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Characteristics and dimensions subject to change without notice.

YOUR LOCAL CORRESPONDENT

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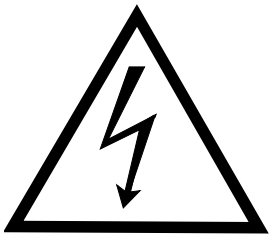
SAFETY

Servodrives present two main types of hazard :

- **Electrical hazard**



Servoamplifiers may contain non-insulated live AC or DC components. Users are advised to guard against access to live parts before installing the equipment.

Even after the electrical panel is de-energized, voltages may be present for more than a minute, until the power capacitors have had time to discharge.

Specific features of the installation need to be studied to prevent any accidental contact with live components :
- Connector lug protection ;
- Correctly fitted protection and earthing features ;
- Workplace insulation
  (enclosure insulation humidity, etc.).

General recommendations :

- Check the bonding circuit;
- Lock the electrical cabinets;
- Use standardised equipment.

- Mechanical hazard

Servomotors can accelerate in milliseconds. Moving parts must be screened off to prevent operators coming into contact with them. The working procedure must allow the operator to keep well clear of the danger area.

All assembly and commissioning work must be done by **qualified** personnel who are familiar with the safety regulations (e.g. VDE 0105 or accreditation C18510).

Upon delivery

All servoamplifiers are thoroughly inspected during manufacture and tested at length before shipment.

- Unpack the servoamplifier carefully and check it is in good condition.
- Also check that data on the manufacturer's plate comries with data on the order acknowledgement.

If equipment has been damaged during transport, the addressee must file a complaint with the carrier by recorded delivery mail within 24 hours.

Caution :

The packaging may contain essential documents or accessories, in particular :

- User Manual,
- Connectors.

Storage

Until installed, the servoamplifier must be stored in a dry place safe from sudden temperature changes so condensation cannot form.

Special instructions for setting up the equipment

CAUTION

For this equipment to work correctly and safely it must be transported, stored, installed and assembled in accordance with this manual and must receive thorough care and attention..

Failure to comply with these safety instructions may lead to serious injury or damage.

The cards contain components that are sensitive to electrostatic discharges. Before touching a card you must get rid of the static electricity on your body. The simplest way to do this is to touch a conductive object that is connected to earth (e.g. bare metal parts of equipment cabinets or earth pins of plugs).

1. GENERAL

This option is designed to provide serial information about absolute position sychronized with an externally generated (by Numerical Control) timing signal (CLOCK).

The option is configured in part by straps on the card and via the DIGIVEX-PC software.
This is a highly valuable option **if the motor is fitted with a holding brake**.

Two cards have been developed:

- SC 6637- RUB 1 card: provides absolute position encoding only.
- SC 6637 - RUB 2 card: provides encoding and software inputs / outputs for origin (home position) setting and software.

