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Characteristics and dimensions subject to change without notice

YOUR LOCAL CORRESPONDENT

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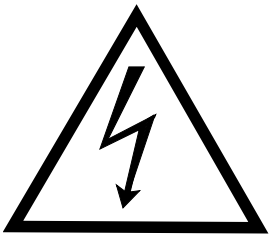
SAFETY

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. SC 6643 CARD

1.1 Operating specifications

The SC6643 card is an optional extra for using with

DIGIVEX Single Drive, DIGIVEX Multi Drive and DIGIVEX Power Drive

from the DIGIVEX product family.

It allows:

- SINCOS motor position emulation.
- Interface between DIGIVEX and the external instructions which support the SINCOS signals for executing the positioning.
- An INDEXING function identical to that of the SH 6601 indexing function card.

The position sensor is the motor resolver.

1.2 Description.

This card should be inserted in the upper section of DIGIVEX.

Compatibility:

This card is only compatible with DIGIVEX motion controllers fitted with a SR6628B microprocessor card and 27C040 memory containing AP513Vxx software.
It is necessary to have PME driver software, version 3.15 or above, for this card to be recognized.

SINCOS emulation allows a SINCOS encoder output to be emulated.

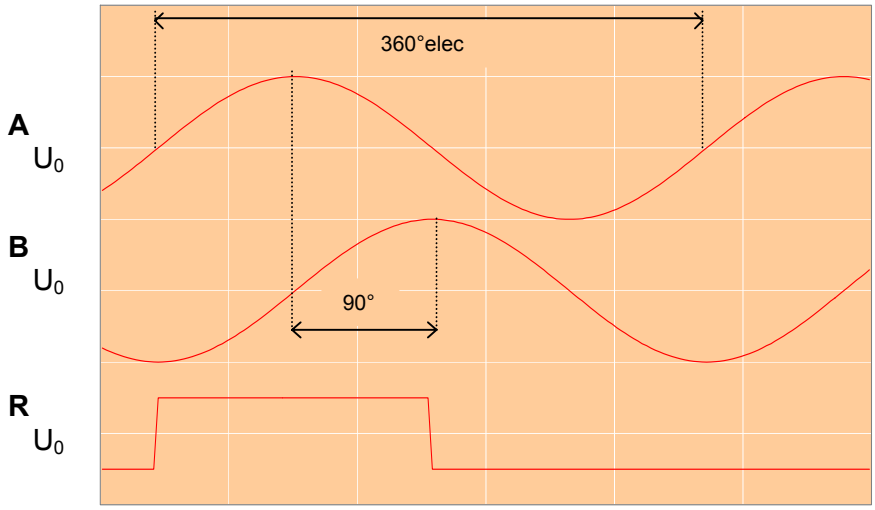
The indexing allows absolute positioning to a specific position on the motor revolution.

2. SINCOS EMULATION FUNCTION

2.1 Output signals

The A and B sinusoidal signals are out of phase by 90° and have voltage levels of 1Vpp. The R reference signal has a voltage level of 0.5…1Vpp.

A, B and R Signals in a clockwise direction at the end of the motor spindle side



Incremental signals

2 sinusoidal signals A+ and B+ and their inverse A - and B –
Referenced in relation to U_0 = 1.5 V.
Approx. differential amplitude 1Vpp
Under an impedance load Z_0 =120Ω.

Reference signal

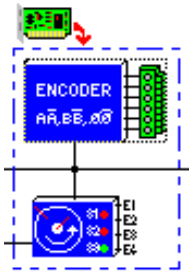
1 rectangular signal R+ per motor revolution and its inverse R-
Referenced in relation to U_0 = 1.5 V.
For a resolver with a single pair of poles.
Approx. differential amplitude 0.5…1 V
Under an impedance load Z_0 =120Ω.

