E25 system

INSTRUCTIONS FOR USE

CE

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1. DESCRIPTION OF THE E25 SYSTEM

The range of the Sylvac E25 boards is an industrial solution for the signal processing of the capacitive measuring probes with 5, 10, 25 and 50 mm range (P5, P10, P25 and P50).

- Boards in european standard format 100x160 mm, according to DIN 41 494.
- The E25-2 and E25-4 analog boards supply an analog voltage, acceptable for :
  - Analog/digital converter board E25C232
  - Analog acquisition board for computer (PC)
  - Analog plotter
  - Digital or analog voltmeter
- Sylvac offers a selection of housings and cabinet racks for the assembling of boards as well as backplane boards for the electrical connections between each other (a conventional cabling may also be done).

E25-2

- 2 probe inputs, selectable for P5, P10, P25 or P50
- 2 outputs from 0 to 10 V or –5V to +5V
- external power supply +15V and –15V

E25-4

- 4 designated inputs for P5 or P10 or P25 or P50
- 4 outputs from 0 to 10 V
- external power supply +15V and –15V

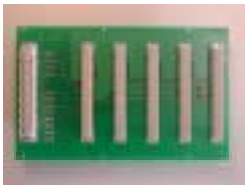
E25C232

- 32 analog inputs, 0 to 10V
- extension up to 104 inputs using E25-EXT extension board
- 1 command input
- 1 RS232 digital output, selectable from 4800 to 19200 bps
- integrated Min/Max and scanning function
- approx. 300 measurements per second with resolution of 2 μm
- approx. 20 measurements per second with resolution of 0.1 μm
- external power supply +5V, +15V and -15V

E25S

- linear power supply for all E25 boards
- power supply input 230V or 110V, switchable
- outputs +5V, +15V and –15V / 0.5A, protected against over charge, voltage and temperature fluctuations.

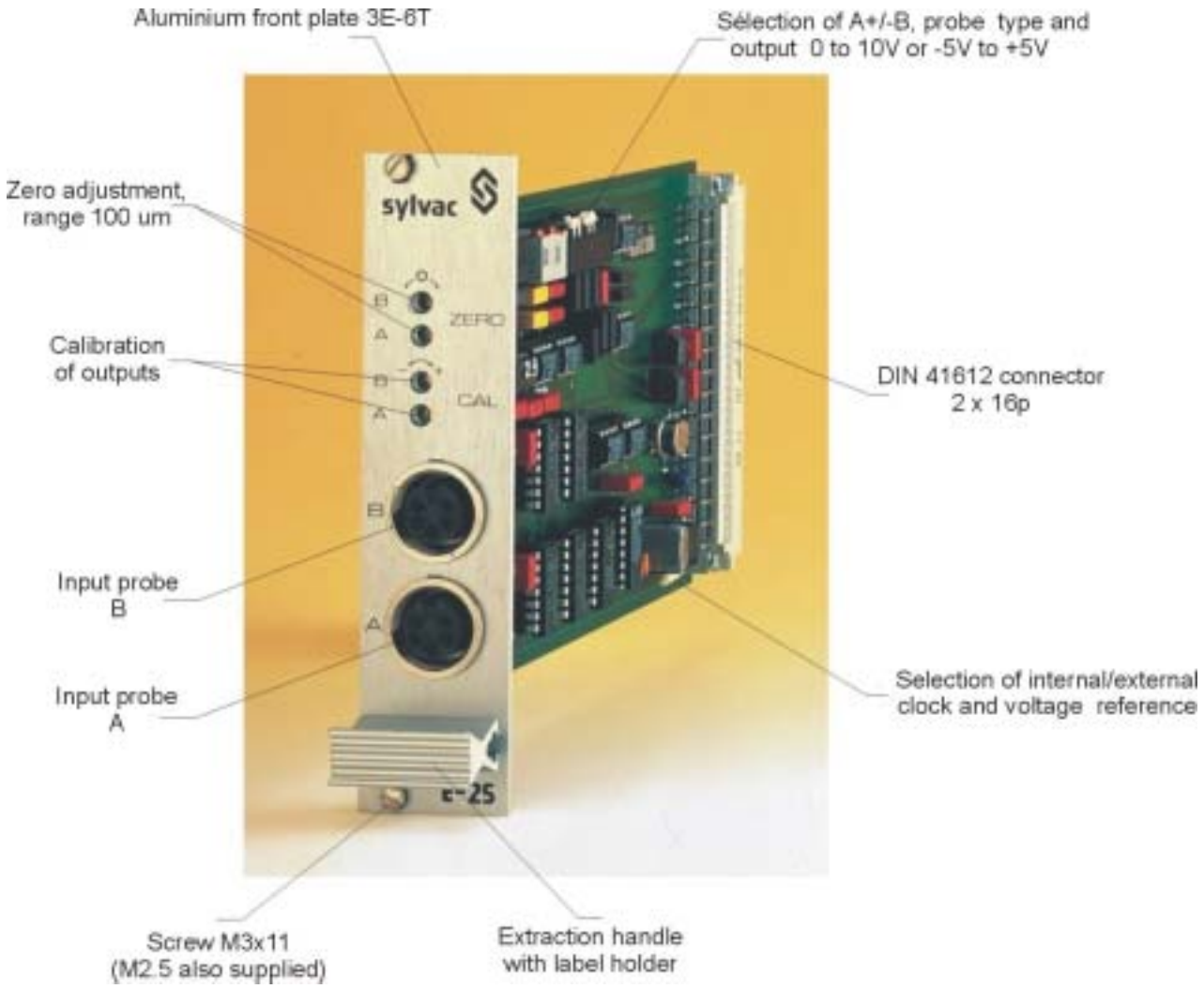
Backplane board for connection of :



- E25-356 : 4 x E25-2, 1 x E25C232, 1 x E25S, format 3U-42F
- E25-357 : 4 x E25-4, 1 x E25C232, 1 x E25S, format 3U-42F
- E25-355 : 11 x E25-2, 1 x E25C232, 1 x E25S, format 3U-84F
- E25-352 : 10 x E25-4, 1 x E25C232, 1 x E25-EXT, 1 x E25S, format 3U-84F
- E25-354 : 23 x E25-4, 1 x E25C232, 1 x E25-EXT, 1 x E25S, format 6U-84F

2. ANALOG BOARD WITH 2 INPUTS, E25-2

2.1 DESCRIPTION



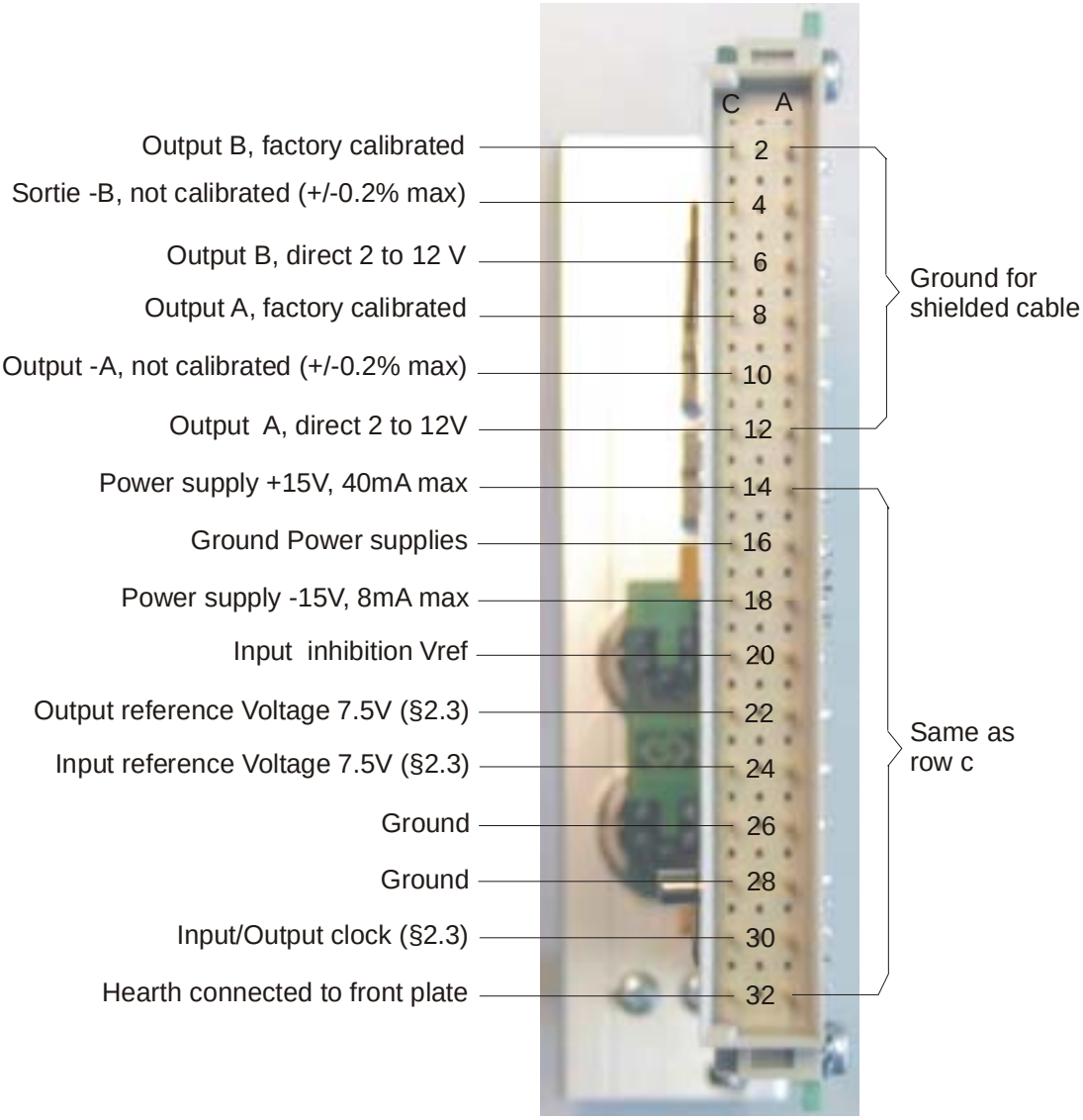
- Front plate according to DIN 41494, made of clear anodized aluminium. Dimensions : width 6T (30.5 mm), height 3E (128.7 mm), thickness 2.5 mm. The front plate can easily be removed from the circuit board.

- Zero adjustment range (Offset) for each channel. Allows a measuring range adjustment within approx. 100 μm.

Application : - Mechanical probe approach within ± 50 μm to the required position
- Fine setting using the zero adjustment range

- Circuit board in european standard format (DIN 41494) : 100 x 160 mm, thickness 1.6 mm.

