ANALOG POSITIONER FOR LINEAR AXIS

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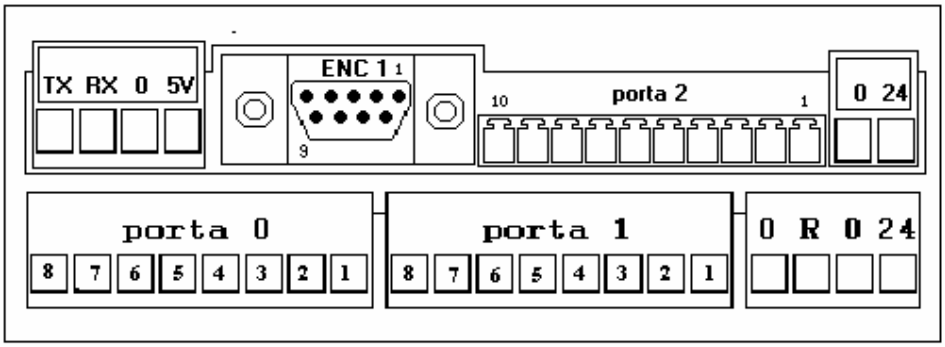
I N D E X:

REAR VIEW



ELECTRIC CONNECTIONS

Port 0:

Pin N°	
1	(IN) EMERGENCY
2	(IN) FC0
3	(IN) FC −
4	(IN) FC +
5	(IN) START
6	(IN) STOP
7	(IN) HOME
8	(IN) MANUAL

Port 1 :

Pin N°	
1	(IN) RESTART
2	(IN) LOAD BLK
3	(OUT) COUNTING END
4	(OUT) AXIS IN POSITION
5	(OUT) CYCLE PROGRESS.
6	n.c
7	(OUT) OUT HOME
8	(OUT) DRIVE ENABLING

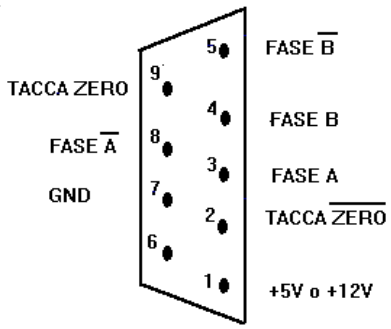
Port 2 :

Pin N°	
1	INP BLK 8
2	INP BLK 4
3	INP BLK 2
4	INP BLK 1
5	OUT 8
6	OUT 4
7	OUT 2
8	OUT 1
9.	**N.C.**
10.	**N.C.**

Analog output

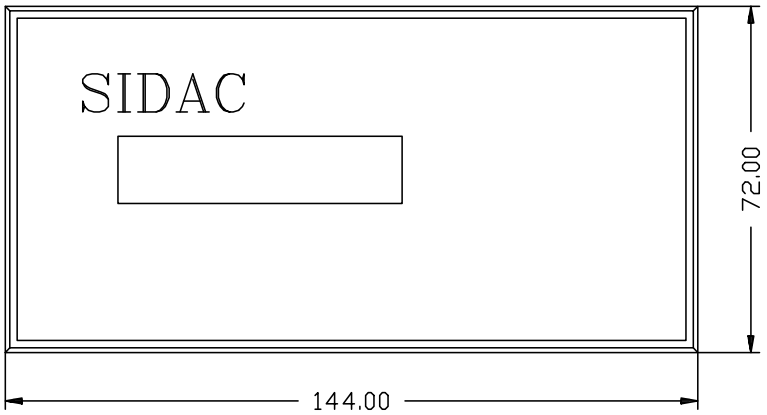
Pin "R" = Analog reference output +/−10V
Pin "0" = GND or analog zero reference

Connettori Encoder

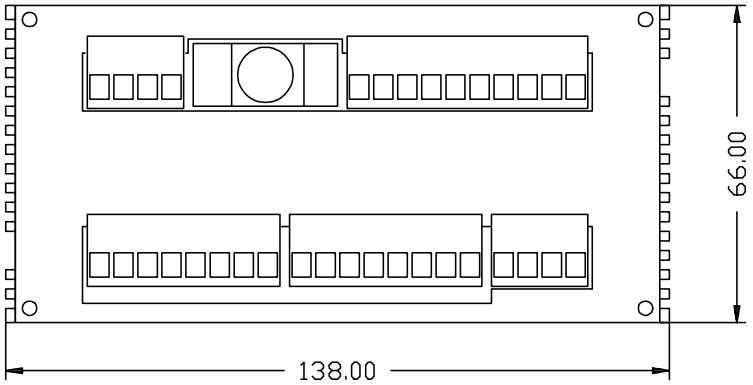


DIMENSIONS:

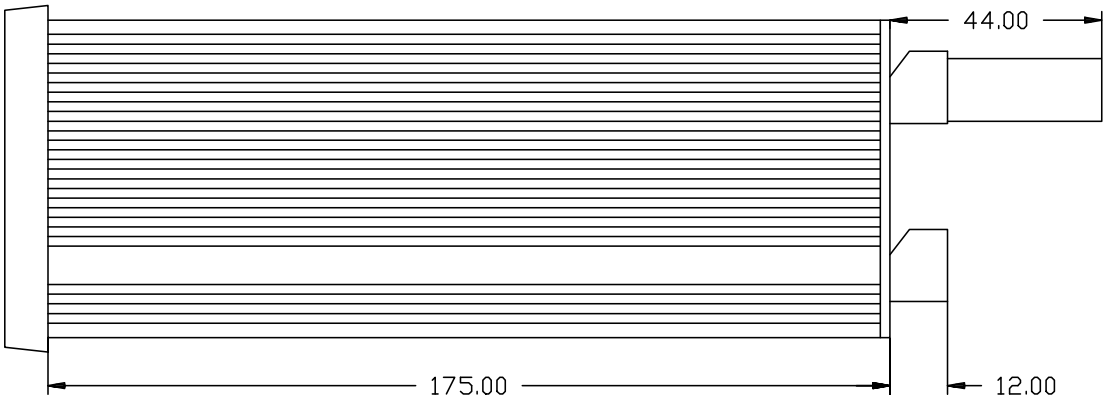
VISTA FRONTALE



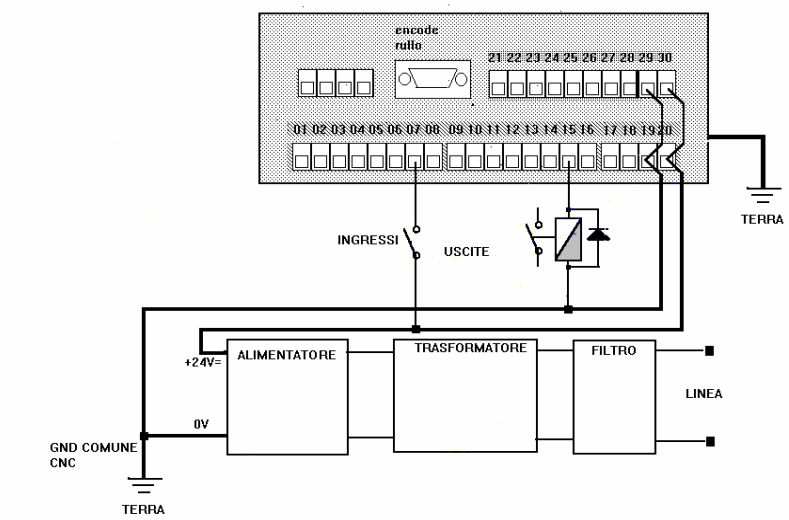
VISTA RETRO

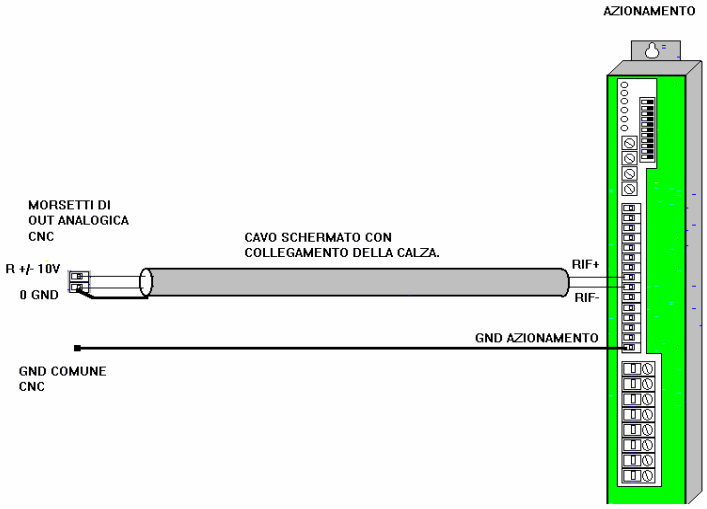


VISTA LATERALE



NORME DI COLLEGAMENTO CONSIGLIATE.





DESCRIPTION OF I/O SIGNALS

Note: Logical state 1 = contact closed
Logical state 0 = contact open

INPUTS:

EMERGENCY: Input for general enabling, priority on all signals
Closed = axis enabled
Open = axis without feedback, drive not enabled
The opening of the contact stops any positioning. Furthermore, it is used as a reset for some error conditions.

FC0: Input for zero microswitch
Closed = microswitch covered

FC-: Input for limit-switch for negative travel
Closed = NOT on limit-switch

FC+: Input for limit-switch for positive travel
Closed = NOT on limit-switch

START: Input for motion start
Active on transition from 1 to 0 of a pulse of at least 10 ms

STOP: Input for motion stop
Closed = it interrupts the motion, it has priority over START.

HOME: Input for request for cancelling
Closing of the input starts the sequence for machine's zero.

MANUAL: Input for selection of manual operation mode
Closed = preparing for motion in manual motion

RESTART: Input for calling and execution of the first program block.
Active on the transition from 1 to 0 of a pulse of at least 10 ms

LOAD BLK: Input for loading the hardware features of the next block
The transition from 0 to 1 of a pulse of at least 10 ms will load the corresponding block at the binary number entered on INP1/2/4/8.

INP BLK 1, INP BLK 2, INP BLK 4, INP BLK 8:
Value in binary of the block prepared with LOAD BLK.

PREDEFINED OUTPUTS:

AXIS IN POSITION:
It goes to logic level 1 when the axis is in position.

CYCLE PROGRESSING:
It goes to logic level 1 when the Minicompax is in automatic mode during the execution of a block.

OUT HOME: It goes to logic level 1 during the execution of the machine's zero.

ENABLING OF DRIVE:
Output dedicated to enabling the drive.
It is open during emergency. Contact closed = everything OK.

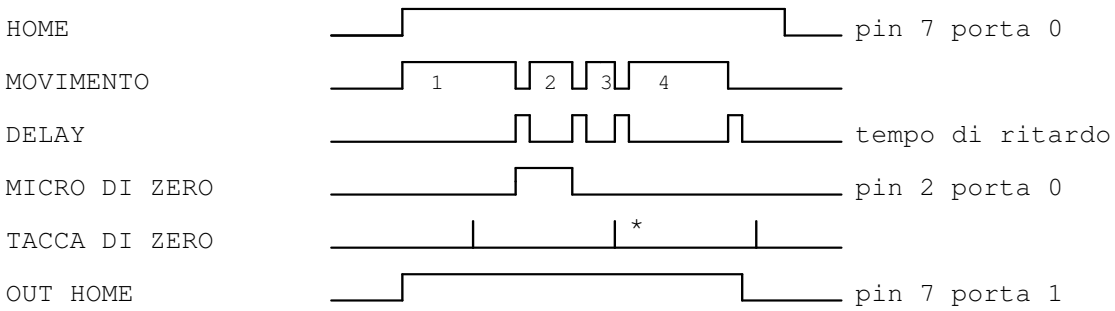
COUNTING END:
It becomes active when the block counter comes to zero.

PROGRAMMABLE OUTPUTS:

OUT1,OUT2,OUT4,OUT8:
At the end of the execution of each block they assume the value programmed by the utilizer.

