PROGRAMMATORE DIGITALE

DIGITAL PROGRAMMED / PROGRAMMEUR DIGITAL / DIGITALPROGRAMMER

DPS824/ 8 - 16 - 24   DPS824/ 8 - 16 - 24 K   DPS824/ 8 - 16 - 24 S

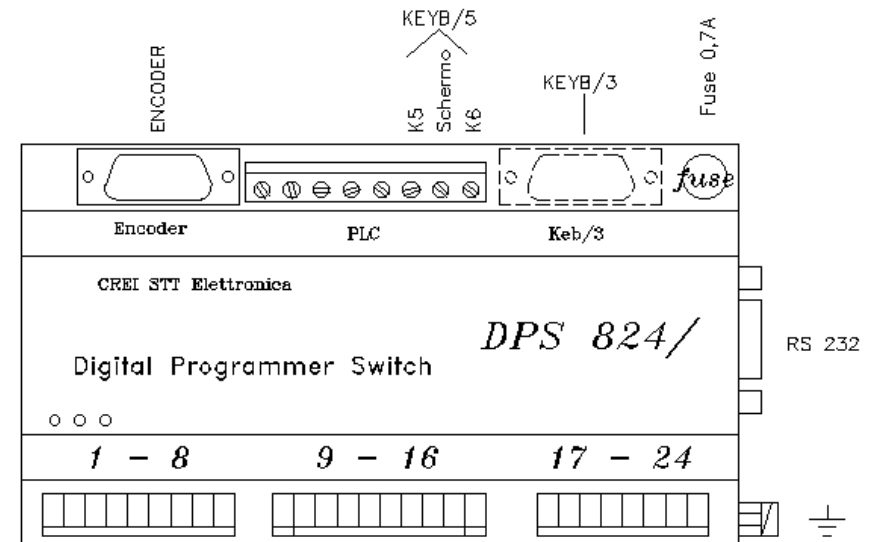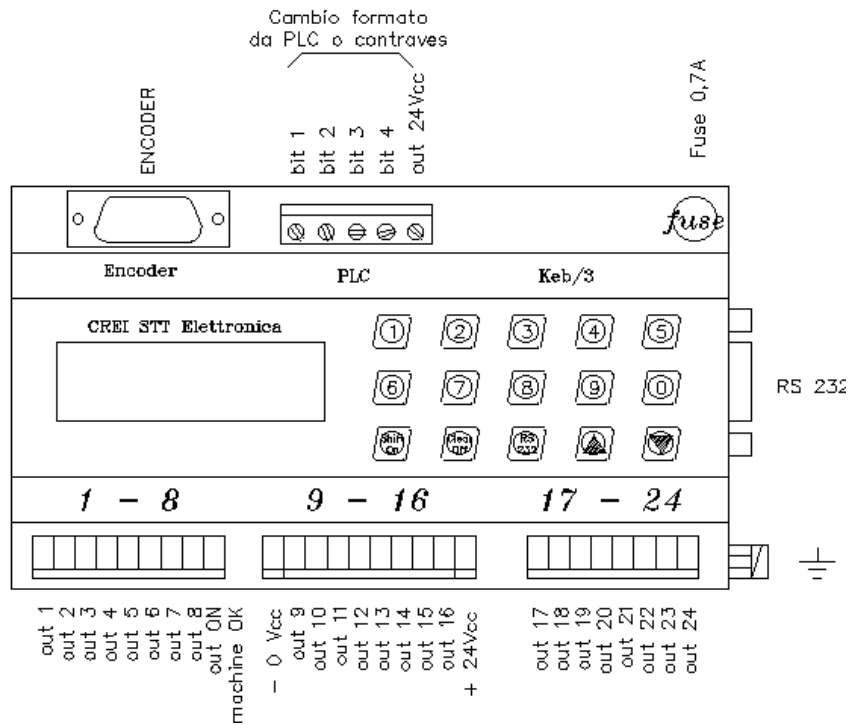**Manuale di istruzione / Instruction handook / Manuel de conduite / Betribsanweisung**

Power : 24Vdc
Max Output : 500 mA each out - 1,2 A for 8 out IC
Encoder : absolute 360 Inp./rev.
PC implementation : with software and RS232 cable CREI STT.

Remote Keyboard KEYB/3 :
Max length for cable 1mt.

Remote Keyboard KEYB/5 :
Max length for cable 100mt in RS485.
Power 24Vdc.

