DAC-250

OPERATION MANUAL
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1. INTRODUCTION

The DAC-250 is a universal programmable controller, designed to control machinery based on incremental displacement of certain machine functions such as the backgauge control of an industrial shear. For a better understanding the backgauge will be referred to throughout this manual but remember, any machine section with a movement, measured by an incremental encoder, could be meant instead. The DAC-250 is not confined to axis positioning but can program parameters, related to other machine functions, as well.
It is possible to program several steps which can be combined to programs. The DAC-250 is capable of controlling servo-loop systems, a one- or two-speed AC or DC drive system.

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2. HARDWARE

The DAC-250 consists of two printed circuit boards and a frontpanel. The two PCBs are:

- I/O board;
- Computer board containing all LEDs, character displays and keyboard interface.

2.1. Frontpanel

Unfold the drawing at the end of this manual, which shows a representation of the front panel with a description of the function keys.

2.1.1. Displays and LEDs

Displays
The DAC-250 has eight character displays. These are 7-segment displays. The eight displays are divided as follows:

- two displays for number and step indication (N,ST).
- six displays for parameter value display.

LEDs
The control panel contains thirteen LEDs:

- nine LEDs indicating the selected parameters;
  (Xm, Xp, COR, DX, F, CY, C, # and I);
- one LED to indicate that the CH-function ⊣⊢ is active;
- one LED in the stop key, indicating that the DAC-250 is stopped;
- one LED in the Semi-automatic mode key, indicating that the DAC-250 has been started in semi-automatic mode.
- one LED in the Automatic mode key, indicating that the DAC-250 has been started in Automatic mode;

2.1.2. Keyboard

The keyboard contains the following keys:

- 10 numerical keys (0 - 9)
- decimal point
- plus/minus toggle
- clear key, to clear a parameter value
- cursor key, to select the next parameter
- N, program number increment key
- ST, step increment key
- manual movement low speed up key (+)
- manual movement low speed down key (-)
- manual movement high speed key (x key in combination with + or - key)
- stop key (0)
- semi automatic start key
- automatic mode start key

2.2. Memory

The following (external) memory is available:

- 32 Kbyte EPROM for program code (optional 64K)
- 8 Kbyte RAM
- 2 Kbyte EEPROM for step and machine parameter storage.

3. OPERATING MODES

3.1. General

The DAC-250 has three operating modes: Manual mode, Automatic mode and Semi-automatic mode.

Manual mode is selected if N = 0 and ST = 0.
Automatic and semi-automatic mode are both selected with a key on the frontpanel. These keys also serve as start buttons.

When the automatic or semi-automatic key is pressed the DAC-250 will position the backgauge according to the programmed parameters in the selected step.
The LED of the corresponding key (either automatic or semi-automatic) will light up.

When the stop button (O) is pressed the DAC-250 will control the backgauge at its actual position.
The LED of the stop button will light up.

In some situations the "stop" is forced by the DAC-250 itself. In that case the LED of the relevant start button extinguishes and the LED of the stop button lights up.

In the following paragraphs the three operating modes are described.

First the parameter readout after pressing start and stop is described.
Paragraph 3.1.1. describes the inputs and outputs which have a direct relationship with an operating cycle.

3.1.1. Start/stop parameter readout

When the start button is pressed the cursor moves automatically to Xp. This means that when the start button is pressed always the actual position is displayed.

When the stop button is pressed again the cursor moves to Xm.

There are two exceptions:

1. When the cursor is at the parameter # it will stay at # when the start or stop button is pressed.
2. When the counter (#) is used in the downcounting mode the cursor automatically moves to # when the value 0 is reached. In this case the DAC-250 also goes to stop.

3.2. Manual mode

Manual mode can only be selected if N = 0 and ST = 0.

In Manual Mode all parameters can be programmed. Only the program flow part of code (C) and step repetition (CY) have no meaning. However, Stock Counter (#) can be used.

When the automatic or semi-automatic key is pressed (start function) in manual mode the backgauge moves to the programmed position.

The stock counter (#) will be either incremented or decremented at each manual cycle, depending on the setting (refer to chapter 4.2.8).
When the stock counter reaches zero in downcounting mode the DAC-250 stops. The cursor automatically goes to the #-LED).

If the LED of the stop button is lit the backgauge can be moved manually by pressing the manual movement keys on the frontpanel. These keys are:

+ = slow speed in counting up direction
- = slow speed in counting down direction
X = high speed, must be pressed together with the + or - key.

3.3. Automatic mode

In Automatic Mode a program can be executed.
When the automatic key ⇨ is pressed the backgauge moves to the programmed position of the current step (N,ST).

A new step (N,ST) is loaded at each change of the status of the START input.
If the value for step repetition CY is higher than 1, only the value of CY in the current step is decremented by 1 and no new step will be loaded.

Note:
A step with CY = 0 will be skipped.

In some situations the DAC-250 stops instead of moving to the new backgauge position. This depends on the program flow code (C) (refer to chapter 4.2.7).

3.4. Semi-automatic mode

The execution cycle in Semi-automatic Mode is mainly equal to the Automatic Mode.

In semi-automatic mode the DAC-250 stops at the end of a cycle.

If the programmed value for CY is higher than 1 a number of cycles equal to this value must have been executed before the DAC-250 stops.

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4. PARAMETER PROGRAMMING

The DAC-250 is a programmable backgauge controller.
The DAC-250 can also program parameters, related to other machine functions.
One such set of parameters is referred to as a "step".
Several steps can be combined to build a program. During the execution of the program the steps within a program are executed one after another in an automatic cycle.

4.1. Identification of a step

A step is identified by a 2-digit number in the range 0-99.
This means that up to 100 steps can be programmed and stored into memory.
The number of the selected step is displayed on two character displays. The digit, highest in order (left-hand), is called "N", the lowest in order (right-hand) is called "ST".

The keys N and ST are used to increment the value of N and ST. If N or ST = 9 it will become 0 after the next increment. If you pass the required numeral you can only increment until this numeral appears again, i.e. you cannot decrement.
Holding the keys N and ST will speed up the effect.

If in manual mode two LEDs light up:

- the selected parameter;
- the LED at the right of the ST-display.

Note:

"N" can be considered as a program number and "ST" as a step number within the program. This definition enables the programming of 10 programs of maximum 10 steps each. However, you are free to make programs consisting of more than 10 steps or to let a program start at every N,ST combination.
The current N,ST is memorized after power down. At power up this step is automatically loaded again.

4.2. Programmable Parameters

A parameter can be programmed upon selection. The selected parameter is indicated by a LED. Each parameter is represented by its own LED. Selecting a parameter is done by pressing the ▸ key. The actual value of the selected parameter is displayed on the 6-character display.
There are five step dependant parameters and two general parameters. The function Xp, which is also indicated by a LED, is not a programmable parameter. If Xp is selected the actual position of the backgauge is displayed.

The step dependant parameters are:

- Xm = position of the backgauge
- COR = correction of the position of the backgauge
- DX = retraction of the backgauge
- F = function outputs
- CY = number of (step) repetitions
- C = code

The general parameters are:

# = Stock counter: counting of products
I = inch/mm selection

Each time the ▸ key is pressed the next parameter becomes active. The sequence is as follows:

▸ Xm ▸ Xp ▸ COR ▸ DX ▸ F ▸ CY ▸ C ▸ # ▸ I ... ▸ Xm and so on.

Holding the key ▸ will speed up the effect.

4.2.1. Programming a value

When a parameter is selected its value can be programmed.

To program a value the following keys are available:

- 10 numerical keys (0-9)
- decimal point
- plus/minus
- clear key (⌫)

When programming a value each new digit is added as follows:

- left of the decimal point:
  all existing digits are shifted one place to the left, the last programmed digit will be the least significant.

- right of the decimal point:
  the digits appear from the left to the right

Example:

Suppose the value 367.25 has to be programmed. The table below shows the order of the keys to be pressed. The number of decimals depends on the setting of the machine parameter and may as well be limited to only one digit.

key pressed	value on display
	0.00
3	3.00
6	36.00
7	367.00
.	367.00
2	367.20
5	367.25

Plus/minus key:

If the plus/minus key is pressed a minus sign is displayed in the first free digit left of the value. If the plus/minus key is pressed and all the digits are already used the minus sign is placed in the leftmost digit (the leftmost digit of the value is blanked out).
If the plus/minus key is pressed a second time the value becomes positive again (toggle function).

Clear key:

When the clear key (⌀) is pressed the value on the display is set to zero.
The value which is displayed after clear is one "0" left of the decimal point. The number of zeros at the right of the decimal point depends on the parameter format. The minus sign is also reset after clear.

Example:

A parameter with two digits right of the decimal point is displayed as "0.00" after clear.

The range of values which can be programmed is machine dependant and will be discussed in the next paragraphs.

4.2.2. Backgauge position Xm

When the cursor is at Xm a value is displayed with a format depending on the installed machine parameter.

This format represents the stepping resolution of the backgauge movement.

Note 1:

The backgauge position can also be programmed negative if chaining is used (see chapter 4.2.8).

Note 2:

If the cursor is at Xm and a correction (COR) has been programmed (see chapter 4.2.4) this will be indicated by a flashing "COR" LED.

4.2.3. Actual position readout Xp

If Xp is selected the actual backgauge position is displayed.

If the reference has not passed yet only small squares are displayed: the lower four segments of each display are lit.

4.2.4. **COR**(rection)

Correction on the programmed backgauge position.
The value to be programmed at COR appears in the same resolution as Xm.

Default: 0

4.2.5. Retract distance DX

In some cases it may be necessary to clear (retract) the material from the backgauge. This may occur at the moment when the mechanical action begins. The retract distance is a programmable displacement of the motor axis in the upcounting direction.
The value at DX appears in the same resolution as Xm.

Default: 5

4.2.6. Function Outputs F

There are two function (on/off) outputs: F1 and F2.

These outputs can be used in two ways:
1.) The value of these two outputs can be programmed as one parameter.
2.) They can be used by the stroke length limitation function as a warning signal.

Use machine parameter 28 to select one of these functions.

1.) In case the outputs are programmed as one parameter, there are four combinations:

Value	F2	F1
00	off	off
01	off	on
10	on	off
11	on	on

Default: 00 (both off)

A combination can be programmed with function F.
The digital outputs will be set to the programmed value when the start-enable input becomes high while the DAC has been started. The outputs stay at the actual value during the program step and will be reset when the DAC is stopped.

2.) In case the stroke length limitation function is programmed through machine parameter 28, the function outputs have a different function. Then the machine has a maximum stroke length, dimensioned in seconds. With function F, you can program a stroke length as a percentage of that maximum stroke length. When the desired time has elapsed, output F1 will become active. Output F2 is not used in this function and remains inactive.

4.2.7. Repetition CY

Step repetition: the number of times a step is repeated before the next step is executed.
Range : 0 - 9999
Default: 1

Note 1:
The value 0 means that the step must be skipped.

Note 2:
This parameter has no meaning in Manual mode and is equal to 0.

4.2.8. **Code C**(haining)

This parameter is a combination of two functions:

- Chaining indication
- Program flow code

Chaining:

0 = The programmed backgauge value (Xm) is an absolute position.
1 = The programmed backgauge value (Xm) is a chain value.

This means that the new value is obtained by adding or subtracting the programmed value to/from the previous position. Consequently the value may be negative as well.

Program flow code:

5 = Start of program: this indicates the first step of a program.
6 = Program end code: after this step has been completed the first step (= code 5) is loaded and the DAC-250 stops. The program counter will be adjusted.
7 = Program end code: after this step has been completed the first step (= code 5) is loaded and the program is executed again as long as the stock counter (#) is not equal to 0. After each completion of the program the repetition counter is decremented (if decrement mode is selected). On reaching value 0 the DAC-250 stops.
8 = Program end code: after this step has been completed the first step (= code 5) is loaded and the program is executed again. This is repeated endlessly.
9 = Program end code: after this step has been completed the DAC-250 stops.

The chaining code can be combined with a program flow code. In that case two digits have to be programmed. The order in which these digits are programmed is not important.

Example:

If the programmed backgauge position in a step must be a chain value and it is the last step, the value for the code (C) can be 16 or 61. Both combinations have the same meaning (code 1 and code 6).

Note 1:

If the chain/absolute code is omitted the position is assumed to be an absolute backgauge position.

Note 2:

If the chaining code is set (code = 1) in a step it will be indicated by the " →|→| " LED (at the right of the upper display).