2.2 DIN 41612 CONNECTOR AT THE REAR, according to DIN 41612 (IEC-603-2) forme C, 2x16 contacts



Output probe A (contact 8c) or B (contact 2c), alternately, according to setting of code switches :
- from 0V, probe in extended position to +10V, probe in compressed position
- from –5V, probe in extended position to +5V, probe in compressed position

Output - A (contact 10c) : alternately, according to setting of code switches :
- from 0V, probe in extended position to -10V, probe in compressed position
- from +5V, probe in extended position to -5V, probe in compressed position
- in –(A+B) mode : from +10V, probe in extended position to -10V, probe in compressed position
- in B-A mode : from –10V to +10V

Output - B (contact 4c) : alternately, according to setting of code switches :
- from 0V, probe in extended position to -10V, probe in compressed position
- from +5V, probe in extended position to -5V, probe in compressed position
- in A-B mode : from –10V to +10V

Direct output A (contact 12c) or direct B (contact 6c) not calibrated and not filtered :
- from 12V P25 in extended position to +2V P25 in compressed position
- from 6V P10 in extended position to +2V P10 in compressed position

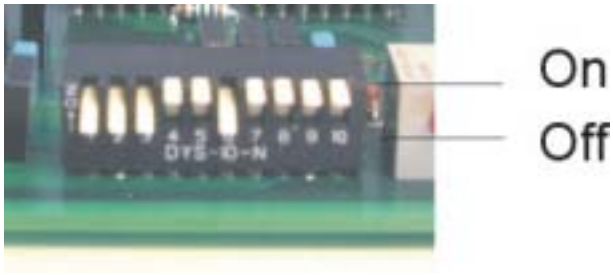
NOTE : the analog outputs are cabled with shielded wires.

Power supply +15V and –15V : supplied by E25S

2.3 CODE SWITCHES

2.3.1 Code switch with 10 positions

Position when supplied :



The switches 4 to 10 allow the selection of the probe type (P5, P10, P25 or P50) and the range of the output voltage :

Probe A and B	Voltage range	Switch position						
		4	5	6	7	8	9	10
P5	0 to +6V	OFF	OFF	OFF	OFF	OFF	ON	ON
P10	0 to +10V	OFF	ON	ON	OFF	OFF	ON	ON
	-5V to +5V	OFF	OFF	ON	OFF	OFF	OFF	OFF
P25	0 to +10V	ON	ON	OFF	ON	ON	ON	ON
P50	-5V to +5V	ON	OFF	OFF	ON	ON	OFF	OFF

The value of the voltages on outputs ± A and ± B is absolute, which means that the voltage values are locked in and will be maintained after switching off/on the board. A setting of the absolute value may be done on the front plate : zero adjustment.

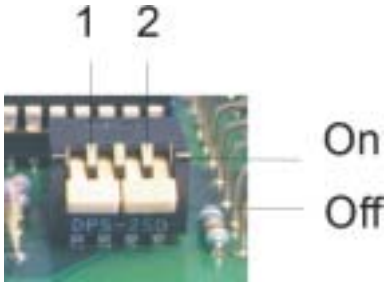
The switches 1 to 3 allow to perform the function of sum or difference of 2 probes in mode -5V to +5V :

Switch position			Function	Output -A	Output -B
1	2	3			
OFF	OFF	OFF	no link	-5V to +5V	-5V to +5V
ON	OFF	OFF	output –A = -(A+B)	-10V to +10V	-5V to +5V
OFF	ON	OFF	output –A = B-A	-10V to +10V	-5V to +5V
OFF	OFF	ON	output –B = A-B	-5V to +5V	-10V to +10V

Note : the outputs –A and –B are not calibrated. A calibration must be done before use.

2.3.2 Dip switch with 2 positions

Position when supplied :



Switch 1 : selection of internal / external timer :

- Position OFF : the internal timer of the board is activated. It is available on pin 30 (a and c) of the rear plug connector. Frequency : 111.86 kHz, voltage 15 Vpp, cyclic ratio 50%.
- Position ON : the internal timer of the board is not active. The timer will be activated by an external source, coupled with pin 30 of the raer plug connector.

Important : for application of more analog boards, coupled in parallel, it is important to activate the timer only on one board. The other boards are working on this only timer. If this condition will not be respected, the analog signals become instable.

Board connection for coupling in parallel :

- Connect the pins 30 of all E25 analog boards.
- Set switch 1 of one board at position OFF, the one of the other boards at position ON.

Switch 2 : selection of internal / externall voltage reference :

- Position OFF : the internal voltage reference is used by the board. It comes to 7.5V ± 22 mV max. and is available on pin 22 (a and c) of the rear plug connector.
- Position ON : the internal voltage reference is not active (but is still available on pin 22). The board works using an external voltage reference, incoming through the pin 24 a or c of the rear plug connector.

2.5 CALIBRATION

If a recalibration becomes necessary or the use of the outputs –A and –B, proceed as follows :

- The output to be calibrated must be connected to a high precision voltmeter (6 digits or more) or to the E25C232 board.
- Connect a probe to channel to be calibrated : A or B
- Set a gauge block of 5 mm for P5, 10 mm for P10, 25 mm for P25 or 50 mm for P50 underneath the probe contact.
- Adjust the position of the probe mechanically. The position should be approx. 0.6 mm away from the end of the measuring range.
- Retain the value indicated on the voltmeter or the E25C232 board.
- Remove the gauge block. The output voltage must have moved 10.0000 V. Adjust this voltage using the setting screw at the front plate.

Adjustment direction : turn clockwise to increase the voltage range.

- for probe P5 or P10 : 1µm displacement corresponds to 1 mV output
- for probe P25 : 1µm displacement corresponds to 0.4 mV output
- for probe P50 : 1µm displacement corresponds to 0.2 mV output

- Put the gauge block again into position and check whether the deviation is really 10V. If not, repeat the adjustment as described.

For calibration in A ± B mode, proceed as follows :

- Calibrate the output -A with a probe connected to input A. If the output -B will be used, calibrate it with a probe connected to input B. The switches 1 to 3 must be in position OFF.
- Move the probe into a steady position.
- Connect the 2nd probe to the other output. Select the required function (-(A±B) on –A or (A-B) on –B) using switches 1 to 3, see § 2.3.2.
- Calibrate the 2nd channel using the corresponding calibration screw and keep simultaneously the 1st probe in steady position.

2.5 SPECIFICATIONS

Absolute voltage of outputs +A and +B (total range)	P5 :	-0.8 to +5.7 V	
	P10 :	-0.6 to +11 V	or –5.6 to +5.9 V
	P25 :	-0.4 to +10.3 V	or –5.4 to +5.3 V
	P50 :	-0.5 to +10.1 V	or –5.5 to +5.1 V

The voltages break out below 0V (-5V) and above 10V (+5V). The reason is the probe area contact range of 0.5 mm.

Linearity of all outputs, with	P5 :	max. 1.5 µm
	P10 :	max. 1.2 µm
	P25 :	max. 1.5 µm
	P50 :	max. 3 µm

It is possible to use probe extension cables. The max. cable length for the probes comes to 10 m. These cable extensions have a specially shielded isolation. The use of a standard cable has unfavourable consequences regarding the probe accuracy. Sylvac supplies on request extension cables or direct probe cables of different length.

Sound on the outputs :	250mVpp, conducting frequency band DC-100MHz
	50 mVpp, conducting frequency band DC-20MHz

NOTE : this important sound appears in peak form, caused by the reading system of the probes. The rest of the signal is stable. For a permanent analog / digital conversion, particular attention must be payed to this problem. The conversion should be synchronized on the timer of the E25 board (pin 30 a, c). The E25C232 board has been adapted to receive this signal and supplies an acceptable digital value.

The generation time of the output voltage = answer of the analog outputs for the instantaneous bounce of the probes over the entire measuring range :

P10 :	Time constant τ = max. 0.5ms
	Generation time for accuracy of 1 µm : 5ms
	Generation time for accuracy of 0.1 µm : 6ms
P25 :	Time constant τ = max. 0.6ms
	Generation time for accuracy of 1 µm : 6ms
	Generation time for accuracy of 0.1 µm : 7.5ms

The mechanical time constant of the probes is much higher than these electrical values.

Consumption :	+15V : max. 40 mA
	-15V : max. 8 mA
Dimensions (width x depth x height)	30.5 x 170 x 128.7 mm
Weight	0.18 kg
Operational temperature	+5 to + 50 °C
Storage temperature	-20 to + 60 °C

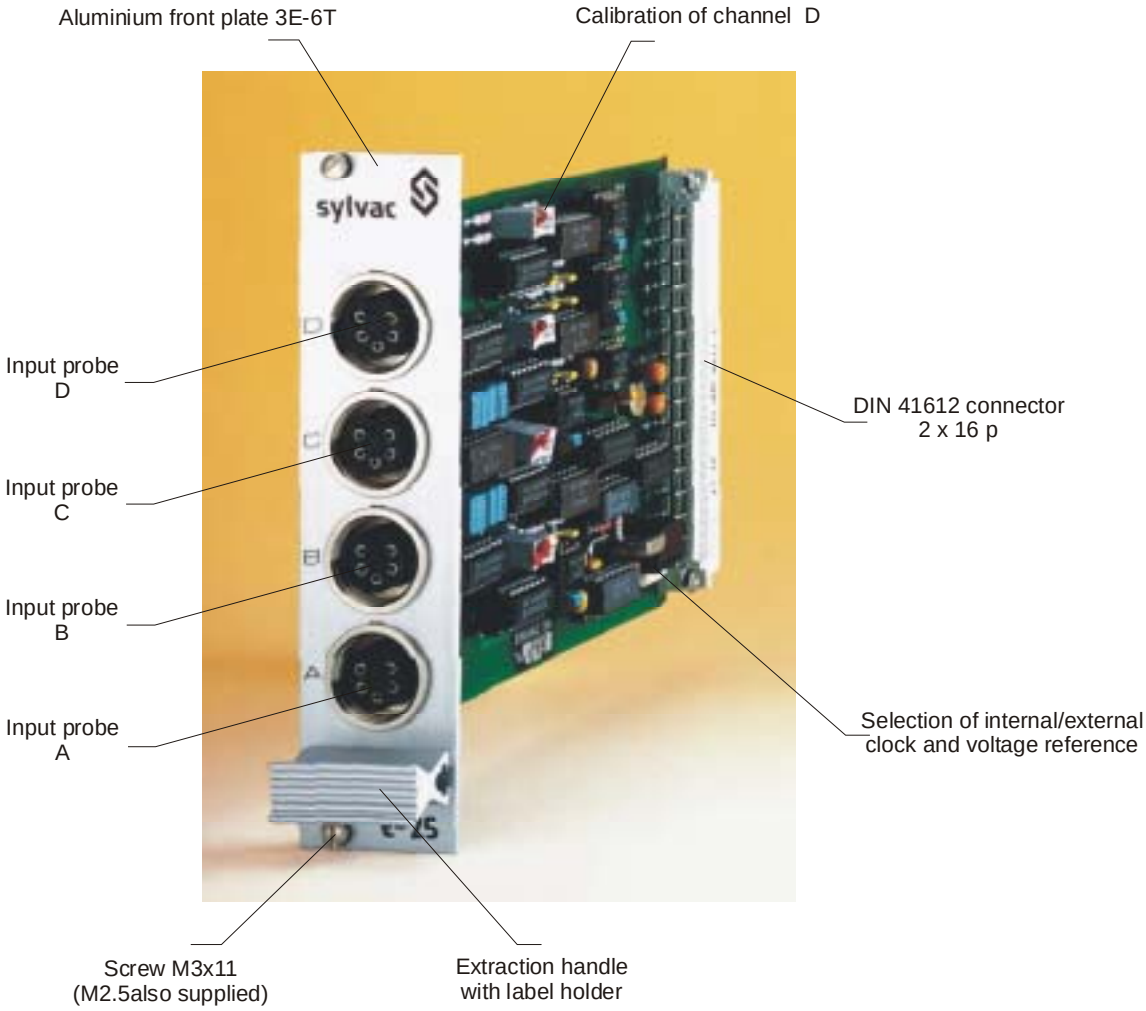
2.6 DELIVERY

	Code number
E25-2 board, including :	906.1150

- 1 connector, female, 2x16 p, for soldering
- 2 slotted screws M2.5x11
- Instructions for use
- Declaration of conformity

