sylvac

D 80S

INSTRUCTIONS
FOR USE

Program version V1.0
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SWISS MADE

sylvac

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CONTENTS

1. D80S DISPLAY UNIT

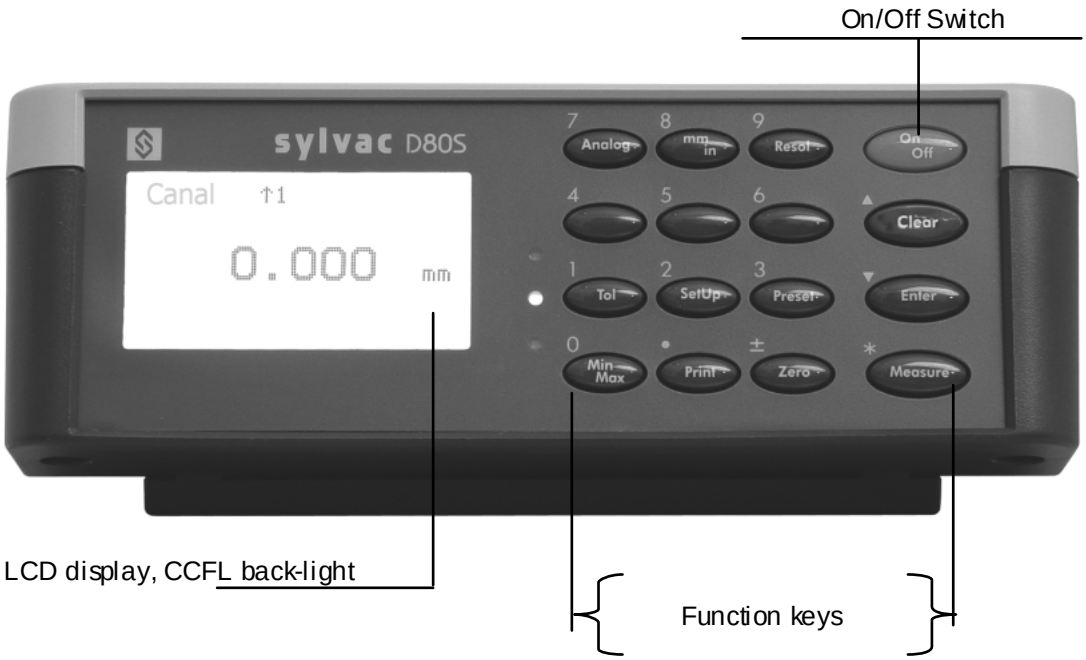
1.1 GENERAL DESCRIPTION

The **D80S** unit displays the absolute displacement of the long-travel Sylvac probes 2, 5, 10, 25 et 50 mm (**P2**, **P5**, **P10**, **P25** et **P50**). Highest resolution is **0.1 µm**.
Numerous integrated functions will resolve most metrological problems, be they in the workshop or laboratory.
The 8200 points backlit graphic read out provides tremendous flexibility and ease of use Similarly, it allows the unit to be used simply and in a choice of 3 languages. All readings entered are protected from erasure if the unit is switched off (when switched back on, the unit returns exactly to the point where it was switched off, and the probe's position is retained). The numerous inputs/outputs of the unit, as well as its modest dimensions and ability to function from batteries allow it to be incorporated in a great variety of industrial locations.

A 230 V, 120 V or 100 V charging block is supplied with the unit **D80S**.

By means of complementary multichannel units it is possible to connect from **1 à 8** probes to just one **D80S**.
Each probe connected can be individually selected.

1.2 FRONT OF UNIT



1.3 FUNCTION KEYS

1.3.1 Summary of functions

: displays or removes analog scale.

: direct conversion mm/in.

+

: lock/unlock the mm/inch conversion.

: choice of the resolution :

0.1-0.01-0.001-0.0001 mm
ou 0.01- 0.001-0.0001-0.00001 in

: display or remove tolerances
< = >

+

: enter nominal value and tolerances limits.

: display or remove the MAX, MIN, Delta or Mean first chosen by pressing SET UP and then Min/Max

+

: choose mode to be displayed first by pressing Min/Max.

: in Min/Max mode : display successively Min, Max, Delta, Mean.

: in Min/Max mode : clear the MIN/MAX memory to the current value.

	: introduction of parameters or functions for the following keys., ***Tol***, o5 ***Enter***, ***Min/Max***, ***Setup***, ***Preset***, ***Print***, ***mm/IN*** All The parameters will be stored after unit has been switched off.	 + 	: introduction of general parameters: function of the external contact, language, keyboard lock, sound inhibition, date/time input and save configurations (up to 12).
	: display the Preset value (zero or any value).	 + 	: introduction of a Preset value for the selected channel. (for Preset zero, enter 0).
	: printout of the following : measure on RS232 outputs.	 + 	: choice of RS232 transmission parameters and RS232 output format.
		 + 	: display the program version (firmware)
	: choice of channel and measuring direction		

: either proceed to preceding channel, adjust contrast

When entering parameters : confirm numerical entry or proceed to following menu.

+

: choice of Enter/Clear function : change channel, contrast adjustment

+

:unlock the keyboard if inhibited..

: either proceed to following channel
Leave a menu without modification.

+

: main reset of the unit
(complete reinitialization of parameters)

: switch unit ON / OFF.
All parameters will be stored after unit has been switched off.

Sw 1

: can be programmed for:: (external contact)

1.data transmission to RS232 outputs

2.hold

3.new min/max

4.preset

5.change channels

: different combination of the above functions are also possible.

1.3.2 General method

All functions are directly accessible, e.g. by pressing the ***Tol*** key, tolerance indicators will be displayed. Pressing it again causes the indicators to disappear. The numbers on the function keys are used to select a menu or to enter numeric values. The ***Setup*** key allows the input of parameters required for the various functions of the unit.

1.3.3 Entering numbers :

Numbers are entered as follows:

The old numerical value will be displayed first.

Should the ***Clear*** key be pressed before any other key has been activated, the program cycle will be set back without correcting the old value.

Pressing the ***Enter*** key validates the input value and the next menu is displayed.

All values to be input are selected in the same way as for a calculator. Plus and minus can be changed at any time by pressing the +/- key.
The number of digits on the left hand side of the decimal point is max. 4 for mm and max. 2 for inch. The number of digits after the decimal point depends on the resolution.
An input value can be started directly with the decimal point.
If an incorrect value is selected, press the ***Clear*** key and start again.

1.4 OPERATION

1/ Depending on the operating location, the independent base may be screwed onto the bottom of the unit, so that the display is presented « face-on » to the operator.

2/ Connect the charger (*Section. 1.8.3*).

3/ Connect one probe **P2, P5, P10, P25** or **P50** (*Section. 1.8.8*) or several probes if operating with one or more **D102/D108** units (*Section 2.3*).

4/ Switch on unit. ***On/Off***

5/ Select language by pressing ***2*** then ***2*** then ***2*** and then 1,2,3,4,5 (*see chap.1.6.9.2)*
This selection is memorized permanently by the unit (along with all other data).

6/ Where necessary, convert from metric to imperial measurement by pressing ***mm/inch*** key.

7/ Specify the readout resolution by pressing ***Resol*** key and then 1,2,3 or 4 (*Section 1.6.4*).

8/ If required (*refer to Section. 1.6.3*) :
Reverse direction of probe measurement. (*Channel + (+/-)*)

9/ If required, connect the foot pedal or other external contact (*section. 1.8.4*) and assign its function(*refer to section 1.6.11*). It is also possible to connect a printer to RS232 output, (*section 1.8.1*) and set up transmission parameters (*section 1.6.11.*)

10/ Reset display to zero or to any probe reference value by pressing ***Preset*** key. The stored preset value may be entered with ***Setup*** key then ***Preset*** key (*section. 1.6.8*).

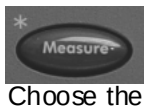
11/ The displayed measurement can be accompanied by :

the analog scale (*section 1.6.6*)
tolerances indicators. (*section. 1.6.7*)
min/max mode (*section 1.6.10*)

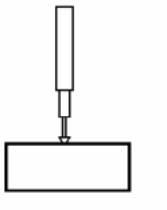
12/ Once the unit has been set up, the keyboard can be locked. The external contact and ***Print*** key remain active. The mm/inch function can also be locked.

1.5 EXAMPLES OF OPERATIONS

1.5.1 Simple measurements :



Choose the required channel + channel number



+

Reverse measuring direction

1.5.2 Measurements and checking tolerance limits :

Activates or deactivates the tolerance indicators.

1.6 FUNCTION KEYS

1.6.1 CLEAR KEY

Operating in normal : move to following channel, adjust contrast measuring mode (1.6.2)

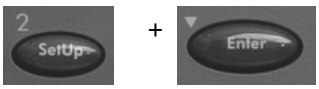
Operating in Min/Max mode : clears the Min/Max memory before taking a new measurement.

Operating in Set Up mode : cancels an input value or cancels a chosen menu without alteration.

1.6.2 ENTER KEY

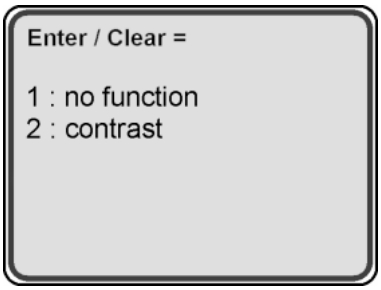
Operating in normal measuring model: move directly to preceding channel, adjust contrast.

Choose between following two functions :



1/ press ***Setup*** key 2/ Then press ***Enter***

The following menu will appear :



Choice 1 allows you to move directly to the preceding channel by pressing the ***Enter*** key, or to the following channel by pressing the ***Clear*** key. Constant pressing is possible.

Choice 2 allocates the ***Enter*** and ***Clear*** keys for contrast to be adjusted by means of the Enter and Clear keys according to working conditions (temperature, angle of view).

1.6.3 MEASURE KEY

The ***D80S*** unit can command up to ***8*** channels. The use of ***D108*** or ***102*** units makes it possible to connect up to ***8*** probes ***P2, P5, P10, P25*** or ***P50***.