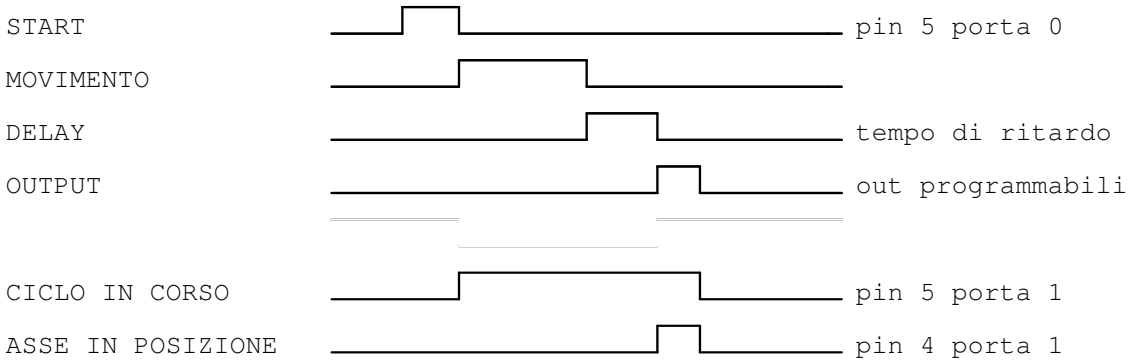
TIMING FOR I/O SIGNALS

THE FOLLOWING POSITIONS ARE SUBJECT TO CLOSING OF THE EMERGENCY INPUT



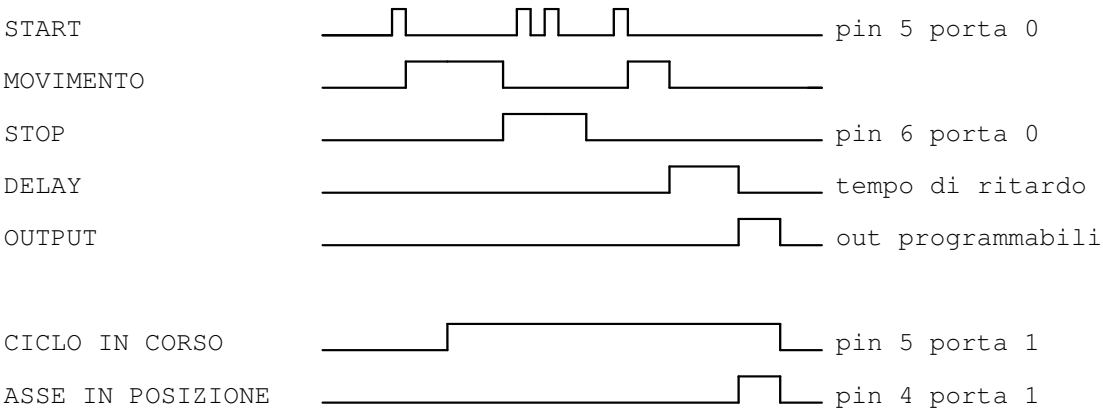
A)Time diagram for zero-setting cycle

Zero-setting starts with the activation of HOME input.
Motion "1" is the research of the zero microswitch, motion "2" uncovers the microswitch, motion "3" searches the zero-mark and motion "4" carries out PRESETTING.
Motions "3" and "4" need not be carried out. The same refers to the delay between each single phase.
HOME input can be removed as soon as the cycle ends.



B)Time diagram of positioning cycle

The motion starts with the transition from 1 to 0 on the START input.
As soon as the motion ends, the delay time "delay" will be generated, which is constant for all program blocks. It can also be zero to be entered into MENU 2 sub 09).
Therefore, the binary value for the block in execution (entered in submenu 05) will be generated on the programmable outputs for the time entered in submenu 06.
The procedure can be carried out only if the EMERGENCY input is closed and no error condition is active.



C) Time diagram of the positioning cycle with stop control

The activation of the STOP signal causes stopping of the movement until a new START signal is given, with the STOP not being active.
The steps for the execution of the block remain the same as for the previous cycle.

INSTALLATION

NOTE: These steps must be carried out with no electric voltage on.

Connect the power supply cables:
the 24 V tension must be connected to both circuit-boards.
Connect the common lead of all contacts as close as possible to the 24 V terminals of the Minicompax unit.
The ground lead of the Minicompax must be connected - where possible - to a grounding bar, to which all grounding wires of the whole system should be connected by making a star connection in a single spot.
It is not suitable to use the same cable for powering inductive loads such as motors, power relays, magnetic valves, etc.

Connect the contact for AXIS ENABLING to PIN 1 PORT 0.
Connect the microswitches for limit position (to avoid mechanical end position) to PINS 3 and 4 PORT 0.
Connect the contact corresponding to the START signal to PIN 4 PORT 0.
Connect the contact for ZERO LIMIT-SWITCH to PIN 2 PORT 0.
Connect the reference signal (0 and R) of the drive.

If the drive presents a differential input, connect the negative input to zero.
Utilize a screened cable protected by the braid which must be connected only at the unit side.
As to the encoder, it is necessary to use a screened cable. Connect the braid of the encoder to the ground only at the Minicompax side.
The connection cable of the encoder should be as short as possible and must be clearly separated from the power circuits.
If there is no Z phase, bridge PIN 2 with PIN 1 and PIN 9 with PIN 7.

The following wires can be used only if required:
Connect the STOP contact to PIN 6 PORT 0.
Connect the contact for MACHINE'S ZERO SETTING to PIN 7 PORT 0.
Connect the contact for MANUAL mode to PIN 8 PORT 0.
Connect the contact for the RESTART signal to PIN 1 PORT 1.

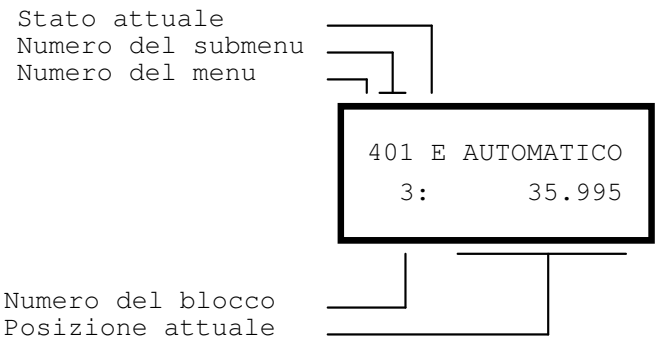
ACTIVATION OF LIMIT-SWITCH

When a limit-switch is activated, any run of the motor will be stopped immediately.
This latter one will remain in torque and under feedback so to enable exit from the end position in controlled mode.
By pressing the **RUN/STOP** key the movement for exit from the end position will be activated.

POWER OFF-SWITCHING IN EMERGENCY OR LIMIT POSITION

Removing of power due to limit position can be managed by a separate wire.