Note 3:

If the first step of a program is searched the first step with code = 5 with a lower N,ST number will be loaded. If no step with code = 5 is found step N,ST = 01 will be loaded.

Default: 0

4.2.9. Stock Counter

Range : 0 - 9999
Default: 9999

Stock counter determines the number of times that the selected program will be repeated (product counter).

There are two operation modes for the product counter:

- downcounting
- upcounting

This mode can be selected by a special operator selectable parameter (see chapter 6).

In the **downcounting** mode this counter has only meaning if the code in the last step of the selected program is equal to 6 or 7, or if the Manual mode (N,ST = 00) has been selected. In all other cases this counter is not used. During execution of a program the #-value will be decremented each time a program has been executed once. When the #-value reaches zero the DAC-250 stops and the cursor will automatically move to the #-LED.

If in the downcounting mode the value zero has been reached (DAC-250 to stop) the programmed value is reloaded if the start button is pressed.

In the **upcounting** mode the #-value is incremented by 1 each time a program has been executed once. The programmed #-value is the counter preset. When the #-value reaches 9999 the next value will be zero.

This actual #-value will always be displayed. In the upcounting mode the original programmed value is lost after one or more steps have been executed.

Note:

If in Manual mode code= 8 is programmed in downcounting mode the #-value will not be decremented (endless mode).

4.2.10. Inch/mm selection

Programming unity for backgauge position (Xm), actual position of the backgauge (Xp), correction (COR) and retraction (DX).

0 = mm
1 = inches

Default: 0

Resolution:
In case of programming in inches the decimal point moves two positions to the left. If possible the total number of digits is incremented by 1. The parameters, influenced by this conversion, are Xm, Xp, COR and DX. The conversion follows the machine-installed resolution.

4.2.11. Programming key lock

If the programming key lock is off it is impossible to change the value of the parameters. If you try to change a value the LED indicating the selected parameter flashes. This happens if one of the following keys is pressed:

- 0 thru 9
- decimal point
- clear
- plus/minus

There are a few exceptions:

- In manual mode (N = 0, ST = 0) all parameters can always be programmed, even if lock is in the OFF-position.
- The correction COR can always be programmed.
- Program repetition # can always be programmed.

4.2.12. Range checking

Each programmed parameter is checked against its minimum and maximum value. If a programmed value is invalid the display starts flashing.
If the display is flashing and one of the following keys is pressed the value will be limited at its minimum or maximum value:

- Cursor key ▸
- N
- ST
- Automatic start
- Semi-automatic start

5. PROGRAMMING EXAMPLES

Before the actual programming starts it may be useful to do some exercising on the front panel. The following sequences do not necessarily represent an actual situation on your machine.

With these exercises it will be easy to make your own sequences. It may require a final check but once the sequences are correct we recommend to keep record. In case of repeat orders it will be possible to recall the sequence (program) related to the product to be made.
We start with the contents of a complete program, followed by the list of entries.

Example 1

This program is based on a resolution of 0.1 mm.

N	ST	Xm	COR	DX	F	CY	C	Comment
1	0	100.0	0.0	0.0	00	1	5	Start of program Move the backgauge to 100.0 mm
1	1	75.0	0.0	0.0	00	2	1	Move the backgauge to 75.0 with respect to the former position (chaining) Make this step twice.
1	2	200.0	2.5	0.0	01	1	0	Move the backgauge to 200.0 mm + 2.5 mm and activate F1.
1	3	275.0	0.0	5.0	00	1	0	Move the backgauge to 275.0 mm and then 5.0 mm if retraction is necessary
1	4	300.0	0.0	0.0	00	1	8	Move the backgauge to 300.0 mm and return to step 10 (N = 1, ST = 0).

Entries

Key	Displays 2-D	6-D	LEDs on	Comment
	0 0	50.0	Xm	Initial backgauge position
N	1 0	999.0	Xm	Start of program Backgauge is at position 999.0 Change position to 100.0
1	1 0	1.0	Xm	Enter 1st digit of value 100.0
0	1 0	10.0	Xm	Enter 2nd digit of value 100.0
0	1 0	100.0	Xm	Enter 3rd digit of value 100.0
▸	1 0	50.0	Xp	Press cursor
▸	1 0	0.0	COR	Press cursor
▸	1 0	0.0	DX	Press cursor
▸	1 0	00	F	Press cursor
▸	1 0	1	CY	Press cursor
▸	1 0	0	C	Press cursor
5	1 0	5	C	Enter flow code (see chapter 4.2.7 where code 5 is explained).
▸	1 0	9934	#	Press cursor
▸	1 0	0	I	Press cursor
▸	1 0	100.0	Xm	Press cursor
ST	1 1	999.0	Xm	Backgauge is at position 999.0 Change position to 75.0
7	1 1	7.0	Xm	Enter 1st digit of value 75.0
5	1 1	75.0	Xm	Enter 2nd digit of value 75.0
▸	1 1	50.0	Xp	Press cursor
▸	1 1	0.0	COR	Press cursor
▸	1 1	0.0	DX	Press cursor
▸	1 1	00	F	Press cursor
▸	1 1	1	CY	Press cursor
2	1 1	2	CY	Enter value of repetition
▸	1 1	0	C	Press cursor
1	1 1	1	C	Enter 1 for C(haining) mode
▸	1 1	9934	#, CH	Press cursor
▸	1 1	0	I, CH	Press cursor
▸	1 1	75.0	Xm, CH	Press cursor
ST	1 2	999.0	Xm	Backgauge is at position 999.0 Change position to 200.0

Key	Displays 2-D	6-D	LEDs on	Comment
2	1 2	2.0	Xm	Enter 1st digit of value 200.0
0	1 2	20.0	Xm	Enter 2nd digit of value 200.0
0	1 2	200.0	Xm	Enter 3rd digit of value 200.0
▸	1 2	50.0	Xp	Press cursor
▸	1 2	0.0	COR	Press cursor
2	1 2	2.0	COR	Enter 1st digit of value 2.5
.	1 2	2.0	COR	Enter decimal point
5	1 2	2.5	COR	Enter decimal of value 2.5
▸	1 2	0.0	DX	Press cursor
▸	1 2	00	F	Press cursor
1	1 2	01	F	Enable output F1
▸	1 2	1	CY	Press cursor
▸	1 2	0	C	Press cursor
▸	1 2	9934	#	Press cursor
▸	1 2	0	I	Press cursor
▸	1 2	200.0	Xm	Press cursor
ST	1 3	999.0	Xm	Backgauge is at position 999.0 Change position to 275.0
2	1 3	2.0	Xm	Enter 1st digit of value 275.0
7	1 3	27.0	Xm	Enter 2nd digit of value 275.0
5	1 3	275.0	Xm	Enter 3rd digit of value 275.0
▸	1 3	50.0	Xp	Press cursor
▸	1 3	0.0	COR	Press cursor
▸	1 3	0.0	DX	Press cursor
5	1 3	5.0	DX	Enter necessary retraction value
▸	1 3	00	F	Press cursor
▸	1 3	1	CY	Press cursor
▸	1 3	0	C	Press cursor
▸	1 3	9934	#	Press cursor
▸	1 3	0	I	Press cursor
▸	1 3	275.0	Xm	Press cursor
ST	1 4	999.0	Xm	Backgauge is at position 999.0 Change position to 300.0

Key	Displays 2-D	6-D	LEDs on	Comment
3	1 4	3.0	Xm	Enter 1st digit of value 300.0
0	1 4	30.0	Xm	Enter 2nd digit of value 300.0
0	1 4	300.0	Xm	Enter 3rd digit of value 300.0
▸	1 4	50.0	Xp	Press cursor
▸	1 4	0.0	COR	Press cursor
▸	1 4	0.0	DX	Press cursor
▸	1 4	00	F	Press cursor
▸	1 4	1	CY	Press cursor
▸	1 4	0	C	Press cursor
8	1 4	8	C	Enter flow code (see chapter 4.2.7 where code 8 is explained).
▸	1 4	9934	#	Press cursor
▸	1 4	0	I	Press cursor
▸	1 4	300.0	Xm	Press cursor

End of program 1

Example 2

This time the resolution is set at 0,01 mm.

N	ST	Xm	COR	DX	F	CY	C	Comment
2	0	50.00	0.00	0.00	00	1	5	Start of program Move the backgauge to 50.00 mm
2	1	65.00	0.00	0.00	00	0	0	Skip this step
2	2	80.00	0.05	0.00	10	1	0	Move the backgauge to 80.0 mm + 0.05 mm and activate F2.
2	3	100.00	0.00	2.50	00	1	9	Move the backgauge to 100.00 mm and stop the program.

Entries

	Displays			
Key	**2-D**	**6-D**	**LEDs on**	**Comment**
	0 0	50.00	Xm	Initial backgauge position
N	2 0	999.00	Xm	Start of program Backgauge is at position 999.00 Change position to 50.00
5	2 0	5.00	Xm	Enter 1st digit of value 50.00
0	2 0	50.00	Xm	Enter 2nd digit of value 50.00
▸	2 0	50.00	Xp	Press cursor
▸	2 0	0.00	COR	Press cursor
▸	2 0	0.00	DX	Press cursor
▸	2 0	00	F	Press cursor
▸	2 0	1	CY	Press cursor
▸	2 0	0	C	Press cursor
5	2 0	5	C	Enter flow code (see chapter 4.2.7 where code 5 is explained).
▸	2 0	9934	#	Press cursor
▸	2 0	0	I	Press cursor
▸	2 1	65.00	Xm	No changes; continue with next step

Key	Displays 2-D	6-D	LEDs on	Comment
ST	2 2	999.00	Xm	Backgauge is at position 999.00 Change position to 80.00
8	2 2	8.00	Xm	Enter 1st digit of value 80.00
0	2 2	80.00	Xm	Enter 2nd digit of value 80.00
▸	2 2	80.00	Xp	Press cursor
▸	2 2	0.00	COR	Press cursor
.	2 2	0.00	COR	Enter decimal point
0	2 2	0.00	COR	Enter 1st decimal of correction
5	2 2	0.05	COR	Enter 2nd decimal of correction
▸	2 2	0.00	DX	Press cursor
▸	2 2	00	F	Press cursor
1	2 2	10	F	Enable output F2
▸	2 2	1	CY	Press cursor
▸	2 2	0	C	Press cursor
▸	2 0	9934	#	Press cursor
▸	2 2	0	I	Press cursor
ST	2 3	999.00	Xm	Backgauge is at position 999.00 Change position to 100.00
1	2 3	1.00	Xm	Enter 1st digit of value 100.00
0	2 3	10.00	Xm	Enter 2nd digit of value 100.00
0	2 3	100.00	Xm	Enter 3rd digit of value 100.00
▸	2 3	100.00	Xp	Press cursor
▸	2 3	0.00	COR	Press cursor
▸	2 3	2.50	DX	Press cursor
▸	2 3	00	F	Press cursor
▸	2 3	1	CY	Press cursor
▸	2 3	0	C	Press cursor
9	2 3	9	C	Enter flow code (see chapter 4.2.7 where code 9 is explained).
▸	2 3	9934	#	Press cursor
▸	2 3	0	I	Press cursor
▸	2 3	100.00	Xm	Press cursor

End of program 2

6. MACHINE FUNCTIONS

6.1. Selecting machine functions

Most of the machine functions can only be modified by authorized personnel and only with a special access code.
These functions are discussed in chapter 7.

The machine functions which are accessible by the operator are discussed in chapter 6.2 and 6.3.

6.2. Position adjustment

If no reference encoder is used the backgauge position is adjusted by programming a special machine function. The value which must be programmed is the real backgauge position. This programmed position will be copied to the actual position read-out parameter Xp. This is only valid if machine parameter 10 is programmed at the value 3.

The machine function can be entered if N = 0, ST = 0
Move the cursor to CY; the LED lights up.
Enter the special code **2345**.
Press the ST-key once (N = 0, ST = 0). The LEDs at Xm, Xp and CY light up, indicating that this parameter has been selected.
Enter the real backgauge position.
Return to normal programming mode by pressing the cursor key ▸.

If operating without a reference encoder the actual backgauge position read out will be memorized after power down.

6.3. Counting (#) mode

The stock counter (#) can operate in two modes:

- downcounting
- upcounting

This machine function is accessed as follows:

Make N = 0 and ST = 0
Move the cursor to CY; the LED lights up.
Enter the special code **1111**. Press the ST-key once.
The LEDs #, CY and I will light up.