INDEX

1 . MAIN FEATURES

This unit has been designed and realised to generate and process electrical timing signals necessary to run any automatic machine type.
The equipment is based on the principle of a cam programmer; instead of using special shaped cams or adjustable cams to actuate the micro witches, the wanted "ON/OFF" switching points are keyboard programmed.

Comprehension :

Cam : function allowing ON/OFF signals within 360 degrees of a complete revolution (turn).

Phase : cam section included between the "ON" condition and the subsequent "OFF" one.
The "ON/OFF" points (at this points on the electrical output there are the condition "1") are determined during the programming phase and chosen by the programmer with one degree resolution .
Configuration defined by a complete program of all used cams, with relevant phases
Size : pulse generator to be fitted on continuous motion mechanical members with direct drive.

Programmer : the unit receives the pulses from the encoder and processes them according to the pre-set program (size).

▼ **:** to confirm the digited or keep on selecting

▲ **:** to select or come back to the previously inserted data.

1 . 1 DPS 824/ 8 - 16 - 24 technical specifications

- Power 24VCC
- NPN or PNP Output. Each output can supply max. 350mA , max. 1.2A for each 8 set cam (NPN max. 50mA). Outputs are short circuit protected but not Overload protected.
- 32 Character LCD display
- 8-16-24 programmable Cams
- 180 phases for each CAM may be selected
- Memory for up to 99 size
- Response speed up to 2400 RPM. This speed decreases if Anticipation is selected.

1 . 2 Technical specifications of the encoder

The programming unit are supplied complete with STT ELETTRONICA absolute encoders in any case.
Whatever damage or fault origined by other encoder makes will make void all warranties .
The same is for any possible connection that could damage the equipment irreparably.

- Shaft (diameter) : 10mm
- Load on the shaft : 200N (20.5Kg.) axial and radial
- Number of revolution: 3000 max. (for short periods 6000)
- Moment of inertia : 80 gcm2
- 15 pole connector : IP54 insulation
- 19 pole connector : IP65 insulation
- Working temperature : 0 + 60° C.
- Binary code
- Power supply : 8V to 24Vdc.
- Absorption : 80 / 120 mA
- Output power : 30mA

1 . 3 Programmer guide

```
NUM. OF ADVANCES
0,1=6,2=12,3=24,0
```
main display

SIZE 1 = Indicates the programmed output format.

UNCONNECTED = displays the DPS status, the encoder is disconnected.

DEGREES or REVOLUTIONS = When the encoder is connected, displays the angular position or rotational speed of the encoder in RPM if the speed exceeds 10 turns per minute.

T 00000000 = Indicates the number of turns completed by the encoder. This can used to indicate the piece count with an external input (see Chap. 6.3, Special Functions).

Before starting to program the Cams, make sure that the Function Parameters are set correctly. To do this, use the keyboard to go through the 4 main menus.

Language selection Menu

Clock Menu

Function Menu

Cam Menu

2 . Language selection menu

From the main display, use the ▲ key to access the language selection menu. At this point, type the number which corresponds to the desired language:

1.	Italian	2.	English	3.	French
4.	German	5.	Spanish		

3 . Clock Menu

From the main display, use the *Clear/Off* key to be able to set the date and time. Then use the following keys :

Clear/Off   to leave the settings as they currently are.

Shift/On   to change the date settings.

Once changed, use the ▼ key to confirm. This operation will be used whenever a data entry needs to be confirmed.
Type the number which corresponds to the desired day of the week.

1.	Monday	2.	Tuesday	3.	Wednesday
4.	Thursday	5.	Friday	6.	Saturday
7.	Sunday				

Continue through the rest of the menus till the last display always confirming with the ▼ key. At the end, use the *Clear/Off* key to return to the main display.

4 . Function menu

Use the ▼ key to access the Function menu from the main display. Continue using the On-line instructions until the code (4-5-6) is requested.

Once in the function menu, the list of functions may be scrolled forward with the ▼key or backwards with the ▲ key. Use the ▼ key to confirm any data change. Use the *Clear/Off* at any time to exit the function menu.

Warning: Once in this menu, any change made will take affect immediately without it being confirmed. It is good practice therefore not to give the access code to unauthorised personnel.

```
CREI STT  BOLOGNA
ITALY - 2578 P60B
```

2578 : Serial number
P60B : Software being used

Before entering the menu, general summary information is displayed.