DESCRIPTION OF DISPLAY



The actual state is represented by a flashing "E" when an emergency condition is activated,
by an "*" when everything is OK and the axis is in position and
by a "B" when the axis is carrying out a block.

DESCRIPTION OF KEYS AND KEY SEQUENCES

0 .. 9 NUMERICAL KEYS

+/- TO ENTER THE ALGEBRAIC SIGN

MENU TO PREPARE THE SELECTION OF A MENU.
when it is active, the letter "m" appears in the 4th column of the 1st line

SHIFT TO ACTIVATE SOME KEY SEQUENCES FOR PARTICULAR FUNCTIONS
when it is active, the letter "s" appears in the 4th column of the 1st line

RUN STOP TO ACTIVATE THE EXECUTION OF SPECIFIC POSITIONING IN MANUAL MODE

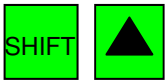
▼ ▲ TO MOVE INSIDE OF THE MENUS

MEANING OF KEY SEQUENCES

TO SELECT A MENU

(MENU NUMBER)

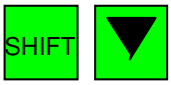
TO RECALL THE SUBMENU 00



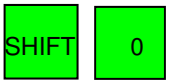
TO SELECT THE NEXT SUBMENU

TO SELECT THE PREVIOUS SUBMENU

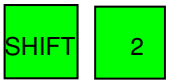
TO MOVE DOWN BY 10 SUBMENUS



TO CANCEL THE VALUE ON THE DISPLAY



TEACH-IN (ONLY IN MANUAL MODE)



AVOID ANY DEPRESSING OF SEVERAL KEYS SIMULTANEOUSLY.

ORGANIZATION OF DATA

The basic structure consists of 9 MENUS:

Menu 0 = reserved
Menu 1 = Manual mode
Menu 2 = Axis parameters
Menu 3 = Block editing
Menu 4 = Automatic mode
Menu 5 = Cycle count
Menu 6 = Machine zero-point
Menu 7 = unassigned
Menu 8 = Error management
Menu 9 = reserved

Each MENU contains different SUBMENUS, the number and meaning of which obviously vary according to the respective MENU.

	MENU1	MENU2	MENU3	MENU4	MENU5	MENU8
sub00	CONTINUOUS	zm PF0 ON	blk	AUTOMATIC	PRESET C1	EMERG.INP
sub01	JOG1	zm VF0 ON	pos	PASSWORD	COUNTDW C1	ALARM ZONE
sub02	JOG2	zm origin	speed	First blk.	COUNTUP C2	CKS BLK
sub03	JOG3	zm PF0 OFF	acl	pos act.		CKS PAR
sub04	JOG4	zm VF0 OFF	a/r	fin.pos.		Z.M. FAIL
sub05	GOTO	zm TZ	out	speed		
sub06	PRESET	zm DLY	time	acl		FC-
sub07	ACCEL	zm PRESET	nxt	a/r		FC+
sub08	SPEED	offset		out		
sub09		pos DLY		time		ENCm.FAIL
sub10		errenc msk		nxt		
sub11		alarm zone				ENCa.FAIL
sub12		pos. zone				
sub13		decimals				
sub14		dirloop				
sub15		N. pulses				
sub16		N. microns				
sub17		gain				
sub18		I/O 4/8				
sub19		max.fp				
sub20		speed1				
sub21		speed2				
sub22		slow-down value				
sub23		system acl				
sub24		manual speed				
sub25		dis.display in automatic				
sub26		jog1				
sub27		jog2				
sub28		jog3				
sub29		jog4				
sub30						
sub31		cks par.				

The parameters shown in menus 1 and 9 must not be altered.

AXIS PARAMETERS (MENU 2) (PASSWORD = 9710)

For any access to the menu of machine constants, menu 2 must be called.
This menu is protected against involuntary or undesired manipulations by means of an access code which must be entered into menu 4.01.
Key sequence:

a> MENU 4 (to select menu 4)

b> SHIFT ▲ (to call submenu 0)

c> ▼ (to pass to submenu 1)

Now the message "PASSWORD" appears and also the present value.
If the value is already 0 (zero), the code sequence must only be entered.
Otherwise, the existing value must be cancelled.

Key sequence:

d> SHIFT 0 (to set the value to zero)

e> 9 7 1 0 (to enter the access code)

f> MENU 2 (to select menu 2)

If it is intended to cancel the access code for protecting the data entered, repeat the procedure from point "a" but overjump point "e".