2. OPERATION

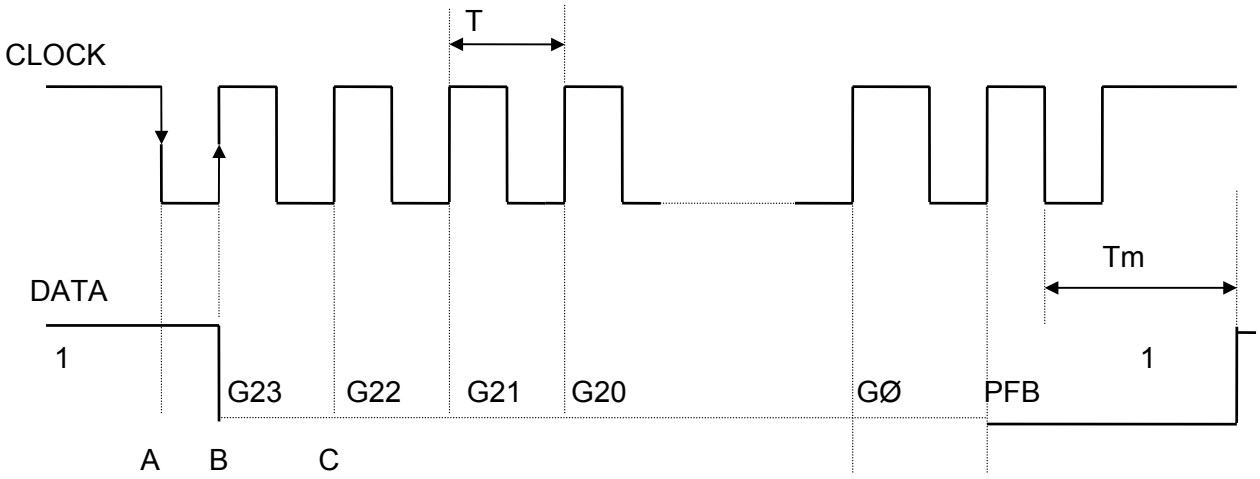
2.1 TYPE OF POSITION SIGNAL

The absolute position is encoded on 24 bits, in binary or Gray code depending on the position of strap ST**1**.

- ST**1** in position **BIN**: binary code
- ST**1** in position **GRAY**: Gray code

Default setting when shipped: Gray code

The position signalling sequence is as follows:



The external clock is at level 1 between two position measurements.
The occurrence, at A, of the first negative-going edge clock input causes the position to be memorized (acknowledgement time: 0.3 µs).
Tm = 17 µs.

One binary or Gray code bit is transmitted over the line for each positive-going edge clock input, beginning with the most significant bits.

G23 = most significant bit,
GØ = least significant bit.

After the least significant bit, a PFB location is reserved for a parity check, which is not validated in the current version (bit is set to Ø by default, to **1** on request).

The absolute position transmitted is cross-referenced to an origin (home position) obtained by a special resetting or origin setting sequence (via logic inputs or via software).

2.2 SIGNAL CHARACTERISTICS

2.2.1 Transmission speed

- Maximum clock speed: 1.5 MHz.
  This frequency is limited by the line transmission times (RS422 type).
- Minimum clock speed : 80 kHz

Line length	Maximum frequency kHz	Minimum transmission time of one position
50 m	400 kHz	92,5 µs
100 m	300 kHz	114 µs

- Minimum inter-frame time (time between end of transmission and next transmission request): depending on solder tag **Y2**.
  Y2 in position 1-2: 17 µs (default option),
  Y2 in position 2-3: 0,66 µs.

Consult the manufacturer about any changes to **Y2**.

The actual time between two position requests is, of course, externally controlled by the positioning system request.

2.2.2 Signal level

EIA RS 422 type signal.
The output signal is galvanically isolated from the DIGIVEX. The output interface must have either a 5 V or a 24 V power supply, depending on the position of strap ST**2**.

ST**2** in **5 V** position : external supply 5 V ± 5%, max. 50 mA
ST**2** in **24 V** position : external supply 24 V ± 5%, max. 50 Ma

2.3 MEMORIZATION OF THE "POSITION FAULT" DIAGNOSIS SIGNAL POSITION

Whenever the auxiliary power supply fails, the absolute position is backed up in an EEPROM.
When power is restored, the actual position is read off and compared with the stored position. If the observed motion is less than a programmed limit, the memorized position is updated.

ATTENTION: Even when within this limit, the system does not detect any offset of an integral number of resolver resolutions.

For safety:

- **The motor must be fitted with a brake and declared as such when customizing the DIGIVEX.**
- In the event of a main power failure, the electronic card checks :
  - ♦ that there is no longer a 24 V supply to the brake,
  - ♦ that the motor speed is ≤ 50 rpm.

A "position fault" diagnosis is signalled and can be read by the DIGIVEX-PC in the following cases:

- In the event of a main failure:
  - ♦ motor declared without brake,
  - ♦ or motor speed > 50 rpm,
  - ♦ or 24 V supply still applied to brake.
- When power is restored:
  - ♦ position outside programmed limit.