All the following functions are available for each channel independently :

any Preset value.
specific tolerance limit.
normal mode, maximum mode, minimum mode, delta mode (max-min), or mean mode (max + min) / 2
measuring direction.
Probes ***P2, P5, P10, P25, P50***

Note: When using the display unit only one probe (without additional accessory unit D102/D108), the same probe can be used for ***8*** channels and thus manage up to ***8*** measurements.

Probe 1 is allocated to channel 1, probe 2 to channel 1 etc..

1.6.3.1 selection of measuring channel :

1/ press I ***Measure key*** , **Channel** appears as negative on the screen.

2/ select number of required channel. (**1**)

3/ end of action

1.6.3.2 selection of channel immediately following :

1/ press ***Clear*** key, if it is configured for the channel selection.

It is also possible to configure the external contacts (foot pedal) for the channel selection.
(*refer to section 1.6.9*).

1.6.3.3 selection of the directly preceding channel :

1/ press ***Enter*** key, if it is configured for the channel selection.

1.6.3.4 reversing the measuring direction :

The measuring direction is indicated by the arrow preceding the channel number. An up arrow indicates that the measurement value increases when the probe moves against inside (so when it is vertical will indicate a positive measurement direction).

1/ press ***Measure*** key 2/ then ***Zero*** key.

The arrow preceding the channel number changes its direction. 

To reverse the direction, repeat the sequence.

1.6.3.5 Introduction (Limitation) of channels number

The limitation of channels number is stored as follow :

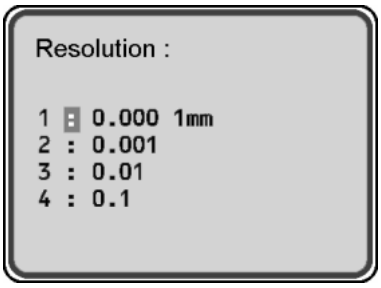
1/ press ***Setup*** key 2/ then ***Measure*** key.

1.6.4 RESOL KEY

Allows choice of resolution displayed and printed :

1/ press ***Resol*** key.

The following will be displayed :



2/ to obtain the correct resolution, select the corresponding number on the keyboard (1 to 4).

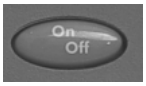
Input values (e.g. Preset or Tolerances) will be automatically input according to the resolution. Resolution is identical for all channels.

The lower the resolution on the D80S , the faster the unit operates.

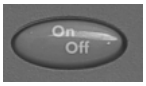
1.6.5 mm/In KEY

Alternates between metric (millimetre) and English (inch) display.

Locking mm/in conversion :



1/ Switch off unit ***ON/OFF*** key



2/ Hold ***mm/inch*** key down, when switch ***ON*** unit.

Unlocking conversion : repeat above operation.

1.6.6 ANALOG KEY

Display or remove the analog scale. The analog scale features an indicating range of 100 points, each one states one least significant digit of the measured value (digit at the most right of the display). Thus the range covered by analog scale is given by the working resolution :

Example : Selected resolution : 0.001 mm . One graduation is equal to 0.001 mm and the inclusive range is therefore 0.1 mm.

Example in normal mode :

In tolerance mode, the scale changes and two fixed vertical lines represent the tolerances limits

The user can then judge centering of measure with tolerances at a glance.

In min/max mode, the line opens out to indicate searching lap back :

1.6.7 TOL KEY

Displays or removes tolerance indicators :

indicates a measured value smaller than the nominal dimension + negative tolerance on the external measurement or smaller than the nominal + positive tolerance on the internal measurement.

indicates a measured value inside the limits of tolerances.

indicates a measured value larger than the nominal dimension + positive tolerance on the external measurement or larger than the nominal dimension + negative tolerance on internal measurement.

This indication is also transmitted to the corresponding opto-coupler for external command purposes.
(*refer to section. 1.8.3*).

Each channel has its own tolerances.

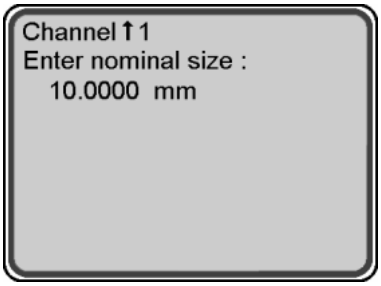
Input of nominal dimension and tolerances :

1/ select the channel.

2/ press ***Setup*** key.

3/ then ***Tol*** key.

The following will be displayed (the current nominal dimension is displayed) :

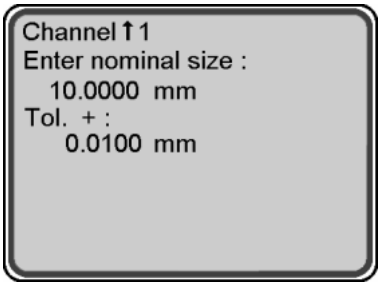


The ***Clear*** key allows you to quit the tolerances input.

4/ input nominal dimension.
Wrong value entered can be cancelled by pressing ***Clear*** key.

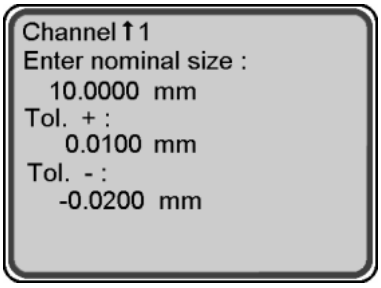
The value is entered as described in (section 1.3.3).

5/ confirm by pressing ***Enter*** key.
The following will be displayed :



6/ input of upper tolerance. If negative, must always be greater than the lower limit.

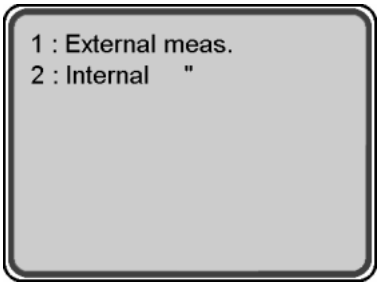
7/ confirm by pressing ***Enter*** key.
The following will be displayed :



8/ enter the lower tolerance with its sign.

9/ confirm by pressing ***Enter*** key.

Le tableau suivant apparaît :



10/ select number 1 or 2 according to the measurements to be taken : internal or external. This input is important for identification of " reject " , " good " or "rework"

External measurement : measured value too big —> Rework (yellow)
measured value too small —> Reject (red)
Internal measurement : measured value too small —> Rework
measured value too big —> Reject

By pressing ***Tol*** key, the tolerance indicators are erased.

Pressing ***Tol*** key again recalls the lights.

1.6.8 PRESET KEY

Displays stored preset value.

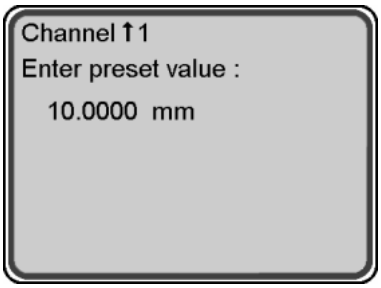
The external contact (e.g. foot pedal) can also be configured to preset the displayed value.

Any preset value may be input, **also 0.000** for zeroing the display.
Each channel (from 1 to 64) has its own preset value.

Input of a preset value :

1/ press ***Setup*** key 2/ then ***Preset*** key

Following will be displayed :

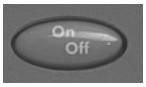


3/ the old preset value is displayed. Enter preset value according to general principle described in section *1.3.3*.

To enter a preset of 0.000, simply press ***Enter*** key.

exit preset input mode.

Once the preset value has been entered, the unit reverts to measuring mode and displays the preset value. Had more preset values been entered, each channel would be affected by its respective value.



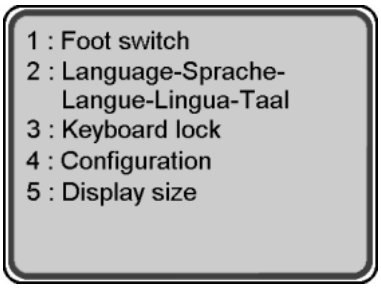
After a general reset (***Clear*** + ***ON/OFF*** keys),the preset values of all channels will be reset to zero.

1.6.9 SETUP KEY

Allows input of parameters for the following functions : Tol, Enter, Min/Max, SetUp, Preset, Print,mm/IN.
The input of parameters is explained with each corresponding function key.

Input of general parameters of unit :

1/ Press ***Setup*** key .2/ then ***Setup*** key.
Following will be displayed :



To exit this menu or the followings without changes,
press ***Clear*** key or ***Enter*** key.

1.6.9.1 ***External contact function*** *:*
menu 1 allows you to define the external contact function (in general the foot pedal supplied with the unit). When the unit is ready for measurements, it is thus possible to inhibit the keyboard and use only the foot-pedal.

<u>This choice may be combined with the following other functions</u> :

1 : Transmission of values through RS-232-C output according to the parameters specified for the Print function. Each time the foot pedal is pressed, the measurement value is transmitted.

2 : display hold. The display is held as long as the foot pedal is pressed, when foot pedal is released, the measured value is sent. The function 5 (change channels) can be combined as well.

3 : Min/Max initialisation Min/Max. The display is held as long as the foot pedal is pressed, when foot pedal is released, the measured value is sent. The functions 2 (hold), 5 (change channels) can be combined as well.

4 : display preset. Alternately, pressing the pedal presets the display, pressing it again sends the measured value.

5 : change channel. The same action on the foot pedal sends the measured value and then changes to the next channel.

6 : Command for pneumatic unit D110. Pressing the foot pedal lifts the probes connected to D80S. Releasing the foot pedal let them go down.

If a combination of the second or 2nd function is not required, simply press ***Enter*** key.

2/ Display hold
the external contact enables :

display hold : as long as the foot pedal is pressed, the display value is frozen.

This function can be combined with :

3 : Min/Max initialisation. The first depression initialises the min/max, the second holds the value
Function 5 (channel change) can be combined as well.

4 : alternately with display preset.

5 : together with channel change.

3/ in Min/Max mode : reinitialise maximum and minimum registers.

(same function as ***Min/Max*** key in Min/Max mode). Function 5 (channel change) can be combined.

4/ Preset of display at each external contact

5/ Change channel, each external contact provokes a jump to the next channel. When the number of channels introduced is reached (max.8) the channel change will be from 1 to 8 and then back to 1.