4 . 1   Output Size

```
OUTPUT SIZE
[01-06] 01
```

This is the active size on the outputs once the functions set-up has been completed. It can only be set from this menu.

4 . 2   Advances Function

```
NUM. OF ADVANCES
0,1=6,2=12,3=24,0
```

0 = non advances
1 = 8 set of advances
2 = 16 set of advances
3 = 24 set of advances

Once the advances sets has been selected, the programmer will require an advances value in Milliseconds .This value can be found in practice or with a simple mathematical formula (illustrated later on) but may not correspond to the true requirements. This for the reason that no variables are taken into consideration which distinguishes delays or mechanical differences between machines. A more practical way is by starting with a very low value and gradually increasing it until the correct value is found. It is preferable that the advanced value is found at the maximum speed for the machine. This assures that the value will work correctly even at the low speeds.

The mathematical formula is as follows:
Known data : Encoder Rotation speed (Cycles/Min), anticipation/Delay necessary (Degrees)
Value to Find: Value in ms (milliseconds to set on the programmer)
Cycles/Min/60 = n (Cycles/Sec)
1000 / n = N (milliseconds/Revolution)
N / 360 = Q (milliseconds/degree)
Q x Degrees of Advances = T (time in milliseconds to set on the programmer)

Example:
Encoder shaft = 300 Turns/Min
Advances Required = 30 Degrees at max. speed
300 / 60 = 5 Cycles/Sec.
1000 / 5 = 200 milliseconds/turn
200 / 360 = 0.55 milliseconds per degree
0.55 x 30 = 16.6 (anticipation time to set on the programmer)

A simplified table calculated using the above formulas can be found in appendix 'C' at the end of the manual.

4 . 3 Degree Offset Function

Gives the possibility to input the offset degrees between the encoder and the machine. This gives the user a quick method of phasing the encoder with the machine.

```
NO PHASE DISP. = 0
SET PHASE DISP. = 9
```

Type in *0* if you wish to use the encoder Zero-Mark (a logical use). Then exit and rotate the encoder shaft until it coincides with machine's "0" point. At this point, tighten the encoder coupling between the encoder shaft and the mechanical joint to fix the encoder position.

Type in *9* if it is not possible to obtain a correspondence as described above. The programmer will automatically calculate the offset degrees between the encoder with the machine.

4 . 4 Rotation Direction Function

```
REVOLUTION DIRECT.
OR = 0   AOR = 1
```

The programmer accepts the encoder signals in both clockwise and anticlockwise directions. The keyboard can be used to set the rotation direction so the display will always show an incremental value.

4 . 5 Speed Limit Function

```
SPEED LIMIT
RPM = 000
```

Gives the possibility to set a maximum shaft rotation speed (RPM). This option dedicates the last DPS Cam to be used as an output indicator that the set rotation speed has been exceeded. Obviously, if this Cam is used for this purpose, it cannot be used normally.

4 . 6 CAM or Encoder Test Function

```
TEST CAMS = 9
ENC=7   (END = 0)
```

CAM Test: This gives the possibility to test the Cam outputs. This is useful after machine installation or for diagnosing an eventual problem situation.

ENCODER Test: Used to verify the Encoder functioning or its connecting cable .Type in 7 and make one rotation handle to test the bit encoder. The display will show encoder OK or FAULT.

4 . 7 Reset Timer and Counter, Delete size

This operation is activated from the function menu.
After inputting the access code, the general display is shown.

```
CREI STT   BOLOGNA
ITALY - 2578 P60B
```

At this point use the *Clear/Off* key to reset the counters and follow the instructions as shown.

4 . 8 Select external size *(PLC or Thumb-wheel Switches)*

In order to change formats from a PLC or Thumb-wheel switches, the DPS must be enabled to recognise external signals. To do this, the output format must be set from the function menu with "0 0".

```
CHOOSE SIZE
[01-10] 01
```

Electrical Connection Diagram

```
  1 2 3 4        SIZE
 ─────────────────────
  0 0 0 0          1
  1 0 0 0          2
  0 1 0 0          3
  1 1 0 0          4
  0 0 1 0          5
  1 0 1 0          6
  0 1 1 0          7
  1 1 1 0          8
  0 0 0 1          9
  1 0 0 1         10
```

```
      PLC
  1  2  3  4  C
 ┌───────────────┐
 │ ⊖ ⊘ ⊘ ⊘ ⊘ │
 └───────────────┘
```

C = out signal 24 Vcc

1 - 2 - 3 - 4 = 24 Vcc   per bit = 1
1 - 2 - 3 - 4 =   0 Vcc   per bit = 0

5.   Cam Menu

Using the ▼ key from the main display, the Function menu or the Cam programming functions are accessed. Use the ▼ key again to start programming.