  This fault causes the drive axis to be set to software zero torque (T = 0] and the ETATPOM output to switch to 1, without the OK relay opening.
- Resolver fault on drive axis.

To reactivate the servo drive and clear the fault, an origin reset must be performed and torque set in the software.

2.4 SOFT LIMIT - ORIGIN DEFINED BY LOGIC INPUTS

The SC 6637 RUB 2 card has two logic inputs and three logic outputs, which are 24 V opto-isolated. For the physical definition of these outputs, see the DIGIVEX digital servoamplifier instructions - PVD 3464 GB § 4.4.4 and DIGIVEX POWER DRIVE (single-axis) PVD 3484 GB.

2.4.1 Origin setting defined

The origin setting sequence may be conducted:

- either via software (see §3),
- or via two logic inputs and one logic output.

The principle is identical in both cases :

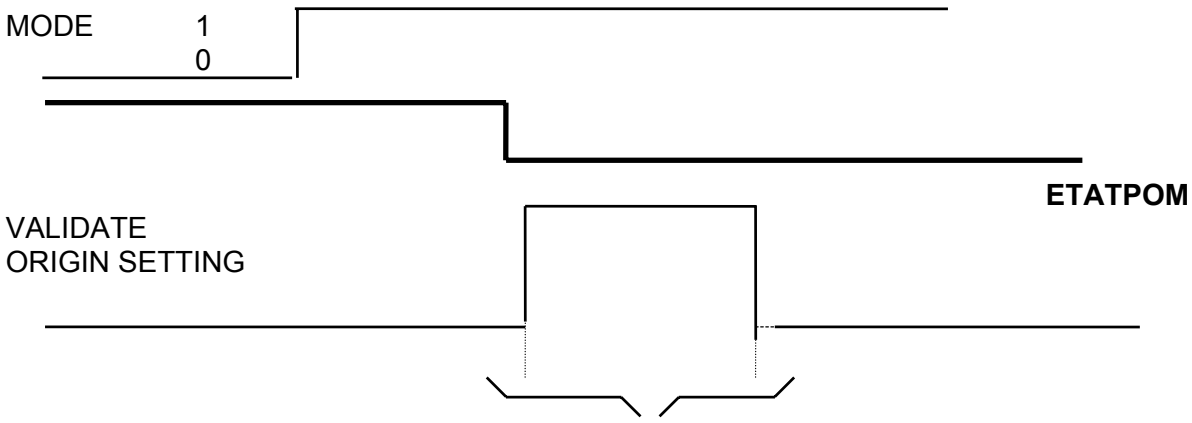
- release the drive: set to zero torque and open brake,

CAUTION: Check that there are no mechanical hazards , especially for vertical drive axes.

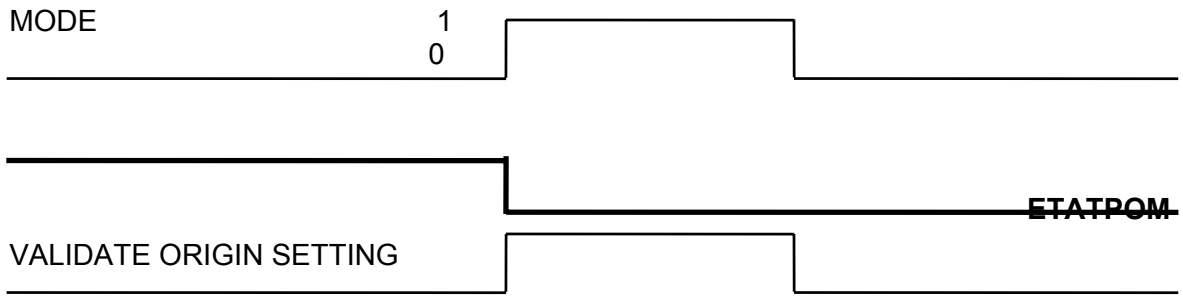
- position the motor manually,
- declare that the current mechanical position has a value set by the "ORIGIN" parameter (which may be Ø or any other value between the minimum and maximum possible).