3. ANALOG BOARD WITH 4 INPUTS, E25-4P5 - E25-4P10 – E25-4P25

3.1 DESCRIPTION

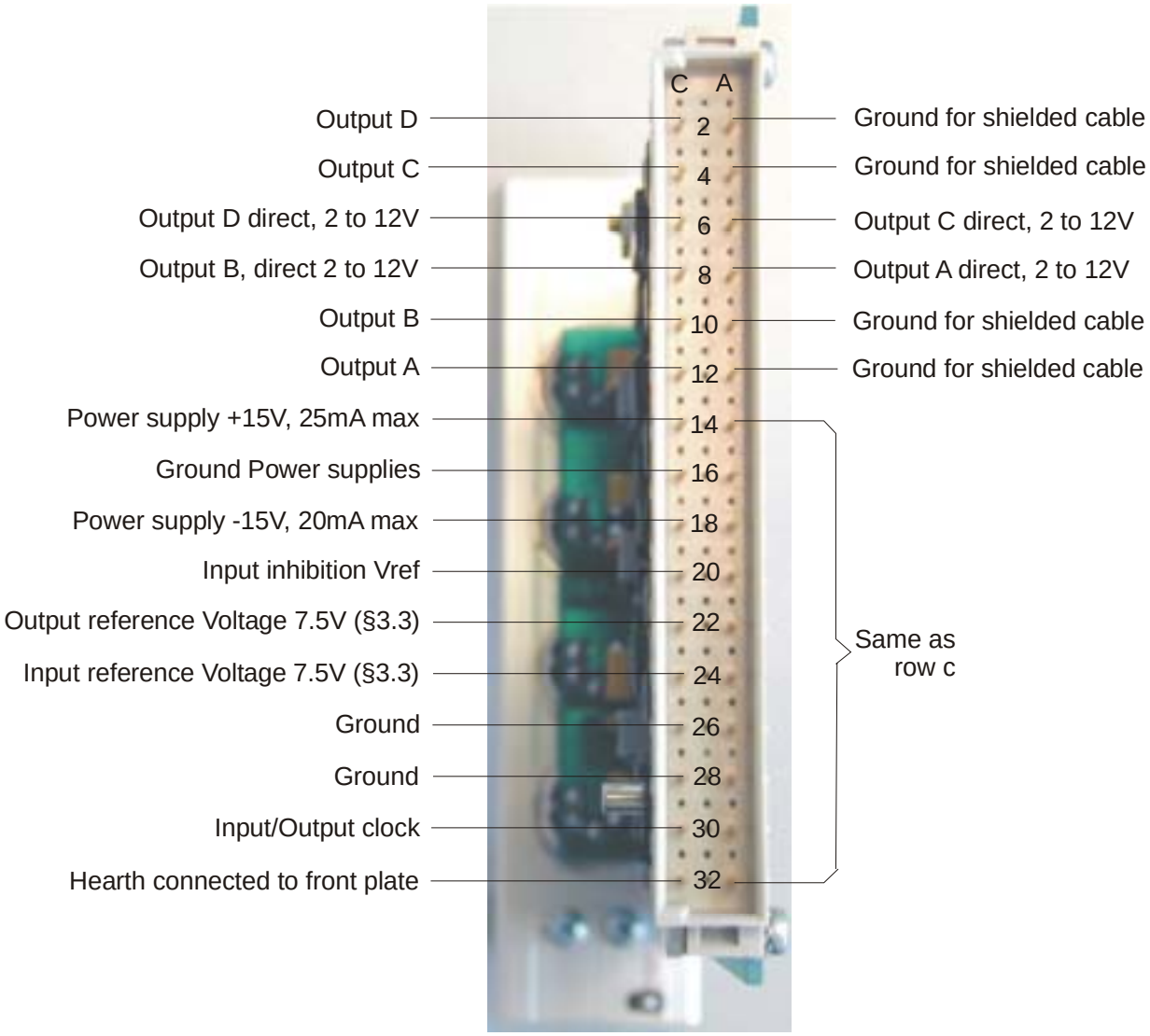


- Inputs A, B, C and D : - for 4 probe P5, board E25-4P5
  - for 4 probe P10, board E25-4P10
  - for 4 probe P25 or P50, board E25-4P25

- Front plate according to DIN 41494, made of clear anodized aluminium. Dimensions : width 6T (30.5 mm),
  height 3E (128.7 mm), thickness 2.5 mm. The front plate can easily be removed from the circuit board.

- Circuit board in european standard format (DIN 41494) : 100 x 160 mm, thickness 1.6 mm.

3.2 DIN 41612 CONNECTOR AT THE REAR, according to DIN 41612 (IEC-603-2) forme C, 2x16 contacts



Output probe A (contact 12c) : from 0V probe in extended position to +10V, probe in compressed position
Output probe B (contact 10c) : from 0V probe in extended position to +10V, probe in compressed position
Output probe C (contact 4c) : from 0V probe in extended position to +10V, probe in compressed position
Output probe D (contact 2c) : from 0V probe in extended position to +10V, probe in compressed position

Direct output A (contact 8a), direct B (contact 8c), direct C (contact 6a) and direct D (contact 6c) are not calibrated and not filtered :

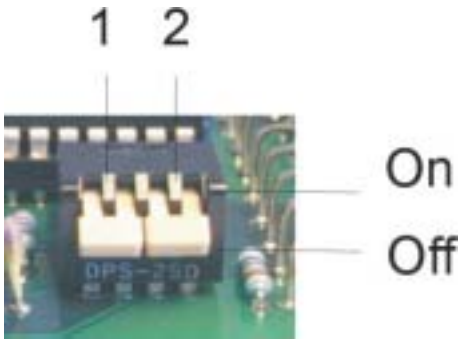
- from 12V P25 extended to +2V P25 compressed
- from 6V P10 extended to +2V P10 compressed

NOTE : the analog outputs are cabled with shielded wires.

Power supply +15V and –15V : supplied by E25S

3.3 DIP SWITCH WITH 2 POSITIONS

Position when supplied :



Switch 1 : Selection of internal / external timer :

- Position OFF : the internal timer of the board is activated. It is available on pin 30 (a and c) at the rear plug connector. Frequency : 111.86 kHz, voltage 15 Vpp, cyclic ratio 50%.
- Position ON : the internal timer of the board is not active. The timer will be activated by an external source, coupled with pin 30 of the raer plug connector.

Important : for application of more analog boards, coupled in parallel, it is important to activate the timer only on one board. The other boards are working on this only timer. If this condition will not be respected, the analog signals become instable.

Connection in parallel of the boards :

- Connect the pins 30 of all E25 analog boards.
- Set switch 1 of one board to position OFF, the one of the other boards to position ON.

Switch 2 : Selection of the internal / external reference voltage :

- Position OFF : the internal reference voltage is used by the board. This voltage is max. 7.5V ± 22 mV and it is available on pin 22 (a and c) at the rear plug connector.
- Position ON : the internal reference voltage is not active (however, it is still available on pin 22). The board works with an external reference voltage which arrives through pin 24 a or c of the rear plug connector.

3.4 CALIBRATION

If a recalibration becomes necessary, proceed as follows :

- The output to be calibrated must be connected to a high precision voltmeter (6 digits or more) or to the E25C232 board.
- Connect a probe to the channel to be calibrated : A, B, C or D
- Set a gauge block of 5 mm for P5 (board E25-4P5), 10 mm for P10 (board E25-4P10), 25 mm for P25 (board E25-4P25) or 50 mm for P50 (board E25-4P25) underneath the probe contact.
- Adjust the position of the probe mechanically. The position should be approx. 0.6 mm away from the end of the measuring range.
- Retain the value indicated on the voltmeter or the E25C232 board.
- Remove the gauge block. The output voltage must have moved 10.0000 V. Adjust this voltage using the setting screw at the front plate.

Adjustment direction : turn clockwise to increase the voltage range.

- for probe P5 or P10 : 1µm displacement corresponds to 1 mV output
- for probe P25 : 1µm displacement corresponds to 0.4 mV output
- for probe P50 : 1µm displacement corresponds to 0.2 mV output

- Put the gauge block again into position and check whether the deviation is really 10V. If not, repeat the adjustment as described.

3.5 SPECIFICATIONS

Absolute voltage of outputs A, B, C and D (total range)	P5 : -0.8 to +5.7 V P10 : -0.6 to +11 V P25 : -0.4 to +10.3 V P50 : -0.5 to +10.1 V

The voltages break out below 0V (-5V) and above 10V (+5V). The reason is the probe area contact range of 0.5 mm.

Linearity of all outputs, with	P5 : max. 1.5 µm P10 : max. 1.2 µm P25 : max. 1.5 µm P50 : max. 3 µm

It is possible to use probe extension cables. The max. cable length for the probes comes to 10 m. These cable extensions have a specially shielded isolation. The use of a standard cable has unfavourable consequences regarding the probe accuracy. Sylvac supplies on request extension cables or direct probe cables of different length.

Sound on the outputs :	250mVpp, conducting frequency band DC-100MHz 50 mVpp, conducting frequency band DC-20MHz

NOTE : this important sound appears in peak form, caused by the reading system of the probes. The rest of the signal is stable. For a permanent analog / digital conversion, particular attention must be payed to this problem. The conversion should be synchronized on the timer of the E25 board (pin 30 a, c). The E25C232 board has been adapted to receive this signal and supplies an acceptable digital value.

The generation time of the output voltage = answer of the analog outputs for the instantaneous bounce of the probes over the entire measuring range :

P10 : Time constant τ = max. 0.5ms
Generation time for accuracy of 1 µm : 5ms
Generation time for accuracy of 0.1 µm : 6ms
P25 : Time constant τ = max. 0.6ms
Generation time for accuracy of 1 µm : 6ms
Generation time for accuracy of 0.1 µm : 7.5ms

The mechanical time constant of the probes is much higher than these electrical values.

