

# SYLVAC 80

## INSTRUCTIONS FOR USE

FIRMWARE VERSION V1.0

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Sylvac SA Ch. du Cloalet 16 CH - 1023 CRISSIER

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# 1 / DISPLAY UNIT D80

## 1.1 GENERAL DESCRIPTION

The D80 unit displays the absolute displacement of the long travel Sylvac probes P10, P25 and P50, with a highest resolution of 0.1  $\mu\text{m}$ .

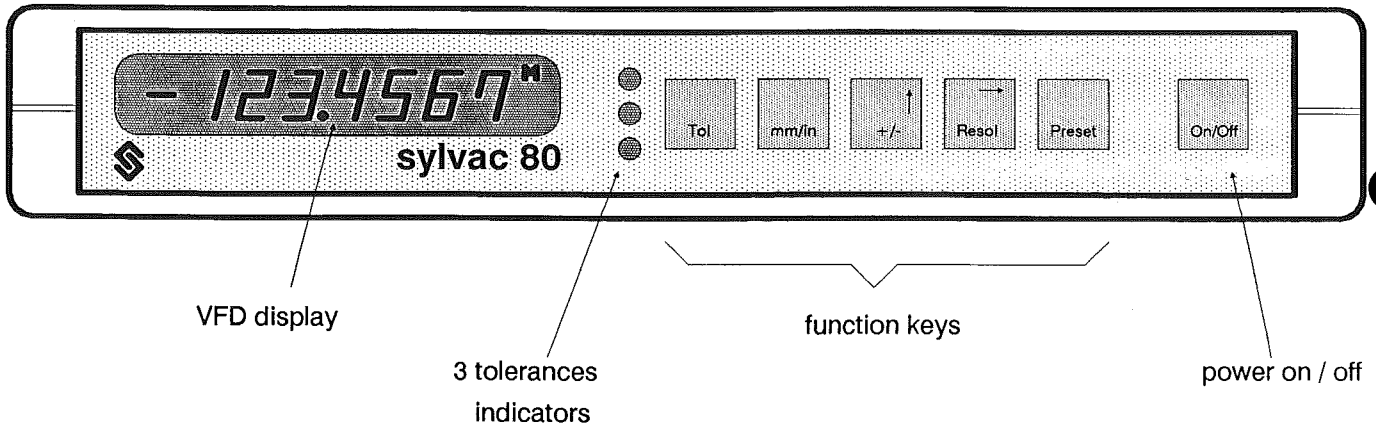
- Bright fluorescent display allows an easy reading of measurement, even at long distances.
- Ease of use as well as its compatibility with accessories of D100 family are making the D80 a universal instrument for workshop or laboratory.
- Integrated RS232 interface allows a bidirectional transmission with a computer or a printer ( for ex. EDP 5000 ).

Delivery comprises a foot pedal, of which function is selectable and a mains power block according to contry : euro 220V, US 120V, UK 240V or Japan 100V.

By means of complementary multichannel units it is possible to connect up to 8 probes into the D80 unit. Each probe having its own parameters : Preset, tolerances and sense of measurement. Those parameters are stored permanently in D80 unit.

D110 pneumatic command unit allows lifting of 1 to 8 probes simultaneously.

## 1.2 FRONT OF UNIT



## 1.3 FUNCTION KEYS

### Summary of functions of keys :



: preset display to zero or to any given value.  
> 2 sec. : enter a new preset value.

+ : display absolute value ( cancels preset ).



: changes display resolution : 0.01 - 0.001 - 0.0001 mm or 0.001 - 0.0001 - 0.000 01 in.  
> 2 sec. : new range of resolutions : 0.1 - 0.01 - 0.001 mm or 0.01 - 0.001 - 0.000 1 in.

+ : software version.



: reverse measuring sense.  
> 2 sec. : selection of one channel.

+ : general reset of unit.



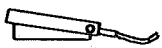
: true mm/in conversion.

+ : locking / unlocking of conversion.



: display or not tolerances indicators.  
> 2 sec. : input of nominal value and tolerances.

+ : self test of unit.



: RS232 data sending or other configurable functions.

+ : choice of external contact function.

### General principle :

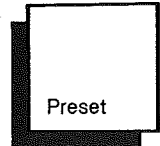
- a brief pressing of the key ( < 2 sec ) activate its function.
- a long pressing of the key ( > 2 sec ) allows input of parameters.

### Input of numbers :

- done digit after digit, key changes digit value by increment of 1 ( a long pressing allows an automatic incrementation ).
- changing of digit from left to right is done with key.
- changing the sign is done on the mostleft digit.
- the number of digits before the decimal point is max of 3 for mm and 2 for inch display. The number of digit after the decimal point is chosen according to the resolution.

All configurations and numeric inputs are stored *permanently* into the unit, even if power block is disconnected.


### 1.3.1 PRESET - ZERO SETTING OF DISPLAY




Pressing Preset key will set display to zero or to previously stored preset value. The external contact ( e.g. foot pedal ) can also be configured for the preset of display ( see chap. 1.3.7 ).



Each channel ( from 1 to 8 ) has its own preset value.

To input a new preset value, press more than 2 sec on this key and then enter the numeric value ( the old preset value is displayed ) :

 increases the blinking digit.

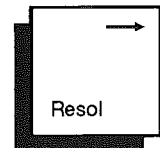
 digit change, from left to right.

( Refer to general principle, chap. 1.3 ).

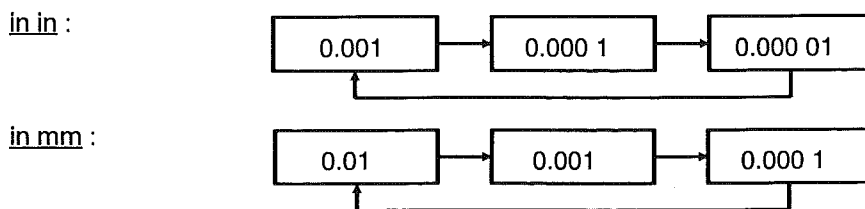
In case of a general reset (  +  ), preset values of all channels are reset to zero.

When switching on the unit while pressing Preset key, offsets of all channels are set to absolute value of reset ( numerical value of presets remains stored ).

### 1.3.2 CHOICE OF RESOLUTION

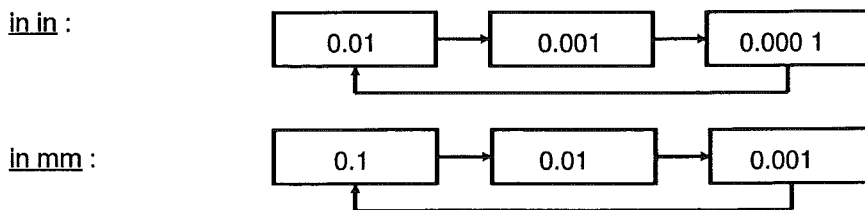


Scan following resolutions :



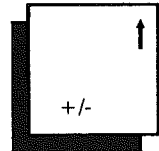
Numerical inputs ( preset and tolerances ) are done according to selected resolution. The resolution is identical for all channels.