Origin setting sequence via logic inputs/outputs (accessible with SC 6637 RUB 2 only)

- Open the brake and set the servo drive to zero torque (CAUTION: beware of possible mechanical consequences).
- Move the drive manually to the desired position.
- Set the "MODE" input to **1** to request the resetting sequence.
- Validate by a positive- or negative-going edge on the "Validate Reset" input.



The actual position is overridden and set to the programmed value.



These inputs can be driven by the same signal

ATTENTION: Any positive- or negative-going edge is acknowledged when validating the origin.

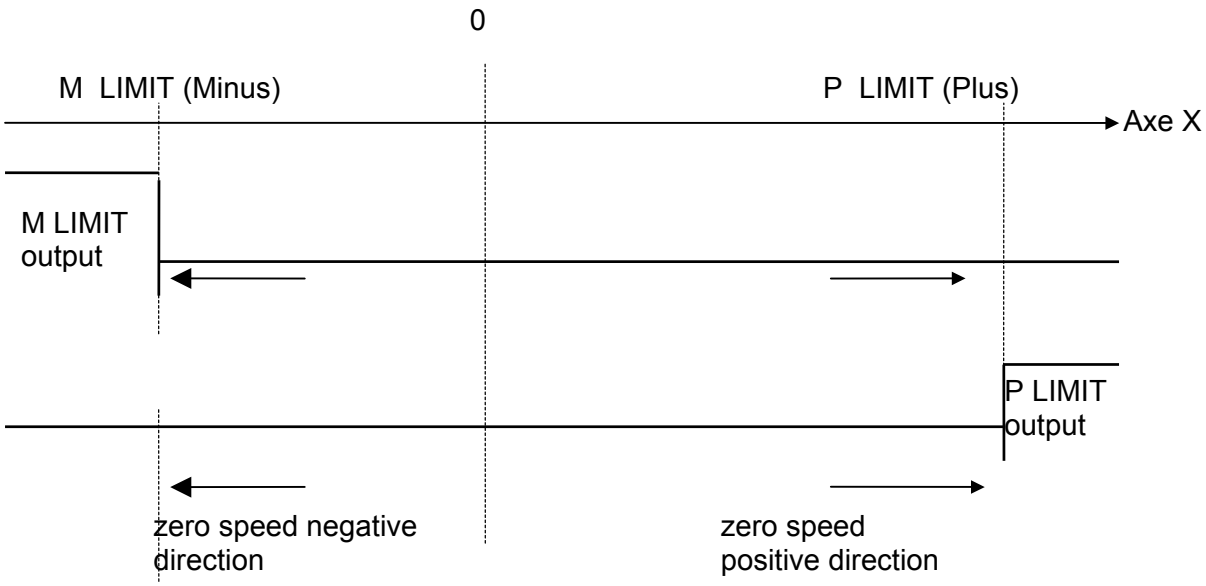
The ETATPOM output is in logic state 1 when the Origin Setting is validated. It is in logic state Ø when a resetting sequence is required (as when "Position Fault" arises).

2.4.2 Software LIMITS

A maximum stroke in positive and negative directions can be programmed via the DIGIVEX-PC with the SSI option validated.

Reaching either of the two soft limits:

- prevents the drive axis from moving further, by setting the servo drive software to zero speed in the relevant direction (CW= 0 or CCW = 0);
- sets the corresponding limit of travel output to 1 logic state (transistor conducting).



ATTENTION: The software limits are cross-referenced to the position origin and therefor related to the origin setting.
After all origin setting sequences, check that the mechanical position of the software stops is correct.

3. PARAMETER INPUT

3.1 VIA DIGIVEX-PC SOFTWARE

3.1.1 SOFTWARE DESCRIPTION

The SSI section can be accessed via the "ENCODER" menu of the DIGIVEX-PC software, in level 2 only (password as required).