Consumption :	+15V : max. 40 mA -15V : max. 8 mA
Dimensions (width x depth x height)	30.5 x 170 x 128.7 mm
Weight	0.21 kg
Operational temperature	+5 to + 50 °C
Storage temperature	-20 to + 60 °C

3.6 DELIVERY

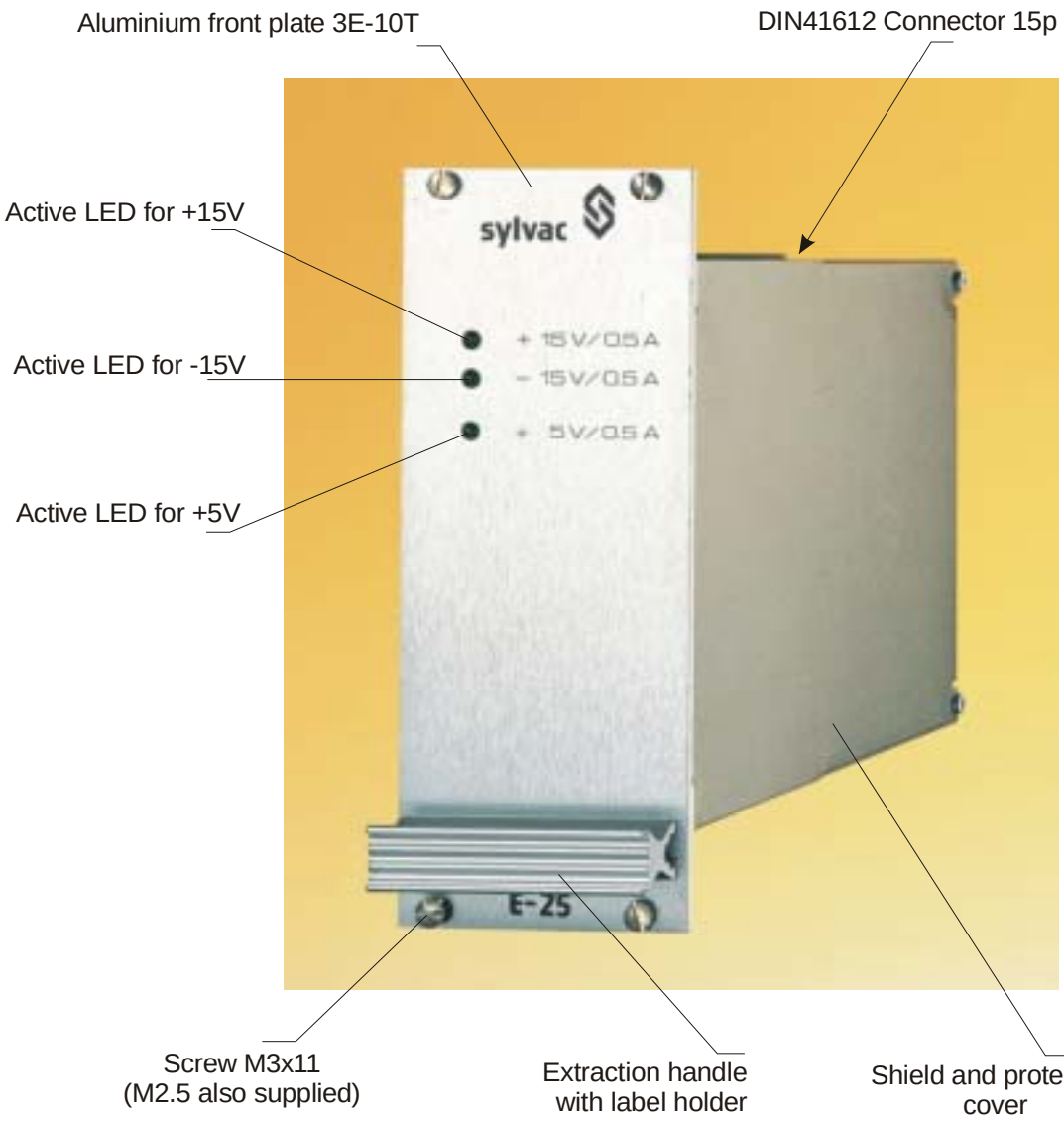
		Code number
Board E25-4P5	for P5	906.1152
Board E25-4P10	for P10	906.1153
Board E25-4P25	for P25 or P50	906.1154

including :

- 1 connector, female, 2x16 p, for soldering
- 2 slotted screws M2.5x11
- Instructions for use
- Declaration of conformity

4. POWER SUPPLY BOARD E25S

4.1 DESCRIPTION



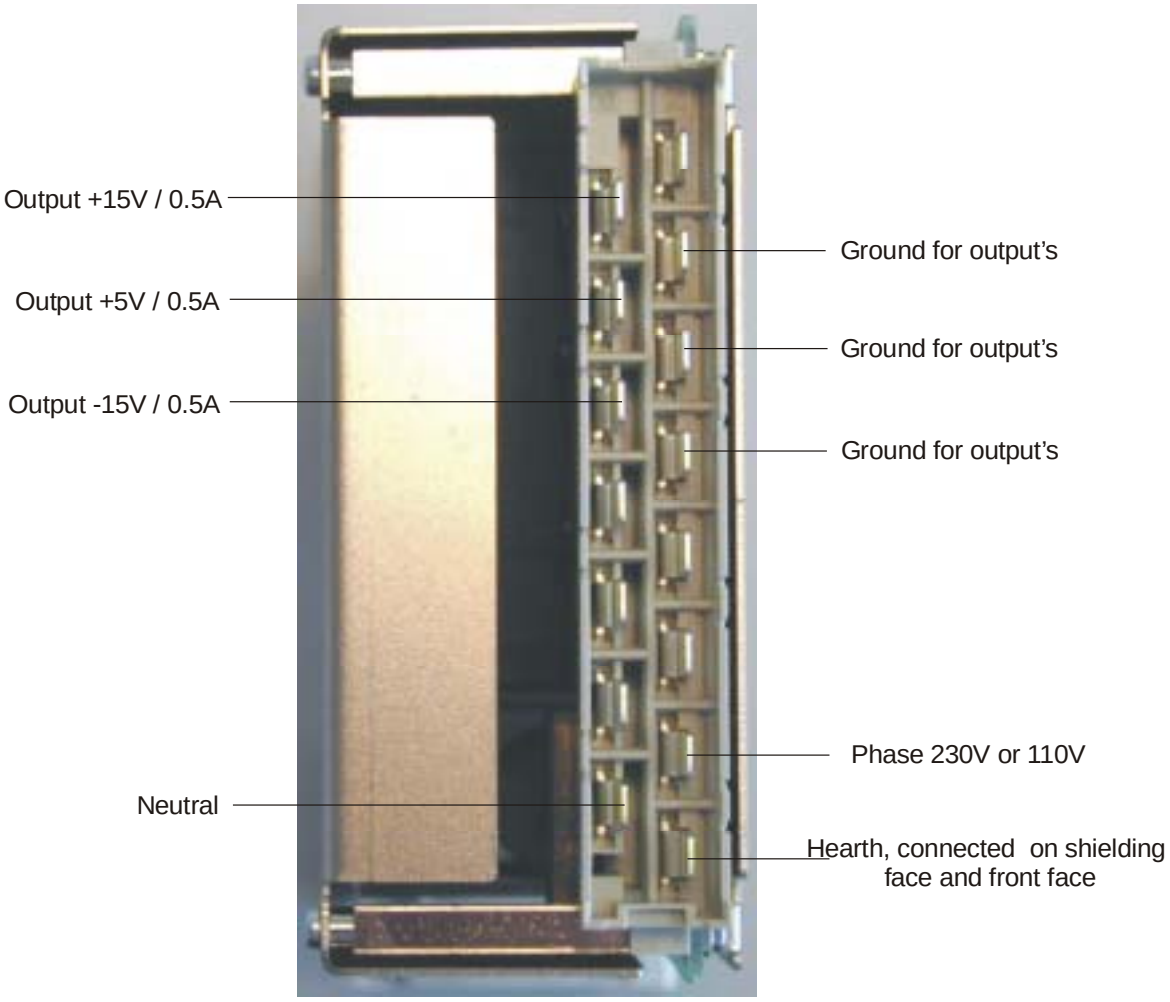
- Front plate according to DIN 41494 made of clear anodized aluminium. Dimensions : width 10T (50.8 mm), height 3E (128.7 mm), thickness 2.5 mm.

- Circuit board in european standard format (DIN 41494) : 100 x 160 mm, thickness 1.6 mm.

- If the green LED's do not light up :
  - Check the 230 or 110 V mains power connection of the rear plug connector (see following page).
  - A strong mains power overvoltage has happened and the overload protection systems have been switched on. In this case, interrupt the power (OFF) and switch it ON again. The 3 LED's should now light up. Eventual one or more output fuses did blow up. Fuse type : 630mA/T.
  - One or more outputs are at the power limit or in short circuit. In this case, locate the connected instrument which has a higher need than 0.5A or find the short circuit.
  - The power supply is situated in a too high temperature environment. In this case, the thermal protection of the voltage regulator intervine. Provide a ventilation or decrease the current coming from the power supply.

If one or more LED's do still not light up after these checking procedures, it seems that the power board has been damaged. It must be sent back for repairs.

4.2 DIN 41612 CONNECTOR AT THE REAR, according to DIN 41612 (IEC-603-2), forme H, 15 contacts



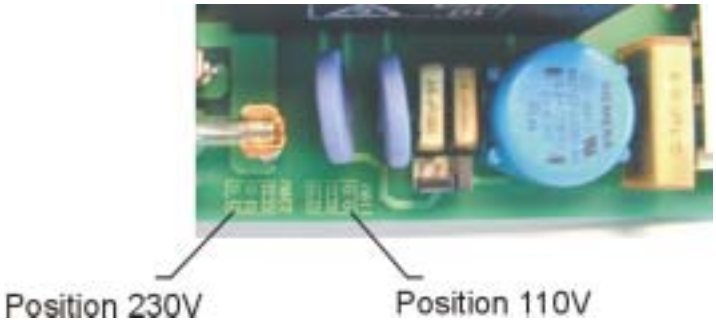
- Mains power supply input protection by PTC : no interchangeable fuse

- Mains power supply input filter for an effective protection against external parasites.