6/ alternately with probe lifting control using D110.

1.6.9.2 ***Choice of language :***
menu 2 allows the choice of 5 languages, English, German or French, Italian, Nederland for all text shown on the display or transmitted to the RS232 ports.

1.6.9.3 ***Inhibit keyboard :***
choice 3 in Setup menu allows you to lock the keyboard. All functions keys are inhibited, except for

On/Off *Key*
footpedal
Print *Key*
And, if required, anyone function key on the keyboard (Exception).

To recall keyboard operation, choose one of the following options :

1/ press any key for at least 5 seconds

2/ switch on unit with ***Enter*** key pressed.

1.6.9.4 ***Configuration***
All unit configuration parameters (tolerances, presets, setups…) can be stored or recalled :

Give backup file number, then ***Enter***

I Insert name of file, in letters and numbers, max. six characters (allows for more efficient file management).

The ***Measure*** *key* switches from numerical to alphabetic input and back.

Up to 12 complete configurations may be stored.

To restore a configuration, simply select the file name, then ***Enter*** . The unit will appear exactly as it was stored.

NB :

to delete an element stored : select 1 : save, then number of file to be deleted then ***Enter*** then ***Clear***

The **MEM?** and **MEMR** remote command allow for the same operation a PC using link RS232.

Program SYLCOM allows backup files to be managed on a PC.

1.6.9.5 ***Height of characters***

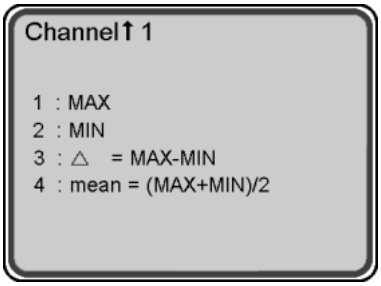
Selection of the height of displayed values.

1.6.10 MIN/MAX KEY

Allows the choice of displaying minimum, maximum, difference Max – min, or mean (max + min)/2 instead of normal measurement. Entering this mode will automatically set minimum and maximum registers to measuring position. Min/Max measurements therefore start from this point.

In this mode, the preset will be given on the displayed value, i.e. on the maximum, the minimum, the difference or the mean value.
Choice of the displayed function :

1/ press ***Setup*** 2/ then ***Min/Max***
The following will be displayed :



Select required displayed value (min, max, etc.).

return to normal mode :

return to choice above :

When working in MIN/MAX mode, the ***Enter*** key and ***Clear*** key have a special function:

Set MIN/MAX registers to the current measuring value. All new Min/Max values start from this point.

Change the displayed value : Maximum → Minimum → Difference → Mean → Maximum.

Example : The probe is used for measuring a camshaft. The unit displays the maximum value. The camshaft is rotated and the displayed value is frozen on the maximum value recorded. The preset value is entered, for example 10,000 mm.

Min/Max registers are initialized by pressing ***Clear*** *Key.*

A new measurement of the camshaft will now display value of 10.000 mm.

1.6.11 PRINT KEY

Printing of values through :

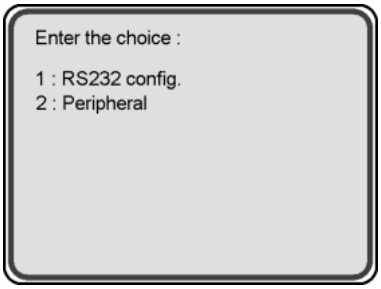
Output RS-232-C, in accordance with transmission parameters selected for this function. Different printing formats are generated by unit ***D80S*** : 80, 40 or 15 columns.

A P in reverse video is displayed on the top right corner of display during RS 232-C transmission. If the channel has no installed probe (NO PROBE on display), 999.9 is transmitted.

It is also possible to configure the external contact (foot pedal) for the RS-232-C output
(refer to section *1.6.9*).

Selection of the RS 232C transmission parameters and the print-out format :

1/ press ***Setup*** key 2/ then ***Print*** key
the following will be displayed :



The 1st menu sets RS 232 C transmission parameters.

The 2nd menu select the RS-232-C output format according to which peripheral is being used.

1.6.11.1 RS232 input/output parameters :

Default parameters (after a reset) : **4800 bps, 7 bits, even parity, CR**.

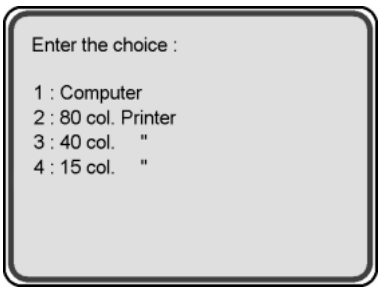
2.1.1/ transmission speed : 300, 600, 1200, 2400, 4800, 9600 et 19200 bauds/sec.

By pressing the ***Clear*** key the preceding menu will be displayed.

By pressing the ***Enter*** key the next menu will be displayed (without changing previous choice).

2.1.2/ word length : on **7** or **8** bits.
2.1.3/ parity control : **No** parity, **even** or **odd**.
2.1.4/ end characters : **CR** (Carriage Return) or CR + LF (Carriage Return + Line Feed) or LF only. A printer with auto LF mode needs only CR. If CR + LF is sent in this case, a supplementary empty line is printed at each carriage return. With a connection to an PC or compatible select CR only.

1.6.11.2 Peripheral choice
The following will be displayed :



These different choices modify the output format for the RS232 outputs.
Remote command of the unit will not be modified.
80 and 40 column formats allow the header to be printed following the user's parameters.

2.2.1/ Connection to a computer. This is the most simple transmission format allowing easy processing of values.

The measurement is transmitted as it appears on the display :

a/ In mm :

SIGN 10^2 10^1 10^0 DP 10^{-1} 10^{-2} 10^{-3} 10^{-4} CR LF
ou 10^3

SIGN = space if positive sign DP = decimal point LF only if requested

10^2 et 10^1 = space if zero 10^{-4}, 10^{-3} et 10^{-2} only with resp. resolutions 0.1 µm, 1 µm et 10 µm.

The sign always immediately precedes the 1st digit.

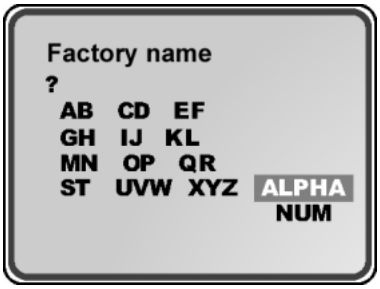
b/ In inch :

SIGN 10^1 10^0 DP 10^{-1} 10^{-2} 10^{-3} 10^{-4} 10^{-5} CR LF

10^1 = space if zero 10^{-5}, 10^{-4} et 10^{-3} only with resp. resolutions 0.00001, 0.0001et 0.001 in

1.6.11.3 Format for 80 column printer :

If a header is required, the unit will ask for company name and will then switch to alpha-numerical input mode, as shown below



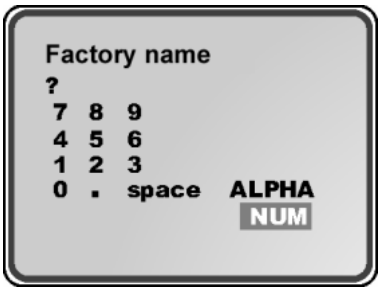
Press ***Clear*** key if no company name has to be printed.

Otherwise an alpha-numerical name may be entered (using figures & letters up to 20 characters.

The table opposite shows the alphabetic input display. The 12 left-hand keys of the keyboard each now represent 2 or 3 letters. The position of letters on the display correspond : to the position on the keyboard. Pressing once on a key selects the first letter of 2 or 3, pressing a second time on the same key selects the second letter, pressing again selects the first letter again (or the third letter for the last 2 keys) and so on. Another couple of letters may also be selected, until confirmed with the ***Enter*** key.

In case of an error, press ***Clear*** key and restart.

The ***Measure*** key allows you to switch from alphabetic to numerical input and back :



The keys are also represented graphically. It is possible to insert a blank space (...).

Continue inserting different letters and numbers and confirm the word by ***Enter*** key.

Example : in alpha mode, 1st depression of key 7 —> selects A, 2nd depression selects—> letter B, 3rd depression —> return to letter A, and so on…Confirm letter with ***Enter*** key.

When company name is entered, the unit asks for :

drawing number
work station
work-piece identification : at heading.
At each printing. This allows each measured work-piece to be identified,
Insertion of date

If one item of a header is not entered (question mark instead of word), this will not be printed.

To print header again : press ***Print*** key

Following pages show printing examples in 80 column format. If tolerances mode is not activated, only the channel number (with A+/-B mode or min/max indication) and measurement are printed. In tolerance mode, we have the nominal value, upper and lower tolerances, dispersion i.e. difference between nominal value and measurement, out of tolerance value (if there is one), External (**E**) or Internal (**I**) measurement indication, and finally if the measurement is within tolerances (**=**), under (**<**) or over (**>**).

a/printing in normal measurement mode with header and tolerance mode not activated :

SYLVAC SA

Piece ident. : COUVERCLE
Drawing nbr : PM230.010.412
Work station : L 201

Date : 12/11/1998

CHANNEL	MEAS. VALUE
1	8.383
1	8.354
1	8.382
1	8.381
1	8.375
1	8.371

b/ printing with header and tolerances enabled :

SYLVAC SA

Piece ident. : COUVERCLE
Drawing nbr : PM230.010.412
Work station : L 201

Date : 12/11/1998

CHANNEL	MEAS.VALUE	NOM.SIZE	UPPER TOL	LOWER TOL	DEVIATION	OUT OF TOL	<=>
1	8.379	8.350	0.020	-0.010	0.029	0.009	E >
1	5.092	5.100	0.000	-0.010	-0.008		E =
2	12.284	12.220	0.050	0.000	0.064	0.014	I >
4	7.004	7.000	0.050	-0.050	0.004		E =

1.6.11.4 Output format for 40 columns printer

For small printers with a paper width of approx. 80 to 120 mm.

Printing time per line may be entered, as small printers often have a limited input buffer.