The counter mode can be programmed as follows:

0 = downcounting
1 = upcounting

Default: 0

Return to the normal programming mode by pressing the cursor key ▸.

If by accident another numeral than 0 or 1 should be pressed the display starts flashing.
Press the clear key (⌫) and try again.

7. MACHINE PARAMETERS

7.1. List of machine parameters

The machine parameters are only accessible with a special entry code. We recommend that machine parameters should preferably be adjusted by authorized personnel. Make N = O and ST = O, move the cursor to CY and enter the special code **8520**. Once the entry code has been entered the different machine parameters can be selected with the N and ST keys; all parameter LEDs light up. An N-ST com-bination selects one machine parameter, so theoretically up to 100 machine parameters can be defined. However, only 50 machine parameters are used.
Return to the normal programming mode by pressing the cursor key ▸.

The following list shows all machine parameters which are available. Chapter 7.2 gives a full description and the way to change them, but only of the active combinations.
In cases where combinations are not used the display shows a zero.

N = 0	ST = 0	not used
N = 0	ST = 1	Software version
N = 0	ST = 2	type of drive
N = 0	ST = 3	Counter pulse division factor
N = 0	ST = 4	Counter pulse multiplying factor
N = 0	ST = 5	Decimal point position
N = 0	ST = 6	Reference position
N = 0	ST = 7	Maximum backgauge position
N = 0	ST = 8	Minimum backgauge position
N = 0	ST = 9	not used
N = 1	ST = 0	Auto indexing
N = 1	ST = 1	Spindle allowance
N = 1	ST = 2	Positioning tolerance (AC-drive only)
N = 1	ST = 3	Retract holdtime
N = 1	ST = 4	Chaining mode
N = 1	ST = 5	Backgauge position offset
N = 1	ST = 6	Safety breakpoint fast speed at maximum position
N = 1	ST = 7	Safety breakpoint fast speed at minimum position
N = 1	ST = 8	not used
N = 1	ST = 9	not used
N = 2	ST = 0	Breakpoint fast speed BFS (AC drive only)
N = 2	ST = 1	Breakpoint slow speed BSS (AC drive only)
N = 2	ST = 2	Stop time T (AC drive only)
N = 2	ST = 3	Overrun OR (AC drive only)
N = 2	ST = 4	overrun wait time
N = 2	ST = 5	DC motor slow speed
N = 2	ST = 6	DC motor high speed
N = 2	ST = 7	AC-output definition
N = 2	ST = 8	Maximum stroke length

N = 2	ST = 9	not used	
N = 3	ST = 0	Servo motor gain	(DC servo drive only)
N = 3	ST = 1	Servo motor switch	(DC servo drive only)
N = 3	ST = 2	Servo motor braking ramp	(DC servo drive only)
N = 3	ST = 3	Servo motor acceleration ramp	(DC servo drive only)
N = 3	ST = 4	Manual movement slow speed	
N = 3	ST = 5	Manual movement high speed	
N = 3	ST = 6	Reference search speed	
N = 3	ST = 7	In-position tolerance	
N = 3	ST = 8	Reference search procedure	
N = 3	ST = 9	not used	
N = 4	ST = 8	EEPROM write access count	
N = 4	ST = 9	Memory erase code	

7.2. Description of the machine parameters

The following machine parameters are defined:

N = 0, ST = 1: Software version

Selecting this N-ST combination brings the number of the software version on the display.

N = 0, ST = 2: Type of drive

Range : 1 - 3
Default : 2

1 = 1-speed AC or DC drive
2 = 2-speed AC or DC drive
3 = servo motor drive

The next two parameters, 03 and 04, are meant to set a correct scaling between the encoder and the display. The encoder gives an exact number of pulses over a mm displacement, the display ‘counts’ the pulses and shows a certain number of millimeters per pulse, according to the Display Resolution. Parameters 03 and 04 are used to adjust the scaling.

N = 0, ST = 3: Counter pulse division factor
Range : 1 - 100
Default : 2

This value is the software division factor.

N = 0, ST = 4: Counter pulse multiplying factor

Range : 1 - 100
Default : 1

Software multiplying factor.

For determining the multiply- and division factors to get a correct encoder scaling the following procedure is advised:

1. use the formular $F = \frac{DR \times NP}{SPP}$

in which:
- DR = Display resolution (1 / 0.1 / 0.01)
- NP = Number of encoder pulses per revolution of the spindle
- SPP = Spindle pitch in mm

2. Write this Factor F as a fraction :

$$F = \frac{\text{multiply factor}}{\text{division factor}}$$

3. Program the division factor value at parameter 03 and
program the multiply factor value at parameter 04.

Example:
- a display resolution of 0.1 mm
- number of encoder pulses 100 ppr
- spindle pitch of 10 mm

results in $F = \frac{0.1 \times 100}{10} = 1$

This means a value of 1 at parameters 03 and 04.

N = 0, ST = 5: Decimal point position

Range : 0 - 3
Default : 1

0 = 1 mm resolution
1 = 0.1 mm resolution
2 = 0.01 mm resolution
3 = 0.001 mm resolution *

* This resolution is used if spindles dimensioned in inches are used. (parameter I must be set to zero, refer to 4.2.10).

This is the resolution for programmed position Xm, position readout Xp, correction COR and retraction DX.

N = 0, ST = 6: Reference position

Range : 0 - 999999 display units
Default : 1000

This position must appear on the display when the reference has passed. The reference encoder must generate a pulse from low to high on the reference input.

N = 0, ST = 7: Maximum backgauge position

Range : 0 - 999999 display units
Default : 9999

Maximum backgauge dimension. This value is a soft limit. Programmed values for Xm and DX are checked against this value.
During execution (DAC-250 started) the end position (combination of Xm, DX and COR) is also checked.
If a programmed (end) position is too large it will automatically be limited at the maximum position.

N = 0, ST = 8: Minimum backgauge position

Range : 0 - 999999 display units
Default : 0

Minimum backgauge dimension. This value is a soft limit.
Programmed values for Xm and DX are checked against this value.
During execution (DAC-250 started) the end position (combination of Xm, DX and COR) is also checked.
If a programmed (end) position is too small it will automatically be limited at the minimum position.

N = 1, ST = 0: Auto indexing

Range : 0 - 3
Default : 1

Each time the supply voltage is switched on, the reference-switch must be passed. This passing for the first time of the reference switch can be done automatically or manually.

Settings, which are possible:

0 = no automatic passing (with reference encoder), in this case the reference point can be passed by pressing the manual pushbutton.
1 = automatic reference passing, the motor will be controlled after pushing the start button in the downcounting direction.
2 = automatic reference passing, the motor will be controlled after pushing the start button in the upcounting direction.
3 = no reference encoder used, the actual backgauge position will be memorized after power down.

Adjustment of the backgauge position is done by programming the real value in a machine parameter (see chapter 6.2).

N = 1, ST = 1: Spindle allowance

Range : 0 - 1
Default : 1

0 = one-side positioning
1 = two-side positioning

Note: One-side positioning is also possible with a servo drive (drive type = 3)

In case of one-side positioning the positioning direction is from a larger to a smaller position.

N = 1, ST = 2: Positioning tolerance

Range : 0 - 9999 display units
Default : 0

The backgauge will position to the new programmed position if the difference between the actual position and the new position is greater than this tolerance.
If the difference is smaller the backgauge will stay at its actual position.
This parameter is only used in combination with one- or two-speed drives (type 1 or 2). This parameter has no meaning if a servo drive (type = 3) has been selected.

N = 1, ST = 3: Retract holdtime

Range : 0 - 999.9 sec.
Default : 1.0 sec

Backgauge holdtime at retract position after the START input goes high.

N = 1, ST = 4: Chaining mode

Range : 0 - 1
Default : 0

In case of chaining the programmed Xm value is relative to the previous backgauge position. The new position can be computed relative to the previous programmed position or relative to the previous actual position. This can be programmed with this parameter.

0 = new position is computed relative to the previous programmed position (including correction).
1 = new position is computed relative to the previous actual position.

N = 1, ST = 5: Backgauge position offset

A backgauge position offset can be programmed. This offset will be added to the displacement of the backgauge. This facility can be seen as tool thickness compensation in certain applications where there is material loss.

In case the offset is used, the backgauge position is calculated as follows:

Xp = Xm + cor + X-offset

Xp = backgauge position
Xm = programmed backgauge position
cor= programmed correction
X-offset= position offset

In case of chaining the position will be calculated as follows:

a) Xm programmed positive = larger position

Xp = Xp + Xm + cor + X-offset

b) Xm programmed negative = smaller position

Xp = Xp + Xm + cor - X-offset

When the X-offset is not needed the value must be programmed 0.

N = 1, ST = 6: Safety Breakpoint Fast Speed at maximum position

Range : 0 - 9999 Display units
Default : 0

N = 1, ST = 7: Safety Breakpoint Fast Speed at minimum position

Range : 0 - 9999 Display units
Default : 0

These parameters are available for 2-speed control, AC and DC. They can be used to program safety zones near the minimum and maximum backgauge position, in which the backgauge can only move with low speed and not with high speed.
These parameters are related to the maximum and minimum positions of the backgauge. They do not indicate exact positions, but indicate the distances to the outer positions.

Fig. 7.1

These zone-parameters can be used to prevent collision of the backgauge construction with some other mechanics parts while moving in high speed.
In case of a DC-drive is slow speed programmed with parameter 21.

Breakpoint for one- and two-speed drives
Fig. 7.2 explains the meaning of the parameters BFS, BSS, T and OR. The indications HS and SS represent the high and low speed of the backgauge. The Breakpoint Slow Speed (BSS) and the stop time (T) serve to position the backgauge. When the backgauge approaches the programmed position at slow speed and comes within the range of the BSS, the controller will switch off and the backgauge will come to a stop. If the resulting position is not correct, try altering the BSS.
When the BSS is not accurate enough to reach the programmed position, use the stop time (T) to delay the moment of switching off the controller.
In the case of a 2-speed drive, you can program the Breakpoint Fast Speed (BFS) to define areas for high speed and low speed. When the backgauge is moving to a programmed position at high speed, it will slow down to slow speed when it is within the range of the BFS.
The advised procedure is to leave the BFS at its high default value and first program BSS and T correctly. Once that has been done, try adjusting the BFS to reduce the production time without positioning inaccuracies.

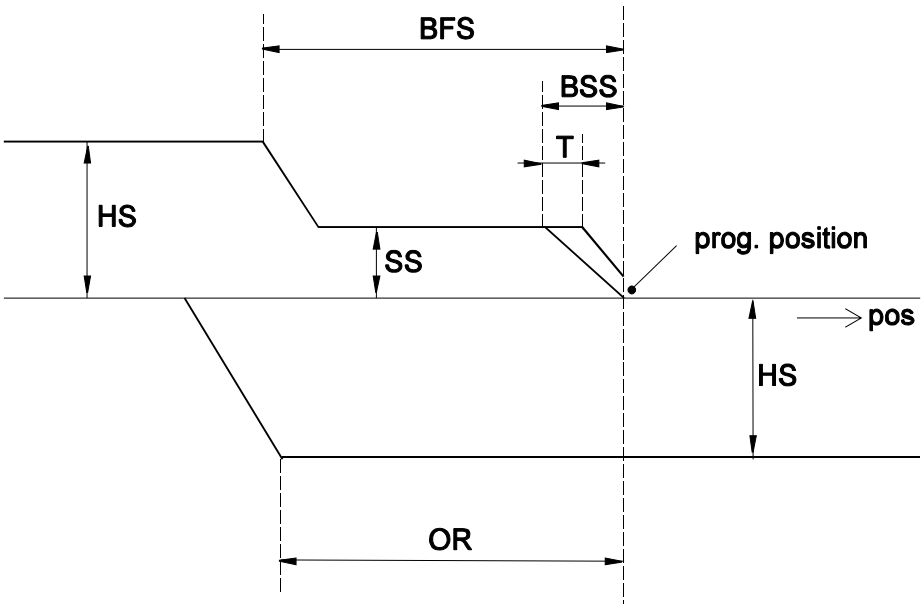


Fig. 7.2

N = 2, ST = 0: Breakpoint Fast Speed BFS

Range : 0 - 9999 count units
Default : 100

Switch point from high speed to slow speed.