4.3 SELECTION OF VOLTAGE 230V or 110V (switchable)

The power supply board E25S will be supplied with the required voltage set at the factory, according to order. If a conversion is needed, proceed as follows :

- Remove the top cover plate (6 screws)
- Connect the two bridges according to required mains voltage :



- Position and fix the cover plate again

4.4 SPECIFICATIONS

Output voltages and und power range :		+5V / max. 0.5A +15V / max. 0.5A -15V / 0.5A
Input voltage :		230V AC ±10% 50 – 60 Hz
	or	110V AC ±10% 50 – 60 Hz
Consumption :		max. 30 VA
Dimensions (width x depth x height)		50.8 x 170 x 128.7 mm
Weight		1.1 kg
Operational temperature		+5 to + 40 °C
Storage temperature		-20 to + 60 °C

4.5 DELIVERY

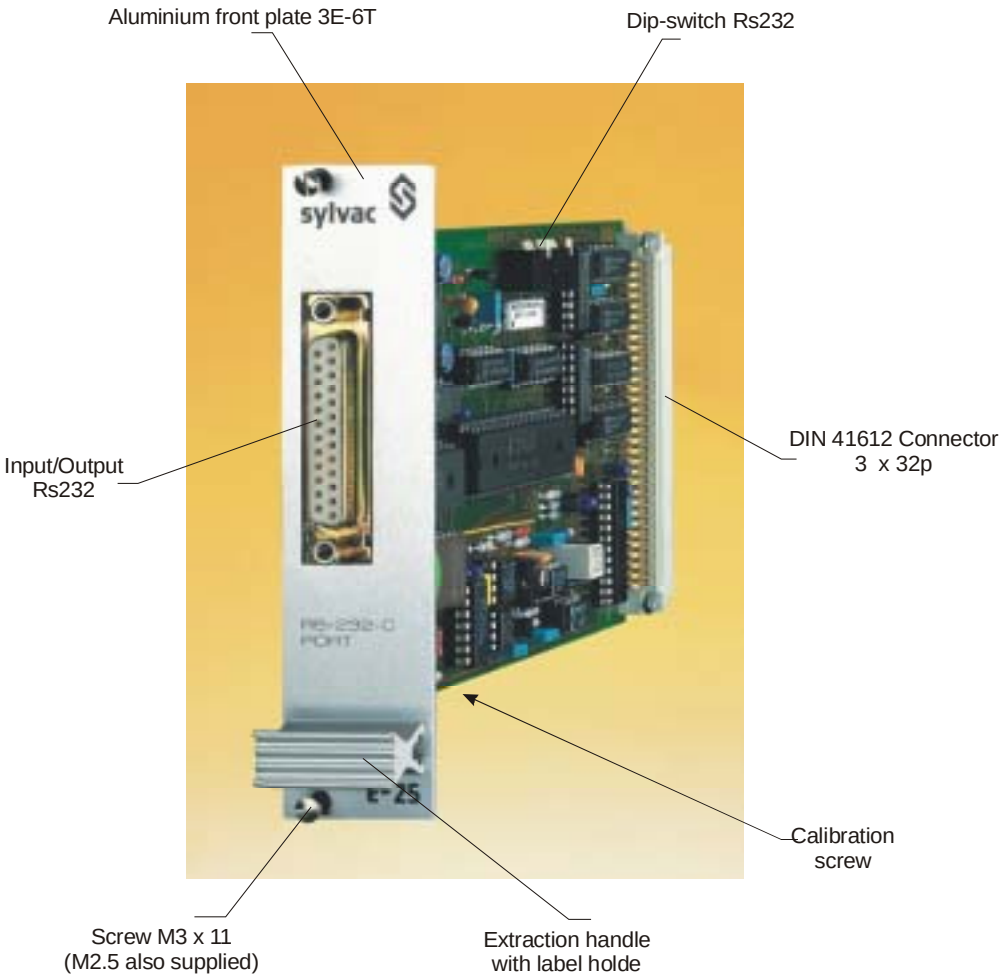
	Code number
Board E25S	906.1155

including :

- 1 connector, female, 15 p, for Faston cable lug 6.3x0.8 mm
- 2 slotted screws M2.5x11
- Instructions for use

5. ANALOG–DIGITAL CONVERTER BOARD WITH 32 CHANNELS E25C232

5.1 DESCRIPTION



The board incorporates the following elements :

- Multiplexer which allows the selection of 32 analog inputs (therefore use 16 boards E25-2 or 8 boards E25-4), extendable up to 104 probes using the extension board E25-EXT (see § 5.7)
- 17 bits converter : input voltage between –0.5V and +10.5V, 340 conversion/sec. Converter type triple ramp, controlled by microcomputer.
- RS232 interface for direct connection of the board to a computer or a programmable automatic device.

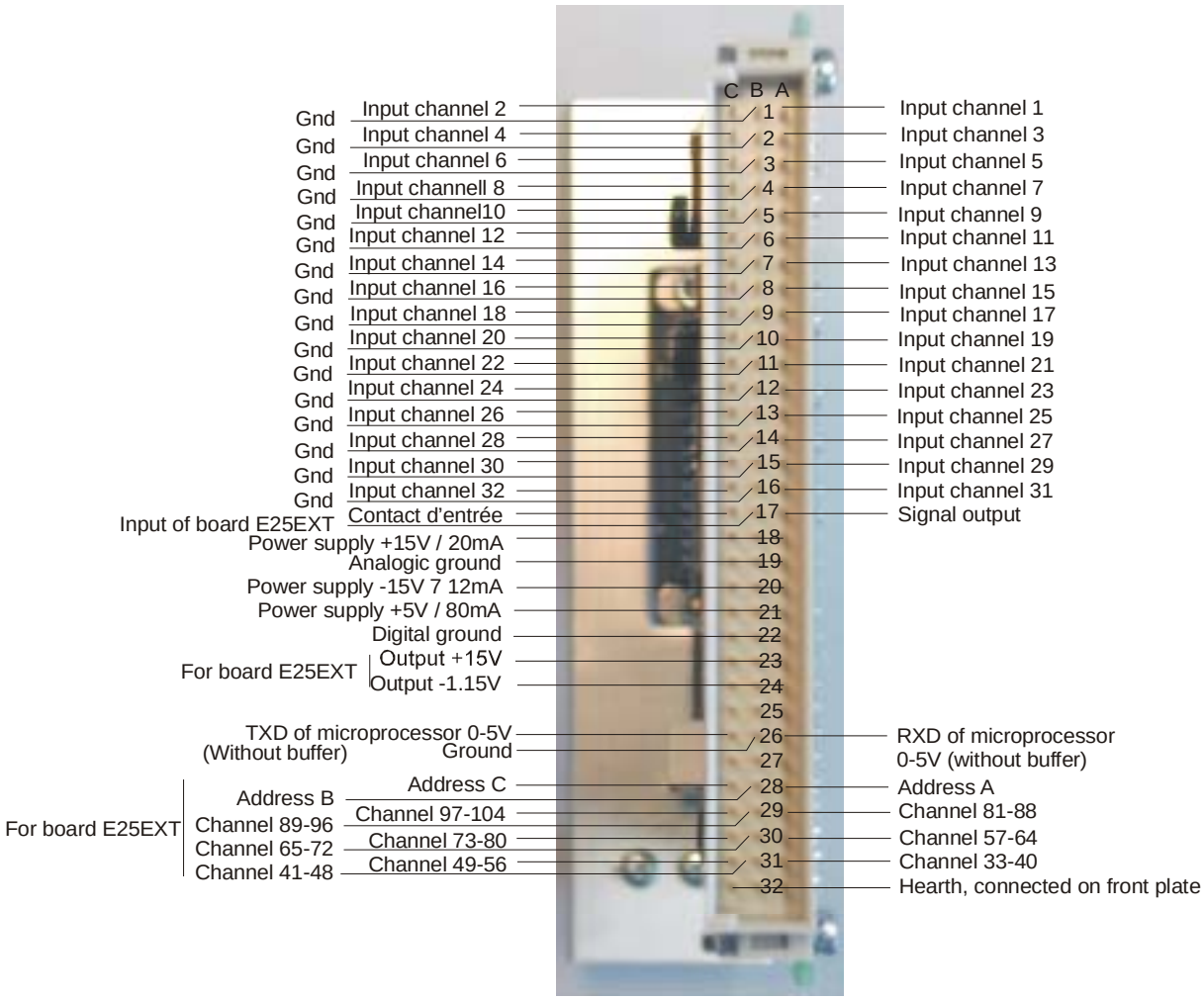
The computer is able to perform the following using simple commands :

- The selection of the measuring channel
- The input of the converted value : the measurement or a certain number of these values
- An automatic scanning of a number of selected channels
- The storage of a minimum or maximum value
- The filtering on 4, 8, 16, 32 or 64 samples
- The storage through the board of 1 to 2700 conversions and their restitution
- The output of a command signal

The rear plug connector allows the connection of the power voltages +5V, +15V and –15V, of the 32 analog inputs, the extension board coupling and one input. This input may be designated to any case : to send a conversion, start / end of a storage function or to send a character of an external action which can be tested by a computer.

For the input voltage of 10.0000V on the board, the converted value is 10.0000. For a probe with 25 mm measuring range, the conversion value must be multiplied by 2.5 to obtain the correct graduation. For a probe with 50 mm range, the multiplication factor is 5.

5.2 DIN 41612 CONNECTOR AT THE REAR, according to DIN 41612 (IEC-603-2) forme C, 3x32 contacts



NOTE : the analog outputs are cabled with shielded wires.

Power supply +15V and –15V : supplied by E25S

5.2 CALIBRATION OF THE BOARD

The calibration is done at the factory. If a recalibration becomes necessary, proceed as follows :

- Connect the board to a computer. Select channel 1, filtered on 32 samples (sending of 1F32 : see § 5.3).
- Use a E25-2 or E25-4 reference board and a reference probe. A reference voltage source with min. 5½ digits accuracy may also be connected.

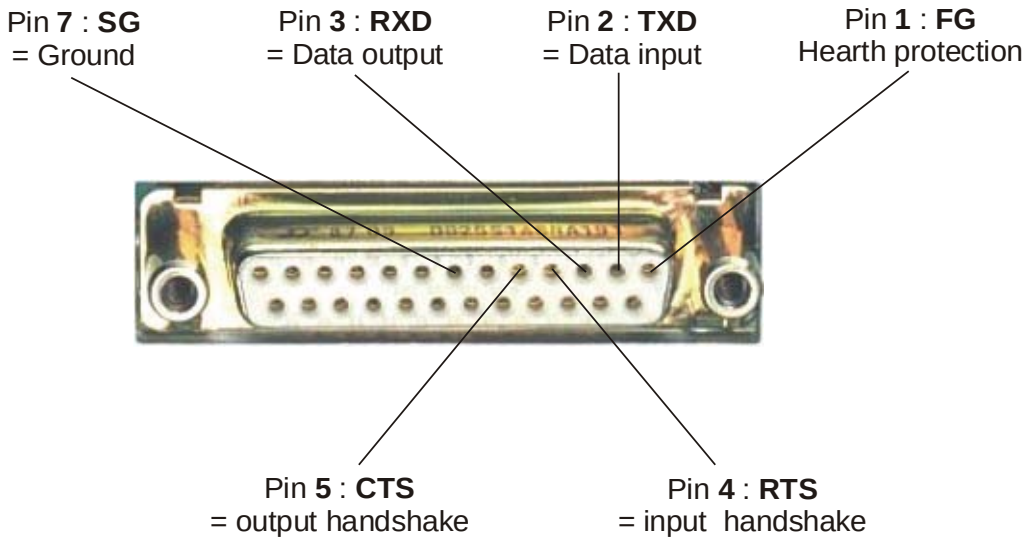
1/ Calibration using Sylvac probe and analog board E25 :

- The probe in extended position, perform a mechanical adjustment so that the converter output value (mentioned on the computer) will be 0.0000. A fine adjustment of this zero value can be done using the zero setting facility on the E25-2 board.
- Set a gauge block of 10 mm for P10, 25 mm for P25 or 50 mm for P50 underneath the probe contact.
- Adjust the calibration screw of the E25C232 board until the value of 10.0000 will be displayed on the computer screen.
- Check the value of 0.0000 again and repeat the adjustment, if necessary.

2/ Calibration using reference voltage source :

- The input of the E25C232 board is on zero volt (short-circuit), read the conversion value on the computer and retain it.
- Establish the reference voltage source, set to 10.0000V, on the input of the board. Adjust the calibration screw so that the reading deviation between 0 volt and 10 volt is 10.0000.
- Check the value again at 0 volt and repeat the adjustment, if necessary.