As for the 80 col. Printer, a header can be added at the start of the printing process. This is carried out as Described in the previous section. A new printout of the header can be activated by pressing the ***Print*** key.

a/printing example in normal measurement mode with tolerances activated and complete header :

SYLVAC SA

Piece ident. : COUVERCLE
Drawing nbr. : PM230.010.412
Work station : L 201

Date : 12/11/2003

CHANNEL	MEAS.VALUE	DEVIATION	OUT OF TOL
1	13.421	5.071	5.051 E>
1	13.369	5.019	4.999 E>
1	13.405	5.055	5.035 E>
1	13.393	5.043	5.023 E>

1.6.11.5 Format for 15 columns printer

For small printers, battery or accumulator powered (e.g. EDP5000 or SP1).

As previously, the unit requests the time needed to print one line. A header cannot be entered here.

a/ in normal mode, the measurements are printed as in computer format, but are preceded by the channel number. In tolerance mode, the difference between the nominal dimension ant the measurement is printed :

CHANNEL	MEAS.VALUE
1	9.716
1	15.434

1.6.11.6 Remote command of D80S unit :
Practically all functions of the D80S unit are remote controllable from a computer through input RS232, according to the following general method :

The first 3 letters of functions are used for remote command. For example, if a measured value is required from the computer, the first 3 letters of Print are transmitted, i.e. **PRI**.

Any number of spaces can be inserted anywhere, except inside numbers.

Command characters may be in upper or lower case (the latter are ASCII coded).

On/Off functions like analog scale or tolerances indicators are activated with the first 3 letters of the function, followed by ON or 1. They are disabled with OFF or 0 (= zero and not the letter O).

For example : TOL ON displays tolerances indicators, as does TOL 1.

There should be no delay between characters in remote command word.

Words used for remote commands :

CHA+ (CHANNEL)	= selects positive measuring direction of the indicated channel.
CHA-	= selects negative measuring direction of the indicated channel.
CHA3	= selects channel 3.
CHA-2	= selects channel 2, in negative measuring direction.
CHA? ou CHA PRI	= identifies the direction of measurement (+/-) followed by the active channel number.
DIS bla...bla... (DISPLAY)	= displays a 20 characters max message on the first line of the D100S display. The end of message is given is given by CR (Carriage Return). This message is cleared by pressing any key on D100S unit or by sending the NOR remote command.
EXT 0 (EXTERNAL CONTACT)	= allocates data transmission function to external contact (foot pedal).
EXT 1	= display hold
EXT 2	= reset Min/Max registers.
EXT 3	= preset display.
EXT 4	= change channel.
EXT 5	= D110 command.
EXT 6	= mode radius =1, mode diameter = 2
EXT 7	= status transmitted automatically.
EXT 8	= status transmitted on request.
EXT 9	= transmission of values + display hold
EXT 10	= new Min/Max the transmission of values.
EXT 11	= preset then transmission of values.
EXT 12	= transmission of values + change channel.
EXT 13	= D110 command then transmission of values.
EXT 17	= new Min/Max then hold.
EXT 18	= preset then hold.
EXT 19	= Hold + change channel
EXT 20	= Hold + D110 command
EXT 24	= new Min/Max (if necessary) then hold and change channel.
EXT 25	= new Min/Max then Print + change channel.
EXT 26	= new Min/Max then change channel.
EXT?	= request status of external contact (corresponding to EXT 8) the unit transmits 0 (zero) if no external contact. The unit transmits 1 if an external contact has occurred (status is automatically reset To 0).
IDE ou **ID?** (IDENTIFICATION)	= identification of instrument—> the unit responds «SYLVAC D80S date V1.0» firmware version

KEY 0 (KEYBOARD)	= keyboard locked.
KEY 1	= keyboard unlocked.
MAX (MAXIMUM)	= selects max function.
MIN (MINIMUM)	= selects min function.
DEL (DELTA)	= selects delta function (max-min)
MEA (MEAN)	= selects mean function (max + min/2)
CLE (CLEAR)	= re-initializes min/max registers when inut is in max, min, delta or mean modes.
ENT (ENTER)	= displays in succession Max - Min - Delta - Mean ... in Min/Max mode.
NOR (NORMAL)	= re-establishes normal measuring function.
MOD? (MODE)	= the unit sends its measuring mode : NOR, MAX, MIN, DEL or MEAN.
MEMR	= restores memory configuration of unit, same transmission parameters as above.
MM (MILLIMETER)	= selects metric unit.
IN (INCH)	= select inch unit.
OUT 1 (OUTPUT MODE)	= actives : automatic output of values : in normal measurement mode : each displayed value is also transmitted to RS 232 output. In this case, the transmission speed at 9600 bauds is : in 0.000 1 mm / 0.000 01 IN = 3 trans. per sec. in 0.001 mm / 0.000 1 IN = 7 trans. per sec. in 0.01 mm / 0.001 IN = 12 trans. per sec. in 0.1 mm / 0.01 IN = 13 trans. per sec.
OUT 0	= disables this mode.
PRE (PRESET)	= displays the stored preset value.
PRE 123.4567	= memorize and display preset value 123.4567.
PRE ?	= unit sends memorized preset value.
PRI ou **?** ou **P** (PRINT)	= print out of the displayed value.
RES1 (RESOLUTION)	= selects resolution of 0.000 1 mm or 0.000 01 IN
RES2	= selects resolution of 0.001 mm or 0.000 1 IN
RES3	= selects resolution of 0.01 mm or 0.001 IN
RES4	= selects resolution of 0.1 mm or 0.01 IN
RST (RESET)	= general reset of the unit (return to initial status)
SAV+no	= save the configuration to the file nbr (1 to 12)
REC+no	= load the configuration from the file nbr (1 to 12)

SET ? (SETUP) = the unit transmits general parameters :

	MM	RES1	ANA0	TOL 0	KEY 0
or	IN	2	1	1	1
or	UM	3			
or	MI	4			

Note : ST00/1indicates if hold function is active or not.

TOL0 (TOLERANCES) = no display of tolerances indicators.
TOL1 = displays tolerances indicators.
TOL 10.2 0.1 -.05 I = input of nominal size 10.2, upper tolerance 0.1, lower tolerance –0.05 and internal measurement (= I).

TOL ? = output of memorized values : for example 10.000 0.005 –0.003

UP = retraction of probes using D110/D110V.
DOWN = return motion of probes using D110/D110V.

Errors codes transmitted by the D100S unit :

ERR 1 = parity error of received message
ERR 2 = syntax error of received message
ERR 3 = content of RAM memory lost.

1.6.11.7 Programming on a PC

An application diskette for communication with PC can be obtained from a Sylvac agent. This diskette includes a Demonstration program written in Pascal for data acquisition and remote command of **D80S** unit.
Basic (QBASIC), supplied with all PCs, is the most simple language to use. Below are 2 examples written in this language found on the diskette.

a/ acquisition of one measured value :

10 CLS	Clear screen
20 OPEN "COM1:4800,E,7,1,CS,DS,CD" AS#1	Selects communication port 1 or computer and the following transmission parameters : 4800 bauds, even paryty, 7 bits /car. 1 stop bit.**CS** inibits time-out control of **CTS** (Clear To Send), **DS** for **DSR** line (Data Set Ready) and **CD** for **CD line** (Carrier Detect).
30 IF INKEY$ <> "" THEN 80	Programs stops if any key is pressed.
40 IF LOC(1) = 0 THEN 30	Wait if RS232 input buffer is empty.
50 LINE INPUT#1, A$	Inputs one complete line up to CR.
60 PRINT A$	Displays value transmitted by **D80S**
70 GOTO 30	Ready for new entry.
80 END	

b/ Rétro-commande de l'unité D100S :

10 CLS	
20 OPEN "COM1:4800,E,7,1,CS,DS,CD" AS#1	
30 PRINT "Donner le mot de commande"	
40 INPUT B$	Enters word for remote command of **D80S** (e.g. PRI for transmitting a value).
50 PRINT#1, B$	Outputs command word through RS232 port.
60 IF LOC(1) > 1 THEN 100	Wait for any response from **D80S** unit.
70 K$ = INKEY$	
80 IF K$ = CHR$(13) THEN 130	Program stopped by pressing by pressing **Enter** key.
90 IF K$ = " " THEN 60 ELSE 30	Pressing another key allows output of a new command word
100 LINE INPUT#1,A$	
110 PRINT A$	Displays eventual response from **D80S**
120 GOTO 70	Ready for new input.
130 END	

For transmission of a long characters strings, e.g. for the transmission of memorized values (Store function), the Computer can use the Xon/Xoff protocol to control transmission. If the RS 232 buffer of the computer exceeds a Given stated limit, e.g. 200 bytes (capacity is 255 bytes), the computer stops transmission by sending Xoff (=ASCII Code 19 = CHR$(19)). When the computer is ready for a new input, it will transmit Xon (=ASCII code 17=CHR$(17))

Pinout of RS232 and Centronics connectors : *refer to Sections 1.8.1*

Various RS232 connection cables for D80s are available from Sylvac.
(*refer to section 1.14*).

1.7 CALIBRATION OF THE UNIT

1.7.1 General calibration

The **D80S** units are calibrated at the factory. However if a re-calibration is required, proceed as follows :

1/ Fix a **P2, P5, P10, P25** or **P50** probe to a vertical support.

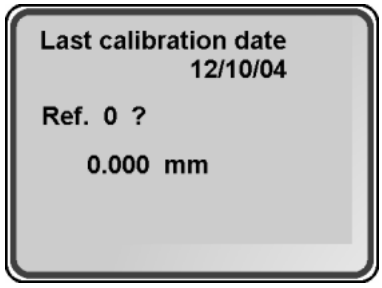
2/ Select a resolution of 0.0001 mm or 0.00001 in.

3/ With the probe in its fully extended contact-free position, reset display to zero (***Preset*** key).

4/ Mechanically position probe under reference base so that readout indicates a measurement :

for **P2** between 0.2 and 0.3 mm
P5 between 0.7 and 0.8 mm
P10 between 0.4 and 0.5 mm
P25 between 0.8 and 0.9 mm
P50 between 1.0 and 1.2 mm

5/ Switch off unit, then switch on by pressing ***Measure*** Key for four seconds.
The following display will appear :



The date of the last calibration is shown.