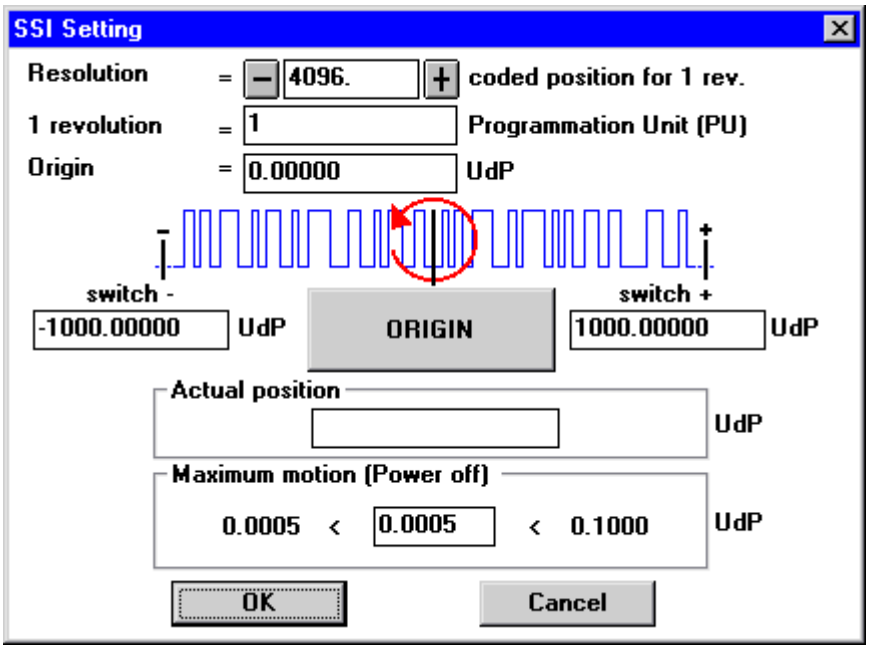
3.1.1.1 Travail "OFF LINE"

The SSI parameters may be included in a parameter file and then loaded via a total transfer.

Access is obtained:

- either by double-clicking on the encoder picture,
- or via PARAMETERS + ENCODER.

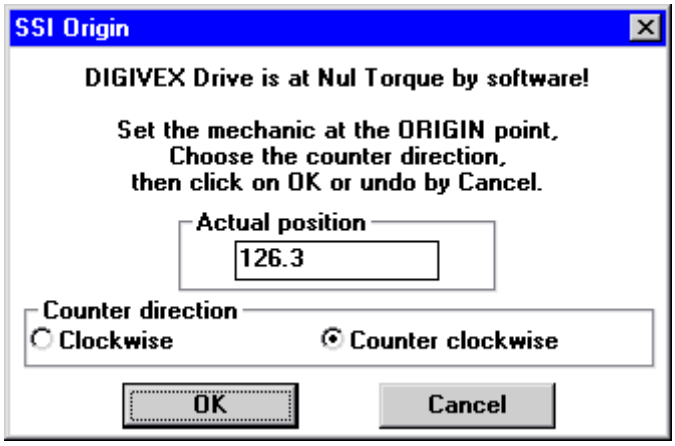
A window is displayed where either the encoder or the SSI option may be selected.
Selecting SSI opens the following parameter window:



Press "OK" to validate all the SSI parameters.

See § 3.2 for parameter definitions.

When working "OFF LINE", clicking on "ORIGIN SETTING" allows access to the window below only, allowing the direction of increasing positions to be chosen: "OFF LINE", the origin setting sequence is meaningless and is not acknowledged.



Press "OK" to validate the parameters and return to the "SSI Card Definition" window.

3.1.1.2 Working "ON-LINE"

When the PC-DIGIVEX connection is made, the software acknowledges the SSI option is available.

- **Total transfer with SSI :**

Identical to total transfer without SSI, except that the origin must be reset.