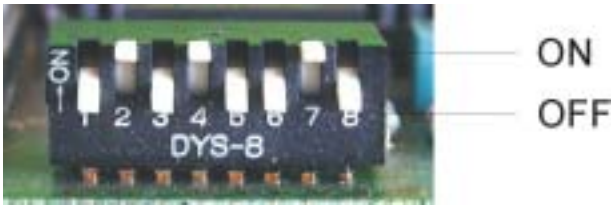
5.3 RS232 CONNECTION



Sylvac supplies the computer connection cable. The handshake RTS/CTS may be activated / disactivated by a switch.

5.4.1 RS232 parameter

Position when supplied :



Parameter settings of the board when supplied : 9600 baudrate, 8 bits, no parity, CR, no handshake RTS/CTS, ASCII transmission.

Switch 1 and 2 : Selection of the transmission speed

1	2	Baudrate [bps]
OFF	OFF	1200
ON	OFF	4800
OFF	ON	9600
ON	ON	19200

Switch 3 : Selection of the transmission format, ASCII or binary.

SW3 OFF : Normal format in ASCII character → position when supplied

Signe +/-	Digit 1 10^{1}	Digit 2 10^{0}	Point décimal	Digit 3 10^{-1}	Digit 4 10^{-2}	Digit 5 10^{-3}	Digit 6 10^{-4}	Digit 7 10^{-5}	CR	LF

NOTE : - the 7th digit appears only in filtered mode on 16, 32 or 64 samples and accepts only the values 0 or 5.
- LF will only be send if switch 7 is on position OFF.

SW3 ON : Binary transmission format on 3 bytes

BYTE 1 (MSB) 1XXX XXXX	BYTE 2 1XXX XXXX	BYTE 3 (LSB) 1XXX XXXX	CR	LF

This format has been designated to reduce the transmission time.
Calculation of the transmission time with a value of e.g. 9600 baudrate : 1 byte (=8 bits) will be transmitted in 1/9600 *8 = 0.8ms. In ASCII format and with 9 transmission bytes it comes to 7.5ms. In binary mode and with 4 bytes it takes only 3.3ms.

The computer program must convert the binary word into a decimal value. The strong bit of each byte is always on 1. Therefore, the transmitted binary number is always one ASCII symbol higher than 128 and no control characters have to be sent. This strong bit must be switched off in the converter program.
The binary mode stipulates a transmission on 8 bits, disregarding the position of switch 4.

Important : In binary mode, the conversions are transmitted continuously without exigency of a reading sequence, unless this mode has been combined with the min/max mode or if the number of values to be transmitted has been requested. The Xon/Xoff protocol of the computer may be used for the transmission flux (see programmation example, § 5.4.3).

Switch 4 : Transmission character length

SW4 OFF : 7 bits per character
SW4 ON : 8 bits per character → position when supplied
If working in binary mode, the position of switch SW4 is unimportant.

Switch 5 : Selection of handshake, yes or no, through control lines RTS / CTS

SW5 OFF : no handshake (CTS stays on ON status – space) → position when supplied

SW5 ON : RTS / CTS handshake

Switch 6 : Selection of parity checking, yes or no

SW6 OFF : No checking and transmission of the parity, 2 stop bits → position when supplied
SW6 ON : Checking and transmission of the parity, 1 stop bit

In case of parity error detection, the board returns the error message ?1.

Switch 7 : Character of end of transmission

SW7 OFF : CR + LF are sent at the end of each transmission
SW7 ON : CR is sent at the end of a transmission → position when supplied

Switch 8 : not in use

NOTE : The position of the switches will be read only after having switched ON (under mains power) the board. If the previous parameters may be changed, switch the power of the board OFF and ON again.

5.4.2 Control commands

The functions of the board will be controlled by the computer using ASCII code of one character (in capital or small letters), followed by CR or CR+LF. Spacings will be ignored.

1 to **104** Selection of the channel to be converted. The board returns automatically the measured value.

D Clears a board selection, no channel is selected and the A, F, L, M and N functions are not activated. Clears as well the transmission in binary mode.

R Reading of the measurement if the channel has been previously selected.
R10 Reading of 10 stored values (memory mode : L).

1A5 Reading of 5 channels, starting at channel 1. The values will be returned in one block,
without spacing, CR or CR+LF at the end of the last measurement.
4A2 Scanning of channels 4, 5 and 6.

10N1 Reading of 10 measurements on channel 1. The values are transmitted without spacing, CR or CR+LF at the end of the transmission.
5N1A10 Five times reading of channels 1 to 10.

1M Channel 1 in min/max mode. Scanning using retro-command R or an external contact
resets the min/max memory.
The minimum value is transmitted first, followed by CR or CR+LF, then the maximum value.
The min/max mode remains until the interruption command D has been sent.

F4 Filtering on 4 samples. **F8**, **F16**, **F32** and **F64**, respectively on 8, 16, 32 and 64 samples. This is necessary to guarantee a steady value in a tenth of micron resolution.
For F16, F32 and F64 one more digit (0 or 5) will be displayed. These digits are assigned to probe P25 or P50 of which the converted value is multiplied by factors 2.5 or 5. They do not appear in min/max or binary mode.

It is a matter of fact that the filtering on 64 conversions returns the highest stability of the conversion value . It is also this mode which slows down most the converter speed.

	Probe compressed :	Probe extended :
without filtering :	between 340 and	470 conversions/sec.
with filtering on 4 conv. :	between 85 and	118 conversions/sec.
with filtering on 8 conv. :	between 42 and	59 conversions/sec.
with filtering on 16 conv. :	between 21 and	29 conversions/sec.
with filtering on 32 conv. :	between 10 and	14 conversions/sec.
with filtering on 32 conv. :	between 5 and	7 conversions/sec.

L Storage of conversions into the internal memory of the board : max. 2600 values.
A memory contents stop may be done in different ways :

- if the data memory is completed
- or if the board receives a reading command R
- or if an external contact has been detected
- or if the number of storages has been indicated

The reading of the stored values may be done :

- in one block by sending the character R. The values will be transmitted without spacing because CR or CR+LF are the characters of end of transmission.
- in several times because the character R is followed by the number of the conversions to be read : e.g. R1 reads a single stored value.

The memory mode may be combined without exception with A, F, N and S. The min/max mode can not be assigned to this L mode. If the S mode has been assigned (start : see here-after), the signal went out before the storage started. In F16, F32 and F64 mode, the 7th digit will not be transmitted.

L2 Start of the storage through external contact.
1A12N100L Storage of 100 values of channels 1 to 12.
3F16L2 Waits for the external contact and then stores the values filtered on 16 samples. Stops if the memory is completed, if the board received the character R or if the external contact has been detected.

S Sends a command signal of 0.5 seconds, the period for the command of a relay, of an electrovalve etc. This pulse duration may be changed between 10 ms and 2.5 Sek. by indicating the duration in milliseconds after S.
S1000 Sending of a signal of one second.

Signal active : output voltage on pin 17a : +5V current max : 100mA (output transistor). A free running diode has been designated on the board to protect this inductive load output.

V Firmware version of the board, answer : (c) SYLVAC SA V1.4

5.4.3 Computer program example

The Qbasic on the computer is the simpliest applicable language. It might be useful for testing the functions of the board or for the realization of calibrations. The management of the RS232 transmission port (COM1, COM2.) is integrated into this language.

Example :	10 OPEN ‘’COM1 :9600,N,8,2,CS,DS,CD ‘’ AS#1	opens the seriel port for the basic parameters of the board (§ 5.4.1)
	20 PRINT#1,’’1’’	selects channel 1
	30 LINE INPUT#1,A$	waits for the answer of the board
	40 PRINT A$	displays the measured value

Scanning of channels 1 to 5 :

```
10 OPEN ''COM1 :9600,N,8,2,CS,DS,CD '' AS#1
20 PRINT#1,''1A5F16''                          scanning of channels 1 to 5,
                                               filtering of 16 measurements
30 LINE INPUT#1,A$
40 FOR I = 1 TO 5
50 A(I) = VAL(MID$(A$,I*8-7,8)                 values with 8 characters
60 NEXT I
```

At the end of this program A(1) contains the value of channel 1, A(2) the one of channel 2, etc.

In case that the number of the transmitted bytes has saturated the connection buffer, the Xon/Xoff protocol may be used. Xoff (character ASCII 19) ends the board transmission and Xon (character ASCII 17) starts it.

The site www.sylvac.ch supplies a basic program in Visual Basic for the management of the RS232 port. The program SYLCOM or SYLWIN allows the testing of the board connections and the different function modes.

5.4.4 Signal of the external command

This input connection has several functions, depending on the active mode of the board :

- If no channel has been selected, an external contact releases the transmission of the character Q (Query) by the board. The computer who reads this character can now start a sequence of measurements or any other action.
- If a channel has been selected, no A, N or L mode has been activated or the binary transmission is still working, the external contact starts the transmission of a conversion.
- If the L mode (storage) is active, the external contact ends the storage. In mode L2 the external contact first starts the storage and then ends it.

The input connection has been designated not to consider possible return pulsations of the external contact. To activate this function, pin 17a must be connected to the mass (input of the shielded transistor).

5.4.4 Error messages

An error message on the computer may appear for following reasons :

?1 : Parity error, received by the message of the board (if the parity has been requested, SW6 ON).
?2 : Reception of an unknown message through the board
?3 : Bad syntax of the message received by the board (e.g. sending of channel 115 if only max. 104 channels are available)
?4 : A conversion value is requested though no channel has been selected or no value has been stored in L mode.
?5 : The RAM memory of the board is damaged

5.5 SPECIFICATIONS

Analog input voltage :	from –0.8V to + 10.8V
Resolution of the AD converter :	17 bits
Linearity of the converter :	± 1.5mV between 0 and 10V
Conversion speed :	between 340 conversions/sec. probe compressed and 470 conversions/sec. probe extended

The filtering of 4 measurements (F4) devides those by 4, F8 by 8 etc.