N = 2, ST = 1: Breakpoint Slow Speed BSS

Range : 0 - 9999 count units
Default : 10

Slow speed switch-off point.

N = 2, ST = 2: Stop time T

Range : 0 - 99 (5 msec units)
Default : 0

Delay time before switching off low speed after BSS has been reached.

N = 2, ST = 3: Overrun OR

Range : 0 - 9999 count units
Default : 50

Overrun distance in case of one side positioning.
Overrun is always in the upcounting direction.

Note: This parameter must also be programmed if one-side positioning is used in combination with a servo drive (type = 3).

N = 2, ST =4: Overrun wait time

Range : 0 - 999 5msec units
Default : 100

Wait time at overrun position before the backgauge starts positioning in the opposite direction.

Output deflections for two speed with DC-motor:

N = 2, ST = 5: DC-motor Slow speed SS

The parameter SS must be programmed if 2-speed DC motor drives are used.
Range : 1 - 100% of maximum output deflection (10 V)
Default : 4%

N = 2, ST = 6: DC-motor high speed HS

The parameter HS must be programmed if 2-speed DC motor drives are used.

Range : 1 - 100% of maximum output deflection (10 V)
Default : 80%

N = 2, St = 7 AC output definition

Range : 0 - 1
Default : 0

It is possible to drive an AC-motor with 3-outputs instead of 4-outputs as set by default.
The output setting is then as follows:

0 = 4 outputs used:
- ++ = high speed opening (backwards)
- + = low speed opening (backwards)
- -- = high speed closing (forwards)
- - = low speed closing (forwards)

1 = 3 outputs used:
- ++ = output off: low speed
  output on : high speed
- + = opening
- - = closing
- -- = not used

N = 2, ST = 8: Maximum Stroke Length

Range : 0 - 9999 seconds of maximum stroke length
Default : 0

With this parameter, it is possible to set a maximum stroke length in seconds. When that programmed time has elapsed, function output F1 will become active.
This means that when you use the stroke function, it will not be possible to use the F1, F2 digital function outputs anymore.

The meaning of this machine parameter is as follows:

value = 0,	stroke limitation disabled, normal function of F1 F2 outputs
value > 0,	stroke limitation active with the programmed value in seconds for the maximum stroke length.

The user can program the desired stroke length as a percentage (0-100%) of the maximum machine parameter time. This percentage value can be programmed in every step by selecting the F-led.
When the percentage value is programmed zero then the stroke limitation is not active in that step.
In this case the F1 output will not be activated.

The following timing diagram is valid:

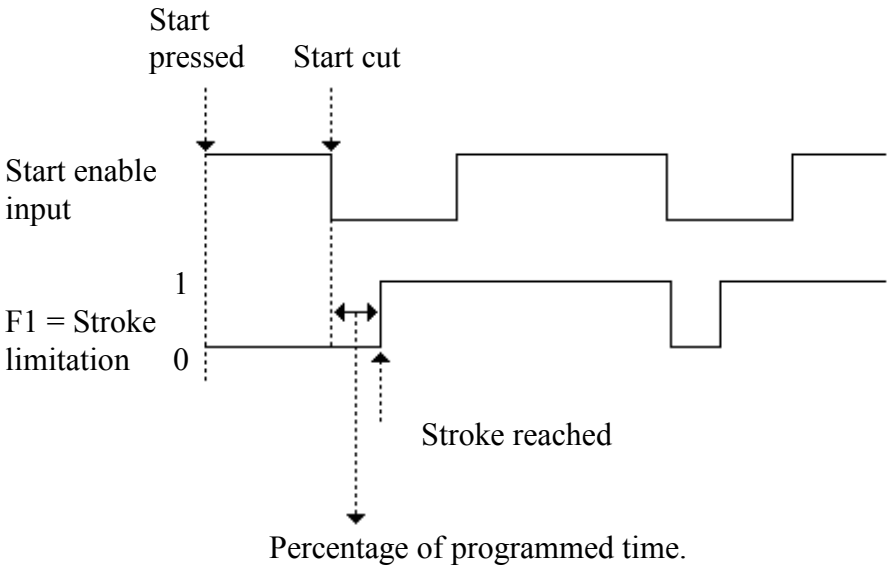


Fig. 7.3

Note: When the DAC-250 is stopped, the F1 output will be off.

Parameters for servo drive adjustment

Fig. 7.4 explains the meaning of the following parameters to be adjusted with DC-servo control:

GAIN, SWITCH, BRAKING RAMP, ACCELERATION RAMP

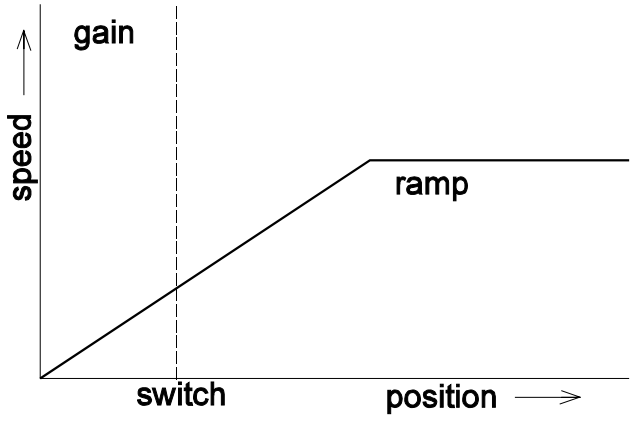


Fig. 7.4

N = 3, ST = 0: Servo motor gain

Range : 1 - 15
Default : 9

N = 3, ST = 1: Servo motor switch

Range : 0 - 999 count units
Default : 3

Switching point from ramp to gain

N = 3, ST = 2: Servo motor braking ramp

Range : 1 - 15
Default : 7

N = 3, ST = 3: Servo motor acceleration ramp

Range : 5 - 1275 msec
Default : 5
This parameter defines the time needed to reach the full speed output.

N = 3, ST = 4: Manual movement slow speed

Range : 1 - 99 mm/sec
Default : 1 mm/sec

N = 3, ST = 5: Manual movement high speed

Range : 1 - 99 mm/sec
Default : 10 mm/sec

N = 3, ST = 6: Reference search speed

Range : 1 - 100% of maximum output deflection (10 V)
Default : 50%

N = 3, ST = 7: In-position tolerance

Range : 0 - 999 count units
Default : 4
The "in-position output" (Ip) becomes active if the difference between the actual position and the programmed position is smaller than this tolerance.

N = 3, ST = 8: Reference Search Procedure

Range : 0 - 1
Default : 0

0 = System 1: standard reference search system without Reference Search Direction switch (RSD-switch).
1 = System 2: reference search system with RSD-switch

Two systems for reference search are implemented:
1. Without Reference Search Direction switch
2. With Reference Search Direction switch

System 1 is the standard reference search system. For this system the motor drive must be equipped with a direction sensitive enable/disable input.
System 2 Now the motordrive does not need any direction sensitive enable/disable input anymore. Also you are free where you place the reference search direction switch (RSD). It may be the same switch; EOT-switch.The advantage of the reference search cycle with system 2 is that in case the RSD switch is mounted in the middle of the X-axes stroke, the DA-control senses the status of this switch. In case the X-axis is between the zero-position and RSD switch a normal reference search cycle is initiated.
In case the X-axis is between the RSD and EOT+ switch the status of the RSD switch indicates that reference search can start in the direction of the RSD switch (forward). Overall you will have shorter reference search cycle time. Another advantage is the fact that it is not needed to mount the limit switches for ref.-search.

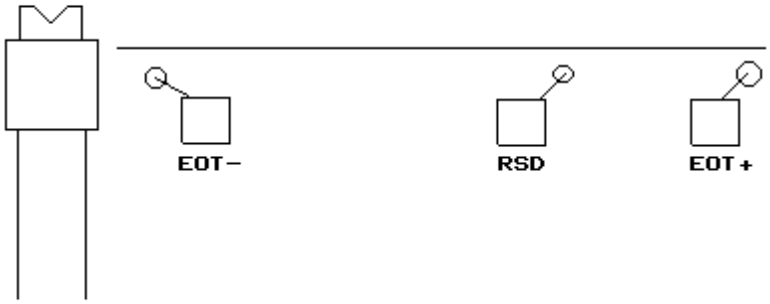
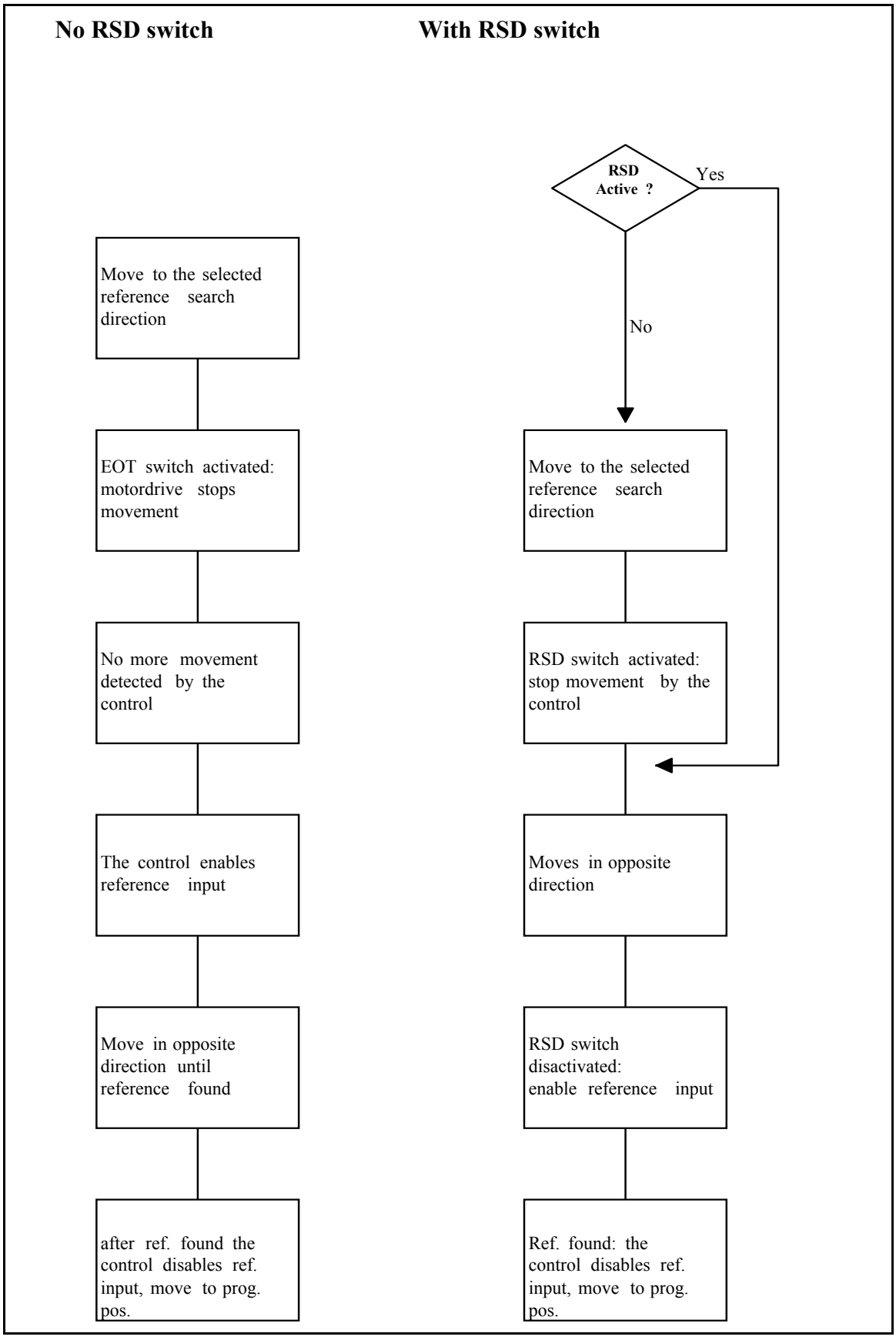


Fig. 7.5

The reference search cycle is as follows:



Note 1: Reference switch activated means RSD (EOT) input is low. Reference switch not activated means input is high (+24V).

Note 2: To be sure that the Ref.-switch (RSD) is mounted, the DAC-control will only move the backgauge over the following distance for taking reference. This in case the RSD-switch input is active (low) at the start of the reference search cycle.