- **Parameter modification "ON LINE" :**

The system provides access to the same windows :

- ♦ either by double-clicking on the "ENCODER" disc: this opens the SSI parameter window directly as the software has acknowledged the option is available.
- ♦ or via PARAMETERS + ENCODER.
- ♦ Clicking on "ORIGIN SETTING" sets the DIGIVEX drive software to zero torque (T = 0), after confirmation.
- ♦ Clicking "OK" calls up the SSI Origin Setting window, which is identical to the one seen in the "OFF LINE" section.

- **<u>Software origin setting sequence</u>:**

The software origin setting sequence is as follows:

- ♦ If required, before setting to zero torque, approach in numerical control manual mode.
- ♦ Call up the SSI window, then the "Origin Setting" section - confirm set to zero torque.
- ♦ Move manually at zero torque to the desired position.
- ♦ Confirm by "OK". The "ORIGIN" value, and clockwise / counter clockwise directions are then acknowledged and the "Origin Setting Completed" output validated.
- ♦ Reset the servo drive torque via the DIGIVEX-PC "Input Assignment" window.

TAKE CARE: Origin must be reset after any change to parameters "ON-LINE" or any total transfer.

3.2 VIA DTP001 CONSOLE

The SSI parameter setting option can be accessed in Parameter Group No. 6.

The PARAM key and (← and →) keys are used to shift from one parameter to the next.

SSI option set-up:

• Current position	PU
• Resolution	position via motor revolutions
• Programming unit	
• Origin position	PU
• Plus stop	PU
• Minus stop	PU
• Counting direction	CW (clockwise) CCW (counter-clockwise)
• Maximum permitted motion with power off	PU
• Origin setting	

PU: Programming Unit
"Default Position" is displayed as SSI FAULT

3.3 PARAMETER FUNCTIONS AND VALUES

- **Resolution**: number of absolute positions encoded per motor revolution:
  Value : 4 to 65 532
  Variation : 4 by 4.

- **Programming unit**: Value in units (mm, rev., degrees, etc.) for one motor revolution.
  Maximum value : as for resolution
  Minimum value : 0
  Digital value : 8 digits, floating decimal.

ATTENTION: Unit programming is a feature provided for entering values in the absolute encoder card. The value actually transmitted is not in units: it is a code (binary or Gray) depending on the number of revolutions and the resolution per revolution.

- **Current position**: present value, in units.

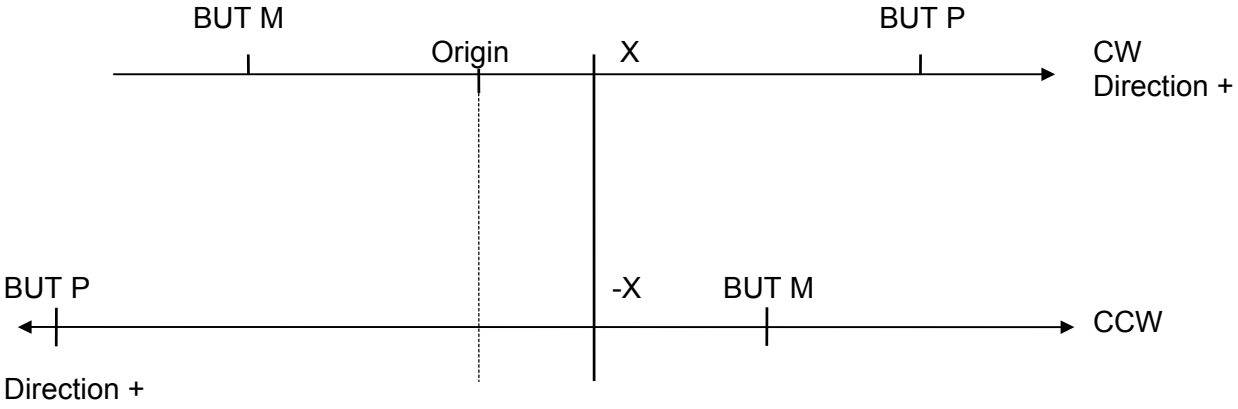
- **Maximum motion authorized when power off:**
  Maximum value: ± 0.1 motor revolutions, converted into units. This value is intended to monitor any motion while power off.

