

 Leica AG, Heerbrugg	ONLINE-Manual <i>DISTO memo/pro</i>	File: online95
4081-BOG	Version:2.0	21.08.98

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1. Purpose

This document describes the on-line command set for the *DISTO memo/pro*, and also its format, which is available through the serial interface.

2. Validity

The following firmware versions support the commands listed:

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DISTO memo firmware from Version 2.05 (21. November 1997) onwards
Disto pro firmware from version 1.0 (15.April 1998) onwards

3. Interface parameters

The interface of the *DISTO memo/pro* is arranged so that it can be connected directly to a PC. The interface parameters are defined ex-works as follows:

9600 baud, even parity, 7 data bits, 1 stop bit

These settings can be changed through the interface commands.

Note: On account of a software error, the functioning of the interface at 4800 baud is not guaranteed (baudrate out of tolerance).

4. Interface protocol

4.1. General definitions

4.1.1. Characters

All characters which have an ASCII code of less than 127 are permitted when entering commands. A command is concluded with an ASCII code smaller than 32 (carriage return line feed). The *DISTO memo/pro* also uses a terminator to conclude a reply. The terminator consists of the characters `<cr><lf>`.

4.1.2. Input

Each command consists of one or more characters and a terminator.

Examples:

```
a<cr><lf>
DSP 12345/F<cr><lf>
```

Numerical entries (command parameters, %) are always input as whole numbers. The following format is permitted:

Operational sign (optional) and numbers which do not commence with zero: -8007.

4.1.3. Replies

One or more replies appear in response to each command received. The following replies are possible:

- | | |
|--|---|
| <code>?<cr><lf></code> | - OK prompt: Everything in order. <i>DISTO memo/pro</i> is ready to carry out a new command |
| <code>@E123<cr><lf></code> | - Error report: A three-digit error code appears in accordance with the appended table. |
| <code>12..10+12345678<cr><lf></code> | - One or more data words, with terminator. |
| <code>Clear text</code> | - Information in clear text |

The reply to a command includes at least an OK prompt or an error report.

4.1.4. Data format

A data word as reply consists of 16 characters which are assembled as follows:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
W	W	w	w	A	U	+	1	2	3	4	5	6	7	8	

In some cases the following data format appears:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
W	W	w	w	A	U	+	1	2	3	4	+	6	7	8	

Position	Beschreibung:	Bemerkung
1,2	Word identifier 00-99	Commences with two zeros
3,4	not significant	Used in service mode to expand the word identifier.:
5	Attribute	0: measured value 1: manually entered value . : No set attribute
6	Units	0: mm resp. for areas 1/1000m ² resp. for volumes 1/1000m ³ 1: 1/100 ft resp. 1/100ft ² resp. 1/10ft ³ 6: 1/10 mm resp. 1/1000m ² resp. 1/1000m ³ 8: ft / in / 1/16 in resp. 1/100ft ² resp. 1/10ft ³ (Disto memo 1/8 in) . : no units
7-15 oder 7-11	Decimal	With operational sign and starting with zeros
12-15	Decimal number 1	With operational sign and starting with zeros
16	Decimal number 2	With operational sign and starting with zeros
	Space	

4.2. Word identifiers (WI)

The following WIs are used:

WI no.	Format (example)	Meaning
11	11...+xxxxxxxxxx	Point number
12	12...+xxxxxxxxxx	Instrument number
13	13...+0070+xxx	Instrument type (0070) and software version (xxx)
31	31..06+xxxxxxxxxx	Slope distance [1/10mm]
51	51...+XXXX+xxx	Distance accuracy in ppm(XX) / mm (xxx)
53	53...+xxxxxxxxxx	Test of measurement signal [mV]
58	58..16+xxxxxxxxxx	Additiv constant
71	71...+xxxxxxxxxx	Coding of measurments
912	912...+xxxxxxxxxx	Frequency correction in ppm
5000	5000..+xxxxxxxxxx	Key codes

4.3. Error reports

Error reports from the *DISTO memo/pro* are within the range from 100 to 199. Error numbers of between 200 and 299 relate to the internal distance-measuring module.