6/ Place probe on reference base (value 0). Press *enter* **Enter** key.
7/ Insert 2 mm test block for the **P2**, 5 mm for a the **P5**, a 10 mm for the **P10**, 25 mm for a **P25** or 50 mm for a **P50**.

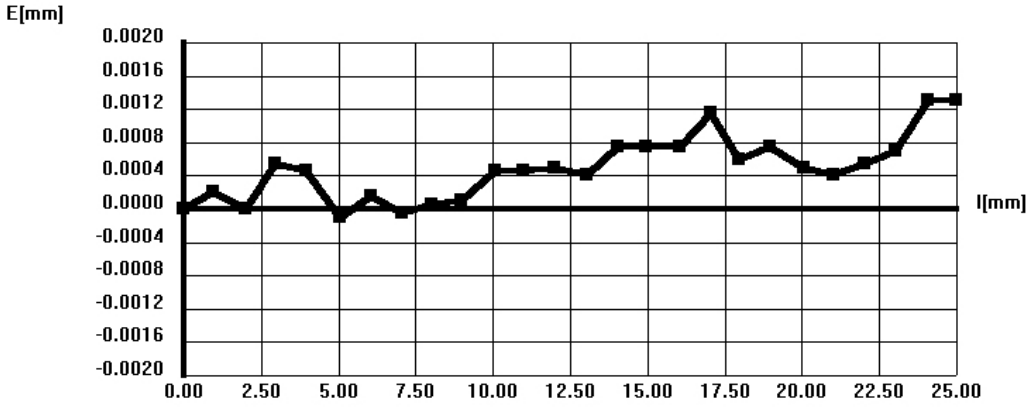
8/Enter exact value of pad on keyboard : 2, 5, 10, 25 or 50 mm, then press ***Enter*** key.

The calibration value is automatically stored and can only be deleted by a new calibration (changing lithium module Or accumulator does not effect the calibration).

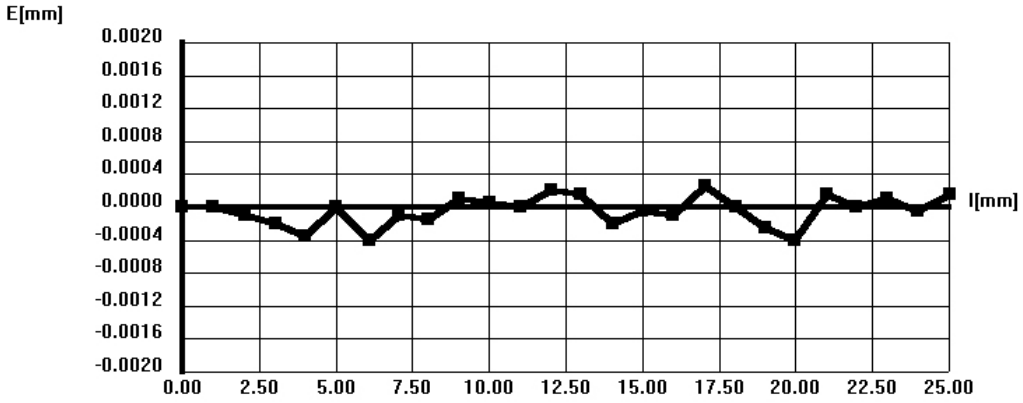
1.7.2 Coupling probe to unit

The user can couple the probe-unit couple and correct from 2 to 25 points linearly.

Example of correction :
1/ Probe P25 with D100S without correction —> max error 1.4 um :



2/ Same instruments, but with correction of 10 points (every 2.5 mm—> max. error 0.7 um :



Introduction of correction : probe out to probe in.

1/ Switch off unit D80S

2/ Switch on unit while pressing ***Min/Max*** key for at least 5 seconds.

3/ If there is room, the date of old correction is displayed.

4/ Insert value of first reference in keyboard, normally 0. In theory, this is the probe travel stroke, approx. 0.8 mm for a **P25** probe. Confirm by pressing **Enter** key.

5/ Then enter correction points. Gauge block may be used, whose exact value is know. With probe in opposition on the pad, insert its exact value on keyboard and confirm by pressing ***Enter*** key.

6/ Continue in same way for all correction points, with 1 point min. and 25 points max.

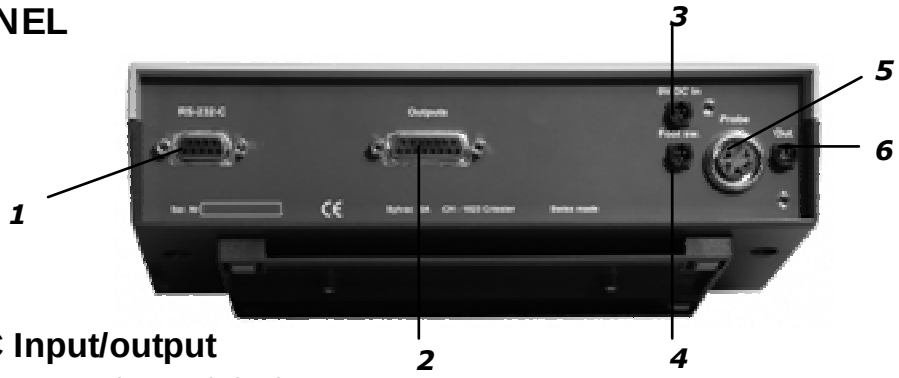
7/ When the final correction point is reached e.g. 5, press the ***Clear*** key and this will exit correction mode (otherwise you will move to the next point.

Correction is indicated by an E on the display (E for Extended accuracy)
This value cannot be deleted, even if you restart the unit (Reset)

If you wish to delete the effect of the multiple correction, briefly press ***Min/Max*** key when switching the unit on.

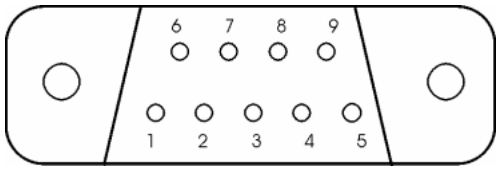
To reconfirm this correction, repeat the same sequence as above.
Correction is the same for all channels of the **D80S**. Multiplexing units D102 and D108 for multiple probe use are invalid.

1.8 REAR PANEL



1.8.1 RS-232-C Input/output

9 pin D-sub female connector (external view) :



Pin 1 : Charger output **8.5 V / 300 mA** non-regulated (current limit protection). Output only with charger connected.

Pin 2 : **RXD** = RS-232-C output when ***Print*** key or foot pedal (if configured) is pressed, or by remote command.

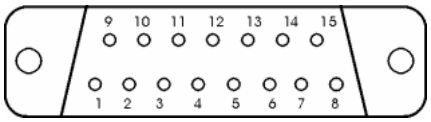
Pin 3 : **TXD** = RS-232-C input for remote command from computer.

Pin 4 : **DTR** (Data Terminal Ready) :not used.
Pin 5 : **SG** (Signal Ground) =Signal ground.
Pin 6 : **DSR** (Data Set Ready) =not used.
Pin 7,8 : Unconnected.
Pin 9 : **6 à 7 V / 150 mA** accumulator output, non-regulated (current limitation).

To configure the RS-232-C transmission parameters, press ***Setup*** key then ***Print*** key.
(refer to ***Print*** key section *1.6.14*).

1.8.2 Outputs

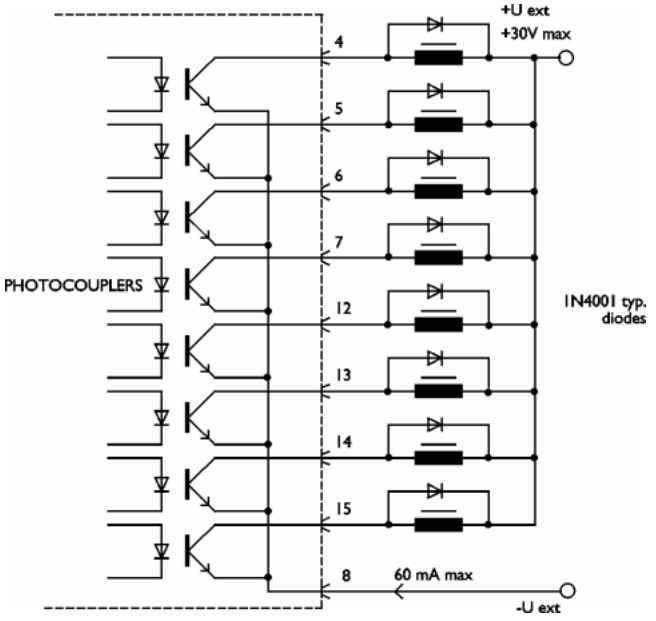
15-pin D-sub female connector (external view) :



Pin 4,5,6,7 and
12,13,14,15 : opto-coupled outputs for sort or pneumatic lifting commands (D110).
Depending on which mode is active, the outputs have the following functions :

mode :	Tolerance	D110 (pneumatic lifting)
Pin 4	<	
Pin 5	=	
Pin7		lowering command
Pin 12		lifting command
Pin 13		lowering command
Pin 14		lifting command
Pin 15	>	

Pin 8 : Common for 8 opto-coupler outputs.



Max voltage = **30 V**, max. current = **60 mA** per output.

The opto-coupler outputs must be supplied externally
With negative voltage to the common emitters (pin 8)

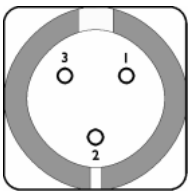
The protection diode is necessary in the event of
Inductive charge (electro-valve), relay, solenoid, etc..)

1.8.3 Socket for mains charger

May be inserted in either 3, or 4.
Before insertion : ensure socket polarization is at 12 o'clock.

1.8.4 Socket for external contact , e.g. foot pedal

May be inserted in either 3 or 4.
The external contact may be configured for different functions, refer to section 1.6.11.



1 : Ground
2 : Power input/charger + 8.5 V
3 : External contact input 1 or 2 (signal = 0 V)

1.8.5 Probe input

Probe input or for linking cable for multi-channel unit ***D102*** or ***D108***.
For best connection, screw the plug into the socket.