ATTENTION
The operations performed in this menu do NOT take effect immediately like they in the Function menu. They take effect only after the work is completed with a save operation (as we will see later on). Therefore, to exit without saving the programmed formats, use the ▲ key till the main display is reached.

5 . 1 Cam Programming

```
┌─────────────────┐
│ CHOOSE SIZE     │
│ [01-10] 01      │
└─────────────────┘
```

- **1** Type in the size number to program and then confirm the operation with the ▼ key.

```
┌─────────────────┐
│  DELETE SIZE    │
│ 01 (YES ▼   NO ▲) │
└─────────────────┘
```

- **2** If the size is being programmed for the first time, it is good practice to confirm the deletion.

```
┌─────────────────┐
│ SIZE 01 CHOOSE  │
│ CAM [01-16] 01  │
└─────────────────┘
```

- **3** Type in the Cam number to program and confirm with the ▼ key.

```
┌─────────────────┐
│ SIZE 01 CAM 01  │
│ START/130 END\000 │
└─────────────────┘
```

- **4** Type in the Phase start degrees (E.g.130) and confirm with the ▼ key.

```
┌─────────────────┐
│ SIZE 01 CAM 01  │
│ START/130 END\160 │
└─────────────────┘
```

- **5** Type in the Phase end degrees (E.g.160) and confirm with the ▼ key.

```
┌─────────────────┐
│ END PROGRAM   ▲ │
│ OTHER CAM     ▼ │
└─────────────────┘
```

- **6** Select whether to program another Cam or to exit the programming mode. If another Cam program is selected, all the above steps will be repeated. If

programming is ended, the Access code (4 5 6) is requested to confirm that the programmed data are to be saved.

```
DIGIT CODE
   –  –  –
```

- **7** Continue following the instructions till completion.

```
MEMORY
YES ▼   NO ▲
```

- **8**

```
WRITING STORED
SIZE [01-10]01
```

- **9**

5 . 2 Multiple Phase programming of the same CAM

Each cam can be programmed with as many as 180 different phases. Its not necessary to program the phases in any particular order. The programmer will reorder the phases sequentially. There must NOT be any overlapping phases in the list.

E.g.   Phase #1   Start: 135   End: **225**
         Phase #2   Start: **212**   End: 260

The second phase selected will automatically be programmed as the only phase with the start of the 2nd and the end of the 2nd phase.

Operations to perform:

Follow the previous instructions till step #5 without using the ▼ key to confirm. Instead use the ▲ key to place the cursor in the Phase start field again and type in a new start phase.

If the new phase values are not within the other phase values (as indicated in the example), then 2 different phases are pre programmed. The number of different phases programmed is displayed before entering the selected cam after saving it.

```
SIZE 01  CAM 01
PHASE SEARCH 003
```

- **10** This screen does not appear when a cam is programmed for the first time.

5 . 3 Deleting one or more phases of the same CAM

To delete a phase from a cam, it is sufficient to select the phase to eliminate and set the phase end value equal to the phase start value.

Example: If phase # 2 has to be eliminated from cam # 9;

                    CAM # 09
         Phase #1   087 - 113
         Phase #2   120 - 142
         Phase #3   227 - 239
         Phase #4   270 - 315

Screen . **10** would display the following:

Use the keyboard to select the phase to delete by typing "002" in place of "004".

```
SIZE 01  CAM 09
PHASE SEARCH 004
```

```
SIZE 01 CAM 09
START/120 END\142
```

Type in "120" in place of "142" for the Phase end degrees and confirm with the ▼ key. At this point, only 3 phase will remain once saved.

5 . 4 Copying existing Size

This function is useful in case a size is needed where the cam program differs very little from the base size.
Instead of rewriting all the cam information, simply copy an existing size to a new size as follows:

Example: Copy size 3 to new size 4.