Measurement with 0.01 in/0.1 mm is available ( the 0.000 01 in/0.000 1 mm resolution is then suppressed ) :  
For this, press Resol key more than 2 sec. At this time the cycle of resolutions is like following :



To come back to normal cycle, press a new time on Resol key for more than 2 sec.  
If the unit is switched on while Resol key pressed, the software version is displayed for 2 sec. ( here version 1.0 ).

### 1.3.3 SENSE OF MEASUREMENT



Reverse sign of display :





indicates a positive measuring direction for probe tip outside to inside.


indicates a positive measuring direction for probe tip inside to outside.


With a probe in a vertical position, this symbol indicates positive measurement sense.


The measuring direction is stored for each channel individually.

After a reset of the unit, all channels are set with a down measuring sense .

A long pressure on this key ( > 2 sec.) allows channel change :


1 / press  until the channel number ( between 0 and 8 ) is displayed.

2 / select channel with  key ( maintaining pressure will roll automatically this number ). 8 channels allowed, then return to channel 0.

3 / validate with Preset key ( or any key except  ).

**Selected channel define also the upper channel when channel change is done with the external contact.**


If selected channel is greater than 1, channel number is displayed on the leftmost digit.

Example : if channel 3 is selected with  key, channel change with foot pedal become :

- channel 1
- then channel 2
- then channel 3
- then channel 1 again
- and so on ...

Channel change is used in principle with 2 channels switching unit ( D 102 ) and 8 channels switching unit ( D108 ). It is nevertheless possible to use more than one channel for a single probe connected directly to D80 : up to 8 presets, tolerances, senses of measurement and radius / diameter measurement are also available.

**Channel 0 set D80 unit in RS232 display mode** : displayed value is not the probe measurement one, but the one of the Sylvac RS232 instrument connected. RS232 transmission parameters are defined like following : 4800 bps, 7 bits and even parity.

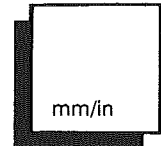
Reset of D80 unit : switch on the unit while maintaining  key pressed.

The unit is then reset like following :

- select channel 1, 0.001 mm resolution and mm unit
- for all channels : positive measuring sense for outgoing probe tip
- preset values at 0.000
- nominal values and tolerances at 0.000
- external contact configured for RS232 data sending

We can see all segments on display when reset occur : it is for the display burn in necessary for vacuum fluorescent displays ( burn in is done at factory ). To come back to normal measuring mode, press any key.


### 1.3.4 TRUE mm / in CONVERSION





Selected unit is displayed :  
- with a M for metric - mm  
- with a I for Imperial - in

Direct conversion in both units. Preset and tolerances values remain stored according to input unit.

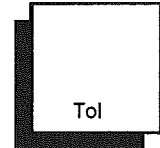
Conversion locking ( D80 remains in selected unit ) :

1 / switch off the unit 

2 / switch on the unit while pressing mm/in key :  + 

To unlock conversion : repeat the same sequence.

### 1.3.5 TOLERANCES INDICATORS



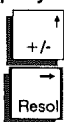
Display or not tolerances indicators :

- Orange signal-lamp :** indicates a measured value greater than nominal size + positive tolerance in external measurements or smaller than nominal size + negative tolerance in internal measurements.
- Green signal-lamp :** indicates a measured value inside tolerances.
- Red signal-lamp :** indicates a measured value smaller than nominal size + negative tolerance in external measurements or greater than nominal size + positive tolerance in internal measurements.

This indication is also transmitted to the corresponding optocoupler output for an external command purpose ( see chap. 1.5.2 ).  
Each channel has its own tolerances, as well as external or internal measuring mode.

#### Input of nominal size and tolerances :


1 / press Tol for at least 2 sec. The green signal-lamp blink and indicates the input of a new nominal size ( the old value is displayed ) :







increases the blinking digit

digit change, from left to right

( refer to general principle, chap. 1.3 ).

2 / validate input with  key. The orange signal-lamp blink and indicates the input of positive tolerance limit, according to the same principle than above. The value may be negative, but must be allways greater than negative tolerance limit.

3 / validate input with  key. The red signal-lamp blink and indicates now the input of negative tolerance limit, with its sign.

4 / validate with  key. The display indicates then E ( for External measurement ) or I ( for Internal measurement ) . The choice is done with  key and validation with  key.

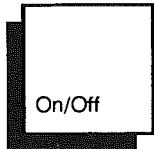
Self test of unit : switch on D80 unit while pressing Tol key.

- Perform the following tests :
- RAM memory of unit
  - program version
  - keyboard ( 1, 2, 3, 4 and 5 )
  - external contact ( 6 )
  - optocoupled outputs and tolerances indicators
  - all segments of display



This test reset D80 unit.







### 1.3.6 SWITCHING ON AND OFF





At switching on with the combination of other keys we have following features :

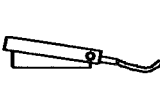

 +  : display of absolute measured value, for all channels.

 +  : display D80 software version.

 +  : reset of D80 unit + display burn in.

 +  : mm <--> in conversion locking / unlocking.

 +  : unit self test.

 +  : external contact function change.


Those different functions are described in detail with each corresponding key.

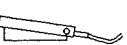

### 1.3.7 EXTERNAL CONTACT - FOOT PEDAL


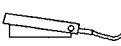



The external contact may be used to send data thru RS232 D80 port.

We can however assign other functions to the external contact :


1 / switch D80 off 

2 / press foot pedal , while switching D80 on 

3 / select function number with  key or  pressed n times.

4 / enter with 

#### Functions of external contact :

- 0 = RS232 data sending
- 1 = display hold
- 2 = new min/max ( min/max mode is introduced by remote command : see chap. 1.4.5 )
- 3 = preset display
- 4 = channel change ( upper limit given by  key pressed more than 2 sec )
- 5 = D110 pneumatic unit command
- 6 = radius mode = 1, diameter mode = 2 ( x 2 )
- 7 = status sending : - automatically --> EXT characters sent thru RS232 port
- 8 = status sending : - on request with remote command EXT ? --> 0 = no contact  
--> 1 = external contact
- 9 = RS232 data sending + hold simultaneously
- 10 = RS232 data sending + new min/max alternately
- 11 = RS232 data sending + preset alternately
- 12 = RS232 data sending + channel change simultaneously
- 13 = D110 lifting as long as the external contact is closed, waiting for 2.5 s then RS232 data sending
- 17 = hold + new min/max alternately
- 18 = hold + preset alternately
- 19 = hold + channel change simultaneously
- 20 = hold + D110 command alternately

## 1.4 RS-232-C TRANSMISSION

The transmission of measured value may be done with foot pedal ( function 0 of external contact ) or may be asked from a computer connected to D80 unit RS232 port ( see chap. 1.4.5 ; remote command ).

If no probe is plugged ( horizontal line on display ), 999.9 is sent.

RS232 plug pinout : see chap. 1.5.1. Sylvac can supply different RS232 cables : see chap. 1.8.