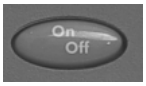
1.8.6 Command output

Socket for command cable used with multi-channel unit ***D102, D108.***

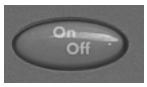
1.9 IN CASE OF DIFFICULTY

1.9.1 Complete reset of unit.

In case of problems, or if the operator so wishes, it is possible to completely reset the unit (will not work if keyboard is locked) :



1/ switch off the unit ***On/Off*** 2/ press ***Clear***



3/ while holding the ***Clear*** key down , switch on the unit ***On/Off***

This operation erases everything entered as a parameter or function and re-initializes the unit in the following manner :

- selects channel 1, a resolution of 0.001 mm and mm measuring unit.
- resets all channels (1 to 8) to positive measuring direction with probe tip returning
- resets all tolerances

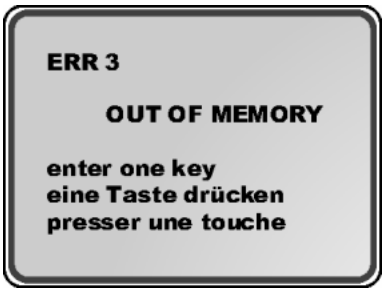
- selects communication with a computer and the following transmission parameters : **4800** bauds, **7** bits/car., **even** parity and **1** stop bit, **CR** at the end of the message.

Reset may also be remote controlled by sending the characters "**RST**" to the RS232 input.

Memory for twelve configuration saves is not deleted.

1.9.2 Loss of memory content.

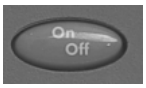
If the following message appears on the screen when the unit is switched on :



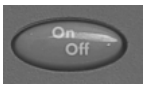
This means that the data back-up lithium module is flat (average life 10 Years). It is therefore necessary to change this module as per the Instructions in Section 1.10.

1.9.3 Software version

The software version may be displayed as follows :



1/ switch the unit ***On/Off*** 2/ press ***Print*** key.



3/ keep it pressed when switching ON

Then any key will return you to normal measuring mode.

1.9.4 Special symbols

Meaning of symbols that may appear on the screen :

K Indicates locked keyboard (to unlock : Enter + On/Off or a long pressure (5 sec.) on any key)

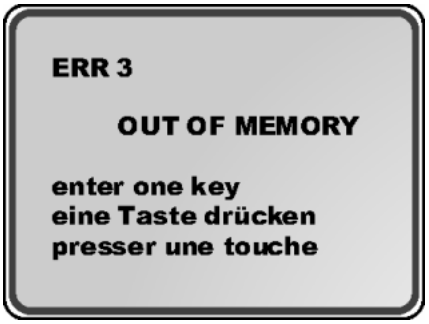
P Indicates RS232 output in progress.

↑ Indicates pneumatic lifting
↓ Indicates pneumatic lowering

? Indicates a non authorized action on keyboard.

1.10 REPLACING THE LITHIUM MODULE

If the following message appears on the screen when the unit is switched on :



This means that the data back-up lithium module is flat (**average life 10 years**)

Note : It is possible to use **D80S** unit with a "flat" lithium module, but all parameters and functions entered by the operator will be lost each time the unit is switched off.

The module is replaced as follows :

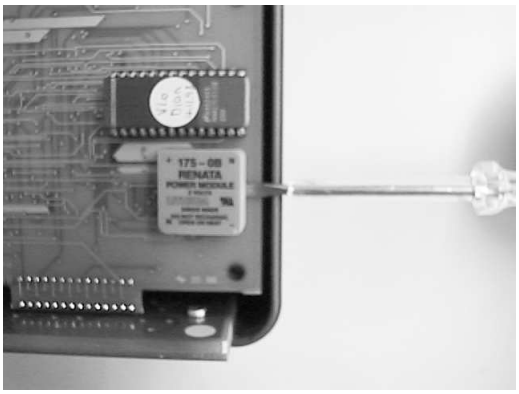
After obtaining a new lithium module from Sylvac representative,

Place the unit on a table and remove the 4 retaining screws of the cover..

Touch a water pipe or other object connected to ground to release any static build-up (the inside of the unit is Sensitive to electrostatic discharges).

Remove yellow cover.

Remove lithium module with a screwdriver :



Insert new lithium module, replace cover and replace the 4 cover retaining screws.

When the unit is switched on again, the memory contents lost message will appear once more.

1.11 TECHNICAL SPECIFICATIONS (D80S)

Enclosure : in terblend plastic (= ASA + polycarbonate) :
resistant to alcohol, glycols, most oils and greases, diluted acids and water.
Non-resistant to aromatic hydrocarbons, esters, ketones, concentrated Mineral acids, ammonia gas and its dilutions.

Front panel : Polyester.

Rear panel : Aluminium varnish.

Keyboard : Flat with metal dome tactile response.

Dimensions : Width 227 mm, depth 132 mm height 77 mm without (87mm with stand)

The stand is adjustable : vertical or inclined at 13°
A complementary base (supplied with the unit) allows an inclination of 35°.

Degree of IP protection : IP40 (according to IEC 529).

Weight of unit : 0.8 kg (1.8 lb).

Accuracy of measurement for D100S + probes : interchangebility of probes and unit guaranteed as follows :

Probe type	D100S error	Probe error	Mean error
P2	1.5 µm	0.8 µm	1.0 µm
P5	1.0 µm	1.5 µm	1.8 µm
P10	1.2 µm	1.0 µm	1.6 µm
P25	1.5 µm	1.2 µm	1.9 µm
P50	3 µm	2.5 µm	3.9 µm

Repeatability (+/- 2s) :
P2 : 0.3 µm
P5 : 0.3 µm
P10 : 0.2 µm
P25 : 0.2 µm
P50 : 0.4 µm

Operating temperature : Between +5°and +40 °C
Storage temperature : Between -20°and +45 °C

Measuring frequency :

Probe in	Probe out	
P2 :	between 170	and 205 measurements per sec.
P5 :	between 170	and 205 measurements per sec.
P10 :	between 170	and 205 measurements per sec.
P25/P50 :	between 130	and 205 measurements per sec.

The value measured is filtered digitally for the display, according to the resolution :

0.0001 mm or 0.00001 in :	approx. 3 readouts per sec. (=3 analog outputs per sec.)
0.001 mm or 0.0001 in :	approx. 5 readouts per sec.
0.01 mm or 0.001 in :	approx.12 readouts per sec.
0.1 mm or 0.01 in :	approx.15 readouts per sec.
in min/max mode :	no filtering, 60 readouts per sec. for 0.1, 0.01 et 0.001 mm

Display: LCD , STN type (Super Twisted Nematics), graphics 128 x 64dots.
Viewing area 66 x 33 mm. CCFL. back-lighting.

Outputs:

	RS-232-C port for linking to computer to computer or printer.
	Command for optional multichannel unit D102, or D108..
Inputs :	1 external contact1, e.g. supplied foot pedal. RS-232-Cport for remote command from computer.
Charger :	country specific, supplied in one of the following 4 types : European standard plug 230 V +/- 10 % 50-60Hz US standard plug 120 V +/- 10 % 50-60Hz Japan standard plug 100 V +/- 10 % 50-60Hz UK standard plug 240 V +/- 10 % 50-60Hz For all 4 models : output 8.5 V / 1100 mA.
Data back-up :	Lithium module 3V 175 mAh Renata type 175-OB. Lifetime approx. 10 ans.

1.12 DELIVERY

Packaging in synthetic material :

		Order No
1 D80S unit		.....
1 charger	European 230V	904.4010
	UK 240V	904.4011
	US 120V	904.4012
	Japan100V	904.4013
1 foot pedal for external contact		904.4101

1 base (to increase incline)

1 instructions manual

1.13 ACCESSORIES

		Order No
Connecting cables for :		
	PC AT computer (Dsub 9p cable socket), 3 m length	925.5609
	Converter (RS232/USB), 2 m) length	925.1142
Adapters :	9M/25M adapter for computer with 25 pins female connector	925.5626
	9M/9M adapter for computer with 9 pins female connector	925.5627
Battery pack (accumulators) :		331.010
Lithium module :		331.005

2. MULTICHANNEL UNITS 2 CHA. (D102) ET 8 CHA. (D108)

2.1 GENERAL DESCRIPTION

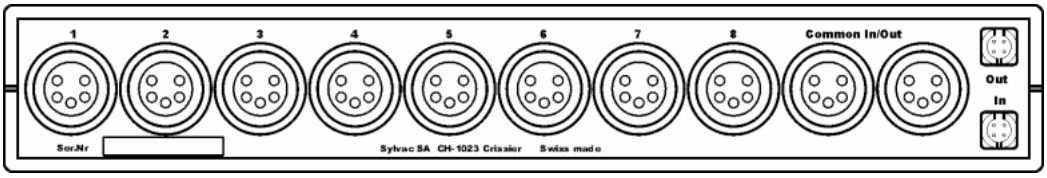
The **D102** et **D108** multichannel units are designed to work with the **D100S**, **D80S** or old **D100/D101** display units. They can be mounted on the display unit by inserting the 4 plastic legs. The multichannel unit equally be positioned separately away from the display unit, close to the probes.

The **D102** unit allows connection of 2 probes on a **D80S**

The **D108** unit allows connection of up to 8 probes on a **D80S** unit.

Choice of channel, its function mode, its preset and tolerance indicators are made from the **D80S** display unit.

2.2 REAR PANEL (D108 unit)



2.3 OPERATION

1/ Connect **D80S** 'Out ' socket to the 'In' socket on the **D102** or **D108** unit, using the short connecting cable provided with the multichannel unit.

2/ Connect the probe input socket marked 'Probe' on the **D80S** unit to one of the two sockets marked 'Common In/Out' of the **D102** or **D108** units using the connecting cable provided.

3/ Plug one or more probes into the sockets marked '1' or '2' for the **D102** unit and '1' to '8' for the **D108** unit. Ideally it is better to connect probes beginning at channel 1 and continue upwards without leaving a space between the channels in use. Input 1 corresponds to channel 1 of **D80S**, input 2 to channel 2, etc.

4/ If several D102 / D108 units are being, they are connected in the same way.

- The 'Out' socket of the lower unit is connected to the 'In' socket of the upper unit.
- One of the two 'Common In/Out' sockets on the lower unit is connected to one of the two 'Common In/Out' sockets on the upper unit.