As the first operation, select the size to be copied from the function menu (in this case, 3).
Then enter in the cam menu and at the request of which size is to be programmed (screen **. 1**), the value "03" will already be set. Answering with the ▼ key, the programmer will pass directly to the Save screen (screen **.9**) . Answering "04" at this point, will save all the contents of size "03" to the new format "04".

6.   Special Functions *(Key function)*

ATTENTION: These functions may only be accessed when the programmer is in normal working mode and at the main screen. In other words, the programmer must not be in any of the following menus; cam, functions, languages, etc.

6 . 1 Maintenance Cycle
Typing the *7* key will display the working hours of the machine.

6 . 2 Partial Production Count
- Typing the *8* key will start the partial production counter which is identified by the dot after the *T. 00000000* counter.

- Typing the *9* key will stop the counter, display it, and reset its contents.

6 . 3 Waste piece counter *(Optional)*
Typing the *4* key will display the waste piece count. This function is enabled by using an external input terminal #5 from the *PLC Format Change*. Having used one input for this function, the externally selectable formats available are now 8.

6 . 4 External Key *(Optional)*
This security feature assures that only authorised personal with the key may access the DPS. This function uses the last input terminal from the *PLC Format Change*.

7.   Trouble Shooting

WARNING: As a precaution, it is absolutely necessary that the power to the programmer is off before connecting or disconnecting the flat cables.

It is good practice to copy the phase programs in memory and their relative functions in the manual (see "Program Table" appendix D2) in case of mishandling by inexperienced personal, or memory loss caused by electrical noise from solenoids, etc. Therefore special attention must be taken to filter those units.
In these cases, first proceed to find the probable cause such as a bad RC filter. Then re-input the function data and set the Clock. .This operation will reset any bad data in the RAM memory.

Fault   The programmer display does not work.

Check Control the main fuse and if burned-out, verify the cause before replacing it. Substitute the fuse with a similar type but not greater than 700mA. If the fuse keeps burning-out, please contact us.

Fault The programmer displays the wrong encoder position.

Check This problem may be caused either by a faulty encoder or encoder connection cable .Verify the problem by using the ENCODER TEST function described in section 4.8 pg.4

Fault The programmer displays the wrong rotation speed.

Check See previous problem.

Fault The programmer does not activate the outputs.

Check Control that the programmer is compatible with the output stages (PNP, NPN, Relays)   and the flat cables are connected correctly.
Use the CAM TEST function to control all the outputs. If it still does not work properly, then check for the possibility of any short circuits.

Fault The operator can't modify, delete or write new cam on the programmer

Check The programmer must be resetting cause a wrong tension or a noise effect. In this case the operator must rewrite all the parameters of the programmer (timer, functions, and language selection). Before rewrite the new cam program, delete all old size .

NB: The outputs are short circuit protected. The LEDS on the front of the programmer evidence any eventual fault (FAIL). If a short circuit occurs, the protection circuit automatically disables the outputs.
To reactivate them, cycle power off and then on again after the short has been removed. If the FAIL LEDS still come on, turn power off, remove the output connector and wait a few seconds before reconnecting and turning power back on again. This gives the protection circuit time to reset itself. If the FAIL LEDS still come on, means that one of the outputs from the driver circuit has burned out.