### 1.4.1 RS232 transmission parameters

Those are fixed at : **4800 bps, 7 bits, even parity and 1 stop bit.**

### 1.4.2 Transmission formats

a/ In inch :

SIGN	$10^1$	$10^0$	DP	$10^{-1}$	$10^{-2}$	$10^{-3}$	$10^{-4}$	$10^{-5}$	CR
= space if positive sign	$10^1$ = space if null		DP = decimal point					$10^{-4}$ , $10^{-3}$ and $10^{-2}$ only with resp. resolutions 0.00001, 0.0001 and 0.001 in	

Sign always immediately precedes the 1st digit.

a/ In mm :

SIGN	$10^2$	$10^1$	$10^0$	DP	$10^{-1}$	$10^{-2}$	$10^{-3}$	$10^{-4}$	CR
	$10^2$ and $10^1$ = space if null							$10^{-4}$ , $10^{-3}$ and $10^{-2}$ only with resp. resolutions 0.0001, 0.001 and 0.01 mm	

### 1.4.3 Linking with EDP 5000 printer

EDP5000 is a small 15 columns Sylvac printer. The printer is powered with its own charger or batteries.

DIP switches of printer have to be set like following :

- switch 1 : OFF = normal mode ON = statistic mode
- switch 2 : no function
- switch 3 : ON  
--> 4800 bps
- switch 4 : ON

## 1.4.4 Programming on an IBM PC® or compatible computer

Sylvac has a demonstration purpose program written in Pascal for the acquisition of values and remote command of D100 unit.

Basic language, supplied with each PC is the most simple language to use. Herewith 2 examples of programs written in this language :

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 of computer and the following transmission parameters : 4800 bauds, even parity, 7 bits/car. , 1 stop bits. CS inhibits timeout control of CTS line ( Clear to Send ), DS for DSR line ( Data Set Reasy ) and CD for CD line ( Carrier Detect ).
30 IF INKEY\$ < > "" THEN 80	program 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 D80
70 GOTO 30	ready for new entry
80 END	

b/ remote command of D80 unit :

10 CLS	
20 OPEN"COM1 : 4800, E,7, 1, CS, DS, CD" AS#1	
30 PRINT"Input command word"	
40 INPUT B\$	enters word for remote command of D80 ( e.g. PRI for transmitting a value )
50 PRINT#1, B\$	outputs command word through RS232 port
60 FOR J= 1 TO 2000 : NEXT	waits for any response from D80 unit
70 IF LOC(1) > 0 THEN LINE INPUT#1 , A\$ : PRINT A\$ ELSE 30	displays eventual answer from D80
80 FOR J= 1 TO 70 : NEXT	
90 GOTO 70	ready for new input
100 END	

Note : The 2 waiting loops ( lines 60 and 80 ) must eventually be adjusted according to computer speed. The parameters above correspond to a PC 386 20 MHz. For a PC AT 286 these parameters can be reduced.

## 1.4.5 Remote command of D80 unit

All functions of D80 unit are remote commandable from a computer, accordind to the following principle :

- the first 3 letters of functions are used for the remote command. For example, if a measured value is needed from the computer, this one transmits the first 3 letters of Print i.e. PRI.
  - several command words can follow to form a maximum chain of 100 characters.
  - any number of empty spaces can be inserted anywhere, *except inside the numbers*.
  - the command characters can be in capital or small letters ( these are ASCII coded ).
  - On/Off functions like tolerances indicators are activated with the first 3 letters of function, followed by ON or 1. They are desactivated with OFF or 0 ( = zero and not O letter ).
- For example TOL ON displays tolerances indicators, as well as TOL 1.

Words used for remote command :

- PRI or ? or P (PRINT) = print out of the displayed value.
- CHA+ (CHANNEL) = selects upward measuring direction of the indicated channel.
- CHA- = selects downward measuring direction of the indicated channel.
- CHA3 = selects channel 3. Also gives upper limit for channel change by means of external contact.
- CHA-2 = selects channel 2, downward measuring direction.
- CHA+ 1-2 + = selects channel 1 minus channel 2, both channels with upward measuring direction.
- CHA\*2 = establishes diameter function of the selected channel.
- CHA\*1 = establishes radius function ( normal ) of the selected channel.
- CHA\*1.5 = measured value is multiplied by 1.5 ( or any number ).
- CHA2=0 = attributes to channel 2 measuring channel 0 ( channel 0 is for RS232 instrument ).
- CHA? or CHA PRI = identifies the active channel.
  
- PRE (PRESET) = displays the stored preset value.
- PRE 123.4567 = memorize and display preset value.
- PRE ? or PRE PRI = unit sends memorized preset value.
  
- MM = selects metric unit.
- IN = selects inch unit.
  
- 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.
  
- TOL0 = no display of tolerances indicators.
- TOL1 = displays tolerances indicators.
- TOL 10.2 0.1 -0.05 I = input of nominal size 10.2, upper tolerance 0.1, lower tolerance -0.05 and internal measurement ( = I, for external one : E or no letter ).
- TOL? = output of memorized tolerances values : for example 10.000 0.005 -0.003 E.
  
- MAX = selects max function.
- MIN = selects min function.
- DEL = selects delta function ( max - min ).
- MEA = selects mean function ( max + min / 2 ).
- CLE = re-initializes min/max registers when unit is in max, min, delta or mean modes.
- NOR = re-establishes normal measuring function.
- MOD? = the unit sends its measuring mode : NOR, MAX, MIN, DEL or MEA.
  
- KEY0 = keyboard locked.
- KEY1 = keyboard unlocked.
  
- RST = general reset of the unit.
  
- SET? = the unit transmitt general parameters :
 

MM	RES1	ANA0	TOL0	CLA0	STO0	KEY0
or IN	2	1	1	1	1	1
or UM	3					
or MI	4					

 Note : STO0/1 indicates if hold function is active or not.
  
- EXT 0 = attributes the function of transmission of values to external contact ( foot pedal ). ( refer to chap. 1.3.7 ).
- EXT 1 = display hold.
- EXT 2 = reset Min/Max registers.
- EXT 3 = preset display.
- EXT 4 = changing of channels.

- EXT 5 = D110 command.
- EXT 6 = radius mode = 1, diameter mode = 2 (x2).
- EXT 7 = status transmitted automatically --> EXT characters are sent thru RS232.
- EXT 8 = status transmitted on request : with remote command EXT?  
--> 0 = no external contact.  
--> 1 = an external contact occurred.
  
- EXT 9 = transmission of value + display hold.
- EXT 10 = transmission of value then new Min/Max.
- EXT 11 = transmission of value then preset.
- EXT 12 = transmission of value + changing of channels.
- EXT 13 = D110 command, waiting for 2.5 s + transmission of value.
- EXT 17 = hold function then new Min/Max.
- EXT 18 = hold function then preset.
- EXT 19 = hold function + changing of channels.
- EXT 20 = hold function then D110 command.
  
- 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 ).
  
- - UP = retraction of probes using D110.
- - DOW = return motion of probes using D110.
  
- IDE or ID = instrument identification --> D80 unit answers "SYLVAC ^ ^ D80" ( ^ = space ).
  
- OUT 1 = activates automatic output of values :  
each displayed value is also transmitted on RS232 output.
  