- **Origin setting**: in units
  Value introduced when the origin setting sequence is validated (by logic input or software).
  Maximum value: corresponds to 2^{23} + 1 codes
  Minimum value: corresponds to -2^{23} - 1 codes
  Value related to 24 bit signal, to resolution and to unit value.

- **Plus LIMIT - Minus LIMIT**
  Values in units corresponding to the maximum desired stroke. They are cross-referenced to the origin position.
  Maximum values: related, as for resetting, to 24 bits, to the unit and to the resolution.

- **Counting direction**:
  - ♦ Clockwise CW: clockwise rotation of the motor shaft viewed from the shaft end increments the absolute position (default value).
  - ♦ Counter clockwise CCW: counter clockwise rotation of the motor shaft viewed from the shaft end decrements the absolute position.

ATTENTION: A change in the clockwise - ⟵⟶ counter clockwise direction reverses the value of the limits and positions relative to the origin.



The mechanical position of the PLUS and MINUS LIMITS is therefore reversed.

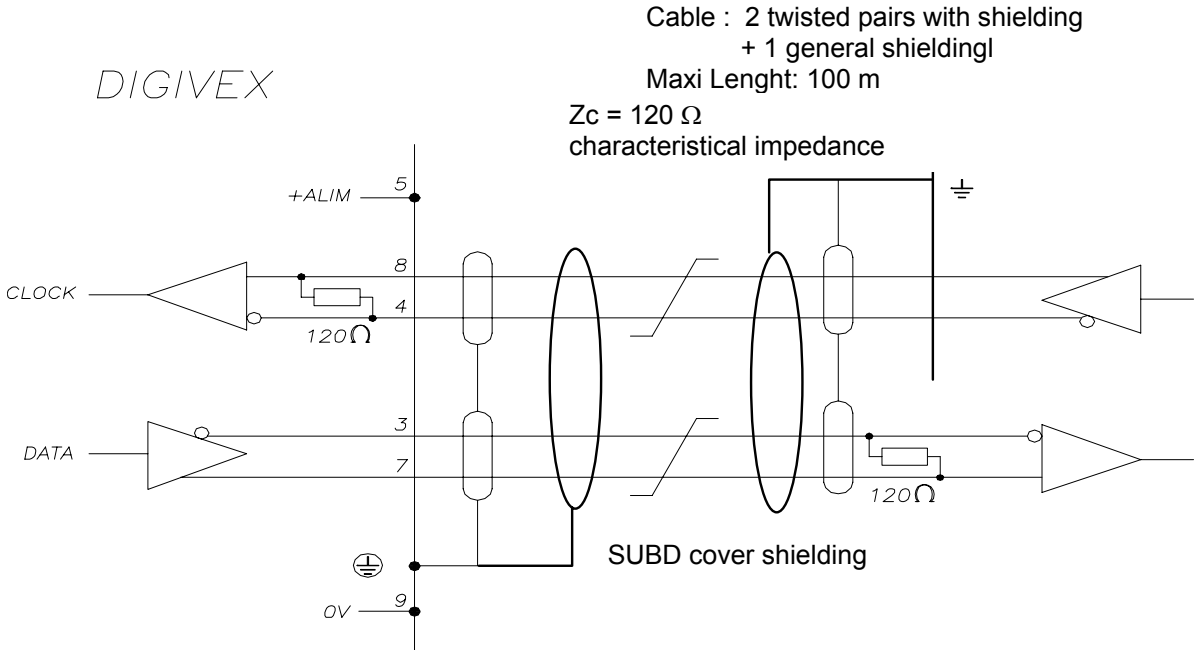
4. CONNECTIONS / STRAP POSITIONS

4.1 SC 6637 RUB 1 CARD

One 9-pin SUB-D male plug

CONTACT	TYPE	FUNCTION	DESCRIPTION
8	Logic Input	CLOCK+ clock input	
4	Logic Input	CLOCK-	
7	Logic Output	DATA+ position output	High = logic 1
3	Logic Output	DATA-	
5	Input	5 V ou 24 V Interface power supply	STRAP ST2 (Sec. 2.2.2)
9	Input	0 V	

LI = Logic Input LO = Logic Output



NB : Don't forget to adapt the data line.