A) Ref. search direction backwards:
1.5 x (max. position - ref. position)

B) Ref. search direction forwards:
1.5 x (ref. position - min. position)

N = 4, ST = 8: EEPROM write access count

The EEPROM write access count is displayed.

Some important parameters are saved in the EEPROM each time at power down. The number of times this will happen is counted and visualized at this machine parameter position. The parameters which are saved are described in the memory management specification.

If the count exceeds the value 9900 the message **'E2Err'** appears on the display each time at power up. Press any key and this message will disappear.
According to the specifications of the EEPROM chips each location can only be rewritten 10.000 times.

N = 4, ST = 9: Memory erase code

Default : 0

Working in the memory erase mode may destroy valuable information. Read the following instructions before pressing one of the buttons. Be sure of the relevant button before pressing it.

0 = no memory erase
1 = complete erase of memory, including step memory and machine parameters. The machine parameters are loaded with the default values.
2 = only the machine parameters are loaded with their initial values. The step memory is not affected.
3 = only the (complete) step memory is erased. The machine parameters are not affected.
10 = erase of program steps N = 0, ST = 1 thru 9
11 = erase of program steps N = 1, ST = 0 thru 9
12 = erase of program steps N = 2, ST = 0 thru 9
19 = erase of program steps N = 9, ST = 0 thru 9

To make the erase effective the following steps must be performed:

a) program the required code at N = 4, ST = 9.
b) exit the machine parameters by pressing the cursor key ▸
c) switch off the power
d) switch the power on again

After the erase and initialization is ready the erase code is reset to zero.

If these steps are not performed in this order the erase code will be reset to zero without any erasing taking place.

INTENTIONALLY

LEFT

BLANK

8. INSTALLATION

8.1. Connection example

To connect the DAC-250 to your backgauge system you will find an example in the appendix.

8.2. Encoder Voltage

Both DAC-150 and DAC-250 are equipped with a power supply circuit for the encoder. This circuit can supply a voltage of 5V or 12V. The controller is delivered with the required power supply voltage for the encoder as is noted on the controller itself.

If necessary, it is possible to change the voltage. To do so, the power supply circuit can be adjusted by replacing several components.

Tables 1 and 2 on the next page contain a list of components that must be (re)placed in order to change the encoder voltage, one way or the other.

The placement of these components can be found on the enclosed component lay-out, drawing nr. 7353-201. As far as the encoder supply is concerned, this lay-out is valid for both types of controllers.

When changing from 12 to 5 V, the RA1-component must be placed. Beware of the correct mounting position on the I/O board:

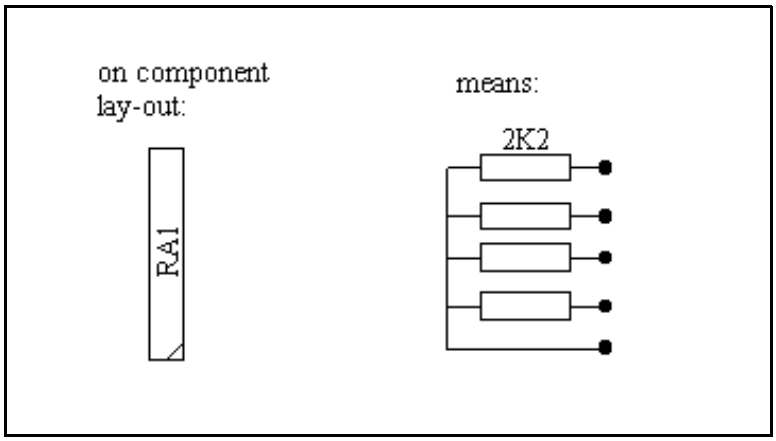


Fig. 8.1

Abbreviations
In the next two tables, the following abbreviations are used:

R = Resistor
RA= Resistor Array
C = Capacitor
J = Jumper (shortcut between connection points)

- = Component is not placed
F = Farad
K = Kilo-Ohm
1K2 = 1200 Ohm
2N2F = 2.2 Nanofarad
390PF = 390 Picofarad

Table 1: Change voltage from 5 to 12 V

Component	Type	Old value	Required value	action
RA1	resistor array, 4 resistors, 5-pins	4 times 2K2	-	remove component
R1	resistor	1K2	22K	replace resistor
R2	resistor	1K2	22K	replace resistor
R3	resistor	1K2	22K	replace resistor
R4	resistor	-	22K	place resistor
R5	resistor	-	22K	place resistor
R6	resistor	-	22K	place resistor
C20	capacitor	2N2F	1NF	replace capacitor
C21	capacitor	2N2F	1NF	replace capacitor
C22	capacitor	1NF	390PF	replace capacitor
J1	jumper	2-3	1-2	change connection

Table 2: Change voltage from 12 to 5 V

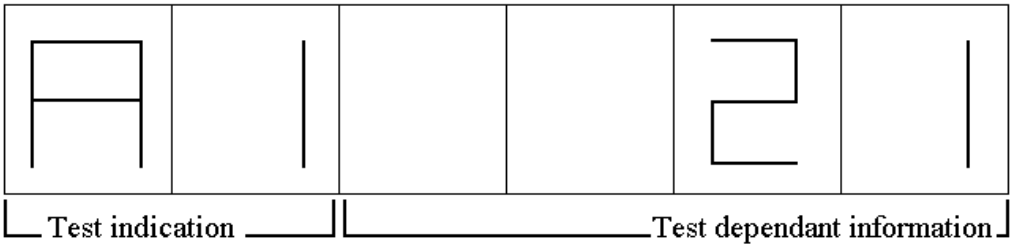
Component	Type	Old value	Required value	action
RA1	resistor array, 4 resistors, 5-pins	-	4 times 2K2	place component
R1	resistor	22K	1K2	replace resistor
R2	resistor	22K	1K2	replace resistor
R3	resistor	22K	1K2	replace resistor
R4	resistor	22K	-	remove component
R5	resistor	22K	-	remove component
R6	resistor	22K	-	remove component
C20	capacitor	1NF	2N2F	replace capacitor
C21	capacitor	1NF	2N2F	replace capacitor
C22	capacitor	390PF	1NF	replace capacitor
J1	jumper	1-2	2-3	change connection

9. DIAGNOSTIC PROGRAM DAC-150/DAC-250

9.1. Introduction

The DAC-150 and DAC-250 are equipped with a diagnostic program. This diagnostic program contains several tests. With each of these tests a certain part of the hardware can be tested. With input and output tests also the interaction with the complete system (machine) can be verified.

The selected test is always displayed in the two leftmost digits of the display. The other four digits are used to display test dependent information.



When the diagnostic program is selected test number 1 (A1) will be active.
Another test can be selected by pressing the cursor key (▸). Pressing this key increments the test number by one.

9.2. Starting the diagnostic program

The diagnostic program can be activated by pressing the keys 7, 8 and 9 simultaneously when the power is switched on. Automatically test A1 is selected.

The diagnostic program contains the following tests:

A1: Ram memory
A2: displays
A3: frontpanel keys and LEDs
A4: digital inputs and outputs
A5: analog output deflection

9.2.1. A1: Ram memory

The memory is tested by writing a test pattern. After this pattern has been written all bytes are read back and checked.
The complete memory is tested.
The test is started by pressing the Start key.

During the test the display will be blank. When the memory test is completed a code will be displayed. When the memory is found OK the value 0 is displayed otherwise the digit 1 will be displayed.

Continue to the next test by pressing ▸.

9.2.2. A2: displays

With this test all the digits of all the displays are tested.
This test is divided into several phases. By pressing the Start key the first one is started. A next phase is selected each time the Start key is pressed. When all phases are selected once and the Start key is pressed again the indication A2 appears on the display again.

The phases of which this test consists are:

1. All segments of all displays are lid
2. All segments of all displays are off
3. One segment of each display is lid for about 1 second. Then the next segment is lid etc.
4. All segments of one display are lid for about 1 second. Then the next display is lid etc.
5. All available decimal points are lid.

Continue to the next test by pressing ▸.

9.2.3. A3: frontpanel keys and LEDs

With this test all frontpanel keys and LEDs can be tested separately.
When a key is pressed a corresponding code will be displayed on the two rightmost digits of the display. By pressing some of the keys also a LED will lid. See table.

Key	Code	LED
1	1	Xm
2	2	Xp
3	3	COR (DAC-250 only)
4	4	DX (DAC-250 only)
5	5	F (DAC-250 only)
6	6	CY (DAC-250 only)
7	7	C (DAC-250 only)
8	8	#
9	9	I
0	0	⇥⇤ (DAC-250 only)
.	16	
+/-	11	(DAC-250 only)
Clear	18	
N	148	(DAC-250 only)
St	147	(DAC-250 only)
Stop	12	Stop
Auto./Start	17	Automatic
Semi-auto	14	Semi-automatic (DAC-250 only)
X	13	
+	15	
-	10	

Continue to the next test by pressing ▸.

9.2.4. A4: digital inputs and outputs

A digital output can be made active by pressing a key corresponding to the following table:

Key	Output	
3	++	(AC-version only)
6	+	(AC-version only)
9	-	(AC-version only)
0	--	(AC-version only)
2	IP	
5	EOC	(DAC-250 only)
7	F1	(DAC-250 only)
8	F2	(DAC-250 only)

When an input is made active a LED will light corresponding to the following table:

Input	LED
EOT	Xm
START	Xp
R	#
KEY-lock/count	I

Continue to the next test by pressing ▸.

9.2.5. A5: analog output deflection (DC-version only)

With this test a certain analog output deflection can be set.
The output voltage is in the range of -10V to +10V.
The deflection can be changed by pressing the + key (greater value) or - key (smaller value).
The current output deflection will be displayed (as % of maximal deflection).

The possible values are:

-100% -80% -20% -5% -0% +0% +5% +20% +80% +100%

--------> + key
<-------- - key

Offset-adjustment

By means of this test you can set the offset voltage of the speed output as follows:

- set output to 0%
- measure the speed output voltage on connectionpoints 24 and 23
- Adjust the output voltage to zero volt with help of potentiometer RP1 on the I/O board type 7353. See also included components lay-out schematics.

9.3. Ending the diagnostic program

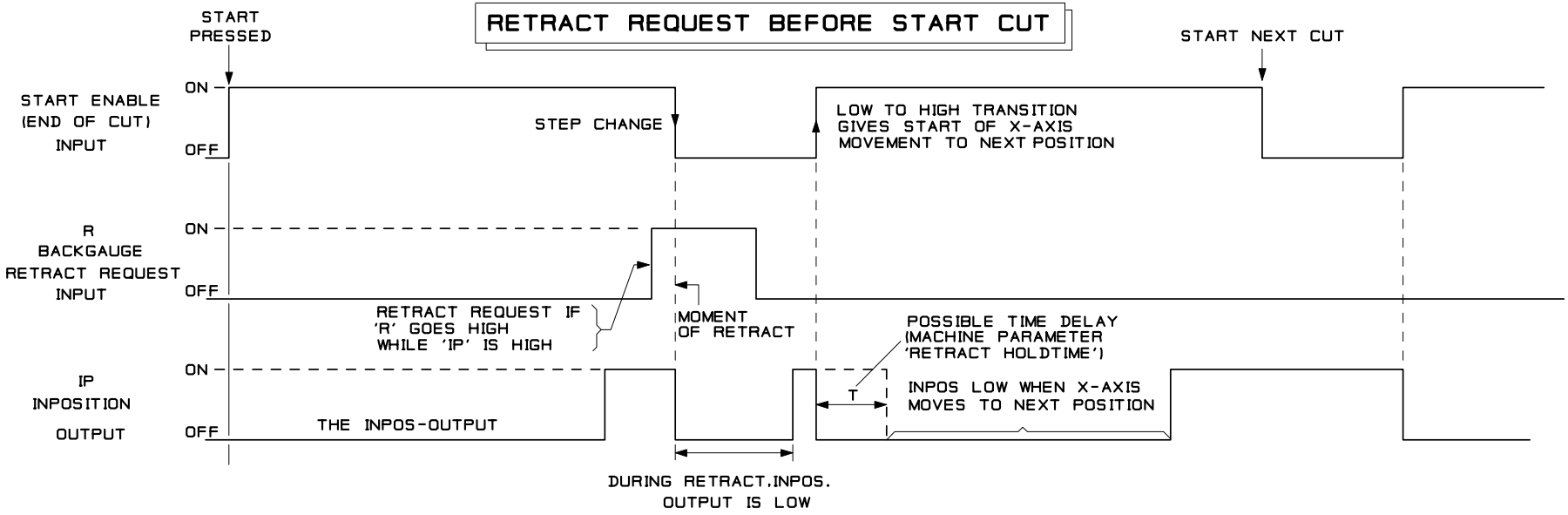
You can end the diagnostic program by switching off the power of the controller and switch it on again to return in the normal programming mode.