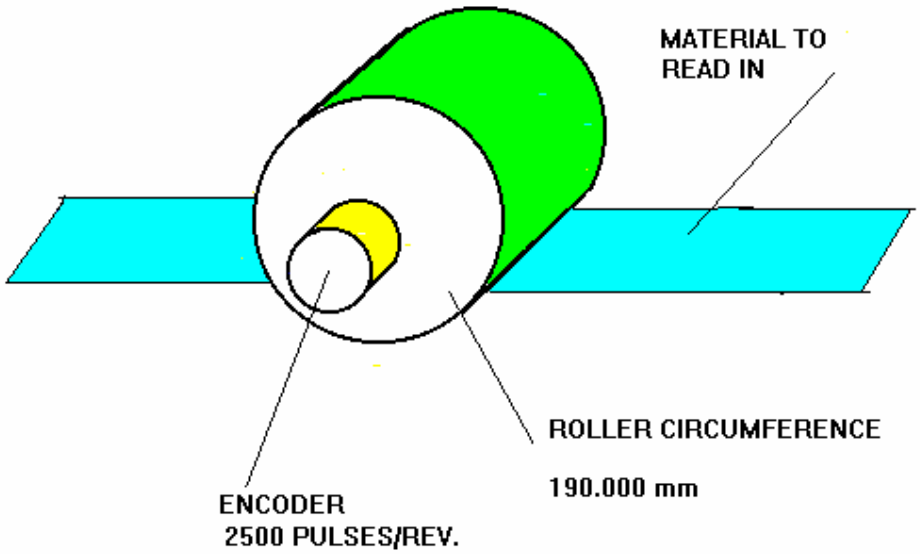
MEANING OF AXIS PARAMETERS

MENU 2

"zm PF0 ON"	Final value for search of limit-switch 0 ON
"zm VF0 ON"	Search speed FC0 ON
"zm origin"	Value taken by the position at the end of machine's zero
"zm PF0 OFF"	Final value for uncovering the limit-switch 0
"zm VF0 OFF"	Speed for uncovering FC0
"zm TZ"	Final value for positioning of search the zero-mark. If it is 0, it does not search the mark.
"zm DLY	Delay between each phase of M.Z. in 5 thousands of second
"zm PRESET"	Value of preset with zero-setting of position
"offset"	Value for automatic offset compensation
"pos DLY	Delay in 5 thousands of second for axis settling
"errenc msk"	Mask for encoder error; to be left at 32 for detecting the emergency of the non operating encoder
"decimals"	Setting of decimal number from 0 to 3
"alarm zone"	Maximum contouring error
"pos. zone"	Limit of axis in position
"dirloop"	(0...3) positive direction and setting to phase
"N. pulses"	Number of encoder pulses *4 for each unit of shifting
"N. micron"	Unit of linear shifting
	THESE TWO NUMBERS ARE USED FOR CONVERTING THE ENCODER PULSES IN UNITS OF SELECTED SHIFTING
	THE FORMULA TO BE USED FOR MINICOMPAX IS AS FOLLOWS:
	$\text{real position} = (\text{number of encoder pulses} * 4) * \frac{\text{N. microns}}{\text{N. pulses}}$
	WHERE THE REAL POSITION IS THE VALUE SHOWN ON THE DISPLAY
"gain"	Gain in thousands 1000 = gain 1
"I/O 4/8"	Parameter to be left to 0
"max.fp"	It is only important, if the job is in relative mode. It is the value where counting is set to zero
"speed1"	Rapid speed in OPEN LOOP
"speed2"	Slow speed in OPEN LOOP
"q.rallent"	Value for slow-down in OPEN LOOP
"system acl."	Acceleration of the axis in step/sec²
"manual speed"	Manual speed in step / sec
"dis.display"	It disables refreshing of display in automatic mode to increase the performances
"jog1"	Size 1 of manual shifting in microns
"jog2"	Size 2 of manual shifting in microns
"jog3"	Size 3 of manual shifting in microns
"jog4"	Size 4 of manual shifting in microns
"cks par."	Checksum of parameters

In order to operate in closed loop set "speed1" and "speed2" to 0 (zero).
Parameter 223 and 224 must not be altered.
Parameter 231 is the checksum of data and will be calculated automatically.
The parameters to be entered into submenus 15, 16 and 17 must be calculated by using the mechanical parameters.
The encoder steps are understood as (encoder pulse number) * 4

Example : (**2500 * 4) 10000 encoder steps = 190.000 microns**
Divide by the maximum common divider: **1 encoder step = 19 microns**
Enter **1 into submenu 15** and **19 into submenu 16.**



The value to be entered in gain corresponds approximately to:
"gain" = (1000/n.microns) * n.pulses
By taking the result obtained as basis, it is possible to make the axis more or less reactive by increasing or decreasing empirically the gain value.
After having entered these parameters, it is suitable to switch the Minicompax off and on again.

OPERATION MODE 'OPEN LOOP'

During this mode the movement is of the following type:
"START...SPEED TRAVEL...SLOW-DOWN...STOP".

Enter the axis Parameters as follows:

```
menu 2.11:alarm zone    = X          (higher than the maximum value)
menu 2.12:pos. zone     = 50         (0.05 mm)
menu 2.17:gain          = 0          (loop gain = 0)
menu 2.20:speed1        = 500        (rapid speed) = 2,5 Volt
menu 2.21:speed2        = 50         (slow speed)  = 0,25 Volt
menu 2.22:slw-dwn value = 2000       (at 2 mm from the position it passes over to
                                      slow speed)
```

The range for parameters "speed1" and "speed2" is between 0 and 2000.
The figure 2000 corresponds to an analog output of +10 Volt.
The parameter 'gain' must be set to 0 or alternatively to a very low value, if the Minicompax unit has to recover the position.

Enter a speed higher than the maximum required and an acceleration equal to 10 times the speed into the program blocks.

Example:
menu 3.02:speed = 1000 1 meter per sec.
menu 3.03:acl = 10000   10 meters per second²

PROCEDURE FOR SETTING THE SYSTEM TO PHASE

When the system is not powered, disconnect the analog reference signal for the Minicompax from the drive input.
Power the whole system.
Make sure that the block "Drive - Motor - Dynamo-tachometer" is connected correctly and regulated in suitable manner as to the parameters of the drive (gain, zero, etc.).
In this condition the motor must stand still.
If in this condition the motor drifts, it means that the polarity of the dynamo-tachometer is reverted. In this case change either the polarity of the motor or the polarity of the tachometer.

Switch power to the machine off.
Feed only the Minicompax and go to Menu 2.
Enter a quite low value for the "alarm zone" (1/10 of the axis travel as a maximum) and set "dirloop" equal to 0.
The parameter "dirloop" permits both to enter the direction of counting and the feedback LOOP without need of changing any wire or cable.
By default this parameter is set to 0 (zero). The direction can be entered with value 0 or 1. The loop can be entered by adding the value 2 to the value of the direction.
Therefore, the values which can be entered are 0,1,2,3.
Make sure that the value entered in "gain", "pulse number" and "microns number" are coherent.
Then move the axis manually into positive direction and make sure that the value shown by Minicompax unit increases. In the opposite case set the parameter 'dirloop' to value '1'.
Move the axis to mid-position for safety reasons.
Connect again the reference signal of the Minicompax to the drive and power the machine.
Now the system can be in the condition of positive or negative feedback according to the phases of encoder, motor, etc.). In order to have the system stable and controlled the feedback must be negative.

NOTE: If these conditions do not take place the axis may drift.
If this occurs, the Minicompax deactivates the enabling output as soon as the position of the axis moves away from the ideal position by a number of steps equal to the maximum contouring error, i.e. the value preset in the parameter "alarm".

If the feedback is positive, the setting of the "dirloop" parameter must be changed by adding 2 to the value already entered.
After having modified the parameter "dirloop", it is suitable to switch off the Minicompax and switch it on again.