Resolution

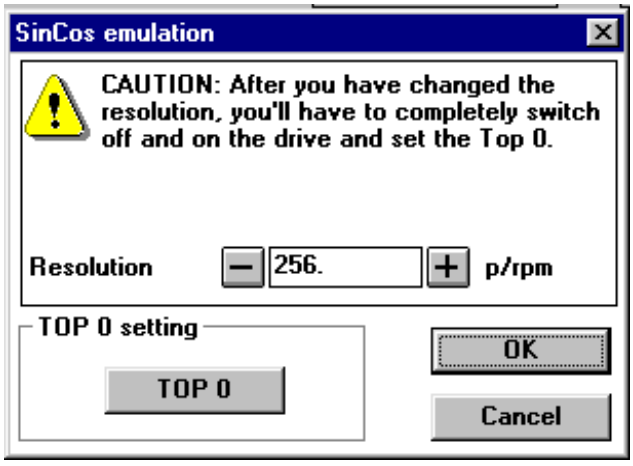
Variable resolution using PME.
512, 256, 1024 sinusoids/motor revolution for a resolver with a single pair of poles.

The resolution can be changed by logging on to PME.

Click on the ENCODER EMULATION picture in the PME window.



You can select one of three resolutions from the SinCos EMULATION window.



Maximum frequency

205 kHz.

Maximum motor rotation speed

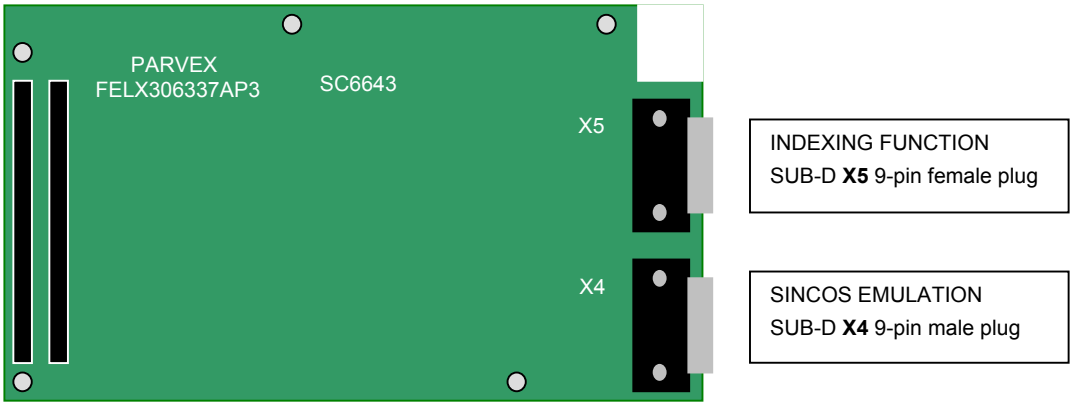
50,000 rpm for a resolution of 256 sinusoids/revolution.
24,000 rpm for a resolution of 512 sinusoids/revolution.
12,000 rpm for a resolution of 1024 sinusoids/revolution.

2.2 Connection

2.2.1 SUB-D 9-pin male connector

Connector X4.x	Type	Function	Characteristics
6 2	Output Output	Port R+ Port R-	Reference signal 0.5V to 1 Vpp under 120Ω
7 3	Output Output	Port B+ Port B-	Sinusoidal signals 1 Vpp under 120Ω
8 4	Output Output	Port A+ Port A-	Sinusoidal signals 1 Vpp under 120Ω
5 9	Output Output	Port +1.5V Earth 0V	Reference voltage U_0=1.5V 0V
1	N.C.		

The sub-D cover must be linked to the cable shielding.



2.2.2 INDEXING function

Please refer to section 3

3. INDEXING FUNCTION

3.1 Operating specifications.

The indexing function is an optional extra for using with products from the DIGIVEX family.

It allows:

- Absolute positioning to a specific position on the motor revolution, controlled by a logic input.
- The output of clearing logic data, when the positioning is obtained.

The function configuration is obtained:

- Either via PME software
- Or via the programming terminal.

The position sensor is the motor resolver.

Cards which allow indexing are:

- SC 6643 card, previously described
- SH 6601 card

3.2 Description.

These cards should be inserted in the upper section of DIGIVEX. 24V DC external power supply I/O.

Compatibility:

These cards are only compatible with motion controllers fitted with a SR6628B microprocessor card and 27C040 memory

- The SH 6601 card requires AP506Vxx software
- The SC 6643 card requires AP513Vxx software and PME software, version 3.15 and above.