INTENTIONALLY

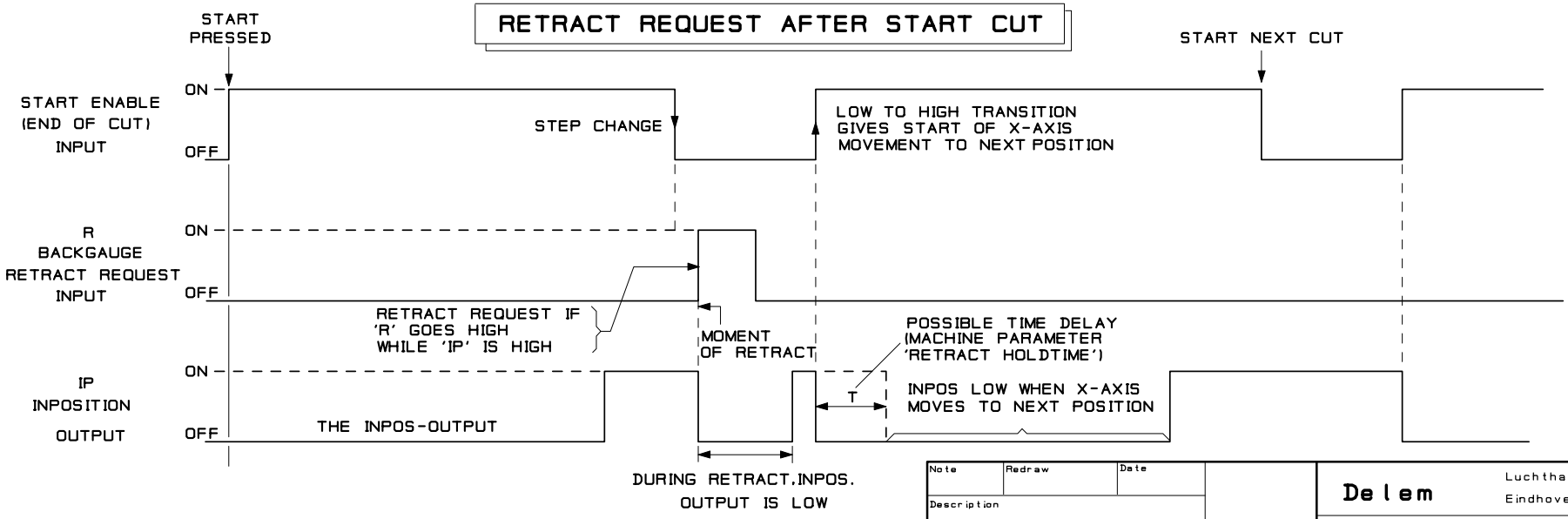
LEFT

BLANK

RETRACT REQUEST BEFORE START CUT



RETRACT REQUEST AFTER START CUT



Note	Redraw	Date
Description		
Note	Redraw	Date
Description		
Measures in mm, unless otherwise specified	Drawn HM	Date 20-01-94

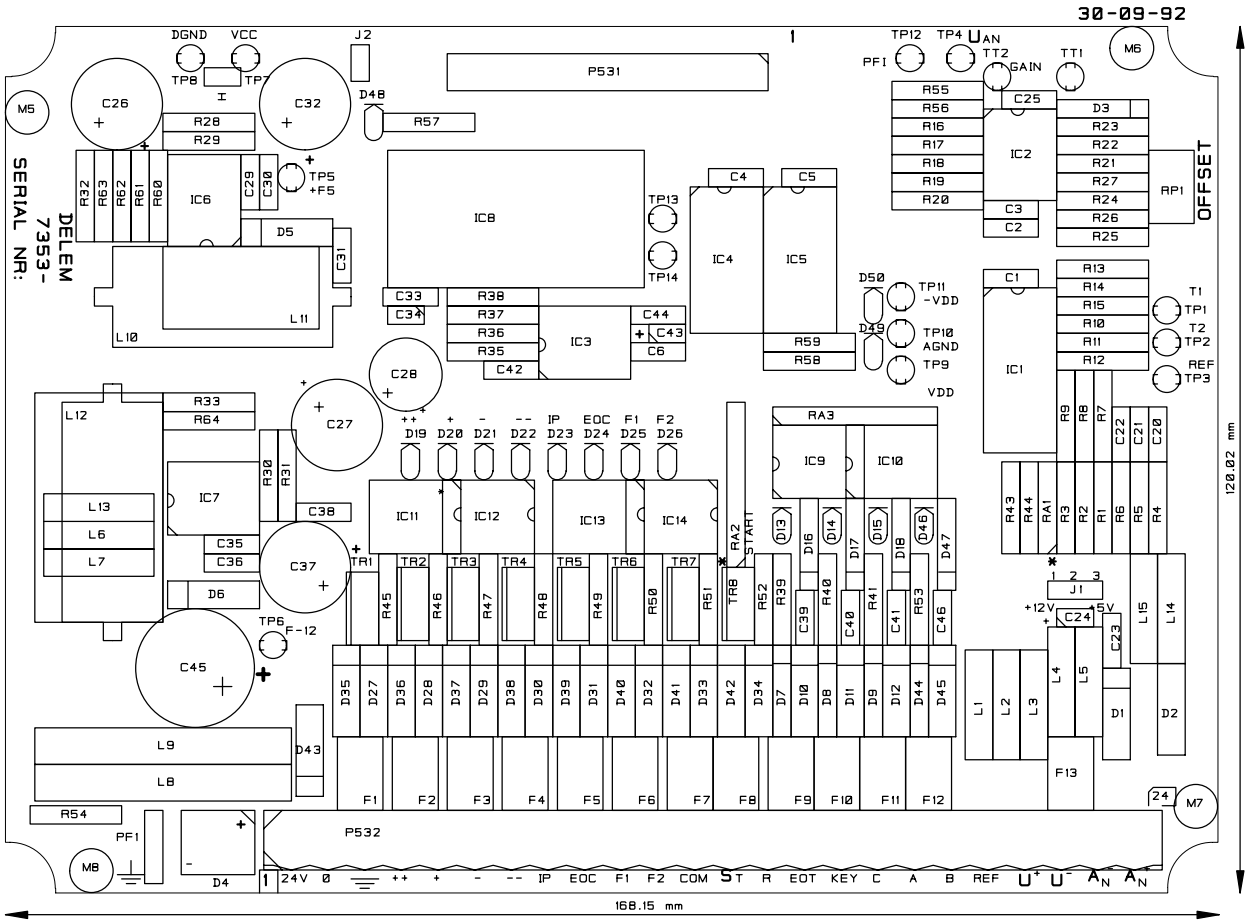
Delem
Luchthavenweg 42,5657 EB
Eindhoven, the NETHERLANDS

COMMANDS DAC250

Auto cycle with retract

Format		Number	Issue
A3		9013-901	A

No unauthorized copying allowed Scale



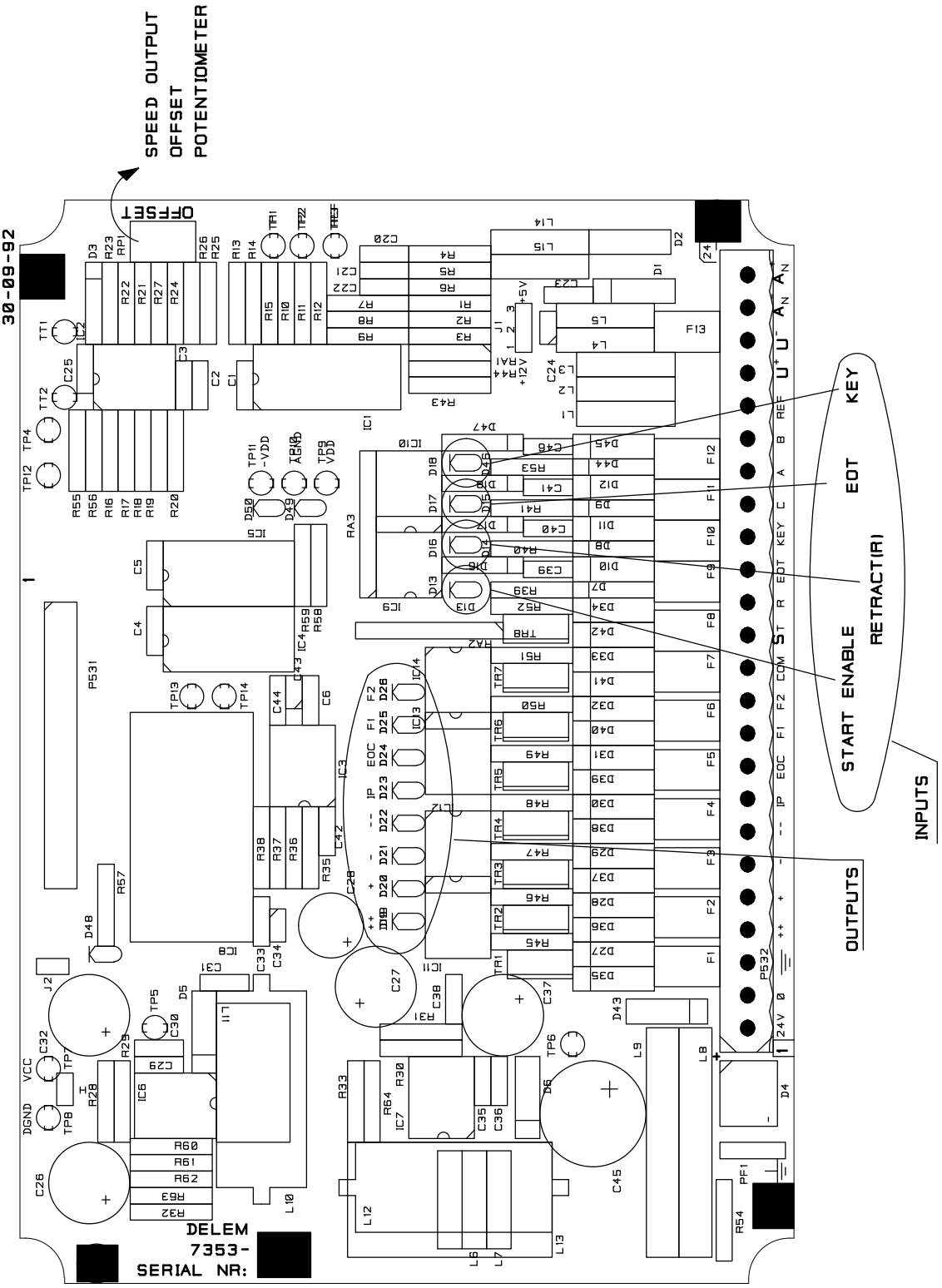
NOTE -C	REDRAWN	DATE: 01-10-92	
DESCRIPTION 1096 1120 1121			
NOTE -B	REDRAWN	DATE: 19-07-91	
DESCRIPTION 951			
MEASURES IN MM, UNLESS OTHERWISE SPECIFIED	DRAWN BY HM	DATE: 30-05-91	