Analog inputs :	32, extendable up to 104 using the board E25-EXT
Measuring value memory :	2600 values
Interfaces :	RS232-C, selectable parameters Optional Current Loop
Consumption :	+5V : max. 80mA +15V : max. 50mA -15V : max. 20mA
Dimensions (width x depth x height)	30.5 x 170 x 128.7 mm
Weight	0.2 kg
Operational temperature	+5 to + 50 °C
Storage temperature	-20 to + 60 °C

5.6 DELIVERY

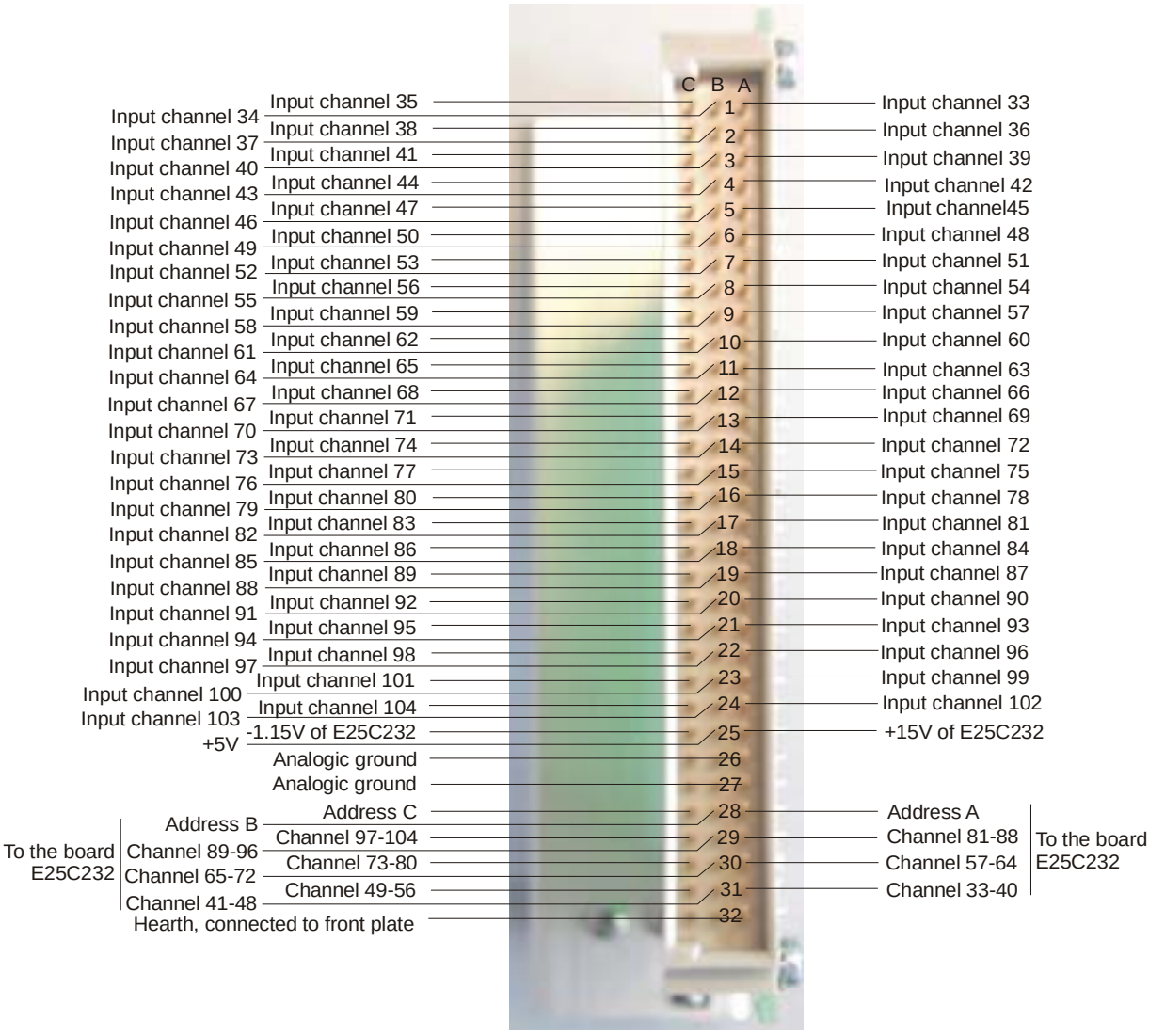
	Code number
Board E25C232 including : - 1 connector, female, 3x32 p, for soldering - 2 slotted screws M2.5x11 - Instructions for use	906.1157
Board E25-EXT including : - 1 connector, female, 3x32 p, for soldering - 2 slotted screws M2.5x11	906.1159

5.7 EXTENSION BOARD E25-EXT

This board allows to extend the inputs of the converter board from 32 to 104.

The board is connected directly to the converter board using the address and power connections.

5.7.1 DIN 41612 CONNECTOR AT THE REAR, according to DIN 41612 (IEC-603-2) forme C, 3x32 contacts



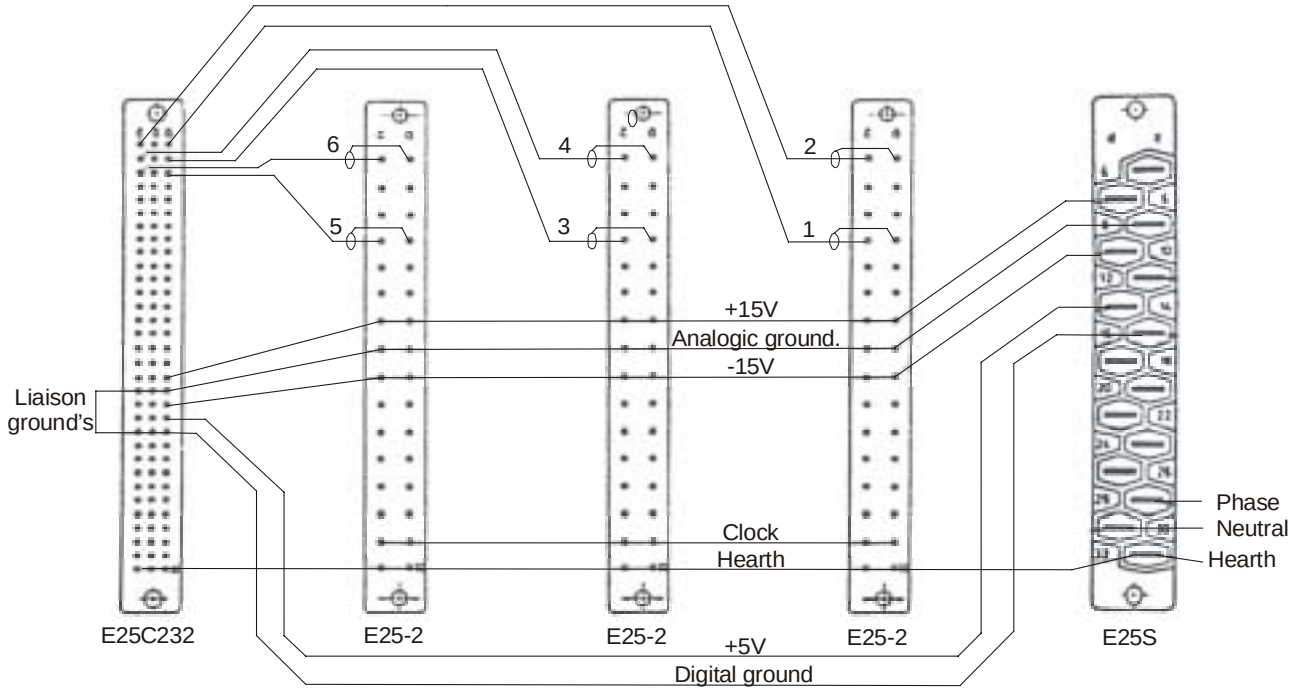
6. INSTALLATION, INTERCONNECTIONS, BACK PLANE BOARD

6.1 INSTALLATION

- The range of E25 boards contains CMOS components which are sensetive to electrostatic discharges. Pay attention not to get in contact with the elements of the circuit board, with the exception of a working area where the electrostatic discharging risks have been eliminated.
- The boards may be mounted into a housing or cabinet rack according to DIN 41494.
- Pay attention not to install the analog boards E25-2 and E25-4 near non-shielded inductive elements (e.g. transformer).
- The wires of the analog outputs are shielded. The shielding is located on the same line as the connected outputs. It may be joint with the earth at only one side. The back plane boards, supplied by Sylvac, are for the shielding of the analog conductor of multiplayer type.
- For the connection in parallel of several E25-2 and E25-4 boards: see the note in chapter 2.3.2 or 3.3.
- The E25S board allows the power supply for up to 12 analog boards E25-2 or 20 analog boards E25-4.

6.2 INTERCONNECTIONS (cabling without back plane)

Interconnection example of 3 analog boards with 2 inputs (→ 6 probes), 1 power supply board and 1 converter board :

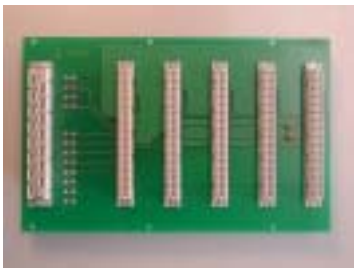


The digital and the analog mass is linked at one point of the E25C232 converter board input.

The timer will be activated only on one E25-2 board. The timers of the other boards are not active (§ 2.3.2).

Important : The mains power supply connections must be performed according to the general standards of electrical safety regulations.

6.3 BACK PLANE BOARDS E25-352, E25-354, E25-355, E25-356 AND E25-357



E25-356 : - 1 to 4 boards E25-2
- 1 board E25S
- 1 board E25C232

For housings/cabinet racks 3U – 42F

Code number: 906.1163

E25-357 : - 1 to 4 boards E25-4
- 1 board E25S
- 1 board E25C232

For housings/cabinet racks 3U – 42F

Code number: 906.1164

E25-355 : - 1 to 11 boards E25-2
- 1 board E25S
- 1 board E25C232

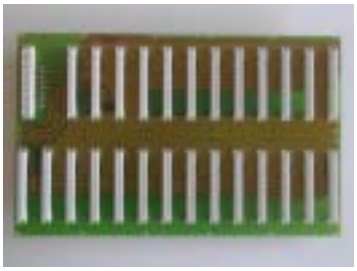
For housings/cabinet racks 3U – 84F

Code number: 906.1162

E25-352 : - 1 to 10 boards E25-4
- 1 board E25S
- 1 board E25C232
- 1 board E25EXT

For housings/cabinet racks 3U – 84F

Code number: 906.1160



E25-354 : - 1 to 23 boards E25-4
- 1 board E25S
- 1 board E25C232
- 1 board E25EXT

For housings/cabinet racks 3U – 84F

Code number: 906.1161

Für all back planes :

Outputs for mains power supply as well as foot pedal output/input signal are cable lug connections.

6.4 HOUSINGS

Complete systems, configured according to customers request, will be supplied on order. Please, contact your nearest Sylvac agent for a detailed quotation.