In this case, the transmission speed is :

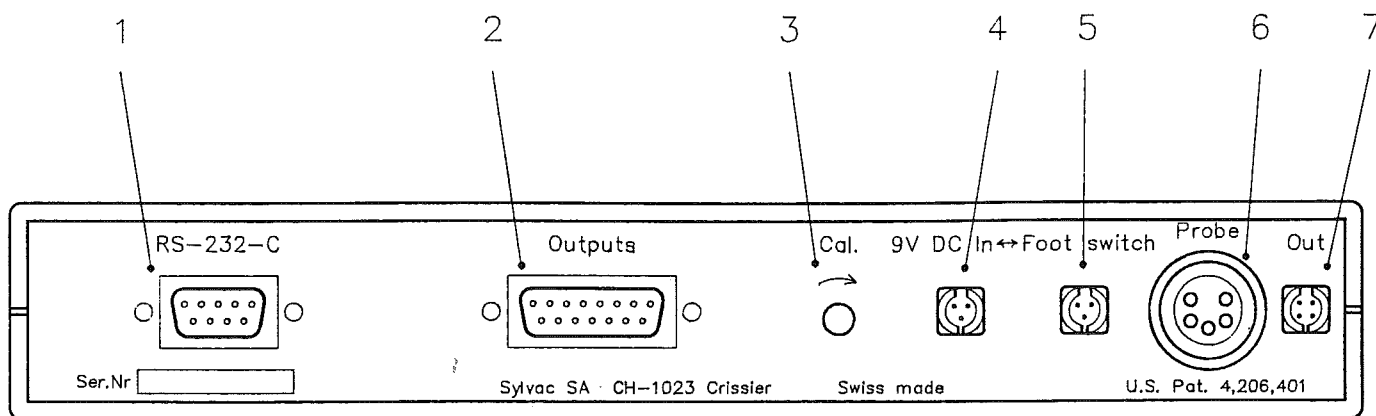
  - in 0.0001 mm / 0.000 01 IN = 2 trans. per sec.
  - in 0.001 mm / 0.000 1 IN = 6 trans. per sec.
  - in 0.01 mm / 0.001 IN = 14 trans. per sec.
  - in 0.1 mm / 0.01 IN = 22 trans. per sec.

  
- OUT 0 = deactivates output mode

#### ● 1.4.6 Code of errors transmitted by D80 unit :

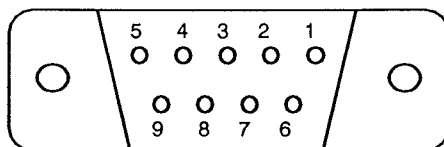
- ERR 1 = parity error of received message
- ERR 2 = syntax error of received message

## 1.5 REAR OF UNIT



### 1.5.1 RS-232-C Input/output

9 pins 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 foot pedal is pressed. (= function nr 0 of external contact ), or by remote command.

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

Pin 4 : **DTR** ( Data Terminal Ready ) = not used on D80.

Pin 5 : **SG** = Signal ground.

Pin 6 : **DSR** ( Data Set Ready ) = Used on channel 0 to ask measuring value of RS232 C connected instrument.

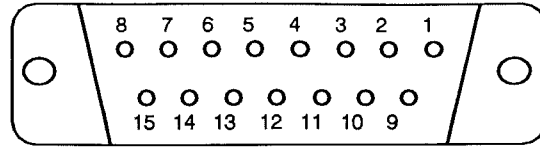
Pin 7,8 : Unconnected.

Pin 9 : Charger output **8.5 V / 300 mA**, same as pin 1.

RS232 transmission parameters are fixed like following : **4800 bps, 7 bits and even parity.**

## 1.5.2 Outputs

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



**Pin 1** : common (digital ground ).

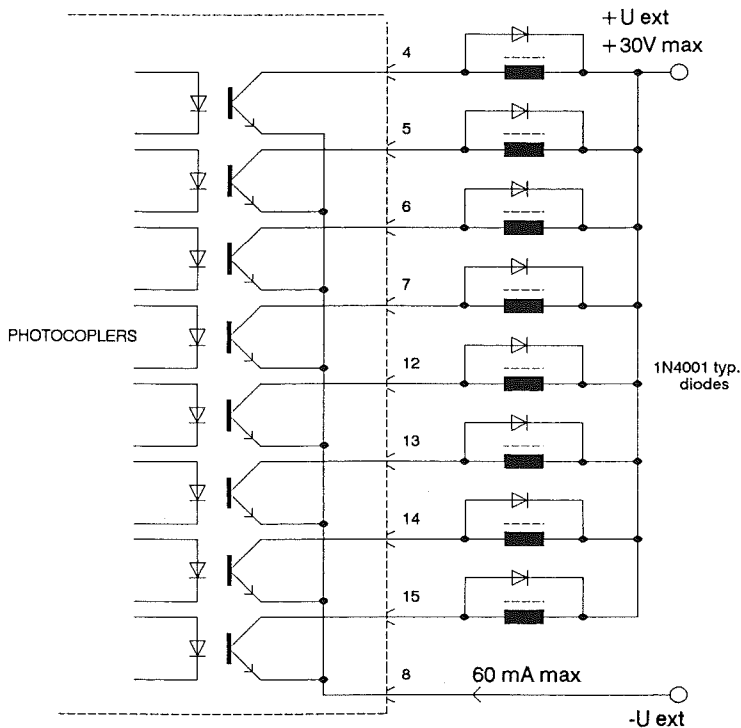
**Pin 2, 3** : not connected

- **Pins 4,5,6,7 and 12,13,14,15** : opto-coupled outputs for sorting or pneumatic lifting ( D110 ) :

Mode :	Tolerance	D110 ( pneumatic lifting )
Pin 4	<	lowering command
Pin 5	=	lifting command
Pin 6		
Pin 7		
Pin 12		lowering command
Pin 13		lifting command
Pin 14		lowering command
Pin 15	>	lifting command

**Pin 8** : Common for the 8 optocoupler outputs.

Connection to optocouplers :



Max voltage = 30V, max current = 60 mA.

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

The protection diode is necessary in the event of inductive charge ( electrovalve, relay, solenoid, etc... ).

**Pin 9** : 5V / 50 mA output, regulated ( protected ).

**Pin 10** : 8.5V / 300 mA output, non-regulated ( protected ).

**Pin 11** : not connected



### 1.5.3 Calibration of the unit.

Access to the calibration screw is protected by a small plastic cap. This ensures protection for the unit's enclosure against dust and solid objects.

The D80 unit is calibrated at the factory. However if a recalibration is required, proceed as follows :

- 1/ Attach a P10, P25 or P50 probe to a vertical support.
- 2/ Select a resolution of 0.0001 mm / 0.00001 in.
- 3/ With the probe in its fully extended position free from contact, preset display to zero ( see chapter 1.3.1).
- 4/ Position mechanically the probe under the reference base so that the readout indicates a measurement :
  - for P10, between 0.3 & 0.6 mm
  - for P25, between 0.5 & 0.9 mm
  - for P50, between 1.0 & 1.5 mm
- 5/ Displace the probe with a 10 mm bloc gauge for the P10, a 25 mm for the P25 and a 50 mm for the P50.
- 6/ Preset readout to zero.
- 7/ Position probe on reference base again.
- 8/ Turn the calibration screw to obtain the respective read-out of 10.0000, 25.0000 or 50.0000 mm.
- 9/ Re-insert the bloc gauge and confirm zero. If it has changed, repeat the procedure from item 6.