The numerical order of the channels starts from the first **D102/D108** unit connected to the display unit. For example if there are 3 **D102** units connected to 1 **D80S** unit : the **D102** unit connected to the **D80S** corresponds to channel 1 to 6.

5/ Presets, tolerances, direction of measurement, modes may then be entered on the **D80S** unit. Once this is done, it is possible to select the channel to be displayed manually or with the external Contact.. These functions are explained in detail in Section 1.6

2.4 TECHNICAL SPECIFICATIONS OF D102 AND D108 UNITS

D102/D108 units:	Housing in Terblend plastic (= ASA+Polycarbonate :refer to characteristics described in Section 1.12)
Clip-on legs:	Polyurethane clip-on legs.
Front and rear panels :	Aluminium and polycarbonate sheet front and rear panels.
Degree of IP protection :	IP50 (according to IEC 529)
Weight of unit :	D102 0.450 kg D108 0.500 kg
Possible measuring error :	max 1 µm (this error can be reduced by re-calibrating the D100S unit).
Operating temperature :	between +5 and +40 °C
Storage temperature :	between -20 and +60 °C
Power supply :	via D100S display unit.

Packaging in synthetic material includes :

	Order No
- 1 D102 unit (2 channels)	904.1102
- or 1 D108 unit (8 channels)	904.1108
- 1 command connecting cable	925.5601
- 1 probe connecting cable	925.5603

2.5 ACCESSORIES

	Order No
- Command connection cable 2.5 m length	925.5602
- Probe connection cable 2.5 m length	925.5604

4 SYLVAC PROBES P2, P5, P10, P25 AND P50

4.1 GENERAL DESCRIPTION

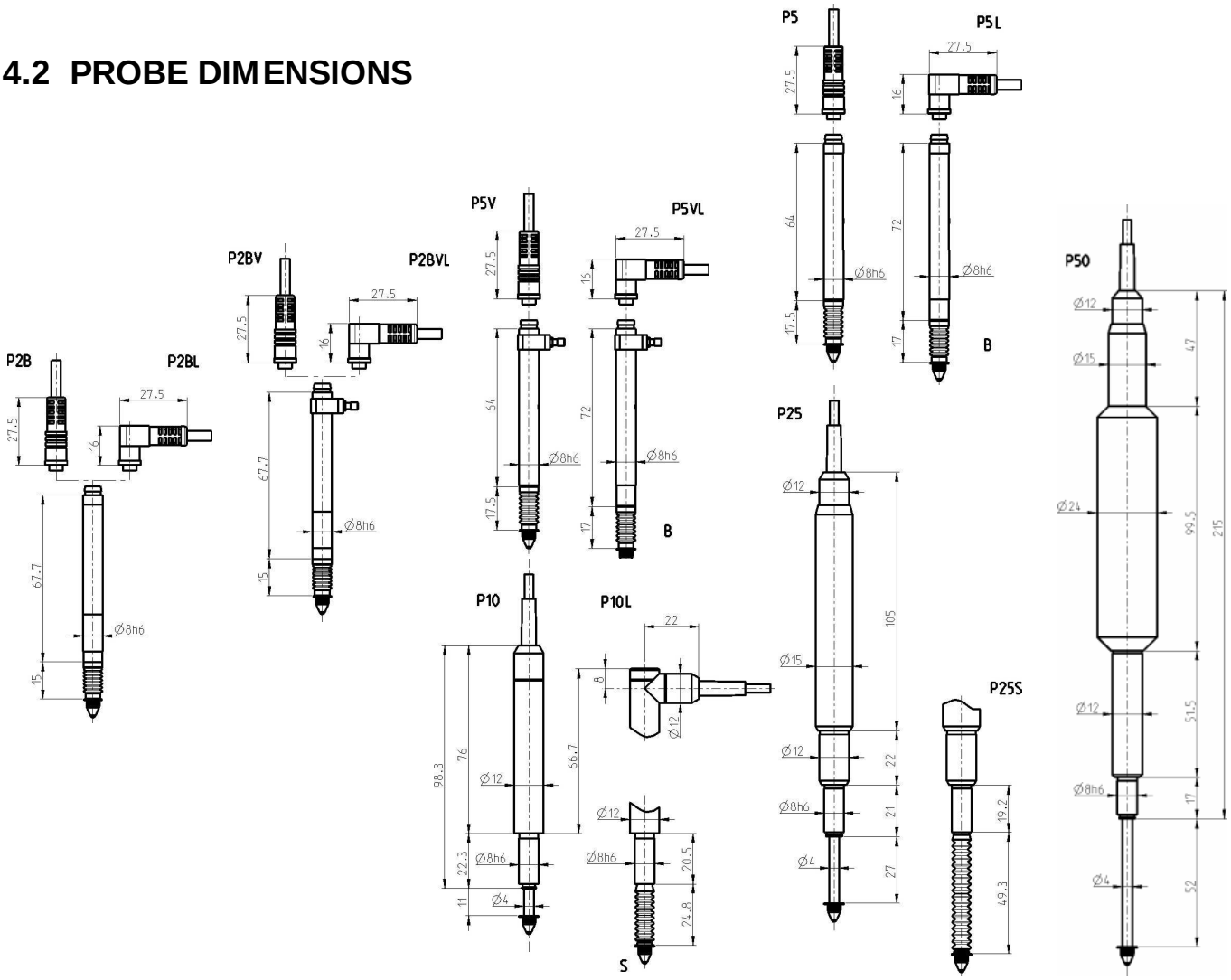
Sylvac long travel probes are of compact design and are distinctive by their stability and consistent measuring accuracy. In addition they are absolute, i.e. having been disconnected then connected again or after switching off the unit, they still display the same measuring value. They have no speed limit, so that they never lose their absolute value.

The built-in preamplifier allows the use of long cables without intermediate amplification. The probe is not affected by magnetic fields. (Up to 20 meters)

P2B	Measuring range of 2 mm (ball cage)	P5V	Same as P5 (vacuum lifting)
P2BL	Same as P2B (right-angled output cable (90°))	P5VL	Same as P5V (right-angled output cable (90°))
P2BV	Same as P2B (vacuum lifting)	P10	Measuring range of 10 mm
P2BVL	Same as P2BV(right-angled output cable (90°))	P10L	Same as P10 (right-angled output cable (90°))
P5	Measuring range of 5 mm	P25	Measuring range of 25 mm
P5L	Same as P5 (right-angled output cable (90°))	P2 5S	Same as P25 (with rubber boot)
		P50	Measuring range of 50 mm

Different lifting methods are available for various probes :
- by photo-cable
- by foot pedal and cable
- by pneumatic lifter : D110 unit
- by vacuum, only for P2 - P5 : D110V unit

4.2 PROBE DIMENSIONS



4.3 USE

4.3.1 Precautions

To ensure optimum measurement precision avoid all lateral pressure when presenting the probe contact to the objet to be measured. Ideally, a mechanical retracting lifter should be used.

Carefully clamp the fixing bearing of the probe in the holder. Fixing too tight can influence the measurement.

Avoid any impact on the probe spindle.

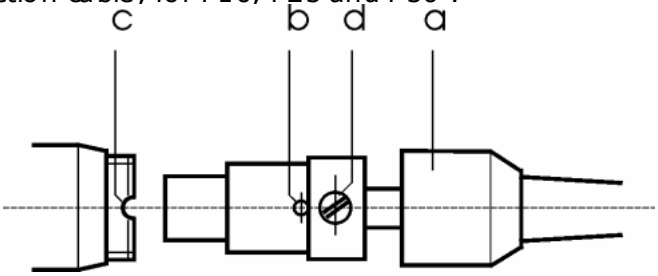
4.3.2 Changing the contact point

The probe spindle has an ISO M 2.5 thread in the end allowing replacement of the contact points. When changing the contact point, the probe spindle should be in the outmost position.

4.4 MAINTENANCE

This has been reduced to a simple operation. When the measuring spindle no longer slides with complete ease And precision, clean it with a dust free cloth and lightly lubricate with a fine oil.

4.4.1 Replacing the connection cable, for P10, P25 and P50 :



unscrew the cap (**a**)
pull out the cable
plug in the new cable, locate the pin (**b**) of the cable sleeve (**d**) in the slot (**c**).
Screw on the cap (**a**)

Notes : use connection cable for the corresponding probe (**P10-P25-P50**).

For the **P2/P5** :the cable is connected to the probe by means of a sealed connector.