No.	Format	Meaning
103	@E103	Non-valid parameter for entering commands, or non-valid command, or non-valid result
106	@E106	Communication with internal module not possible
121	@E121	Parity error
124	@E124	GSI buffer overflow or general communication fault
189	@E189	Internal memory defective, or data defective

190	@E190	Memory compartment is full
191	@E191	Calculation error
217	@E217	Parameter set-up not in order
221	@E221	Parity error in internal communication
224	@E224	GSI buffer overflow or general internal communication fault
252	@E252	Temperature too high
253	@E253	Temperature too low
255	@E255	Received signal too weak
256	@E256	Received signal too strong
257	@E257	Background light too strong
255	@E255	Received signal too weak, or measurement time too long, or distance below 250mm
272..299	@E272	Internal module error

5. Commands

5.1. General

The *DISTO memo/pro* essentially has two operational modes:

- Off-line operation, basic mode: The *DISTO memo/pro* is in this mode immediately after being switched on by pressing the measurement key or by using a PC to enter any character across the interface. The instrument is mainly operated with its own keyboard and the measured values and results are transmitted to the serial interface. The recorded values can also be output by means of a key function. In addition, some commands can be triggered with the PC across the interface instead of with the keyboard of the *DISTO memo/pro*.
- On-line or remote operation: In on-line mode, the *DISTO memo/pro* is no longer controlled by means of the keys and the display. Instead, a PC is used. To get into on-line mode ('ONLINE' – indicated in the display) the appropriate command must be transmitted, after which functions for measuring, displaying and keyboard interrogation are available. The operational mode can be quitted by means of a separate command on the PC or with the OFF key combination. In this mode, the point of reference for all measurements is the surface of the lens.

5.2. Standard set of commands (off-line)

Commands which are compatible with the earlier *DISTO* versions are indicated here by the use of **heavy type** in the title of the function.

5.2.1. ON command (a)

Function: To switch on or reset the *DISTO memo/pro*
 Input: a<cr>
 Output: ?<cr><lf> or @Exxx<cr><lf>

5.2.2. On-line command (A)

Function: Switches the *DISTO memo/pro* to on-line mode
 Input: A<cr>
 Output: ?<cr><lf> or @Exxx<cr><lf>

5.2.3. OFF-command (b)

Function: Switches off *DISTO memo/pro*

Input: b<cr>
 Output: ?<cr><lf> or @Exxx<cr><lf>

5.2.4. STOP/CLEAR command (c)

Function: Aborts current operation
 Input: c<cr>
 Output: ?<cr><lf> or @Exxx<cr><lf>

5.2.5. Distance measurement (g)

Function: Triggers single distance measurement
 Input: g<cr>
 Output: WI31 WI51<cr><lf> or @Exxx<cr><lf>

5.2.6. Tracking (h)

Function: Triggers continuous distance measurement. The measurements continue until the next command is entered or until there is an error
 Input: h<cr>
 Output: WI31 WI51<cr><lf> or @Exxx<cr><lf>

5.2.7. Signal measurement (k)

Function: Triggers continuous signal measurement. The measurements continue until the next command is entered or until there is an error
 Input: k<cr>
 Output: WI53<cr><lf> or @Exxx<cr><lf>

5.2.8. Laser (o, p)

Function: Switches laser on or off
 Input: o<cr> Switches laser on
 p<cr> Switches laser off
 Output: ?<cr><lf> or @Exxx<cr><lf>

5.2.9. Outputting a help text (N999N)

Function: Outputs a help text for all available commands
 Input: N999N<cr>
 Output: Commands with syntax and short description in clear text

5.2.10. Software version (N00N)

Function: Outputs software version and instrument type to interface
 Input: N00N<cr>
 Output: WI13<cr><lf> or @Exxx<cr><lf>