### 1.5.4 or 1.5.5 Socket for mains adapter.

May be inserted either in ( 4 ) or ( 5 ).

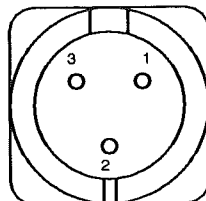
Before insertion : observe socket polarization at 12 o'clock.

### 1.5.5 or 1.5.4 Socket for external contact e.g. foot pedal.

May be inserted either in ( 5 ) or ( 4 ).

The external contact is configurable for different functions, see chapter 1.3.7.

Distribution of pins for (4) and (5) ( external view ) :



- 1 : ground
- 2 : power input + 8.5 V
- 3 : external contact input

### 1.5.6 Probe input

Probe input or for linking cable for multi-channel unit D102 or D108.

### 1.5.7 Command output

Socket for command cable used with multi channel unit D102 or D108.

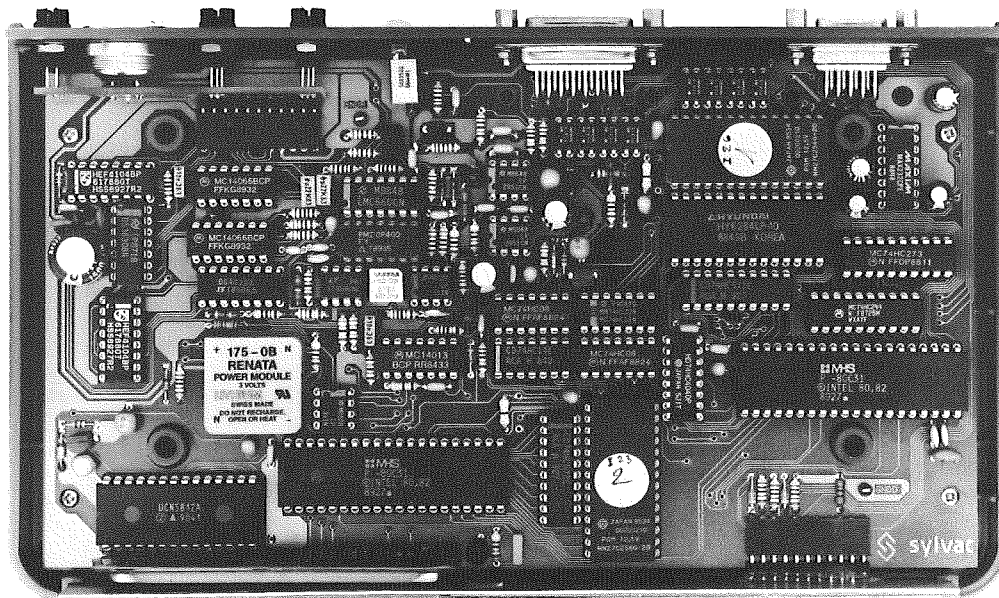
## 1.6 CHANGING THE LITHIUM MODULE

If all display's segments are on when the unit is switched on, this means that the safeguarding data lithium module is low ( average life **10 years** ).

By pressing any key it is possible to use unit D80 with a "dead" lithium module, but parameters and functions entered by the operator will be *lost* each time the unit is switched off.

The module should be changed by a Sylvac representative. If the operator wishes to change the module by itself, he must adhere to the following installation procedure :

- After obtaining a new lithium module from your Sylvac representative upend the unit on a table and remove the 4 screws holding the cover.
- Discharge yourself on a water pipe or other device connected to earth ( the inside of the unit is highly sensitive to electrostatic discharge ).
- Remove lithium module 175-OB-Renata with a screwdriver, without damage other components or PCB :



- Insert now the new lithium module with the same orientation.
- Replace the 4 screws to fix back the cover.
- When the unit is switched on again, all segments will appear again for the last time.

## 1.7 TECHNICAL SPECIFICATIONS

Enclosure in terblend plastic ( = ASA + polycarbonate ) :

- *proof* to alcohol, glycols, most oils and fatty substances, diluted acids and water.

- *unproof* to "aromatic" hydrocarbons, esthers, ethers, cetones, acid mineral concentrates, ammoniac gas and its dilutions.

Front plate and keys in polyester. Rear plate in anodized aluminium.

Dimensions :  
 length : 227 mm  
 depth : 132 mm  
 height : 37.5 mm without stand ( 47.5 mm with stand ).

A complementary base ( supplied with the unit ) allows an inclination of 21°.

Degree of IP protection : IP50 ( according to IEC 529 ).

Weight of unit : 1.8 lbs ( 820 g ).

Accuracy of measurement with D80 and probes : the interchange between unit and probes is guarantee like follow :

probe type	D80 error	probe error	mean error
P10	1.2 um	1.0 um	1.6 um
P25	1.5 um	1.5 um	2.1 um
P50	3 um	4 um	5 um

The mean error is the geometrical mean of both errors. Maximum error is the addition of both errors. This error may be lowered by matching an unit with a probe ( recalibration ).

Repetability ( +/- 2s ) :  
 with a P10 0.3 um.  
 with a P25 0.3 um.  
 with a P50 1.2 um.

Working temperature : between - 10° and + 50 °C.  
 Storage temperature : between -20° + 60°C.

Relative humidity : from 5 to 90 % ( without condensation ).

Frequency of measurement :  
 - for P10 probe in between 170 and 205 measurements per sec.  
 - for P25/P50 probe out between 130 and 205 measurements per sec.

Display : VFD ( Vacuum Fluorescent Display ) 7 segments, 8 characters of 7.8 x 3.5 mm and indication of working unit : M for mm and I for inch.

Keyboard : polyester membrane keyboard, outline of keys embossed. Metal domes with tactile feedback.

Outputs :  
 - optocoupled output signals for sorting and for pneumatic unit D110.  
 - RS-232-C port for linking to a computer, a printer...  
 - command for optional multichannel units D102/D108.

Inputs :  
 - external contact, e.g. supplied foot pedal.  
 - RS-232-C port for remote command from a computer.

External mains adaptor / charger : according to country, supplied in one of the following 4 types :  
 - European standard plug 220V  
 - US standard plug 120V  
 or for Japan 100 V  
 - UK standard plug 240 V

for the 4 models : input voltage +/- 10%, frequency 50-60 Hz, output 8.5 V / 450 mA.

Safeguarding of datas : with lithium module 3 V / 175 mAh Renata type 175-OB. Lifetime approx. 10 years.