4.5 TECHNICAL SPECIFICATIONS

	P2BL/P2B	P2BV/P2BVL	P5/P5L	P5B/P5BL	P5V/P5LV	P5BV/P5BVL	P10S/P10LS	P10/P10L	P25S	P25	P50
Construction	Pluger gage	Pluger gage	Pluger gage	Pluger gage	Pluger gage	Pluger gage	Pluger gage	Pluger gage	Pluger gage	Pluger gage	Pluger gage
Type of bearing for meas. Plunger	ball bearing	ball bearing	Friction bearing	ball bearing	Friction bearing	ball bearing	Friction bearing	Friction bearing	Friction bearing	Friction bearing	Friction bearing
Moving mass (without contact)	3.4 g.	3.4 g.	3.7 g.	3.7 g.	3.7 g.	3.7 g.	4.1 g.	4.1 g.	9.6 g.	9.6 g.	15.3 g.
Linear measuring range	2 mm / .078"	2 mm / .078"	5 mm / .19"	5 mm / .19"	5 mm / .19"	5 mm / .19"	10 mm / .39"	10 mm / .39"	25 mm / .98"	25 mm / .98"	50 mm / 1.96"
Total range	2.5 mm / .098"	2.5 mm / .098"	6.5 mm / .25"	6.5 mm / .25"	6.5 mm / .25"	6.5 mm / .25"	10.8 mm / .42"	10.8 mm / .42"	25.8 mm/ 1.01"	25.8 mm/ 1.01"	52.2 mm / 2.05"
Pre-travel	0.25 mm/.009"	0.25 mm/.009"	0.7 mm /.025"	0.7 mm /.025"	0.7 mm /.025"	0.7 mm /.025"	0.5 mm / .02"	0.5 mm / .02"	0.8 mm / .03"	0.8 mm / .03"	1 mm / .04"
Accuracy over the range	0.8 µm	0.8 µm	1 µm	1 µm	1 µm	1 µm	1 µm	1 µm	1.2 µm	1.2 µm	2.5 µm
Accuracy with D100S unit	1.5 µm	1.5 µm	1.6 µm	1.6 µm	1.6 µm	1.6 µm	1.6 µm	1.6 µm	1.9 µm	1.9 µm	3.9 µm
Accuracy with D100S unit (Coupled)	0.5 µm	0.5 µm	0.6 µm	0.6 µm	0.6 µm	0.6 µm	0.6 µm	0.6 µm	0.8 µm	0.8 µm	1.5 µm
Limit of travel											
upper stop	2.5 mm	2.5 mm	5.7 mm	5.7 mm	5.7 mm	5.7 mm	10.4 mm	10.4 mm	25.8 mm	25.8 mm	51 mm
lower stop	0.2 - 0.3 mm	0.2 - 0.3 mm	0.7 - 0.8 mm	0.7 - 0.8 mm	0.7 - 0.8 mm	0.7 - 0.8 mm	0.4 - 0.5 mm	0.4 - 0.5 mm	0.8 - 0.9 mm	0.8 - 0.9 mm	1.0 - 1.2 mm
Measuring force	0.60-0.75N		0.60 - 1.20 N	0.50 - 0.90 N			0.70 - 1.25 N	0.60 - 0.80 N	0.70 - 1.40 N	0.60 - 1.00 N	0.50 - 1.10 N
without pressure								≤ 0.10 N		≤ 0.15 N	
low pressure			0.20 . 0.25 N					0.20 - 0.25 N		0.20 - 0.30 N	
high pressure			1.00 - 1.80 N					0.70 - 1.50 N		0.70 - 1.60 N	
(Tolerance +/-20%)											
Increase of measuring force	0.04 N/mm	0.04 N/mm	0.4 N/mm	0.04 N/mm	0.04 N/mm	0.04 N/mm	0.03 N/mm	0.03 N/mm	0.024 N/mm	0.024 N/mm	0.016 N/mm
Permissible lateral force	0.70N		0.70 N					0.60 N		0.30 N	0.25 N
Repetability	0.2 µm	0.2 µm	0.2 µm	0.2 µm	0.2 µm	0.2 µm	0.2 µm	0.2 µm	0.2 µm	0.2 µm	0.2 µm
Zero drift	0.01µm/°C/(mm)	0.01µm/°C/(mm)	0.01µm/°C/(mm)	0.01µm/°C/(mm)	0.01µm/°C/(mm)	0.01µm/°C/(mm)	0.02µm/°C/(mm)	0.02µm/°C/(mm)	0.01µm/°C/(mm)	0.01µm/°C/(mm)	0.01µm/°C/(mm)
Protection according to IEC529								IP40		IP40	IP40
with rubber boot	IP64	IP64	IP64	IP64	IP64	IP64	IP50		IP50		
Lifting lever	*	Vaccum	*	*	Vaccum	Vaccum	Pneum.lifter	Pneum.lifter	Pneum.lifter	Pneum.lifter	Pneum.lifter

Accuracy using extension cables :
These measuring errors are applicable only when using **D100S** unit without re-calibration :

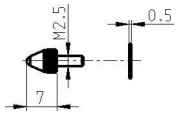
Normal cable	+ extension up to 5 m:	additional error	1.5 µm approx.
	+ extension up to 10 m :	"	3 µm approx.
	+ extension up to 15 m :	"	6 µm approx.
	+ extension up to 20 m :	"	8 µm approx.
Direct cable	+ extension up to 5 m :	additional error	3 µm approx.
	+ extension up to 10 m :	"	6 µm approx.
	+ extension up to 15 m :	"	10 µm approx.

This in a progressive error margin and re-calibration of D100S unit can considerably reduce the error.

4.6 ACCESSORIES

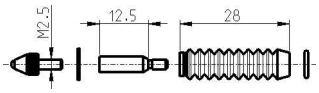
Standard measuring tip with M2.5 thread, with 2 mm ball.
(supplied with each probe).

Order No : **905.2204**



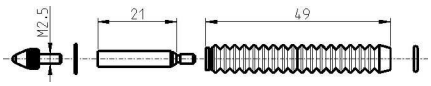
Rubber boot set for **P10** and **P10L** probes

Order No : **901.2003**



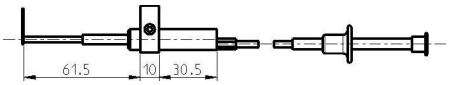
Rubber boot set for **P25** probe

Order N°. **901.2004**



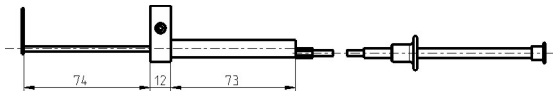
Lever with photo-cable, for **P10/P25** probes

Order N°. **901.2005**



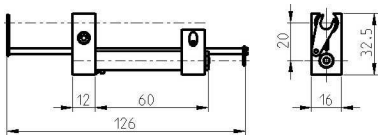
Lever with photo-cable, for **P50** probe

Order N°. **901.2006**



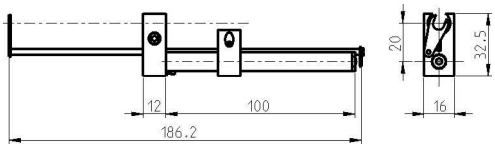
Pneumatic lifting jack for **P10/P25** probes

Order N°. **901.2010**



Pneumatic lifting jack for **P50** probe

Order N°. **901.2011**



Input pressure is 2 to 3 bar (dry, filtered air). The jack does not affect the probe's measuring pressure.
The unit is fully sealed and requires no maintenance.

5 PNEUMATIC COMMAND UNITS D110(V)

5.1 GENERAL DESCRIPTION

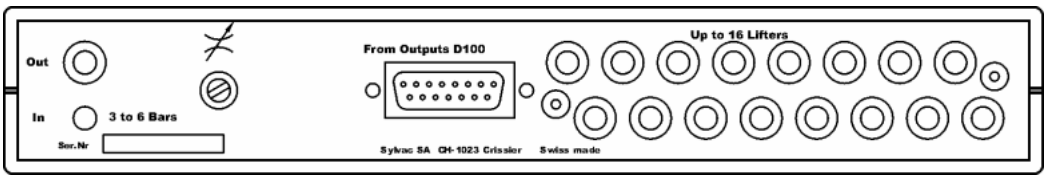
The pneumatic command units **D110/D111** or **D110V/D111V** (vacuum) are designed to work with the display units **D80S**. They can be mounted on the display unit by inserting the 4 plastic legs, or, for weight considerations, under the display unit. They can also be positioned separately away from the display unit, close to the probes.

- the **D110 / D110V** units allow the control of pneumatic/vacuum lifting of from 1 to 16 probes.

A maximum of 1**D110 / V** can be connected to one **D80S**, allowing the pneumatic/vacuum command or a maximum of 8 probes.

The retraction and return motion of probes is commanded from D80S unit, i.e. by means of the foot pedal. Remote command from a computer for pneumatic lifting is equally possible. Please note that all pneumatic lifters or vacuum probes are commanded simultaneously, so it is not possible to control each lifter separately.

5.2 REAR PANEL (D110 unit)



5.3 OPERATION OF D110 / D110V

1/ Connect the **D110** unit to the **D100S** unit ('Outputs' socket) by means of the 15 pin connecting cable.

2/ Connect from 1 to 8 lifters to the pneumatic outputs of the **D110**.Use the semi-flexible black PUR tube with an, outside diameter of 4mm and an inside diameter of 2.5 mm which is supplied with the pneumatic lifter. Unused sockets must have the red plastic plug which close the air outlet.

3/ Connect the air system at the point marked 'In' on the unit using the quick connector supplied and a tube with an outside diameter of 6 mm and an inside diameter of 4 mm. Filtered and dry air, 3 to 6 bars.

4/ Configure the **D80S** unit for lifting :

-using the foot pedal (external contact) : ***Setup*** key then ***Setup*** key then 1 then 6 (*refer to Section 1.6.9*).

-using the computer : this gives the UP order for lifting and DOW (DOWN) for the return motion (refer to Section 1.6.11.6 : remote command).

5/ Control the probe return speed by means of the microflow restrictor thumbscrew on the rear panel (can be locked by means of the locknut).

5.5 TECHNICAL SPECIFICATIONS

D110 units : :	Terblend plastic housing (= ASA+Polycarbonate : *refer to Section 1.12*)
Clip-on legs:	Polyurethane clip-on legs.
Front panel :	Polycarbonate front panel
Rear panel :	Varnished aluminium rear panel
Degree of IP protection :	IP50 (according to IEC 529)
Weight of unit :	D110 900 g (2 lb) D110V 800 g (1.8 lb)
Operating temperature :	beetween +5 and +40 °C
Storage temparature :	between -20 and +60 °C
Control:	electrically by display unit D80S
Air supply :	filtered and dry, pressure 3 to 6 bar.

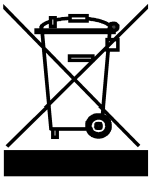
Packaging in synthetic material includes :

	Order N°
1 D110 unit (16 channels)	904.1110
or 1 D110V unit (16 vacuum channels)	904.1112
1 command connecting cable D80S - D110, length 2m50	
1 quick connector for connection to air supply	
16 plastic obturating caps	
or 1 D111 unit (16 channels)	904.1111
or 1 D111V unit (16 vacuum channels)	904.1113
1 D110 - D111 linking air tube	
16 plastic obturating caps	

The air tube between the pneumatic unit – pneumatic lifters is supplied with pneumatic lifters.

5.6 ACCESSORIES

	Order No
Plastic pipe in black PUR outside diameter 4mm, Inside diameter 2 mm for 901.2010 connection, per meter	901.2012
Plastic pipe in black PUR outside diameter 6 mm, inside diameter 4 mm for D110 connection, per meter	901.2013
Plastic pipe in black PUR couple 2x ø 4/2 mm	901.2014



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Version 10.2005 / SYL – D80S – E

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