The encoder emulator option can be fitted at the same time as the indexing card.

The cards have 4 logic inputs and 3 logic outputs:

- 2 inputs are used:
  - ♦ Indexing request,
  - ♦ Cam.
- 1 output:
  - ♦ Indexing executed.

Connection to the external control unit via SUBD 9-pin male plug.

3.3 Operating principle

3.3.1 Description

The user gives an external indexing request instruction via logic input:

- The motor speed is adjusted to 600 rpm.
- Wait for the coincidence of the top0 and external cam signal (1 active state).
- Servo-control to the indexing position.

When the system is in the "indexing window":

- Output of indexing executed logic data.

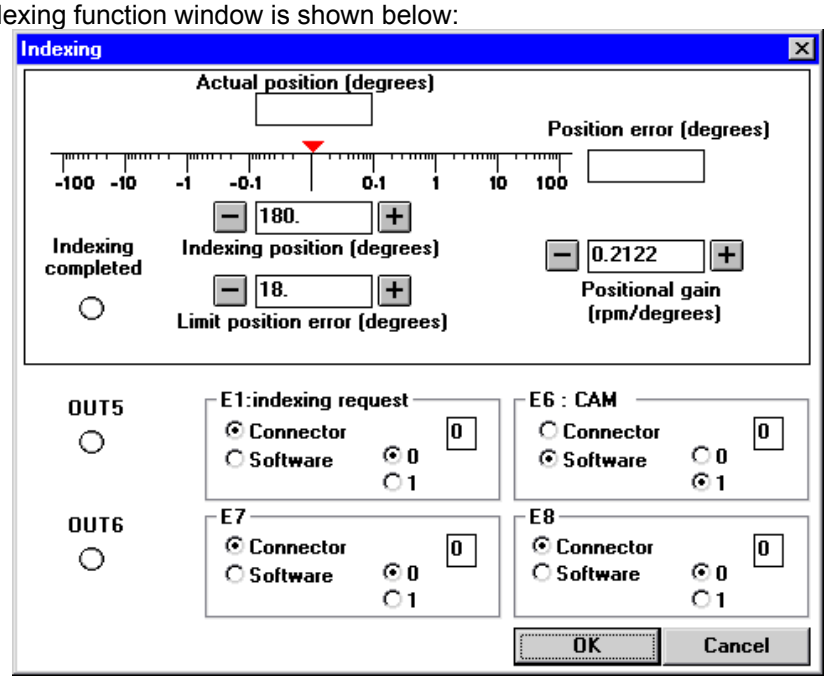
The system remains indexed as long as the "indexing request" input is active (value 1).
The "indexing position" is determined by the user during a learning phase.

Servo-control parameters for the indexing position can be set by selecting a gain suited to the application.

The output of indexing executed data is defined by setting the width of the indexing window around the target position.

3.3.2 Setting parameters with PME software

The "Windows" indexing function window is shown below:



There are 3 modifiable parameters in the upper section:

- Indexing position: Defines the target position during the indexing phase.
  Programmable value in the motor revolution from 0° to +360°

  (see paragraph entitled "Learning").

- Position gain: Defines the servo-controlled gain to the position during indexing.
  Value to be changed to suit each application (see paragraph

  entitled "Positioning gain").

- Indexing window: Defines the window around the indexing position in which we consider that the position is reached.

Displayed for your information:

- Actual position: Actual motor position.
- Position error: Difference indicated between the actual position and the target position.
- Filtered displayed value: (position error)

  Coupled with this value, a logarithmic line chart that situates the motor position in relation to the indexing position: Scaled in degrees between –100° and +100°.
  If the position error is less than +/- 0.01°, the marker is positioned in the middle of the chart.
  If the error is more than +/- 100°, the marker is positioned at the left or right end in accordance with the error sign.

The I/O configuration is to be found in the lower section.