Packaging in synthetic material comprising :

	Order Nr
- 1 D80 unit ( without accumulator )	904.1080
- 1 external mains adaptor	European 220 V 904.4010 UK 240 V 904.4011 US 120 V 904.4012 Japanese 100 V 904.4013
- 1 foot pedal for the external contact	
- 1 instruction manual	

## 1.8 ACCESSORIES

	Order Nr
- Sylvac Printer EDP5000	926.1805
- Connecting cables for :	
- Epson HX-20 computer, length 2m50	925.5605
- Epson PX-16 computer, length 2m50	925.5606
- Epson P40 15 col. printer, length 1m50	925.5607
- IBM PC AT computer or equivalent ( Sub-D 9p male connector ) , 3m	925.5609
- 9M/25F adapter for IBM PS2 or PC XT computers	925.5625
- 9M/25M adapter for computers or printers with 25 pins female connector	925.5626
- 9M/9M adapter for computer with 9 pins female connector	925.5627
- Lithium module to safeguard memory	904.4005
- Foots for stacking 2 units or more, 4 pieces	

## 2 MULTICHANNEL UNITS : 2 CHANNELS ( D102 ) & 8 CHANNELS ( D108 )

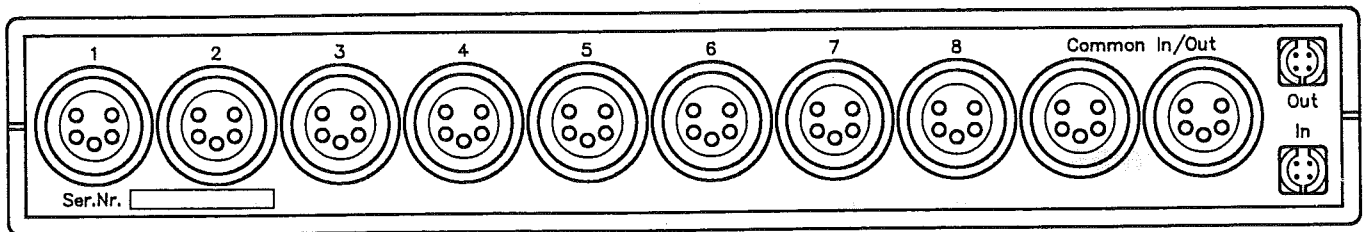
### 2.1 GENERAL DESCRIPTION

The D102 and D108 multichannel units are designed to work with D80 display unit as well as the display units D100 / D101. They can be mounted on the display unit by inserting the 4 plastic feet. The multichannel unit can equally be positioned separately away from the display unit, *close to the probes*.

- the D102 unit allows connection of 2 probes on a D80 unit
- the D108 unit allows connection of up to 8 probes on a D80 unit.

A maximum of 8 probes is allowed on D80 unit. Choice of channel, its function mode ( sense of measurement, radius/diameter mode), its preset and tolerance indications are made from the display unit D80.

### 2.2 REAR PANEL ( D108 unit )



### 2.3 OPERATION

1 / Connect D80 'Out' socket to the input socket 'In' on the D102/D108 unit, using the short connecting cable provided with the multichannel unit.

2 / Connect the probe input socket marked 'Probe' in unit D80 to one of the two sockets marked 'Common In/Out' of D102 or D108 units with the connecting cable provided.

3 / Plug one or more probes into the sockets marked '1' and '2' for unit D102 and marked '1' to '8' for unit D108. Ideally it is better to connect probes to be used beginning at channel 1 and to continue upwards without leaving a space between channels in use. The input 1 correspond to channel 1 of D80, input 2 to channel 2, etc...

4 / If using several D102 units, they are connected in the same manner :

- 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 other 'Common In/Out' sockets on the upper unit.

The numerical order of the channels starts from the first D102 unit connected to the display unit. For example if there are 2 D102 units connected to 1 unit D80 : D102 unit connected to D80 correspond to channels 1 and 2, following unit correspond to channels 3 and 4.

5 / Presets, tolerances, sense of measurement, radius/diameter mode may be introduced on D80 unit for each channel. This done, it is possible to select manually displaying channel or with the external contact, if configured for this function.

All these functions are explained in detail in chapter 1.3.

## 2.4 TECHNICAL SPECIFICATIONS

D102/D108 units :

Housing in Terblend plastic ( = ASA + Polycarbonate : see characteristics described in chapter 1.7 ) .  
Polyurethane clip-on feet.

Front and rear plates in polycarbonate.

Degree of IP protection ( according to IEC 529 ) : IP 50.

Weight of unit :  
D102 1 lb ( 0.45 kg ).  
D108 1.1 lb ( 0.5 kg ).

Possible measuring error : max 2  $\mu\text{m}$  ( this error can be reduced by recalibrating D80 unit ).

Working temperature : between +5° and +40 °C.  
Storage temperature : between -20° and +60 °C.

 Power supply : by display unit D80.

Packaging in synthetic material including :

- 1 D102 unit ( 2 channels )
- or 1 D108 unit ( 8 channels )
- 1 command connecting cable
- 1 probe connecting cable

Order Nr

904.1102  
904.1108

## 2.5 ACCESSORIES

- Command connection cable 2.5 m length
- Probe connection cable 2.5 m length

Order Nr

925.5602  
925.5604

### 3 SYLVAC PROBES P10, P25 AND P50

#### 3.1 GENERAL DESCRIPTION

Sylvac long travel probes of compact design are distinctive by their stability and consistent measuring accuracy. Furthermore they are **absolute**, that is to say that having been disconnected then connected again or after a switch off of the unit, they still display the same measuring value. They have *no speed limit*, such that they do not lose their absolute value after a unit jump.

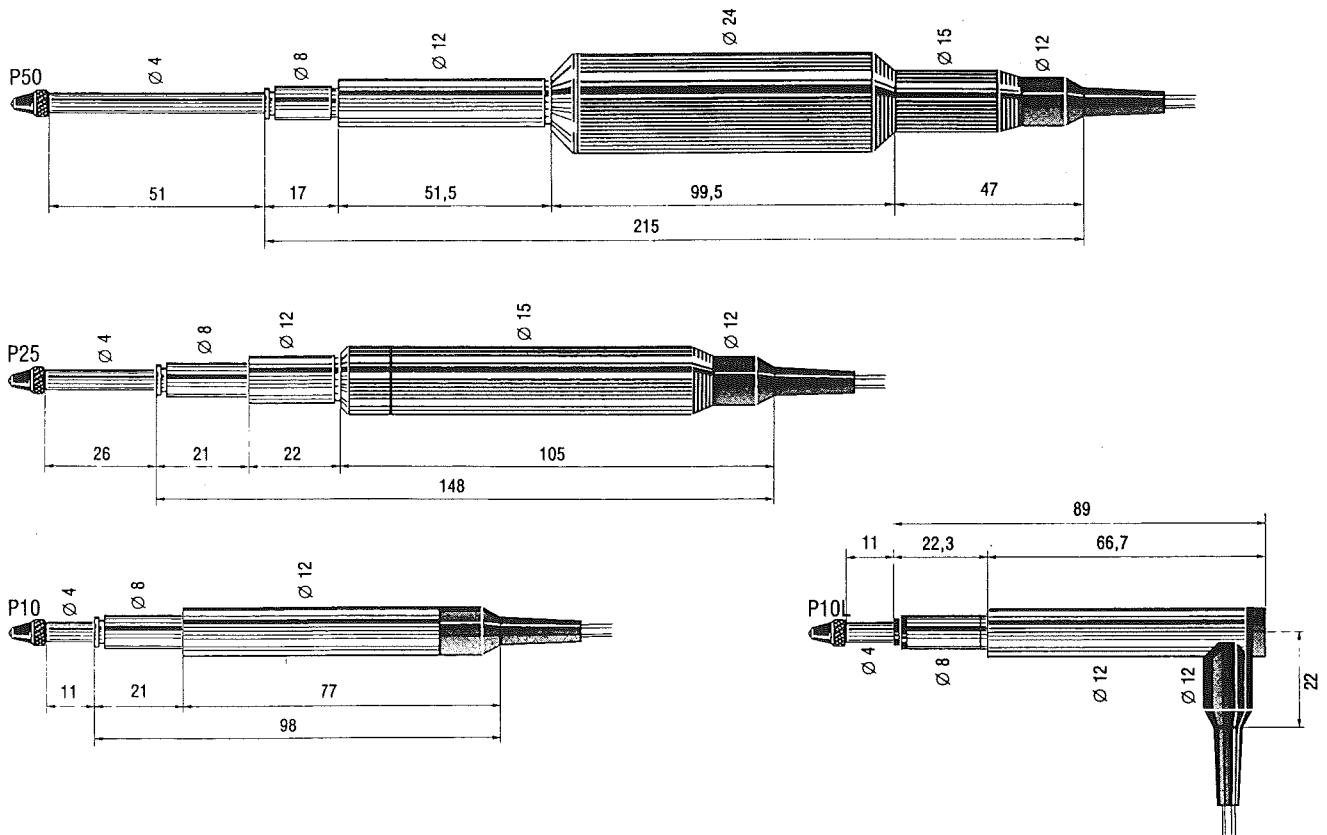
The built in preamplifier allows the use of long cables without intermediate amplification. A special water resistant model is usable in harsh environment. The probe is not affected by magnetic fields.