APPENDICE / ENCLOSURE / PIECE JOINTE / ANLIEGEND A

Schema dimensionale - Layout drawing - Schema des dimension - Massbild
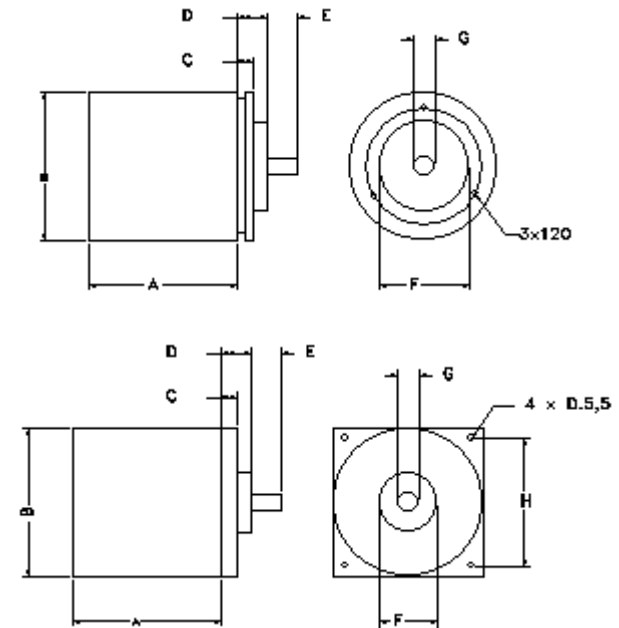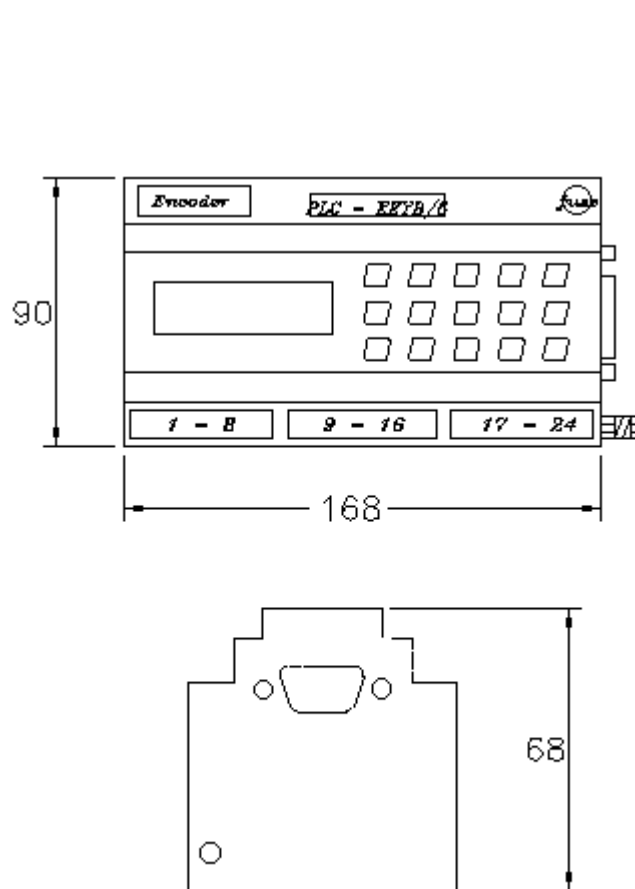
Modello	Fissaggio	Attacco	A	B	C	D	E	F	G	H
IP54L	flangia	assial1e	65,5	65	6,3	14	20	31,75	10	52,42
IP65LRC	flangia	radiale	65,5	65	6,3	14	20	31,75	10	52,42
IP65RA	flangia	assiale/radiale	54,5	62	6,8	14	20	31,75	10	52,42
IP54LE	servo	assiale	62	65	8	14	23,5	38	10	/
IP65LE	servo	assiale	62	65	8	14	23,5	38	10	/

APPENDICE / ENCLOSURE / PIECE JOINTE / ANLIEGEND B

Collegamento Encoder Programmatore / connection Encoder and Programmer / connexions encoder programmeur / anscluesse Enc.+Programmer

connettore encoder mod.IP54L 15 poli connecteur encoder mod.IP54L 15 poles encoderverbinder mod.IP54L 15 polen 15 pole encoder connector mod.IP54L	Connettore programmatore 15 poli connecteur programmeur 15 poles verbinder programmer 15 polen 15 pole programmer connector	connettore encoder mod.IP65L 19 poli connecteur encoder mod.IP65L 19 poles encoderverbinder mod.IP65L 19 polen 19 pole encoder connector mod.IP65L	
1	1	A	1° bit encoder
2	2	B	2° bit encoder
3	3	C	3° bit encoder
4	4	D	4° bit encoder
5	5	E	5° bit encoder
6	6	F	6° bit encoder
7	7	G	7° bit encoder
8	8	H	8° bit encoder
9	9	J	9° bit encoder
12	12	M	nc.
		N	nc.
		S	nc.
15	15	T	GND
13	13	U	+ 24 Vcc
14	14	V	+ 24 Vcc

APPENDICE / ENCLOSURE / PIECE JOIUNTE / ANLIEGEND C

Tabella degli anticipi - Advance Chart - Tableau Vavance - Tafel Voreilung

VELOCITA'(giri/min) - SPEED(RPM) - VITESSE(tours/min.) - GESCHWINDIGKEIT(drehzahl/min.)