- E5: indexing request:

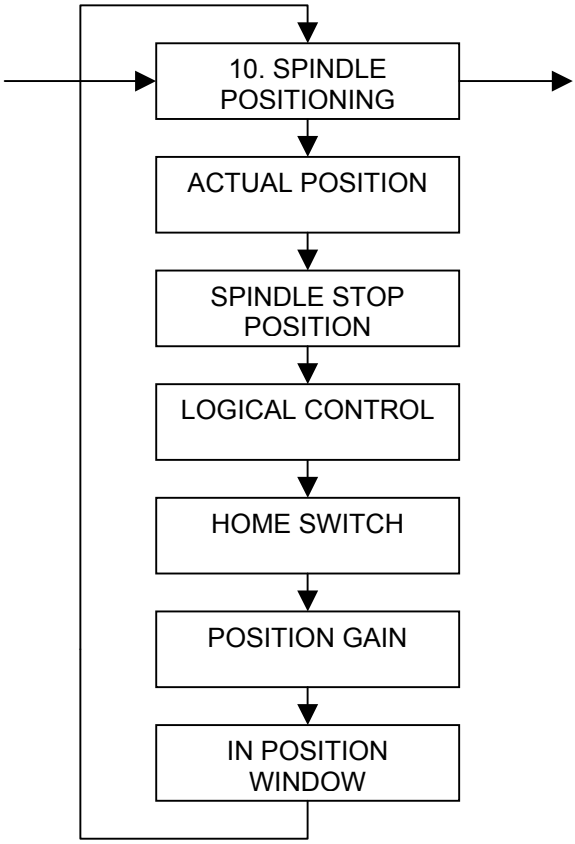
  Indexing function instruction logic signal.
  0: normal running mode.
  1: Indexing.
- E6: CAM: (see paragraph entitled "Cam input").

  Cam logic signal.
  Linked to multi-polar resolver use possible.
  Resolver with a single pair of poles: signal to be set to 1.
  Multi-polar resolver: line the external cam up with 1 and a single encoder top0 (1 active state).

The E7 and EI8 inputs are not used.

The S5 and S6 outputs are not used.

3.3.3 Using the terminal to set parameters.



3.3.4 Learning.

The indexing position is described as follows:

- **Outside of the indexing phase**, by directly entering the value desired in degrees in the motor revolution.
- **During indexing**, by pressing the + and – cursors in connection with the indexing position parameter. The motor remains servo-controlled to this position and follows the variation instruction given by the user. The value can also be entered directly into the relevant field with validation by + and - cursors (the motor will suddenly be servo-controlled to the new position).

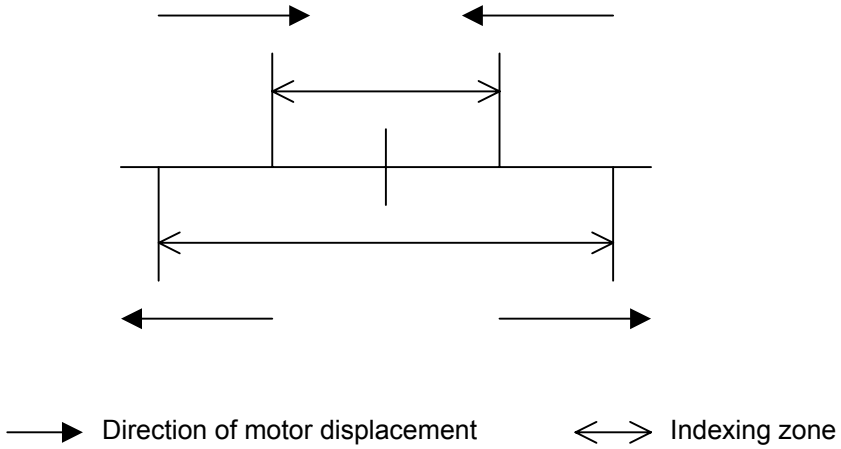
The adjustment parameters (indexing position, gain) are put into the motion controller memory by using the "OK" key.

3.3.5 Adjustment.

The position gain parameter must be changed to suit the application. The indexing timing as well as the stiffness of the position motor spindle will be directly linked to the value of this parameter.
A value that is too high can lead to motor instability.
A value that is too low will give a slack positioning, as well as slow indexing.