- P10 : probe with measuring range of 10 mm
- P10 L: the same but with output cable at a right angle
- P25 : as above with 25 mm
- P50 : as above with 50 mm

Different lifting methods are available for the different probes :

- by photocable
- by foot pedal and cable
- by pneumatic lifter : D110 unit

#### 3.2 PROBE DIMENSIONS



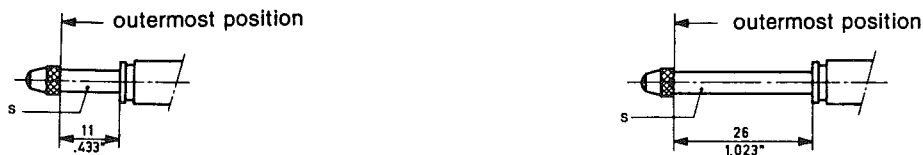
### 3.3 USE

#### 3.3.1 Precautions

- To ensure optimum precision of measurement avoid all lateral pressure when presenting the probe contact to the object 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 shock to the probe spindle.

#### 3.3.2 Changing the contact point

The probe spindle has an ISO M 2.5 thread in the end which allows exchanging of the contact points. When changing the contact point, the probe spindle ( "S" on diagram ) should be in the outermost position :

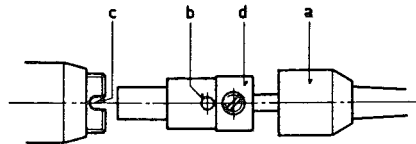


### 3.4 MAINTENANCE

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.

#### 3.4.1 Replacing the connection cable

- 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 )



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



### 3.5 TECHNICAL SPECIFICATIONS

SPECIFICATIONS	CODE NUMBERS		
	P10 / P10L	P25	P50
Construction	Plunger gage	Plunger gage	Plunger gage
Type of bearing for measuring plunger	Friction bearing	Friction bearing	Friction bearing
Moving mass (without measuring contact)	3.2 g / 0.11 oz	8.7 g / 0.31 oz	14.6 g / 0.51 oz
LINEAR MEASURING RANGE	10 mm / 0.4"	25 mm / 1"	50 mm / 2"
Total measuring range	10.8 mm / 0.43"	25.8 mm / 1.02"	52.2 mm / 2.06"
Limit of travel :			
- upper stop	10.4 mm / 0.41"	25.4 mm / 1"	50.7 mm / 1.99"
- lower stop	0.4 mm / 0.02"	0.4 mm / 0.02"	1.5 mm / 0.06"
Accuracy over the measuring range	1 $\mu$ m / 0.00004"	1.5 $\mu$ m / 0.00006"	4 $\mu$ m / 0.00016"
Measuring force	0.6 - 0.9 N	0.6 - 1.2 N	0.6 - 1.4 N
Increase of measuring force	0.03 N/mm	0.024 N/mm	0.016 N/mm
Permissible lateral force	0.6 N	0.3 N	0.25 N
Repeatability	0.1 $\mu$ m / 0.000004"	0.1 $\mu$ m / 0.000004"	0.2 $\mu$ m / 0.000008"
Zero drift	0.0001 mm/deg.C	0.0001 mm/deg.C	0.0001 mm/deg.C
Temperature range	0 - 70 deg C		
Cable length	1 m 50 / 59"		
Extension cables	1, 2, 3, 6, 10, 15, 20 m / 39, 78, 118, 236, 394, 590, 787"		
Direct cable special length	1, 3, 6, 10, 15, 20 m / 39, 118, 236, 394, 590, 787"		
Lifting lever	yes		
Interchangeable measuring contacts	yes		
Protection according to IEC529	IP 40 without rubber boot IP 50 without rubber boot		

#### Accuracy using extension cables :

These measuring errors are applicable using D80 units without recalibration :

Normal cable + extension up to 5 m : extra error 1.5  $\mu$ m approx.  
 Normal cable + extension up to 10 m : extra error 3  $\mu$ m approx.  
 Normal cable + extension up to 15 m : extra error 6  $\mu$ m approx.  
 Normal cable + extension up to 25 m : extra error 8  $\mu$ m approx.

Direct cable up to 5 m : extra error 3  $\mu$ m approx.  
 Direct cable up to 10 m : extra error 6  $\mu$ m approx.  
 Direct cable up to 15 m : extra error 10  $\mu$ m approx.

This is a progressive error margin and recalibration of D80 unit can greatly reduce the error.

### 3.6 ACCESSORIES

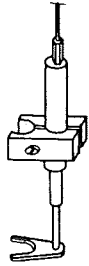
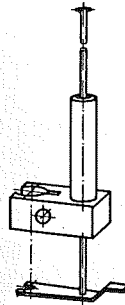
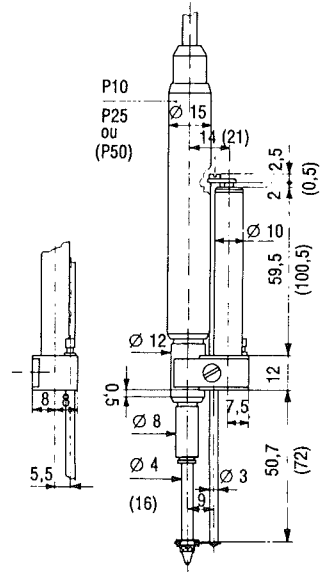


Photo-cable lifter for probe 25 mm (1") and P10 (.4").  
Code number: **PZ3**.  
For probe 50 mm (2").  
Code number: **PZ22**.