5.2.11. Instrument number (N01N)

Function: Outputs instrument number to interface
 Input: N01N<cr>
 Output: WI12<cr><lf> or @Exxx<cr><lf>

5.3. Extended command set (remote operation and on-line operation)

5.3.1. Quitting on-line mode (B)

Function: Causes *DISTO memo/pro* to go to off-line operation mode
 Input: B<cr>

Output: ?<cr><lf> or @Exxx<cr><lf>
 Function: Can also be achieved using OFF key combination

5.3.2. Measuring distance (G)

Function: Triggers single distance measurement with short output
 Input: G<cr>
 Output: WI31<cr><lf> or @Exxx<cr><lf>

5.3.3. Tracking (H)

Function: Triggers continuous distance measurement with short output. The measurements continue until the next command is entered or until there is an error
 Input: H<cr>
 Output: WI31<cr><lf> or @Exxx<cr><lf>

5.3.4. Setting baud rate and parity (N73N)

Function: Sets baud rate and parity. Caution: Slow baud rates can cause buffer overflow in the communications part

Input: N73N%N%N<cr>
 1. Parameter %: baud rate:
 1: 300 baud
 2: 600 baud
 3: 1200 baud
 4: 2400 baud
 5: 4800 baud
 6: 9600 baud
 7: 19200 baud
 2. Parameter %: Parity
 0: No parity
 1: Odd parity
 2: Even parity

Output: ?<cr><lf> (with new baud rate) or @Exxx<cr><lf>

Note:On account of a software error,the functioning of the interface at 4800 baud is not guaranteed (baudrate out of tolerance).

5.3.5. Describing the display (DSP)

Function: Enables the display to be described
 Input: DSP *<cr>
 *: Output text with the following options:
 /F: For flashing display
 /Dn: Decimal places from 1 to 4
 /Un: Units 0-m, 1-ft, 2-ft/in, 3-in
 /ln: Displays reference icon: 0-Front, 1-Middle, 2-Rear
 /Nx/y: Displays sub number x/y
 An empty character chain erases the entire display
 Output: ?<cr><lf> or @Exxx<cr><lf>
 Example: DSP 123456 /F /D2 /U0<cr><lf>
 Corresponds to a flashing output of 1234.56m

5.3.6. Reading the keyboard (KEY)

Function: Enables the keyboard to be interrogated
 Input: KEY %<cr>

Output: %: <0: Wait for key
 >0: Time out [ms] for interrogating keyboard
 WI5000<cr><lf> or @Exxx<cr><lf>

5.3.7. Emitting an audible signal (BEEP)

Function: Emits an audible signal
Input: BEEP %<cr>
 %: Length of beep from 0 to 5000 [ms]
Output: ?<cr><lf> or @Exxx<cr><lf>

6. Appendix

6.1. Key - Codes

<p>The diagram shows the keypad layout of a Leica DISTO pro. The keys are arranged as follows: <ul style="list-style-type: none"> Top: A red triangle pointing up. Below: The 'Leica' logo. Row 1: A red '+' sign and a red '-' sign. Row 2: A red 'X' and a red '=' sign. Row 3: A red key with an upward arrow and a red 'f'. Row 4: A red key with two left-pointing arrows, a red circle, and a red 'M'. Bottom: A display screen showing 'ft' and 'in 18', and the text 'DISTO pro' below it. </p>	<p>Key Codes</p> <p>32768</p> <p>4 256</p> <p>128 16</p> <p>2 (only DISTO pro)</p> <p>8 (only DISTO pro)</p> <p>64</p> <p>8 1</p>
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6.2.Character Set

0							
8							
16							
24							
32							
40	[]	°		.	-	
48	0	1	2	3	4	5	6
56	8	9			=		?

64	d	A	b	C	d	E	F
72	H	I	J		L		n
80	P		r	S	T	U	
88		y		l		j	7
96	'	A	b	c	d	E	F
104	h	.	j		L		n
112	P		r	S	T	U	
120		y		l		j	'