DELEM
LUCHTHAVENWEG 42 NL-5657 EB
EINDHOVEN, THE NETHERLANDS

DA250 I/O

COMP.LAYOUT 301C

FORMAT	CODE:	NUMBER:	ISSUE
A3		7353-201	C
PAGE OF			SCALE



L1,2,17,32

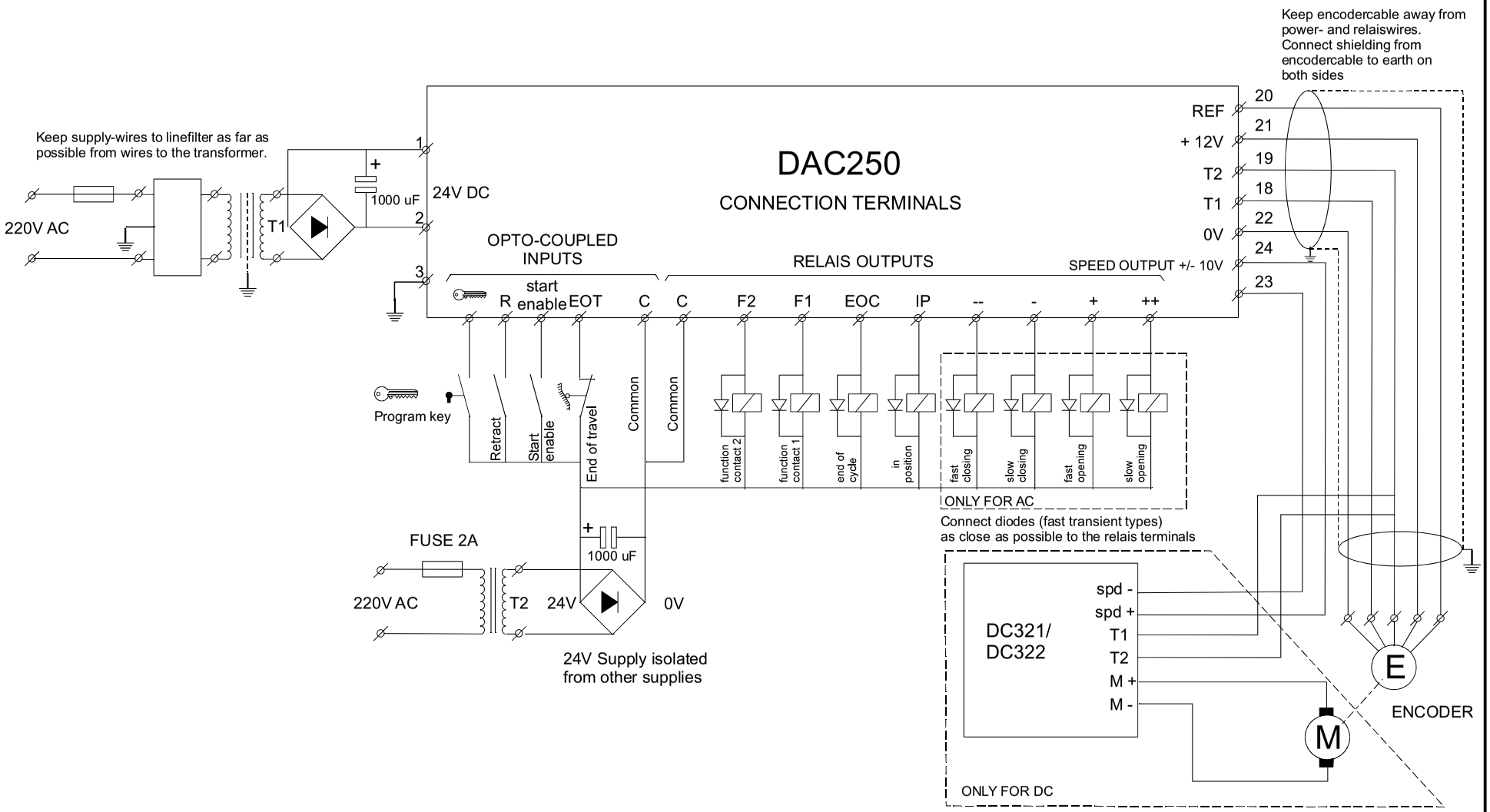
Note	Redraw	Date	
Description			
Note	Redraw	Date	
Description			
Measures in mm. unless otherwise specified	Drawn HM	Date 31-01-95	

Delem

Luchthavenweg 42,5657 EB
Eindhoven, the NETHERLANDS

DAC250 I/O

Format		Number	Issue
A4		7353-501	-
No unauthorized copying allowed		Scale	



Note	Redrawn	Date		
Description - -				
Note	Redrawn	Date		
Description - -				
Measures in mm, unless otherwise specified	Drawn VW	Date 01-07-1996		

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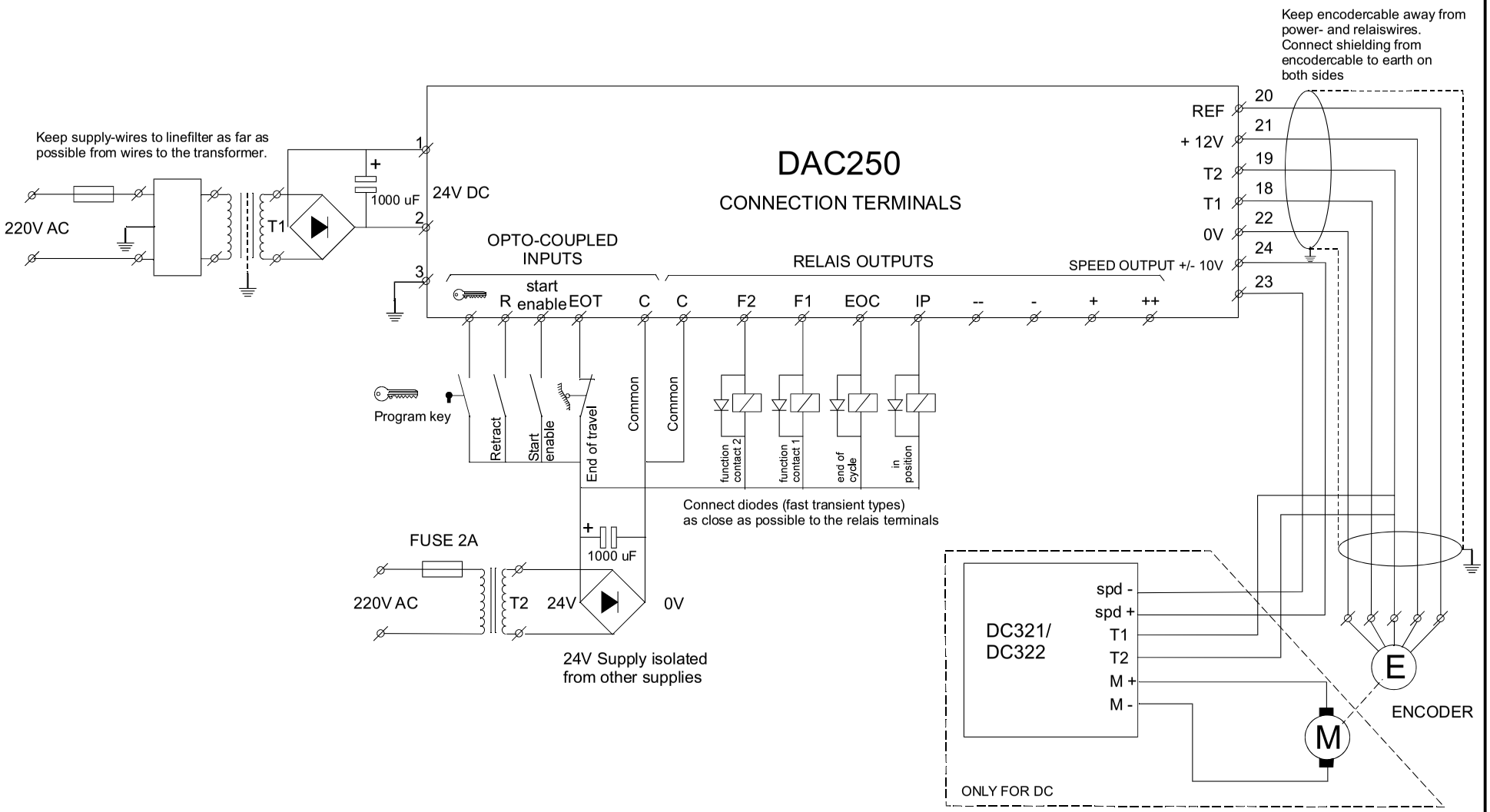
CONNECTIONS DAC250 servo drive EXAMPLE

Format		Number	Issue
A3		9005-101	D

No unauthorized copying allowed Scale



Note	Redrawn	Date		
Description - -				
Note	Redrawn	Date		
Description - -				
Measures in mm, unless otherwise specified		Drawn VW	Date 01-07-1996	

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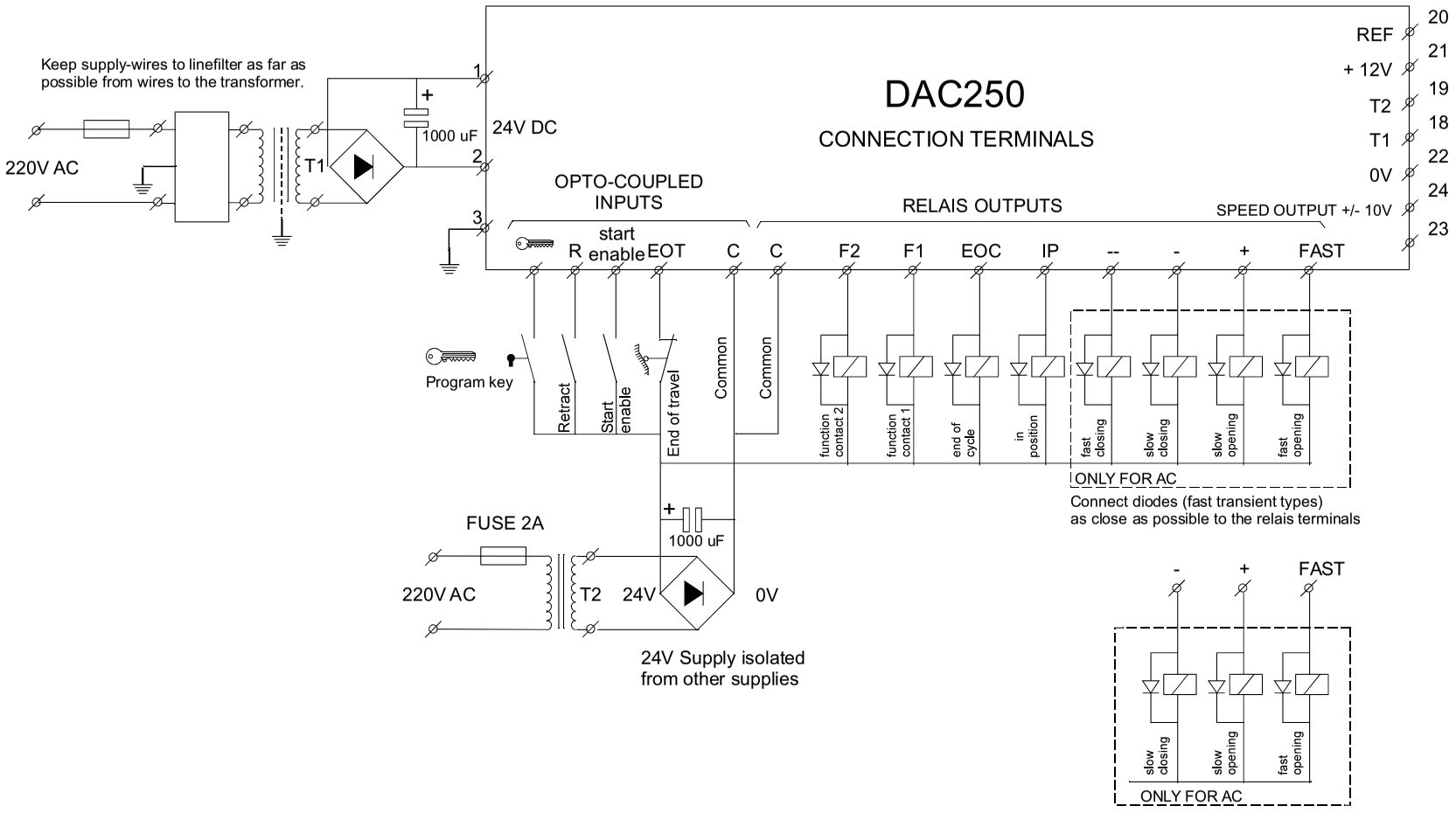
CONNECTIONS DAC250 servo drive — EXAMPLE

Format		Number	Issue
A3		9005-102	B

No unauthorized copying allowed | Scale



Note	Redrawn	Date
Description - -		
Note	Redrawn	Date
Description - -		
Measures in mm, unless otherwise specified	Drawn VW	Date 01-07-1996