MACHINE ZERO-SETTING

In order to carry out the procedure of MACHINE ZERO-SETTING, HOME input must be enabled having the emergency input closed. For activating the sequence via keyboard

press key SHIFT and RUN STOP

The phases for zero-setting are as follows:

1. Positioning at the size entered in menu 2.00 using the speed set in menu 2.01
2. Covering of the microswitch stops instantaneously the axis and the size will be zeroed
   elapsing of a pause equal to the time entered in menu 2.06
3. Positioning of the size entered in menu 2.03 using the speed set in menu 2.04
4. As soon as the limit-switch will be uncovered, the axis will be locked and the size will be zeroed: pause equal to the time entered in menu 2.06
5. If menu 2.05 contains 0, switch over to step 8
6. Positioning at the size entered in menu 2.05 for researching the zero mark
7. As soon as this mark is read, the axis will stop and the size will be set to zero: pause equal to the time entered in menu 2.06
8. Positioning equal to the time entered in menu 2.07. At the end of positioning, zeroing of the position is done.
   If the size is set to 0 (zero), positioning does not take place, but the pause time will be controlled.
9. Setting of the axis origin entered in menu 2.02.

NOTE:
The display shows the current situation of the procedure.
The OUT HOME output is active during the entire zerosetting cycle.
The preset size moves the axis into the position considered as size 0. During the sequence for machine zero-setting the position area is forced to 100.
If the positioning ends before detecting the event required, or the input for zero-setting will be deactivated, an error on machine's zero will be emitted.
For resetting the procedure, the emergency input must be restored.

MANUAL MODE (MENU 1)

For carrying out the motions in manual mode, it is necessary to activate the "MANUAL" input, or to call via keyboard Menu N°1.

For entering the direction of travel press the key +/- :
the algebraic sign entered for counting will be displayed on the 1st line, 6th column of the display.

Move inside the submenu of the desired option and press key RUN STOP for moving the axis.
The following options are available:

MENU 1.00: CONTINUOUS the axis moves when the key RUN STOP is kept depressed
MENU 1.01: JOG1 the axis moves by the value entered in menu 2.26
MENU 1.02: JOG2 the axis moves by the value entered in menu 2.27
MENU 1.03: JOG3 the axis moves by the value entered in menu 2.28
MENU 1.04: JOG4 the axis moves by the value entered in menu 2.29
The speed is the one entered in menu 1, sub 08.
If the access code is activated, it is possible to accede to the following options:

MENU 1.05: GOTO by keeping RUN STOP depressed, the axis moves until it reaches the value entered in the second line.
During motion the IDEAL position will be displayed and not the real one.

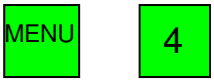
MENU 1.06:PRESET by pressing SHIFT RUN STOP the present position will be preset to the value entered in the second line
MENU 1.07:ACCEL acceleration value for the axis in manual mode
MENU 1.08:SPEED value of axis speed in manual mode

TEACH-IN OF A POSITION

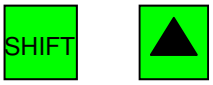
For memorizing the position during the job press the sequence SHIFT 2
The number of the block is the one shown at the beginning of the 2nd line.
When carrying out this procedure, all the other values of the block will be set to zero.
The number of the block will be self-increased each time the position is memorized.
The number of initial block is the one entered in menu 4 sub 02, which indicates the block to be loaded when activating the RESTART input.

ENTERING OF A PROGRAM -- EDITING OF BLOCKS

The blocks can be transferred through a serial line or entered via keyboard.
For entering the data via keyboard, also the access code must be entered:
Key sequence

a> 

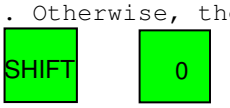
(to select menu 4)

b> 

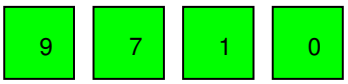
(to call submenu 0)

c> 
(to pass over to submenu 1)

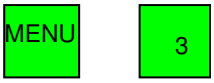
Now the message "PASSWORD" and the present value appears.
If the value is already 0 (zero), only the access code sequence must be carried out. Otherwise, the existing value must be set to zero.

d>. 

(to cancel the value)

e>. 

(to enter the access code)

f>. 

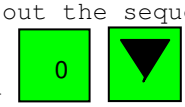
(to call the menu for editing of blocks)

The blocks of a program are structured as follows:

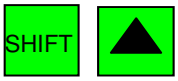
menu 3.00:blk	number of block
menu 3.01:pos	final position in mm
menu 3.02:speed	motion speed in mm/sec.
menu 3.03:acl	acceleration of axis in mm/sec².
menu 3.04:a/r	0 = movement in absolute mode, from 1 to n.. entering of a movement in relative mode; the movement entered will be carried out n.. times before passing over to the next block
menu 3.05:out	decimal value which shall be obtained by port 2 (0..15)
menu 3.06:time	duration of pulse for out-signal: if 0 has been entered, the output remains active up to the next refreshing. The time is entered in 5 thousands of second.
menu 3.07:nxt	0 = loads the next block 999 = end program, the next start will restart the program from the block number entered in menu 4 of option 'first block' 1000 = loads and carries out the next block 2000 = cancels the value at the end of motion 3000 = cancels the value at transition of start x = next block

Block number zero can not be called as the next block.
The block to be loaded at start or with RESTART input is the one entered in menu 4.02.

For entering the parameters, carry out the sequences shown underneath:

Cancel the block number by pressing 

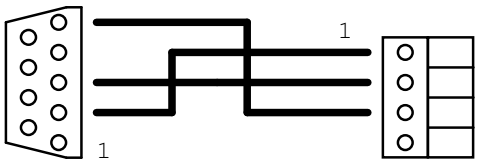
Enter the block to be edited by using the numbers of the keypad

Press  and enter the desired value into each submenu. After completion of the input of the data in a block, press 

for calling the start submenu. Then repeat the sequence from the beginning for each single block to be edited.
If one or more data of a block must be changed, go to the submenu required and change the respective value without changing the other data. This condition occurs for example when one or more positions have been taught in via MANUAL mode and the remaining parameters must be entered for each block.
Once data editing is terminated, it is suitable to cancel the access code: repeat the input procedure from point "a", but overjump point "e".