The indexing window parameter defines the zone around the indexing point where we consider that the indexing is executed. When the motor enters this zone, the OK indexing output is activated. The zone width around the point is variable (hysteresis is created):

(window width factor 2)



3.3.6 CAM input.

The cam input allows a multi-polar resolver to be acknowledged.
When the motor speed has been adjusted to 600 rpm, the indexing waits for a coincidence between an encoder emulation top0 and the presence of the cam signal.
The motor will continue to be driven at 600 rpm until this coincidence is obtained.
The position servo-control is triggered as soon as this coincidence is found.

Single pole resolver:

- Externally controlled input set at 1
- Or internal control with the value 1.

Multi-polar resolver:

- Compulsory use of an external cam with coincidence of the active value (value 1) with one and only one of the top0 obtained on the motor revolution.

The default value: SOFTWARE, value 1.

3.4 Software

3.4.1 Indexing position.

The default value: 180° if resolver_polarity = 1

3.4.2 Positioning gain.

The default value: 0.212 rpm/degree.

The positioning gain adjustment is linked to the application speed frequency range. The loaded motor speed frequency range is given by:

$$f_{SPEEDFR} = G_S x \frac{Ke}{J_T x 79562} \text{ (Hz)}$$

If the inertia is variable, we take the maximum inertia value for the frequency range calculation.

The position frequency range will approximately be: $f_{POSITIONFR} = \frac{f_{SPEEDFR}}{5}$

The positioning gain G_p in rpm/degree will be $G_P = \frac{G_S . K_e}{J_T . 379880}$

$f_{SPEEDFR}$:	speed frequency range
G_S :	speed loop gain (mA/rpm)
Ke :	FEM between phases at 1000rpm in Volts
J_T :	Total inertia (motor + load) (kgm^2)
$f_{POSITIONFR}$:	position frequency range

3.4.3 Positioning window.

The default value: 9° if resolver_polarity = 1 .

Minimum programmable value: 0.05°/(number of pairs of resolver poles).

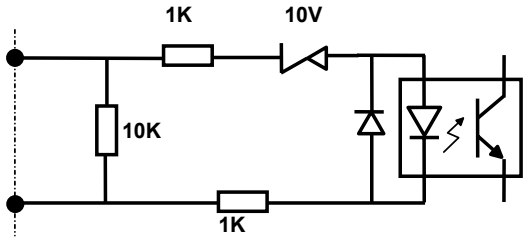
3.5 Connection

3.5.1 SUB-D 9-pin connector.

CONTACT	TYPE	ROLE	SPECIFICATIONS
1	EL 5+	Indexing request	
5	EL 5- (0V)		
2	EL 6+	Cam	
5	EL 6- (0V)		24V LOGIC INPUTS
3	EL 7+	NA	TYPE 1 OPTOCOUPLED
5	EL 7- (0V)		
4	EL 8+	NA	
5	EL 8- (0V)		
6	SL 4+	Indexing executed	
5	SL 4- (0V)		
7	SL 5+	NA	
5	SL 5- (0V)		24V LOGIC OUTPUTS
8	SL 6+	NA	50 mA maxi OPTOCOUPLED
5	SL 6- (0V)		
9	+24V input	E/S power supply	
5	0V input	0v common E/S	

4. ELECTRICAL SPECIFICATIONS.

24V DC optocoupled input
Type 1 input (standard IEC 1131-2)



	MINI	NORMAL	MAXI
Level 0 input voltage	-	0V	5V
Level 1 input voltage	15V	24V	30V
Level 0 input current	-	0mA	0,5mA
Level 1 input current	4mA	9mA	12mA
T on response time (0 to 1)	-	1 ms	-
T off response time (1 to 0)	-	1 ms	-

Logic outputs

The outputs are fed by the external 24V (terminal 9). The three 0V outputs and terminal 5 are linked.

- Maximum output current (level 1) : 50 mA
- Residual current (level 0) : Negligible
- Response time : 1 ms
- Voltage drop for I=50mA : 2 V

PNP opto-isolated (opto-mos) output, the load being linked to the logic 0V (terminal 5).