm)

STRAIN MONITOR

10

(Bar)

PRESSURE

3

(Sec x 10)

TIMING

● SINGLE

● PRG 1 2 3 4 5

● CHAMBER LEAK TEST

TEST PROGRAM

● LEVEL   ● TESTING

● PASS

● FAIL

TEST-RESULT

PRINT

ENTER

STOP



SIGN	CODE	SIGN	CODE	SIGN	CODE	SIGN	CODE	SIGN	CODE
NUL	00	3	51	G	71	[	91	o	111
LEER	32	4	52	H	72	\	92	p	112
!	33	5	53	I	73	]	93	q	113
„	34	6	54	J	74	^	94	r	114
#	35	7	55	K	75	_	95	s	115
\$	36	8	56	L	76	`	96	t	116
%	37	9	57	M	77	a	97	u	117
&	38	:	58	N	78	b	98	v	118
'	39	;	59	O	79	c	99	w	119
(	40	<	60	P	80	d	100	x	120
)	41	=	61	Q	81	e	101	y	121
*	42	>	62	R	82	f	102	z	122
+	43	?	63	S	83	g	103	{	123
,	44	@	64	T	84	h	104		124
-	45	A	65	U	85	i	105	}	125
.	46	B	66	V	86	j	106	~	126
/	47	C	67	W	87	k	107		
0	48	D	68	X	88	l	108		
1	49	E	69	Y	89	m	109		
2	50	F	70	Z	90	n	110		