MANAGEMENT FROM PC THROUGH SERIAL LINE

The cable required for the connection must be as shown underneath:



Pan type connector	connector type WEIDMULLER
9 poles, female	4 poles, pitch 5.08 mm
to connect to the PC serial port	to connect to Minicompax

Between pins 1 and 3 of the WEIDMULLER connector, place a resistor of 470 Ohm.
Utilize a braided cable.
Connect the cable to the serial line "COM1"

Launch the TEST.EXE file which is present on the floppy disk supplied with the system.
If the connection is correct, the screen shows the first 16 blocks.
Inside of this ambient, the data of program blocks and axis parameters can be transferred from PC to Minicompax and vice versa.
The commands available are shown at the lower end of the screen.

The commands "save par" and "save blocks" are used for saving in a file the data contained in Minicompax. As a matter of fact, by using the two commands, the system invites to enter the file-name where the data read are to be saved.
On the other side, the commands "restore par" and "rest blocks" are used for transferring the data contained in the files to the Minicompax unit.
Also in this case the file-name to be transferred will be required.
It is obvious that in this way, by using different names for the files, several programs can be transferred to the Minicompax if necessary.
Furthermore, it is very practical to write the program blocks, since the files can be changed with any text editor (EDIT of DOS type, WORDSTAR, M, etc.)
An option which can be very useful is the command "clr all blk", which cancels the contents of all blocks contained in the Minicompax unit.

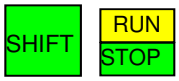
Example:
Use the command "clr all blk" to cancel all blocks inside the program TEST.EXE.
Use the command "save blocks" to save the zero-set blocks in a file with any name.
Press ESC to exit from the program.
Launch the text editor, load the file created previously and modify the blocks which will be used for the program.
As soon as editing is completed, launch again the file TEST.EXE. Use the command "rest. blocks" to transfer the data into the modified file.
All blocks of a program can be seen by using the keys "arrow up" and "arrow down".

SETTING OF THE PRE-SETTABLE COUNTER

In automatic mode a counter for cycles executed can be used. If necessary, it can be preset in Menu 5.

Menu 5.00:PRESET C1 Value of count begin
Menu 5.01:COUNTDW C1 Present value of count

Enter the value of counting start into menu 5.00

Press 

for loading the value into menu 5.01.
The count will be decreased by 1 at the end of execution of the block sequence which terminates with 'next' = 999. It restarts at the next start from the block entered in menu 4 at the option 'first block'. This allows entering of the number of times by which the program shall be carried out.
The output signal COUNTING END remains inactive until the value of the counter becomes 0.

MANAGEMENT OF ERRORS (MENU 8)

The flashing "E" in the 5th column of the 1st line indicates that the Minicompax is in an error condition.
The diagnostics of the error conditions will be managed by Menu 8.
The error is active when it is "ON".

Menu 8.00:EMERG INP	ON	EMERGENCY input open
Menu 8.01:ALARM ZONE	ON	the maximum contouring alarm values have been exceeded
Menu 8.02:CKS BLK	ON	possible alterations of data in the blocks
Menu 8.03:CKS PAR	ON	possible alterations of axis parameters
Menu 8.04:Z.M. FAIL	ON	error in search of machine's zero position
Menu 8.06:FC-	ON	negative limit-switch open
Menu 8.07:FC+	ON	positive limit-switch open
Menu 8.09:ENCm.FAIL		unassigned
Menu 8.11:ENCa.FAIL	ON	one or more phases are missing on the encoder

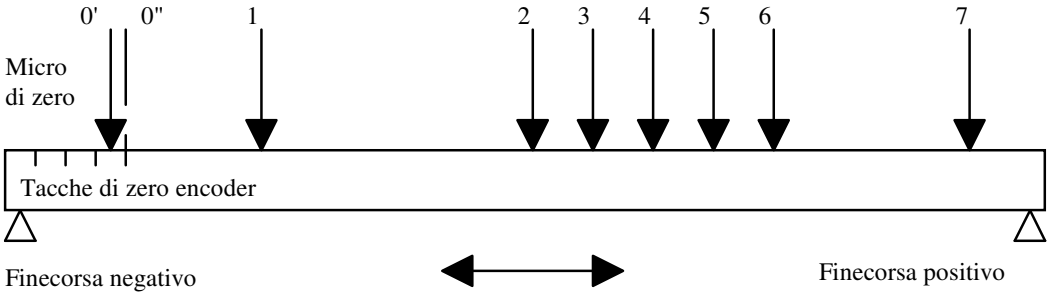
For the solution of the conditions of error 06 and 07, refer to the option "ACTIVATION OF LIMIT-SWITCH".

The activation of the error for the ALARM ZONE indicates that the axis does not succeed to follow the ideal shifting of motion.
The error Z.M. FAIL indicates that one of the phases for zero-setting has terminated without the required event.
For resetting the conditions of correct operation, reset the EMERGENCY input.

The condition of 'encoder removed' can be restored only by solving the problem and switching the Minicompax unit Off and On again.

Example of application:

SCHEMATICS OF AXIS



Example: Linear axis with Pick & place robot

From the position of machine's zero-point, the axis must move to position "1" , where the assumed workpiece is taken over and moved to be unloaded in position "2". Then it returns to position "1", takes another workpiece and carries it to position "3". Then it returns again to position "1", takes another workpiece and carries it to position "4" and so on, until it unloads in position "6", and then it returns to position "1".
Therefore, the next step will be restarting of the cycle by with moving into position "2".
Position "7" is the position for "workpiece scrapped ", where virtually ruined workpieces have to be placed.

Let us assume to have the following specification:
Motor with 3000 rpm. and encoder with 250 pulses/rev, fitted on the fast-running shaft
Total travel of axis 100 mm per rev. of slow-running shaft
Total stroke of axis 2 meters
Mechanical ratio 10 to 1.

Consequently, it can be calculated that a turn of the encoder corresponds to an axis stroke of 10mm.
The number of impulses per rev. must be multiplied by 4 (transition fronts) and the result is that 1000 steps of encoder correspond to a travel of 10'000 microns. Reduced to minimum terms, one step corresponds to 10 microns.
From this it can be seen that the linear distance between two zero marks is approx. 1 cm., and the zero-microswitch must be centered as precise as possible between two marks.
Furthermore, from the features of the motor a maximum axis speed of 30 m/s can be calculated.
The diagram shows two different ZERO points, relating to a zeroing with or without Encoder Zero mark.
As to the installation and phase-setting, please refer to the Instruction manual.