4.2 SC 6637 RUB 2 CARD

One 9-pin SUB-D male plug

CONTACT	TYPE	FUNCTION	DESCRIPTION
8	Logic Input	CLOCK+ clock input	
4		CLOCK-	
7	Logic Output	DATA+ serial data output	High level at output corresponds to logic 1, in
3	Logic Output	DATA-	positive logic
5	Input	5 V ou 24 V serial interface power supply	Serial section supply voltage
9	Input	0 V	
2	Logic Input	Origin setting validation	
1	Logic Input	0 V	
6	Logic Input	MODE Choice of operating mode	1: origin setting mode
1	EL	0 V	0 or NC: normal mode

LI : Logic Input LO : Logic Output

One 9-pin SUB-D female plug

CONTACT	TYPE	FUNCTION	DESCRIPTION
8	Logic Output	M LIMIT+	Negative abutment logic output
4	Logic Output	M LIMIT-	
7	Logic Output	P LIMIT +	Positive abutment logic output
3	Logic Output	P LIMIT -	
6	Logic Output	ETATPOM+	Option card zero setting status output
2	Logic Output	ETATPOM-	
5	Input	24 V	Logic output power supply
9	Input	0 V	

LI : Logic Input LO : Logic Output

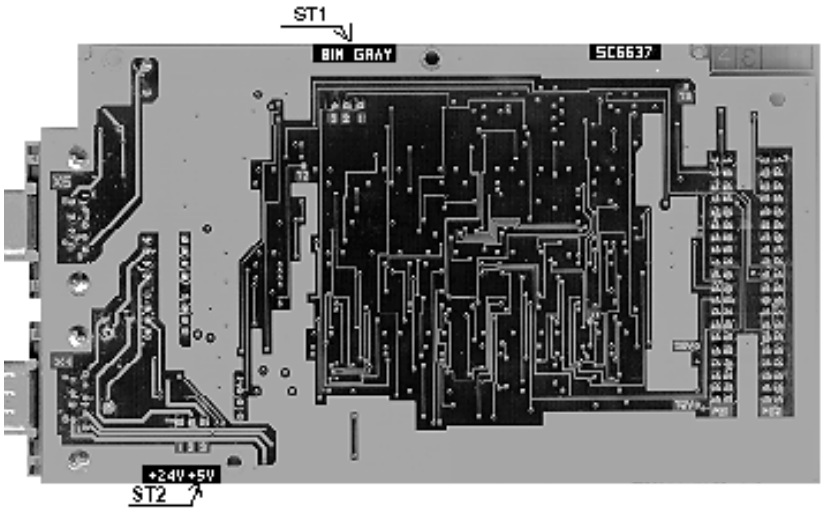
4.3 WIRING REQUIREMENTS

See the DIGIVEX, DMD PVD 3464 GB, DPD PVD 3484 GB or DSD PVD 3500 GB

4.4 ST1/ST2 STRAP POSITIONS

When the options card is fitted :

- Strap **ST1** is at the top
  - Strap to front: binary code, marked BIN
  - Strap to rear: Gray code, marked GRAY
- Strap **ST2** is at the bottom:
  - Strap to front: 24 V supply (marked 24 V)
  - Strap to rear: 5 V supply (marked 5 V)



CAUTION !

DRIVE WITH SSI EMULATION OPTION WILL BE IN FAULT (RED LED FLASHING) AT THE FIRST POWER ON.

IT IS NECESSARY TO DO AN ORIGIN (SOFTWARE ORIGIN OR AN ORIGIN UNDER EXTERNAL LOGIC CONTROL) TO RESET THIS FAULT