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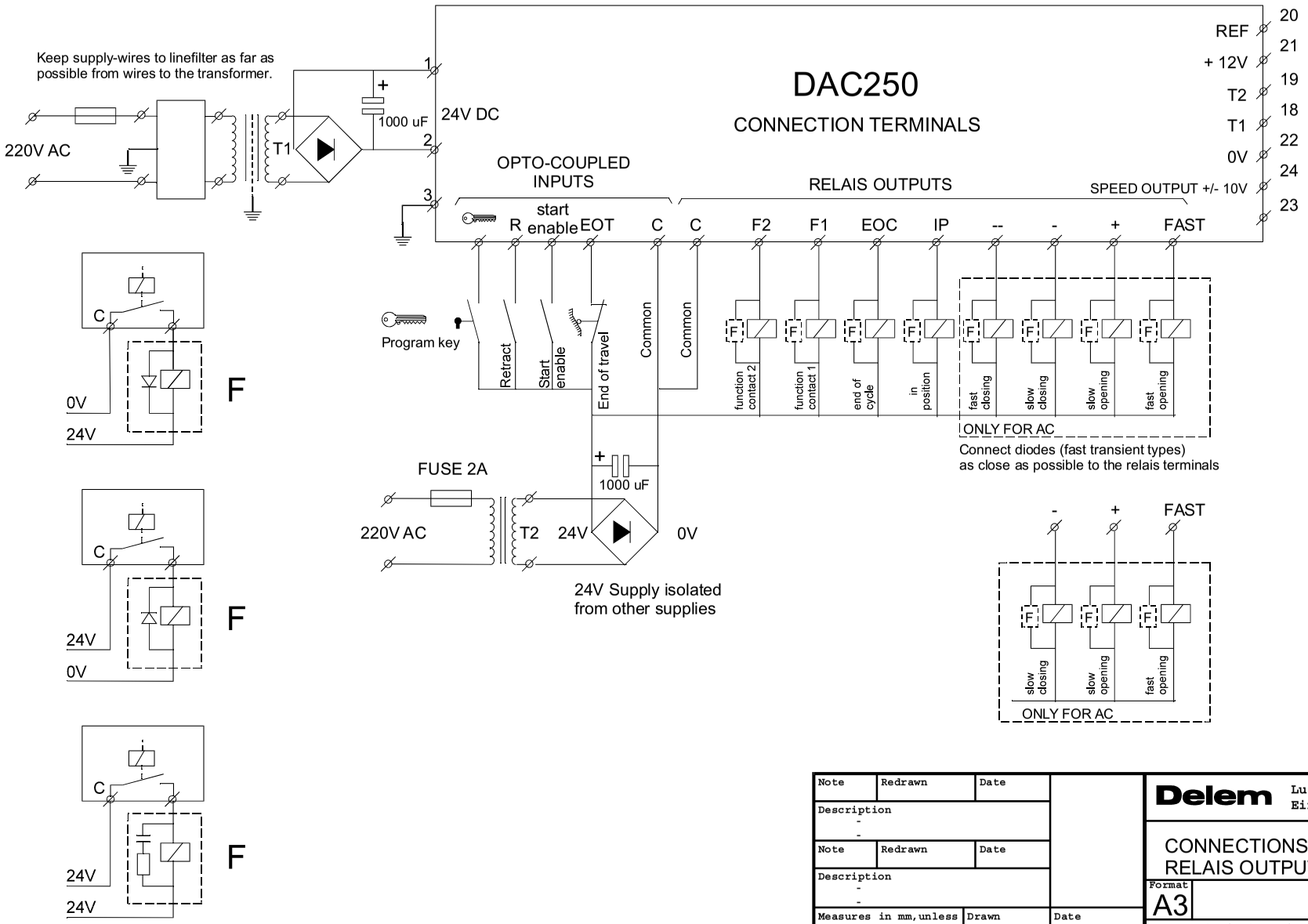
CONNECTIONS DAC250 EXAMPLE

Format		Number	Issue
A3		9005-103	-

No unauthorized copying allowed | Scale



Note	Redrawn	Date
Description - -		
Note	Redrawn	Date
Description - -		
Measures in mm, unless otherwise specified	Drawn VW	Date 05-02-1997

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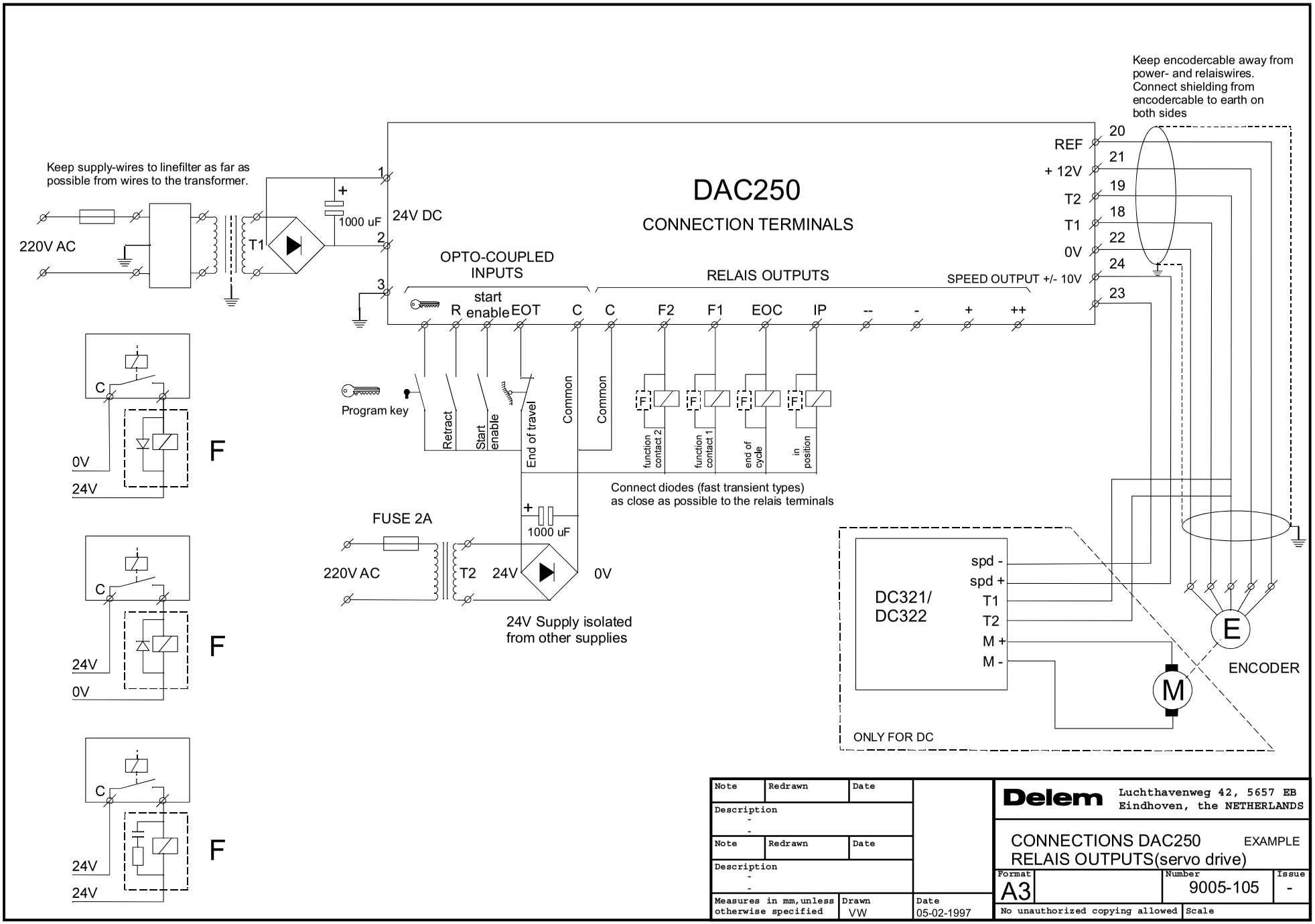
CONNECTIONS DAC250 EXAMPLE
RELAIS OUTPUTS

Format		Number	Issue
A3		9005-104	-

No unauthorized copying allowed Scale



Note	Redrawn	Date
Description - -		
Note	Redrawn	Date
Description - -		
Measures in mm, unless otherwise specified	Drawn VW	Date 05-02-1997

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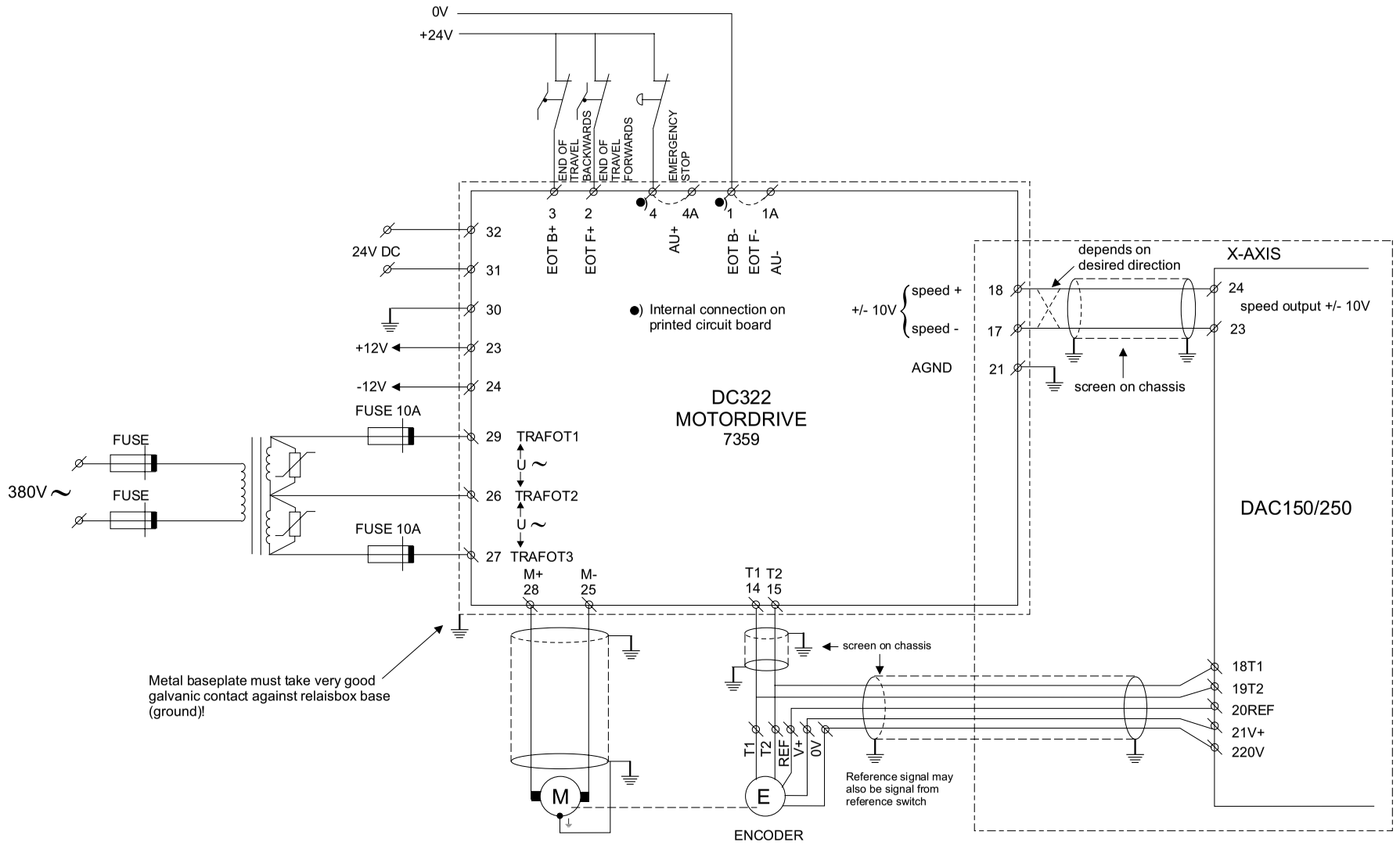
CONNECTIONS DAC250 EXAMPLE
RELAIS OUTPUTS(servo drive)

Format		Number	Issue
A3		9005-105	-

No unauthorized copying allowed | Scale



EXAMPLE DIAGRAM NO WARRANTY

Note	Redrawn	Date
Description - -		
Note	Redrawn	Date 23-04-1997
Description - -		
Measures in mm,unless otherwise specified	Drawn VW	Date 02-07-1996

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CONNECTIONS DC322 (DAX50)
X-AXISuniversal diagram

Format		Number	Issue
A3		9042-103	D

No unauthorized copying allowed Scale