Under these circumstances we can program the Minicompax in the following manner:

Axis parameters:
PF0 ON: **-2.000.000** = 2 meters in negative
For searching the zero-microswitch enter a positioning towards the negative limit-switch equal to the maximum travel of the axis.
Obviously, it is the duty of the operator to check that the axis is not in a position between the negative limit-switch and the zero-microswitch before the zeroing procedure is launched.
The axis can be moved in MANUAL mode before zeroing.
VF0 ON: **200.000** = 20 cm/s
Enter a speed of approx. 20 cm per second
PF0 OFF: **50.000** = 5 cm into positive
The movement to discover the microswitch is only 5 cm, as a greater movement could be due to an error.
VF0 OFF: **50.000** = 5 cm/s
The speed must be low so to ensure positioning.
TZ : **20.000** = 2 cm into positive
From the calculations made before, we can tell that the zero mark as a maximum must be within one centimeter as to the microswitch.
PRESET : **102.000** = 102 mm in positive
Positioning to be carried out automatically after zeroing for reaching position "1".
pos DLY : **200** = 1 second
Between each zeroing step enter a pause of 1 second for settling.
N.PULSES : **1**
N.MICRONS: **10**
The two parameters indicate together that an encoder step corresponds to 10 microns.
GAIN : **100** = 10 % of default gain
The value of gain is linked to a multiplication coefficient.
speed,speed2,
Slow-down value : **0**
To be set to zero.
system acl : **1.000.000** = 1 m./sec²
Parameter for setting the acceleration, utilized only for initialization of the system.
manual speed : **1.000.000** = 1 m./sec.
Parameter for manual speed setting, utilized only for initialization of the system.
jog1 : **500** = 0.5 mm per pulse
jog2 : **1.000** = 1 mm per pulse
jog3 : **10.000** = 10 mm. per pulse
jog4 : **100.000** = 100 mm per pulse
The values entered in the different JOGS are used for any manual movements.

If the positions "1.....7" are known, it is possible to switch over directly to programming of blocks; otherwise teaching-in of positions can be carried out.

The teach-in mode can be carried out inside of Menu 2, where different options are available which offer different modes of motions to the operator, but nothing prevents for example to move the axis manually and to teach-in the value similar to the Minicompax when carrying out the motion.

The value entered in parameter PRESET implies that the axis - once it has carried out zero-setting - moves automatically to position "1": this can be avoided by setting this value to 0.
It is however possible to enter into Menu 4.02 the number of the block to be loaded after zeroing. Therefore, if the preset at the first position is not automatic, by entering as first block the block N° "1", a movement to position "1" can be obtained, however subordinated to the activation of the START signal.

Once the positions have been calculated, it is possible to enter the program blocks:
All positions are expressed in absolute values.

	final position	speed	acceleration	a/r	output	time	next	
BLOCK 1 :	102.000	1.000.000	10.000.000	0	1	10	0	;posi"1"
BLOCK 2 :	300.000	10.000.000	100.000.000	0	2	10	0	;posi"2"
BLOCK 3 :	600.000	10.000.000	100.000.000	0	3	10	0	;posi"3"
BLOCK 4 :	900.000	10.000.000	100.000.000	0	4	10	0	;posi"4"
BLOCK 5 :	1.200.000	10.000.000	100.000.000	0	5	10	0	;posi"5"
BLOCK 6 :	1.500.000	10.000.000	100.000.000	0	6	10	0	;posi"6"
BLOCK 7 :	1.900.000	10.000.000	100.000.000	0	7	10	0	;posi"7"

By using the management from PLC, the program can be only a list of positions which will be loaded automatically by the PLC by means of the input LOAD BLK.
The programmable outputs for each block can be entered in such a way that the PLC always knows the position reached and consequently can load the next appropriate block.
The sequence of execution normally will be 1..2..1..3..1..4..1..5..1..6..1..2..etc.
The PLC will handle the condition of a workpiece ruined to be carried to position 7 and then restart the regular cycle from the suitable position.
Obviously, for this configuration it is necessary to connect the 4 bits of the programmable outputs to the 4 inputs of PLC and the 5 outputs of PLC to the dedicated inputs "LOAD BLK" of the Minicompax unit.
The bits pertaining to the block to be loaded and the signal for loading can be generated simultaneously.
It could be furthermore useful to connect a pushbutton N.O. to the STOP input, in order to stop the axis during a positioning for restart or abandoning afterwards.
For the dialog with the PLC, different predefined outputs can be utilized. For example, the output OUT HOME communicates to the PLC that the machine's zero-point has been carried out completely; the output DRIVE ENABLING may indicate the possible event of an emergency condition.

The same program could be handled independently by the Minicompax unit, except for a ruined workpiece, by rewriting the program as shown below:

	final position	speed	acceleration	a/r	output	time		next
BLOCK 1 :	102.000	1.000.000	10.000.000	0	x	10	0	;posi"1"
BLOCK 2 :	300.000	10.000.000	100.000.000	0	x	10	0	;posi"2"
BLOCK 3 :	102.000	10.000.000	100.000.000	0	x	10	0	;posi"1"
BLOCK 4 :	600.000	10.000.000	100.000.000	0	x	10	0	;posi"3"
BLOCK 5 :	102.000	10.000.000	100.000.000	0	x	10	0	;posi"1"
BLOCK 6 :	900.000	10.000.000	100.000.000	0	x	10	0	;posi"4"
BLOCK 7 :	102.000	10.000.000	100.000.000	0	x	10	0	;posi"1"
BLOCK 8 :	1.200.000	10.000.000	100.000.000	0	x	10	0	;posi"5"
BLOCK 9 :	102.000	10.000.000	100.000.000	0	x	10	0	;posi"1"
BLOCK 10 :	1.500.000	10.000.000	100.000.000	0	x	10	**1**	;posi"6"

In this case the program will be carried sequentially, and after the execution of the last block (10) it returns automatically to the first block (1)

NOTEe:
The programs show the two possible criteria for writing a program, obviously linked to the hardware configuration of the system and therefore to the complexity of the application.
Utilizing adequately the options offered by the Minicompax unit, it is possible to obtain numerous functions such as:
Execution in sequence of 2 or more blocks, which can be launched by only one START pulse, by entering the value 1000 into parameter "next".
Execution of positioning in relative by setting the parameter "a/r" to 1.
Generation of programmable impulsive or static outputs by entering an appropriate value for "time".
Possibility of placing the output signals into input in order to have independent systems.