Lifter for probe 50 mm (2").  
Code number: **PZ23**.



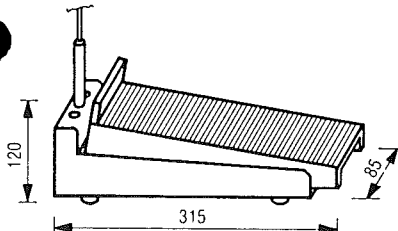
#### Pneumatic Lifter

This small pneumatic lifter is suitable for use:

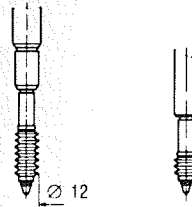
- with P10 and P25 probes. It is fixed on the 12 mm body diameter of the probe. The lifting range is 30 mm/1.18";
- with P50 probe (dimensions inbetween brackets). The lifting range is 55 mm/2.165".

The air supply for each lifter is 2 to 3 bar (filtered, dry air).  
The lifter has no influence on the measuring pressure of the probe. It is waterproof and requires no maintenance.

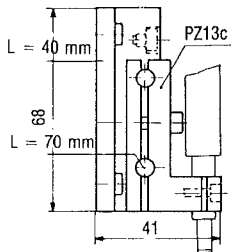
Code numbers:  
for P10, P10L and P25: **PZ7**  
for P50: **PZ18**.



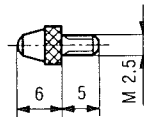
Foot-pedal to retract up to 3 probes, supplied with a cable of 2 m (78.7") and a lifter PZ3.  
Code number: **PZ5**.  
Additional cable with PZ3.  
Code number: **PZ5-1**.



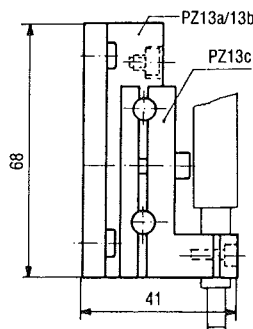
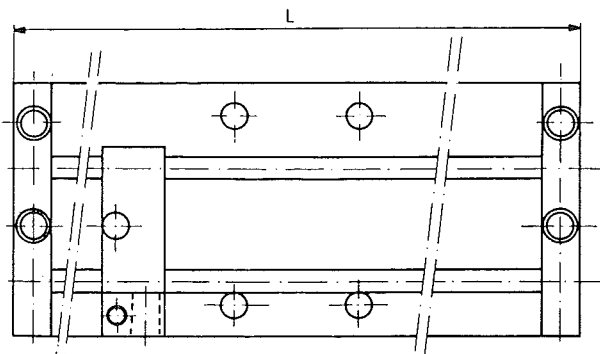
Rubber boot for P25 (restricted measuring range: 19 mm/.75").  
Code number: **PZ11**.  
Rubber boot for P10 (restricted measuring range: 7.5 mm/.3").  
Code number: **PZ12**.



Holder for two probes (mounted on M1/M1-G).  
Code number: **PZ9**.



Standard measuring contact, ball DIA 2 mm (.078").  
Code number: **PZ10**.  
Other measuring contacts with M2.5 thread can be fixed.



Code Nr.:

- Plate for 2-5 probe holders  
L = 105 mm **PZ13a**
  - Plate for 5-9 probe holders  
L = 175 mm **PZ13b**
  - Probe holder for  
PZ13a/13b **PZ13c**
- (Plate will be fixed on measuring stands M1/M1-G).  
The plates are used in connection with probe holders!

## 4 PNEUMATIC COMMAND UNIT D110

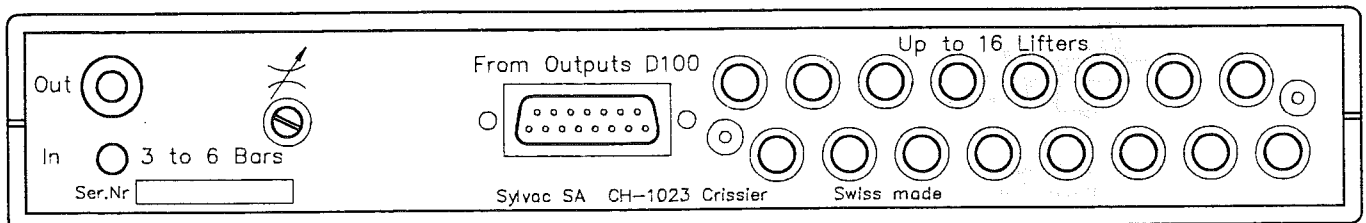
### 4.1 GENERAL DESCRIPTION

The pneumatic command unit D110 is designed to work with the display unit D80. It can be mounted on the display unit by inserting the 4 plastic feet, or, because of the weight of the pneumatic unit, *under the display unit*. It can equally be positioned *separately away from the display unit, close to the probes*.

The D110 unit allows the command of pneumatic lifting of 1 to 16 probes, but D80 limit is 8 probes.

The retraction and return motion of probes is controlled from D80 unit, by means of the foot pedal which have to be configured for this purpose. Remote command from a computer for pneumatic lifting is equally possible. Please note that all pneumatic lifters are commanded simultaneously, so it is not possible to command each lifter separately.

### 4.2 REAR PANEL



### 4.3 OPERATION

1/ Connect D110 unit to D80 unit ( Outputs sockets ) using 15 pins connecting cable.

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

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

4/ Configure the unit D80 for the retraction :

- using the foot pedal ( external contact ) : switch off the unit, press foot pedal while switching on, then choose function nr 5 ( see chap. 1.3.7 ).

- using the computer : this one gives the order UP for the retraction and DOW ( for DOWN ) for the return motion ( see chap. 1.4.5 : remote command ).

5/ Control the probe return speed of probes by using the serrated screw on the microflow restrictor ( locked with a locknut ).

## 4.5 TECHNICAL SPECIFICATIONS

Terblend plastic casing ( = ASA + Polycarbonate : see characteristics descibed in chapter 1.7 ). Polyurethane clip-on feet.

Front plate in polycarbonate, rear plate in anodized aluminium.

Degree of IP protection ( according to IEC 529 ) : IP 50.

Weight of unit : 2 lb ( 0.9 kg ).

Working temperature : between + 5° and + 40°C.

Storage temperature : between - 20° and + 60°C.

Control : by display unit D80, D100 or D101.

Air supply : filtered and dry, pressure from 3 to 6 bars.

Packaging in synthetic material including :

- 1 D110 unit ( 16 channels )
- 1 command connecting cable D80/ D100/D101 to D110, lenght 2m50
- A quick plug for linking with air supply
- 16 plastic obturing caps

Linking air tube between pneumatic unit and pneumatic lifters is supplied with pneumatic lifters.

Order Nr.

904.1110

## 4.6 ACCESSORIES

- Plastic pipe in black PUR outside diameter 4mm, inside diameter 2mm for PZ-8 connection
- Plastic pipe in black PUR outside diameter 6mm, inside diameter 4mm for D110 connection

Order Nr

901.2012

901.2013