GRADI	50	100	150	200	250	300	350	400	450	500
10	33	16	11	8	6	5	4	4	3	3
20	66	33	22	16	13	11	9	8	7	6
30	100	50	33	25	20	16	14	12	11	10
40	133	66	44	33	26	22	19	16	14	13
50	166	83	55	41	33	27	23	20	18	13
60	200	100	66	50	40	33	28	25	22	20
70	233	116	77	58	46	38	33	29	25	33
80	266	133	89	66	53	44	38	33	29	26
90	300	150	100	75	60	50	42	37	33	30

APPENDICE / ENCLOSURE / PIECE JOINTE / ANLIEGEND D

Schema di collegamento porta seriale PC -> DPS - Cable connection serial Port PC -> DPS
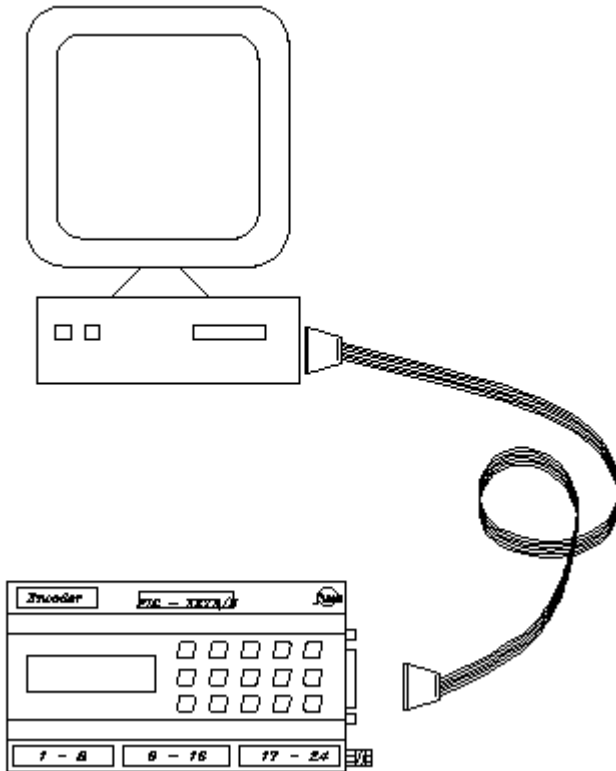
CAVETTO RS232

CONN. FEMMINA	CONN. MASCHIO
Pin 2	Pin 3
Pin 3	Pin 4
Pin 6	Pin 2
Pin 7	Pin 7
Pin 8	Pin 8
Pin 5	Pin 1

Per il software di comunicazione richiedere a CREI STT Elettronica

APPENDICE / ENCLOSURE / PIECE JOINTE / ANLIEGEND E

Scheda programmi - Program table - Carte des programations - Programmkarte

CAM	PHASE 1 ON	PHASE 1 OFF	PHASE 1 ON	PHASE 1 OFF	PHASE 1 ON	PHASE 1 OFF	PHASE 1 ON	PHASE 1 OFF	PHASE 1 ON	PHASE 1 OFF	PHASE 1 ON	PHASE 1 OFF	PHASE 1 ON	PHASE 1 OFF	PHASE 1 ON	PHASE 1 OFF
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																

GRADI DI SFASAMENTO _____	VELOCITA' _____	SENSO DI ROTAZIONE _____
DISPLACEMENT DEGREES	SPEED	REVOLUTION DIRECTION
DEGRES DE PHASAGE	VITESSE	SENS DE ROTATION
VERSCHIEBUNGSGRADE	GESCHWINDIGKEIT	DREHRICHTUNG

ANTICIPO LINEARE AUTOMATICO:

AUTOMATIC LINEAR ADVANCE :

AVANCE LINEAIRE AUTOMATIQUE :

LINEAR AUTOMATISCHE VOREILUNG :

Banco 1																								
Banco 2																								
Banco 3																								
Camma	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

APPENDICE / ENCLOSURE / PIECE JOINTE / ANLIEGEND F

Richiesta assistenza - After sale service - Demande d'assistence apres vende - Bedienungsanforderung

Inviare la richiesta d'assistenza al seguente indirizzo :

Send after sale service request to the following address :

Envoyer le demande d'assistence après vente à l'adresse suivante :

Ihre bedienungsanforderung an die folgende Adresse richten :

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40050 - Castenaso
BOLOGNA (ITALIA)

Tel. +39 - 51 / 781185 -781158

Telefax. +39 - 51 - 781 273

http: // www.creistt.com
e-mail : creistt@tin.it