Standard housings :

Housing capacity	Type	only housing	Housing + back plane
1 to 4 E25-2, 1xE25S, 1xE25C232	3U-42F	906.1180	906.1170
1 to 4 E25-4, 1xE25S, 1xE25C232	3U-42F	906.1180	906.1171
1 to 11 E25-2, 1xE25S, 1xE25C232	3U-84F	906.1181	906.1172
1 to 10 E25-4, 1xE25S, 1xE25C232, 1xE25-EXT	3U-84F	906.1181	906.1173

7. SYLVAC PROBES P5, P10, P25 and P50

7.1 GENERAL DESCRIPTION

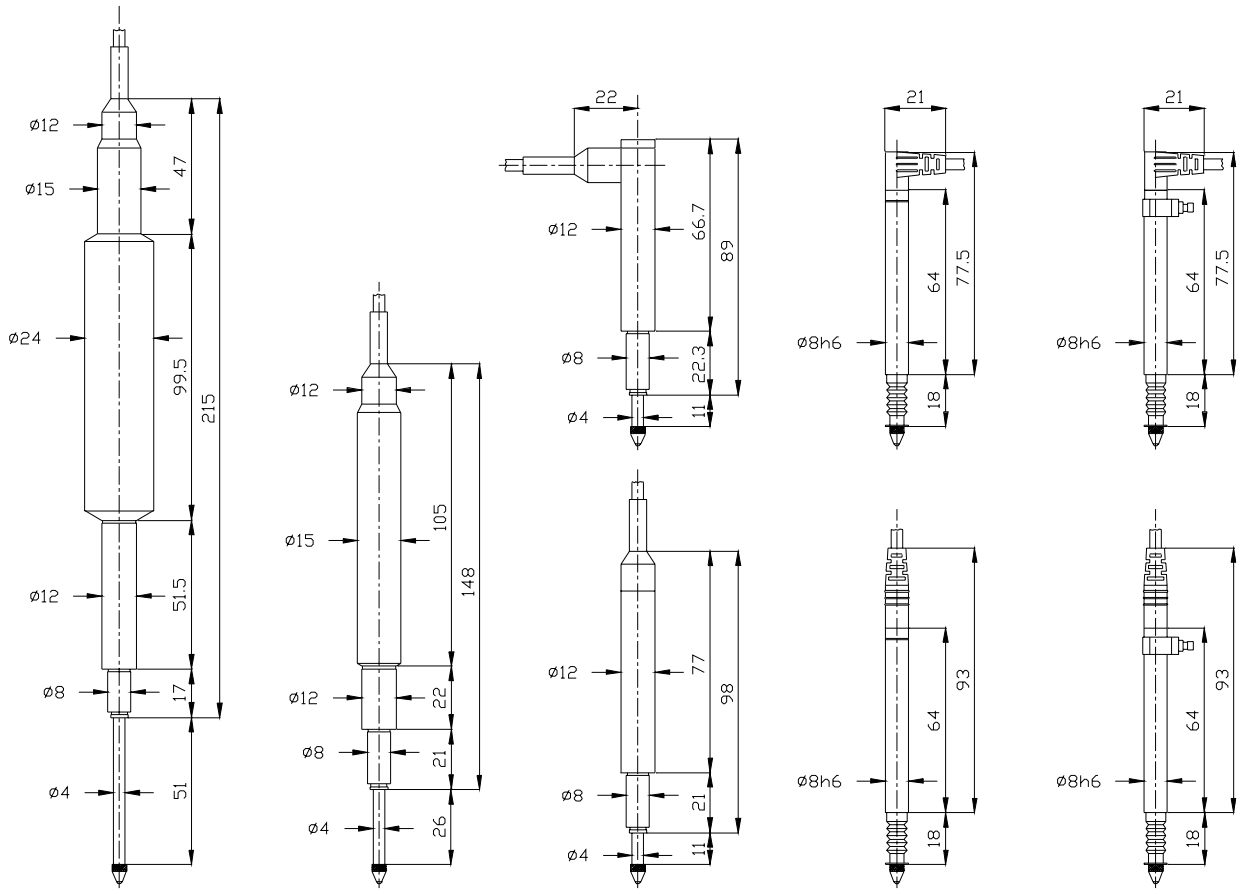
The Sylvac long travel probes are of compact design, have high stability and are of exceptional consistent accuracy. In addition, the measurement values are acquired in absolute mode, i.e. the output voltage of the E25-2 or E25-4 boards remains unchanged even after disconnection/reconnection or power supply interruption. They have a coupling speed limitation which means no loss of the measurement. The integrated preamplifier allows the application of long cables without the need of an intermediate amplifier. The probes are insensitive to magnetic field influence.

All probes (excempt the P5B) have precision friction bearings with high contact stability. The clamping diameter is 8 mm.

P5 (L)	probe with 5 mm measuring range. L stands for a 90° angular cable output
P5 (L) V	same, but designated for pneumatic lifting
P5 B	same, but with ball bearing plunger guiding
P10	probe with 10 mm measuring range
P10 L	same, but with a 90° angular cable output
P25	probe with 25 mm measuring range
P50	probe with 50 mm measuring range

A pneumatic lifting device can be used with probes P10, P25 and P50. A lifting of probe P5V is done direct, controlled by vacuum.

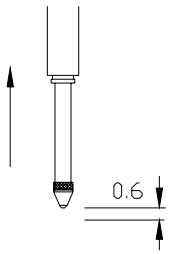
7.2 DIMENSIONS



7.3 APPLICATION

7.3.1 Precautions

- To obtain an optimum accuracy, avoid all lateral pressure during contact with the measuring point on a part to be checked (probe travel in extended position). The best is the use of a mechanical or pneumatic lifting device.
- Do not overtighten the probe location holder. An extreme locking influences the sliding movement of the measuring shaft.
- Avoid any shock against the probe body or measuring shaft.
- The probes have a free contact range of approx.. 0.6 mm.



7.3.2 Exchanging the probe contact point

The sliding probe shaft has an ISO M2.5 internal thread. All commercial dial indicator contact points may be used. To exchange a contact point, the sliding probe shaft must be in the outermost position. Tighten the contact point well (do not use a tool) to guarantee the repeatability.

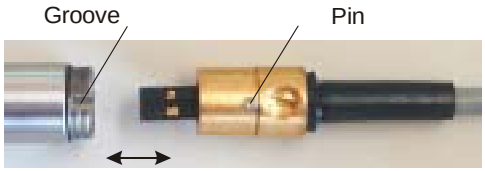
7.4 MAINTENANCE

The maintenace requirement is very simple. If the probe shaft does not slide correctly anymore, clean it using a dust free towel and lubricate it with some fine oil.

7.4.1 Replacing the connection cable

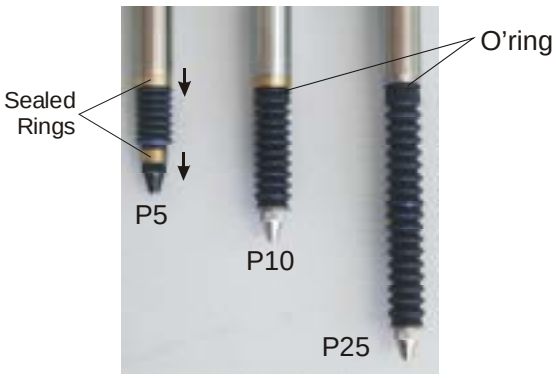
P5 : The plug connector is secured by a joint disc. To remove the connector, push the disc in probe shaft direction.

P10, P25 and P50 : Use a connection cable corresponding to the probe type. Remove the black cover at the probe end. Pull off the cable towards the back side. Observe the pin position when inserting the new cable.



7.4.2 Replacing the rubber boot protection

Regarding the P5, the rubber boot protection is secured by 2 joint washers. To remove this protection, push the washers towards the contact point. For P10, P25 and P50 : care about the direction of the rubber boot protection



7.5 SPECIFICATIONS

Designation	P5 /B/V/L	P10	P25	P50
Accuracy over total measuring range	1.5 µm / .00006"	1 µm / .00004"	1.2 µm / .00005"	2.5 µm / .00010"
Construction	Probe with axial displacement	Probe with axial displacement	Probe with axial displacement	Probe with axial displacement
Type of plunger guiding	Friction bearing P5B : ball bearings	Friction bearing	Friction bearing	Friction bearing
Mouving mass (without measuring insert)	3.2 gr / 0.11 oz	3.2 gr / 0.11 oz	8.7 gr / 0.31oz	14.6 gr / 0.51 oz
Weight	75 gr	95 gr	160 gr	320 gr
MEASURING RANGE	5 mm / 0.2"	10 mm / 0.4"	25 mm / 1"	50 mm / 2"
Total range	6.5 mm / 0.26"	10.8 mm / 0.43"	26.8 mm/ 1.05"	52.2 mm / 2.06"
Limit positions :				
- at the upper end	5.7 mm/0.22"	10.4 mm/0.41"	25.8 mm/1.02"	51 mm/2.01"
- at the lower end	0.7 – 0.8 mm	0.4 – 0.5 mm	0.8 – 0.9 mm	1.0 – 1.2 mm
Standard measuring force	0.6 – 1.0 N	0.6 – 0.9 N	.6 – 1.2 N	0.6 – 1.4 N
- no measuring force	–	0.1 N	0.15 N	-
- low measuring force	0.5 – 0.8 N	0.2 – 0.4 N	0.2 – 0.4 N	-
- high measuring force	1.0 – 1.2 N	0.8 – 1.8 N	0.8 – 1.8 N	-
Measuring force variation	0.04 N/mm	0.03 N/mm	0.024 N/mm	0.016 N/mm
Max. authorized lateral force	0.7 N	0.6 N	0.3 N	0.25 N
Repeatability	0.3 µm / .000012"	0.2 µm / .000008"	0.2 µm / .000008"	0.4 µm / .000016"
Deviation on temperature	0.01 µm/°C mm	0.02 µm/°C mm	0.01 µm/°C mm	0.01 µm/°C mm
Protection according IEC529	-	IP40	IP40	IP40
with rubber boot	IP64	IP50 (P10S) IP64 (P10E)	IP50 (P25S)	IP50
Probe contact lifting	Vacuum (model V)	Pneumatic lifter	Pneumatic lifter	Pneumatic lifter
Temperature limits	0 – 50°C			
Standard cable length	1.50 m / 60"			
Extension cables	up to 20 m / 787"			
Length of special cables	up to 20 m / 787"			
Exchangeable probe inserts	M 2.5			
Code number	P5 : 900.1001 P5V : 900.1003 P5L : 900.1006 P5LV : 900.1008	P10 : 900.1010 P10L : 900.1014 P10S : 900.1012 P10LS : 900.1016	P25 : 900.1025 P25S : 900.1027	P50 : 900.1050

7.5.1 Accuracy using extension cables (different lengths)

The accuracy probe/board remains less than 2 µm/.00008" up to following cable lengths :

Board	Type of cable	without recalibration		with recalibration of the boards	
		P10	P25	P10	P25
E25-2	Direct cable	max. 10 m	max. 5 m	max. 14 m	max. 13 m
	Extension cable	max. 10 m	max. 8 m	max. 20 m	max. 18 m
E25-4P10	Direct cable	max. 12 m		max. 12 m	
	Extension cable	max. 16 m		max. 18 m	

7.6 ACCESSORIES

	Code number
Standard measuring insert with ball contact, ∅ 2 mm (supplied with probes)	901.2002

Commercial dial indicator contact points with standard M2.5 thread
may be used with all Sylvac probes

Set of protection rubber boots for P10 and P10L	901.2003
Set of protection rubber boots for P25 (remaining measuring range 19 mm)	901.2004
Set of protection rubber boots for P50	901.2002

Pneumatic lifting device for P10 and P25, mounted on dia. 12 mm, PZ7	901.2010
Pneumatic lifting device for P50, PZ18	901.2011

The input pressure is 2 to 3 bars (filtered, dry air). The lifting device does not influence the measuring force of the probes. It is completely sealed and needs no maintenance.

Air tube, ∅ 4/2	901.2012
Air tube, ∅ 6/4	901.2013
Double air tube, ∅ 4/2	901.2014

Connection cable P5,	length 1.50 m / 60"	901.5042
Connection cable P5L,	length 1.50 m / 60"	901.5052
Connection cable P10,	length 1.50 m / 60"	901.5002
Connection cable P10L,	length 1.50 m / 60"	901.5032
Connection cable P25,	length 1.50 m / 60"	901.5012
Connection cable P50,	length 1.50 m / 60"	901.5022

Extension cable, length 3 m / 120"	901.5001

Modifications without prior notice

Edition 2005.10 / ME-E25-01-E/ 681.058 - 110